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Monitoring® Times

A Publication of Grove Enterprises

Volume 30, No. 12
December 2011
U.S. $6.95
Can. $6.95
Printed in the United States

Remembering Gorizont: Soviet Russia's International Satellite TV Service

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In this issue:

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Monitoring Times

Vol. 30 No. 12 December 2011

On Our Cover

Photo on left: 60 foot Gorizont dish at the uplink facilities at Mongolia's capital Ulan Bator. Photos on right: Beginning of daily Russian TV service; End of Russian news; IVN uplink in Russian from Cuba; Vietnam women's militia; 1984 Sarajevo Olympics. (All photos by John Wilson W4UVV.

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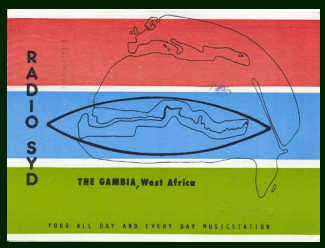

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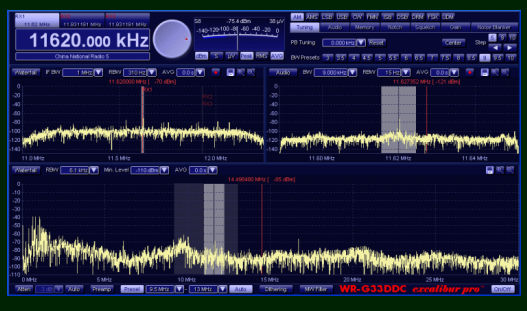

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MONITORING TIMES (ISSN: 0889-5341; Publishers Mail Agreement #1253492) is published monthly by Grove Enterprises, Inc., Brasstown, North Carolina, USA.

Address:	7540 Highway 64 West, Brasstown, NC 28902-0098
Telephone:	(828) 837-9200
Fax:	(828) 837-2216 (24 hours)
Internet Address:	***www.grove-ent.com*** or ***www.monitoringtimes.com***
Editorial e-mail:	***editor@monitoringtimes.com***
Subscriptions:	***order@grove-ent.com***

Subscription Rates: $32.95 in US; $42.95 Canada; and $58.95 foreign elsewhere, US funds. Label indicates number of issues left. Renewal notice is cover sheet 3 months before expiration. *See page 76 for subscription information.*

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COMMUNICATIONS

by Ken Reitz

AMATEUR/SHORTWAVE

League Touts Ham Benefits to White House

Howard Schmidt W7HAS happens to be the White House Cyber Security Coordinator, so it was no trick to bring ARRL top brass to the White House September 12 to discuss the role hams play in emergency communications. According to a press release from ARRL, Schmidt said, "The White House is looking for ways that the great work of amateur radio operators can continue to support emergencies in the future with particular attention to increased use and dependency on Internet based technologies." Also present at the discussion were ARRL President Kay Craigie N3KN and Chief Executive Officer David Sumner K1ZZ.

HFCC Bets on a Multi-platform Future

The High Frequency Coordinating Conference (HFCC), an international non-governmental organization of international shortwave broadcasters, met in Dallas, Texas this past September to discuss issues facing the international broadcasting community.

According to a report in *Radio World* online, the 100 delegates to the conference heard Trans World Radio President Lauren Libby say, "Everything is changing. While we crave stability and a return to the comfort of the past, unfortunately, that will not be the case. Shortwave has a future … if we are willing to once again make it an attractive platform that is easily accessible to the general public that is cross-promoted from other media platforms."

The group toured the Continental Electronics (CE) facility in Dallas and saw tests of Digital Radio Mondiale (DRM) equipment, which CE manufactures.

European Conference Highlights DRM

The International Broadcast Convention (IBC), held in Amsterdam this past September, is regarded as one of the highlights of the broadcast electronics industry year in Europe. Among the subjects each year is the grindingly slow progress of DRM, the digital broadcast scheme which is being adopted in Europe as their de facto digital standard for AM/FM and shortwave broadcasting. On display at IBC were a number of portable AM/FM/SW DRM-capable radios, none of which are available in the U.S.

Trans World Radio's Big New Signal

If you thought that religious broadcasting was confined to creaky, cast-off transmitters, you haven't heard Trans World Radio's (TRW) new station. Sporting two brand-new 250,000 watt,

Controls for new 250,000 watt, DRM-capable, Thomson transmitters at TRW's Guam site. (Courtesy: TRW)

DRM-capable, Thomson shortwave transmitters and no fewer than four massive curtain antennas from its newly upgraded transmitting site on the island of Guam, TRW is banking on its own successful future. The station, KTWR, reported that initial transmitter tests in both analog and DRM formats took place in September and October ahead of an official sign-on in mid-November.

Massive curtain antenna just one of four beamed at Australia, Southeast Asia, India, and China. (Courtesy: TRW)

To learn the latest about KTWR visit their blog at **http://ktwrdrm.blogspot.com**. It's not known where KTWR listeners will buy DRM receivers.

Radio/TV Martí Texting Cubans

According to an article in the *Miami Herald*, Cuba is not happy with U.S. State Department-backed Radio/TV Martí's latest electronic effort to push uncensored news through the tightly controlled Cuban information keyhole. The Cuban government has been able to block most news programming sent through traditional media, including the Internet.

However, Radio/TV Martí has found a way around such censorship with a text messaging system that lets the broadcaster bombard Cuban cell phones with up to 24,000 text messages per week. The way the messages are delivered makes it appear that each message is being sent by different cell phones, making it difficult for the Cuban government to block. The Cuban government calls it "Cyber War," Radio/TV Martí says it's doing nothing wrong. Viva la Cold War.

AM/FM/TV/SATELLITE BROADCASTING

Radiolab Host is MacArthur Fellow

Jad Abumrad, host and producer of the radio program *Radiolab*, which airs on WNYC, New York, and is picked up by many National Public Radio stations, was among the 2011 honorees chosen by the MacArthur Foundation to receive a MacArthur Fellowship. According to a press release from the foundation, the award was given for Abumrad's, "meticulous editing and conversational approach to interviews with experts," noting that, "the structure of *Radiolab* episodes often mimics the scientific process itself, complete with moments of ambiguity, digressions, reversals, and surprising conclusions that evoke in audiences a sense of adventure and recreate the thrill of discovery."

Radiolab host Jad Abumrad (Courtesy: MacArthur Foundation)

The 38 year-old will receive a $500,000 "no strings" stipend from the foundation which is paid out over a five year period.

FEMA/FCC: Tips on EMCOM

There's nothing like a 100 year earthquake and flooding from a hurricane happening in the same week to focus minds on the subject of communications during disasters. So, the combined minds of the Federal Emergency Management Agency (FEMA) and the Federal Communications Commission (FCC) labored mightily to produce a "Tip Sheet for Consumers on How to Communicate During Disasters," which provides consumers with a check list of things to do before an emergency. **www.ready.gov/america/getakit/tech.html**

But, the list is pretty lame, focusing mostly

on knowing how to text on your presumably operable cell phone and advice to buy a crank-up radio. A better bet is to re-read Chris Parris's "Monitoring Disaster Communications" in the August issue of *MT*.

Supreme Court may look at State Dish Taxes

Bloomberg Businessweek in October reported that the U.S. Supreme Court may tackle the issue of state taxes imposed on satellite TV companies. The case comes from the Ohio Supreme Court which upheld Ohio's 5.5 percent sales tax on satellite TV service. According to the Bloomberg report, the case would test states' protection of local interests at the expense of out of state businesses which DISH Network and DirectTV see as unfair.

FCC to LightSquared: Not so Fast!

After indignant uproar by the GPS community and concerns of interference raised by military and civilian federal agencies, the FCC has delayed further deployment of LightSquared's satellite and terrestrially-based nationwide 4G Internet service. Fears of disruption to the millions of GPS users fueled panic-stricken complaints to the FCC regarding the company's service and, even though the company claims to have adequate solutions to the problem, the FCC would like to see some proof.

As expected, on September 13, the FCC issued a public notice stating that "LightSquared may not commence Ancillary Terrestrial Component (ATC) operations until the commission, in consultation with the National Telecommunications and Information Administration (NTIA) find that Global Positioning System (GPS) interference concerns have been satisfactorily resolved."

The FCC reiterated its desire to move forward with the service, encouraging "all parties to work in good faith and expeditiously towards a solution that serves our dual goals of facilitating the introduction of new wireless broadband service while protecting GPS against harmful interference."

PUBLIC SERVICE

Chicago's $23 Million Radio Flop

An article in the *Chicago Tribune* September 23 details the tribulations of that city's $23 million firefighter's radio system that's five years old and still in the box. According to the article, the Motorola system has been in testing stages since the digital system, which includes some 3,000 individual radios, was initially built. City officials say they now hope to have the system operational "sometime in 2012."

Meanwhile, the entire firefighting service continues to rely on an aging analog system. Scrutiny of the Motorola system intensified after a federal report faulted the department for not having enough radios during a fire in December 2010 that took the lives of two Chicago firefighters.

That's not the least of Motorola's Illinois-related worries. A subsequent article in *Chicago Business* reports that Motorola, headquartered in Schaumburg, Illinois, is in jeopardy of losing its 10 year-old contract to provide 18,000 radios to first responders statewide. The article notes that other manufacturers complained about the original no-bid contract that left them out of the competition.

Bus Drivers Clog Motorola System

A news story September 19 on WSOC-TV, Channel 9 Charlotte, North Carolina, reported serious breakdowns of that city's emergency radio service three times over a three week period in August and September. The story noted that the breakdown of the Motorola system that is used by police, rescue and firefighters in Charlotte and Mecklenburg County, lasted between 35 and 75 minutes each and occurred at the same time; just as hundreds of school bus drivers (also on the system) turned on their radios, clogging the channel that logs each radio into the system. Motorola is said to be investigating the problem.

FCC ENFORCEMENT

Jammer Sellers Jammed

In an "omnibus citation and order" the FCC is coming down on online purveyors of cell phone, GPS and other types of radio jammers. The order cited 20 such online companies which, by FCC count, advertized some 215 devices aimed at jamming radio frequencies, including but not limited to those used by cell phones and GPS devices.

The notice warned all parties that, by offering jammers for sale, they were in violation of FCC rules and subject to fines. Fines mentioned in the document includes $16,000 for each violation or each day of such violations up to a maximum of $112,500 for "any single act or failure to act." The listed companies had 30 days from the date of the Order (September 30) to show the Commission how they are now in compliance with sales of these devices.

FCC Lowers 2 Fines, Increases 1

A CBer from Louisiana who had earlier thumbed his nose at field agents later found himself trying to wriggle out of a $15,000 fine for running bodacious power despite verbal and written warnings from the FCC's Enforcement Bureau. After confessing to the infraction as charged, the man claimed he lived solely on Social Security benefits and couldn't afford the fine. The FCC reviewed his documentation and agreed, reducing the fine to $450. There's no word on whether his gear was confiscated.

Office of Inspector General

Meanwhile, a man from Orange Park, Florida was hit with a $15,000 fine for unlicensed operation of his FM station on 94.7 MHz. The FCC was unmoved by his claim that he had no idea it was illegal to run an FM station without a license, but *were* moved by his documented inability to pay. His fine was reduced to $300.

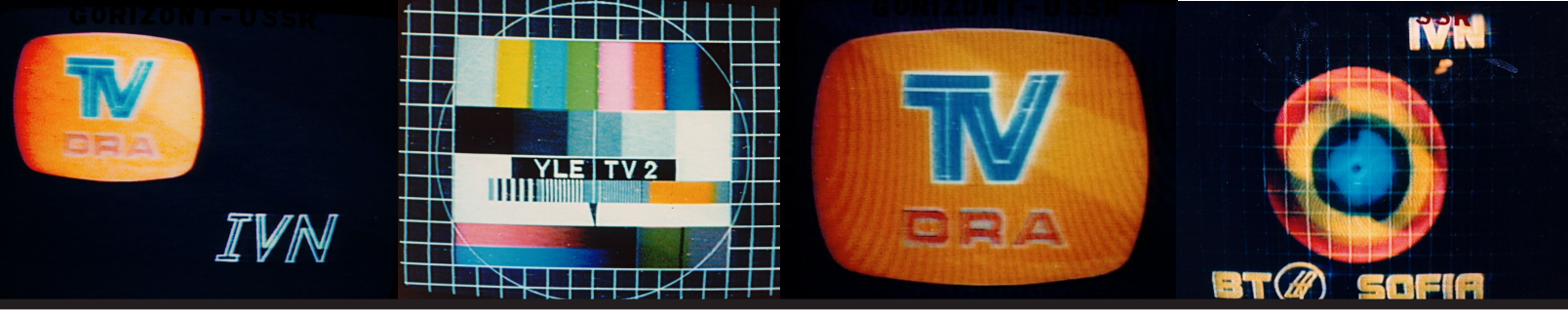
No such luck for a Puerto Rican man, charged with operating an unlicensed FM station on 88.5 MHz in Guayama, Puerto Rico, who admitted to "willful and repeated" violation of FCC rules, but claimed he didn't know anything about needing a license. He was issued a warning. Nearly a year and a half later, agents returned and found him still on the air. Normal fine for unlicensed operation is $10,000 but the FCC upgraded his fine to $15,000.

Jamming Marine Channel 16: $17,000

Finally, a Technician Class ham from Annapolis, Maryland was charged with interfering with the U.S. Coast Guard on VHF Marine Channel 16 (156.800 MHz), the International Distress Safety and Calling Frequency. According to FCC documents, the man was charged with making threatening statements to the USCG on April 6, 2008. On April 7, 2008 his interference consisted of tones from a Dual-Tone, Multi-Frequency (DTMF) keypad.

He may have imagined he had gotten away with it, but nearly a year later the FCC issued a Notice of Apparent Liability for Forfeiture (NAL) in the amount of $17,000 for his actions. In their Forfeiture Notice, dated September 20 of this year, the FCC noted the ham did not dispute any of the findings of the NAL and, in response to showing financial hardship, the ham submitted a single unemployment check from the state of Maryland from April 2009.

Prior to issuing the Forfeiture Order, FCC enforcement staff provided an additional opportunity to submit further proof of inability to pay which was apparently rebuffed. The fine stands.



GORIZONT Remembered

A nostalgic look back at exciting times monitoring satellite TV signals in the U.S. and Atlantic Ocean Region

By John Wilson W4UVV
(All photos courtesy the author)

Occasionally, while watching a TV program, reading a newspaper or magazine article, a word triggers fond radio, fax and data monitoring memories from a time some thirty years ago that I still miss today. Do you remember these terms: LNA, C-band, AZ-EL, Polar Mount, Squint Angle, 70 MHz IF Single Downconverter, Kelvin, *CATV Magazine*, TI, RG-214, 20 meter TVRO Net, Steve Birkell, Teflon slab, footprint, look angles, feed horn, Molniya or *Coop's Satellite Digest*? If so, you probably were one of thousands of individuals who had more than a passing interest in satellite communications technology.

Before memories fade further into the past, I would like to share a few of my monitoring experiences in early satellite TV reception from the early 1980s to mid-90s.

1960s-70s: A Quick TVRO Overview

After the 1957 Sputnik 1 satellite launch and subsequent shock to the national psyche, the U.S. satellite manufacturing industry, like the military, was playing catch-up with satellite launches and having mixed results. The successful commercial geostationary satellites, known as *satcoms,* had relatively low powered transmitters. Satcom users included telecom communications on carriers such as AT&T, GTE, and Bell System affiliates, as well as TV stations and cable TV networks and channels.

Commercial users, requiring broadcast quality TV reception, bought large antennas costing $15,000 or more. Satellite communications receivers costing thousands of dollars were the norm and a Low Noise Amplifiers (LNA) alone could cost $7,500. However, Japanese

electronics manufacturers had a different perspective. They envisioned a potential worldwide market for private satellite TV receive-only systems and began developing products for such use.

Meanwhile, some experimenters located around the country were not satisfied with waiting and attempted to build their own satellite receive-only Earth terminals, as these systems were known at the FCC. Like many other self-educated experimenters, I kept files on satellite communications related subjects.

In the mid-70s, I discovered *CATV*, the cable TV industry's main publication, whose editor was Bob Cooper. He believed satellite delivered programming was part of the cable TV industry's future. Steve Birkell in his "On Experimental Terminals" articles discussed basic subjects relating to TVRO reception. Subsequently his "STTI's International Satellite TV Reception Guidebook" focused on worldwide satellite's attributes and his TVRO reception experiences in England.

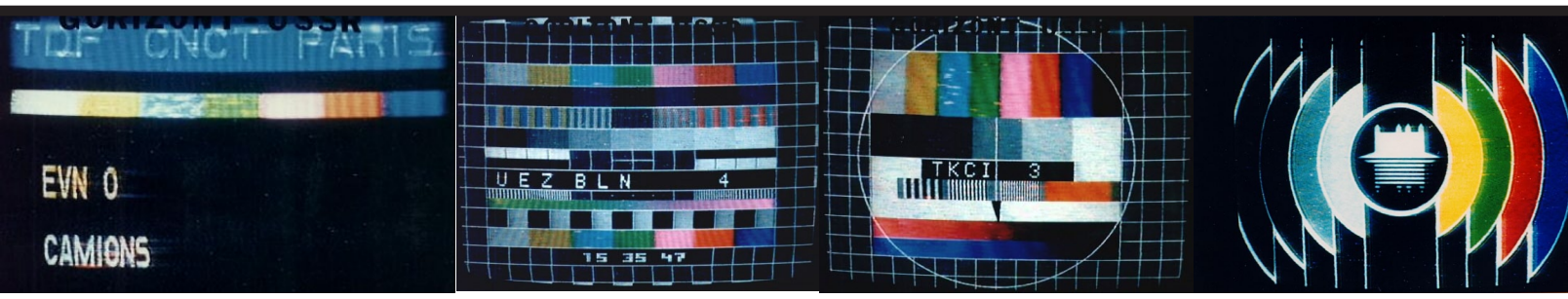
I listened weekly to the 20-meter "TVRO Net" hoping to glean some helpful information about satellite TV subjects. Discussions on-air included topics such as making a LNA, constructing a "Birkell" C-Band feed horn using a copper pipe section, and different antenna designs.

In late 1979, a new magazine, dedicated to individuals who wanted to build their own private TVRO systems, was launched. The magazine, *Coop's Satellite Digest* (CSD), was edited by none other than Bob Cooper. *CSD* was considered the bible of TVRO publications and I anxiously awaited each issue's arrival. By 1979, a few consumer-grade TVRO components began making appearances in the U.S. marketplace.

The 80s: A Quick TVRO Overview

The long wait for TVRO system components availability was ending. More affordable consumer products appeared and some commercial satcom users were shocked: Noise-free satellite TV reception was reported by individuals using smaller sized antennas and consumer-grade LNAs! A 100º Kelvin (K) LNA was now available for $600. Prices continued to fall. Though still pricey, more affordable consumer grade satellite TVRO system components were available to meet increasing consumer demands.

While individual TVRO hobbyists were ecstatic, the National Association of Broadcasters (NAB), whose members included the major networks and the fledgling cable TV industry, were in a panic and lost no time lobbying Congress to pass legislation making individual ownership of satellite TVRO systems illegal. They saw private satellite TV systems as a serious financial threat to their bottom line profits. (In the late 1940s, a similar scare tactic was used, spurred by fears that television would ruin the movie industry.)



The lobbying efforts failed, and by October 1979 the FCC deregulated licensing of satellite receive-only Earth stations; later Congress passed the Satellite Home Viewer Act of 1988 which resolved the legality of private satcom TVRO ownership.

In the early 1980s, I became aware of an Andrews Corporation 10 foot, solid, prime focus feed, parabolic antenna for sale as surplus. It turned out that AT&T was removing selected 10 footers from some of their typical twenty-mile point-to-point terrestrial C-Band microwave links used for telephone and data communications. It was an expensive purchase but time proved the cost was well worth it.

My original TVRO system was a 10 foot parabolic dish on a ground mounted homemade AZ-EL (azimuth/elevation) mount using RG214 coax cable, a 150º LNA, Chaparral Super Feed, Angle Finder, Teflon slab, Ramsey Sat-Tec R2A receiver and a Panasonic multi-standards format monitor. The monitor would allow display of all three video formats used around the world at that time: NTSC, PAL, and SECAM. Later, as new products became available, I changed to a Polarotor I, AVCOM COM-3 and DX-656 receivers, a multiple-standard VCR and AVCOM PSA-35 Spectrum Analyzer.

Satellite World Arcs

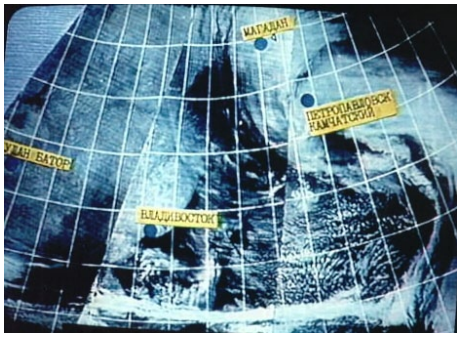
Geostationary satellites worldwide, regardless of frequency range, are divided into four longitude ranges. The two longitude division ranges of interest for monitoring were from 0º to 61ºW, known as the Atlantic Ocean Relay (AOR) arc and 61º to 160ºW, known as the U.S. Arc comprised of satellites serving both North and South America. These arcs differed from the three International Telecommunications Union (ITU) world regions.

The Atlantic Ocean Relay (AOR) Arc

Although some eastern U.S. locations' satellite look angles were low, acceptable Gorizont reception within certain latitude/longitude ranges was possible. Impacting factors included the satellite TVRO system configuration, the target satellite's Effective Isotropic Radiated Power (EIRP) "footprint," weather related issues, clear or obstructed line of sight (LOS) look angles and the viewing downlink location east of the Mississippi River. C-band signals dominated the AOR arc. The few Ku-band signals were the exception and were typically used for European downlink spot beams.

International Telecommunications Satellite Organization (INTELSAT)

Intelsat dominated worldwide satellite relay communications in those days. Most satcom traffic was data, but a limited video capability existed on most Intelsats. Sometimes the program audio would be via a sub-carrier or transmitted as a separate FM Single Channel Per Carrier (FM-SCPC) signal. The downlinked signals were not strong, but I experienced good reception in central Virginia from several Intelsats. On satellite IVA, located at 31ºW, Argentina's ATC 7 and Brazil's Rede Globo on a global beam provided full time programming relays back to their respective satcom TVRO sites where the programming was then re-transmitted via terrestrial VHF-TV transmitters.



Intelsat required all their sites to use only Intelsat approved equipment. Their satcom receivers were rumored to contain real gold relay contacts. Intelsat was allocated seven operational and two spare orbital slots in the AOR Arc spaced from 1º to 53ºW.

Left and Right Hand Circularly Polarized (LHCP/RHCP) signal orientations were used to mitigate Faraday effects on downlinked signals. To receive a circularly polarized signal, an appropriately sized Teflon® slab was manually inserted in the throat of a linear feed in the correct orientation to optimize reception. Without it, a 3dB signal loss occurred. Back then, that could be a killer when attempting to receive weak signals. Conversely, if attempting to receive a linearly polarized signal with the Teflon slab inserted, a 3dB signal loss resulted.

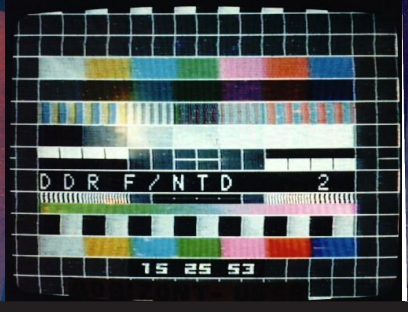
Gorizont (Horizon)

Russian territory spans nine time zones, so providing TV reception for that large an area with varying population locales presented a major technological challenge. Part of the solution was to place geostationary communications satellites in selected geostationary orbital positions. The primary satellites typically used were Gorizonts (Horizon) and/or Statsionars (Stationary). Molniya (Lightning) used satellites in a highly elliptical orbit to supplement TV programming to higher latitude locations. All three satellite systems additionally contained X-band communications for possible military use.

Gorizont 2, and its subsequent replacements, Gorizont 4 and 7 respectively, were positioned at 14ºW at different periods and each had a projected life span of approximately three years. Additionally, each had a six transponder RHCP capability i.e., Channel 6 (3765 MHz), Channel 7 (3725 MHz), Channel 8 (3775 MHz), Channel 9 (3825 MHz), Channel 10 (3875 MHz), and Channel 11 (3925 MHz). Channel 6 used a European spot beam at 40 watts power and the remaining transponders used global beams at 15 watts. Channel 10 was the main "service" channel.

SECAM video format at 50 cycles used an analog 7.0 MHz sub-carrier audio. SECAM was a superior video broadcast standard compared to PAL and the U.S. 1938 NTSC enhanced standard. I experienced noise free reception at my central Virginia location with a 12.5º elevation look angle, and the strongest EIRP downlink footprint of approximately 31dB reached northern latitudes to New England and extended west to the Mississippi River.

From Florida's northern latitude west to



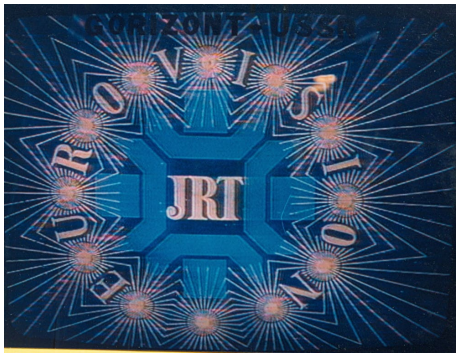
the Mississippi River areas, the EIRP downlink signal was 29dB. A quality viewable signal was unlikely outside those two latitude ranges. Although three separate Gorizonts were operational in the Pacific Ocean Region (POR), all used either northern hemispheric and/or spot beams and quality reception in the western US was unlikely.

Remember, in those times there was not the large proliferation of operational worldwide communications satellites like today. Transmitter power levels were lower and projected operational life expectancies were not as long. In the mid-80s the few AOR satellites receivable in the eastern U.S. mainly included Intelsats, Gorizont and PanAmSats. European hotels and hostels from North Africa to Scandinavia were so desperate for any type of satellite delivered programming, many installed small dish Gorizont TVRO systems. Reception was good, mostly due to the European Spot Beam. TV viewers watched whatever Programma 1 service from Moscow was broadcasting. Global downlink beams were used for the five other transponders and offered the advantage in coverage of approximately one third of the world's surface. Its disadvantage was that downlinked signal strengths were weaker, resulting in good to marginal reception at best at some locations.

Russia was still considered our Cold War enemy and various U.S. laws prohibited the transfer of technology to certain countries such as Cuba. That prohibition included access to U.S. satcom resources. In response, Russia formed a network of communist affiliated countries known as the InterVision Network (IVN). IVN was the eastern bloc countries' answer to Intelsat. The network included but was not limited to Russia, Poland, East Germany, Czechoslovakia, Hungary, Bulgaria, Romania, Algeria, Ukraine, Cuba, Mongolia, Nicaragua, Vietnam and surprisingly, India.

IVN is still operational today using 12 selected geostationary satellites for worldwide coverage. Prior to IVN daily uplinks, Russia intercepted United Press International Television Network's (UPITN) daily feeds package uplinked from London via an AOR Intelsat and downlinked to European terrestrial networks. It converted the PAL signals to SECAM and uplinked UPITN feeds via Gorizont to IVN members.

IVN control was in Prague, Czechoslovakia. The first member to uplink was Moscow. Poor Cuba: many years earlier Cuba selected NTSC as the country's TV standard and without question, Cuba had the worst looking video of any IVN member, most of whom used the PAL format.



After the completion of all IVN feeds, a variety of other entertainment programs were often broadcast. East Germany was a frequent programming contributor. Most programs were well produced, entertaining and of good technical quality. Programming content was similar to some TV variety shows seen on U.S. TV, e.g., singing, bands, dancers, acrobats, dog acts and comedians. Other offerings included symphonic concerts, opera and occasional special event broadcasts from both communist and non-communists European countries sometimes via the Eurovision network. European soccer also was a favorite broadcast choice.

One noticeable cultural difference between European and American TV programming content was showing semi to almost full nudity. Some European cultures had a different perspective compared to certain segments of the American population. Some Gorizont programming I viewed, particularly from East German TV, would never been broadcast on U.S. TV networks or stations. However, in most of Europe such TV programming was quite acceptable.

I recall one East German TV variety program broadcast originating from East Berlin. One segment included a well-dressed male singer performing on a raised platform supported by approximately 29 semi-nude completely chalk-white Greek style female statues. I thought they were stage-prop manikins until the manikins walked away from the platform and began dancing. For some reason the girls received more camera coverage than the singer did.

We Take What We Want

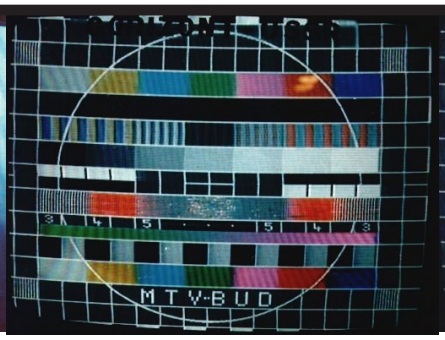
Russia had technical access to most of the western world's TV programming. Occasionally, strange broadcasts, believed to be intercepts by Moscow-based Gorizont technicians for their own enjoyment, appeared. Preferred pilfered programming included BBC-TV music shows, sometimes live! One time a *Star Wars* movie, dubbed in Spanish and intended only for in-theater viewing, popped up. It was possibly a broadcast for Cuban mercenaries fighting in Angola, West Africa.

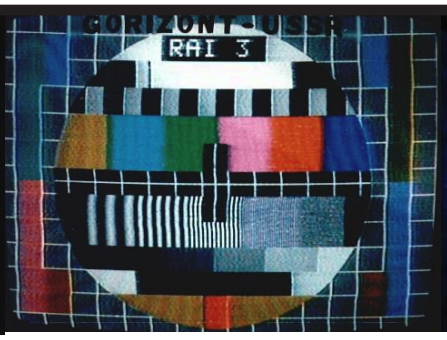
Some of these examples were easily traceable as to uplink source but some were not. For example, during a CBS-TV football intermission, the commentator's audio from a closed circuit stadium to network control link was broadcast via Gorizont. Today, some thirty years later, it is still a mystery how the Russians, at their pleasure, broadcast whatever they liked without concern.

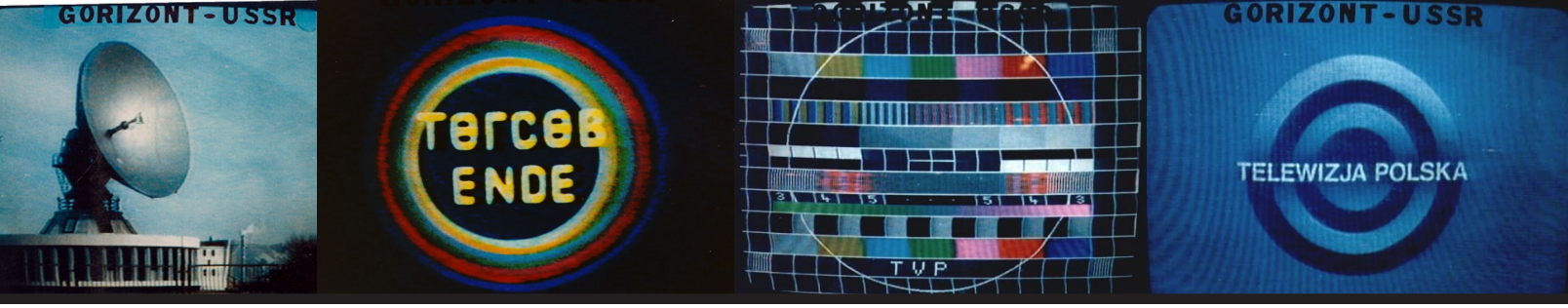
The CNN Connection

At this time, CNN was quickly growing in popularity and providing U.S. viewers quick European and mid-East news events coverage. How did CNN manage that? If you assumed Intelsats were used, you were wrong. CNN founder Ted Turner contracted with Russia to use Gorizont for relaying CNN feeds.

CNN headquarters, located in Atlanta, Georgia had a large dish antenna bore-sighted on Gorizont for the sole purpose of receiving CNN news feeds. It was a brilliant business decision and kept CNN ahead of its competition for much of the decade, and they avoided having to pay expensive Intelsat rate charges. Imagine the outrage and criticism directed at CNN for dealing with a communist country if had one of its competitors or some Congressperson wanted to create an embarrassing situation.







During the 1984 Olympics, Gorizont spoiled me. Why wait for delayed prime-time broadcasts on ABC-TV when I could watch events live from Sarajevo, Yugoslavia?!

Other Gorizont Goodies

FM SCPC and SSB reception involved using a two-port power divider connected to the satellite receiver's Intermediate Frequency (IF) input and an ICOM R7000 communications receiver with NFM or SSB mode selected. I discovered one transponder dedicated to non-voice transmissions and received a few FM SCPC signals on Channel 8 (3.775 MHz) and continued tuning. Then wow! Suddenly I heard many SSB Spanish language telephone calls, which I suspected were being uplinked from Cuba, and, as expected, many Russian language calls. It was then I regretted not studying harder in my college Spanish classes.

There were other finds, too: Cuba uplinked TeleRebele (Rebel TV) in NTSC black and white with sub-carrier audio in the early 1980s. I suspected the purpose was partly to provide programming to Nicaragua, which at the time was a communist leaning country. The programming was dull and beyond boring. Time passed and tuning in one day I received a new full time TV broadcast. It was Madagascar TV. The island country, located off the east coast of Africa also had communist leanings. The broadcast language was French and occasional programming provided interesting views of the island. Although the signal quality was acceptable, it was below par compared to the IVN and other occasional video signals.

Washington-Moscow Hotline

Original hotline communications were teletype-only using a trans-Atlantic cable link. Prior to the launch of Gorizont, located at 14ºW, multiplexed, duplex voice and data communications were subsequently done via the Molniya (Lightning) satellite system for the Moscow to Washington link. Washington to Moscow communications were via Intelsat. The U.S. Army Signal Communications and satcom facility located at Ft. Detrick, Maryland was responsible for the U.S. communications links.

The End of an Era

The end came quickly with no warning. One day I turned on my TVRO equipment to view Gorizont 7 but there were no signals. Thinking I had an equipment problem, I did routine troubleshooting and received a couple of Intelsat TV channels just fine. What could be the cause? A telephone call to another TVRO hobbyist provided the answer. Gorizont transmissions had converted to a digital broadcast format. For me an era of some enjoyable satcom monitoring had ended.

Fortunately, in 1984 I took selected 35 mm live screen shots. They included some IVN member's color bar slates that preceded their first uplink feed. Additionally, each uplinking IVN member country's TV network ID or location slate would be displayed along with starting feed identification for each separate feed. Usually there was a numerical countdown "intro" for each feed.

At the end of the last member feed, a text slate was displayed alerting IVN control that that was the end of its daily feed. Also included were pictures of UPITN TV daily feed slate logos, story feed cueing info and screen shots of occasional feeds from non-IVN member countries, as well as occasional IVN programming content. If you received Gorizont broadcasts, then perhaps you remember some of these pictures. Either way, I hope you will enjoy a pictorial look at some typical Gorizont broadcast activity, long gone and never to return.

Final Word

U.S. Arc satcom frequency range identifiers were created during WWII and subsequently adopted by the FCC as the commercial industry's identification scheme. C-band downlink frequencies and point-to-point links are 3.700-4.200 GHz; Ku-band DSS downlink frequencies are 11.700-12.200 GHz; and DBS (i.e., Direct TV and Dish Network) downlink frequencies are 12.200-12.700 GHz. Most satellites use linear polarization except for DBS and a couple of DSS satellites that can be operator configured for either linear or circular polarity. Although encryption technology was available at the time, few uplinkers chose to use it.

My analog finds peaked in the early to mid-90s and subsequently tapered to less frequent monitoring. Most FM SCPC and SSB LSB/USB finds were C-band radio station relays on Comstars 2/3 and Westar 3. I used a two port power divider, RG-6 coax cable and an ICOM R7000 in the NFM mode, tuning the 70 MHz single conversion IF and later the .950-1.450 GHz block down converter IF ranges. One evening, trolling the arc, I discovered an Associated Press (AP) fax feed on Anik B satellite. Using a fax/FDM decoder, the downlinked faxes had good resolution and were the same black and white photos printed in newspapers.

The broadcast I miss the most in the U.S. arc is the old 50 state United Press International (UPI) Frequency Division Multiplex (FDM) 24/7 feeds on Westar 3. Using a FDM/fax receiver interfaced with a dot matrix printer, I had immediate access to the national feed and 50 individual state broadcasts. I knew the results of elections, winning lottery numbers and news events before they were broadcast on the next radio or TV news update. A few states' news were bundled as one composite regional channel broadcast. In-depth, background and human-interest stories were interspersed between news items. If I wanted more information on a particular news story, I selected that particular state broadcast, as the story would receive more coverage there than on the national broadcast.

About the Author

John Wilson is a retired federal civil service employee from the U.S. Army Computer Systems Communications and Support Group, Ft. Lee (Petersburg), Virginia and currently resides nearby in Prince George County, Virginia. He installed the first private C-band satellite TVRO system in south central Virginia in 1980 and continues to provide DBS, DSS and VSAT installation, maintenance and C/Ku-band teleconference downlinking services in the mid-Atlantic area. He may be reached at w4uvv@amsat.org.

QSLs Give Life to Radio History

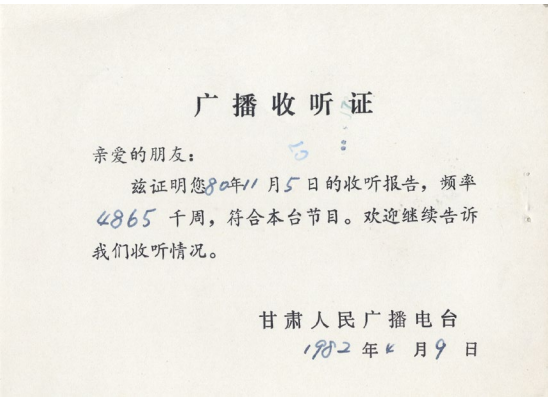
By Jerry Berg

(QSLs are from the author's collection or the collection of the Committee to Preserve Radio Verifications unless otherwise stated.)

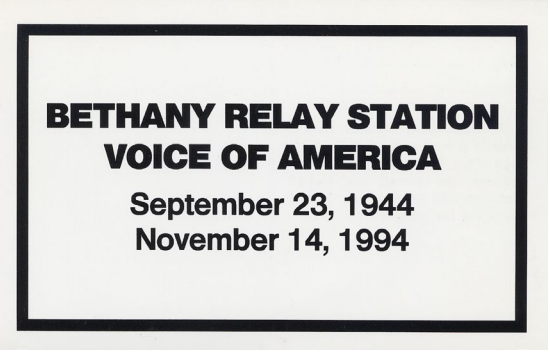
In October, *MT* looked at how QSLs can reflect political history ("Looking at QSLs and Seeing History"). This time we examine QSLs that remind us of events in *radio* history. Some of these events may be of large importance, others small, some of relevance to the general radio world, others only to DXers. But they all bring back memories of bygone days.

Some QSLs are of historic importance simply because of their age or the significance of the period when they operated. It is difficult not to feel a special fascination for the QSLs from stations of the 1930s, such as Radio Tokyo, Deutscher Kurzwellensender ("Zeesen"), EIAR (Rome), the American "X" stations (W2XAF, W3XAL, W8XK, etc.), VK2ME of pre-Radio Australia days, etc. These pioneers of shortwave broadcasting operated at a time when both the technical capabilities of the medium and its propaganda value were being explored for the first time. In the mid-1930s, shortwave broadcasting was barely ten years old, and to the general radio-listening public, hearing signals over long distances was quite amazing.

Some QSLs are historic because they are from stations that operated in bands or modes now largely forgotten. In the 1930s there were the Apex broadcast stations that operated around 30 MHz. Despite their supposedly local character, they were often heard halfway around the world. There were also the "high fidelity" stations operating with wide bandwidths just above the standard broadcast band, and the early FM stations that transmitted around 40 MHz. Other historic broadcast band events would include the

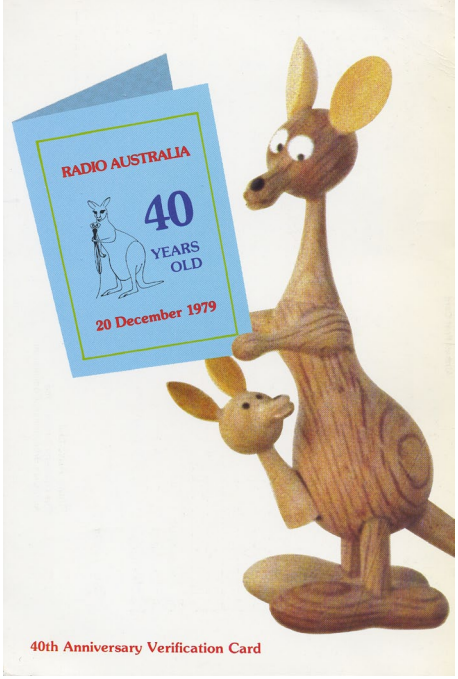


For decades it was impossible to QSL Chinese regional stations. Within the QSLing fraternity, the change in policy in the early 1980s, after which these stations started verifying, was very well received. This QSL is from the Gansu People's Broadcasting Station, Lanzhou.



The VOA station in Bethany, Ohio closed down in 1994. The feelings of the staff were amply conveyed by this black-bordered QSL, which read, on the back: "It is with great sadness that I confirm your reception of the final days of the Bethany Relay Station. Bethany has served the United States proudly for 50 years. 73 and thank you for being there for us."

Some QSLs are of historical interest just because of their age or the identity of the station. This QSL from Radio Tokyo is for reception six months prior to Pearl Harbor.



Radio Australia issued this good-looking card in 1979 to commemorate its 40th year on the air.

There had always been some leased-time shortwave broadcasting, especially among religious stations, but its expansion in the 1990s changed the fundamentals of the medium. Now you no longer needed your own transmitter. Most new "stations" simply leased time over a relatively small number of high-power transmitters. As this QSL shows, one of the locations from which the Voice of Hope, a California-based religious broadcaster, transmitted was Georgia, in the former Soviet Union.

In the days before Fidel, the Cuban shortwave bands were home to numerous private broadcasters. This 1957 QSL is from Circuito Nacional Cubano, which operated on 11740 kHz. Its predecessor network, known as Radio Habana Cuba, was one of the country's major radio chains.

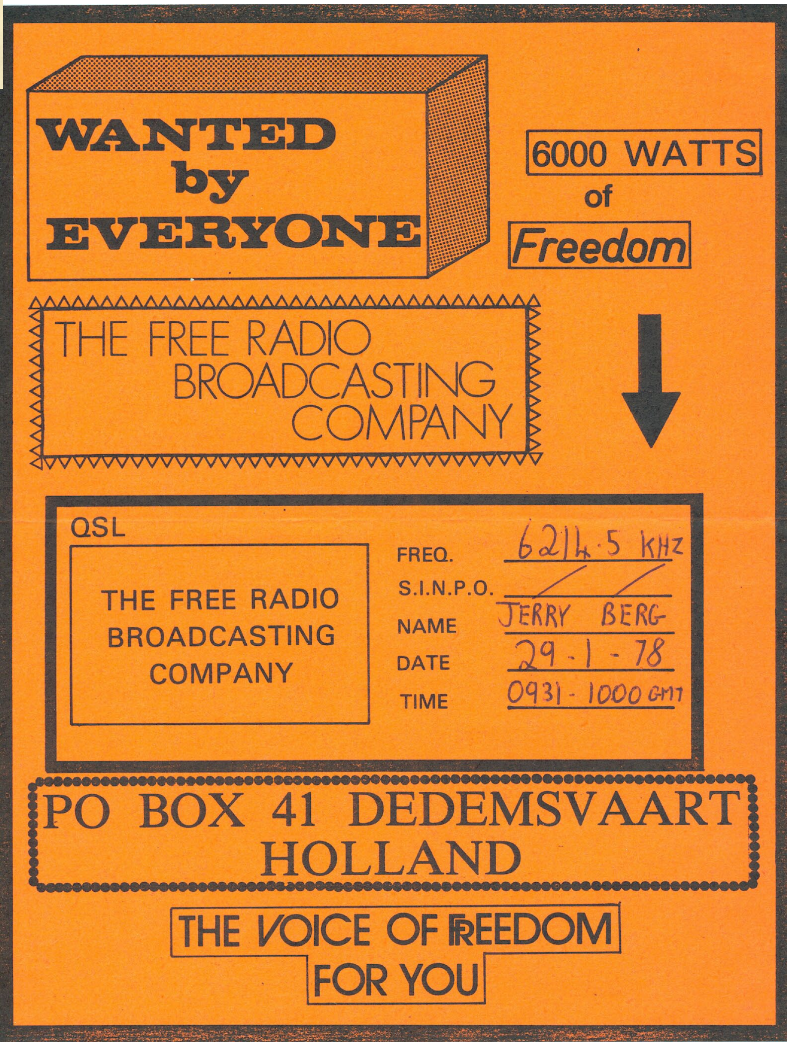
After a long gestation, the Deutsche Welle relay station at Trincomalee, Sri Lanka, began initial tests in 1984, but it did not reach full operation for five more years, and it suffered shutdowns even later. Its operation was plagued with terrorist attacks, local harassment and other problems.

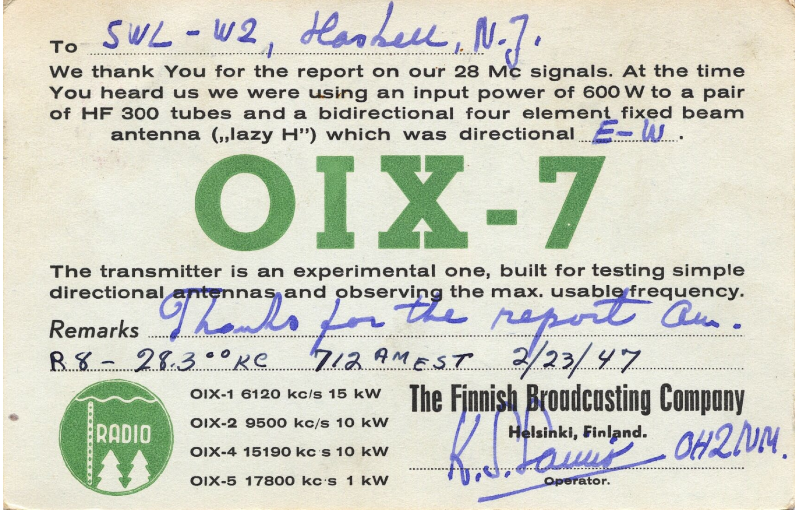
super power (500 kW) broadcasting of WLW, Cincinnati, Ohio on 700 kHz, and the Mexican "border blasters."

Some QSLs serve as reminders of places where the shortwave broadcasting landscape, now barren, was once rich. In the pre-Castro days there were numerous private shortwave stations operating from Cuba. They met their demise when Fidel took power. In Tangier, until private stations were forced to close down at the end of 1959, the shortwave scene was a good reflection of the city's open character, with a multitude of stations and broadcasters, many of them related to one another in ways that were always confusing.

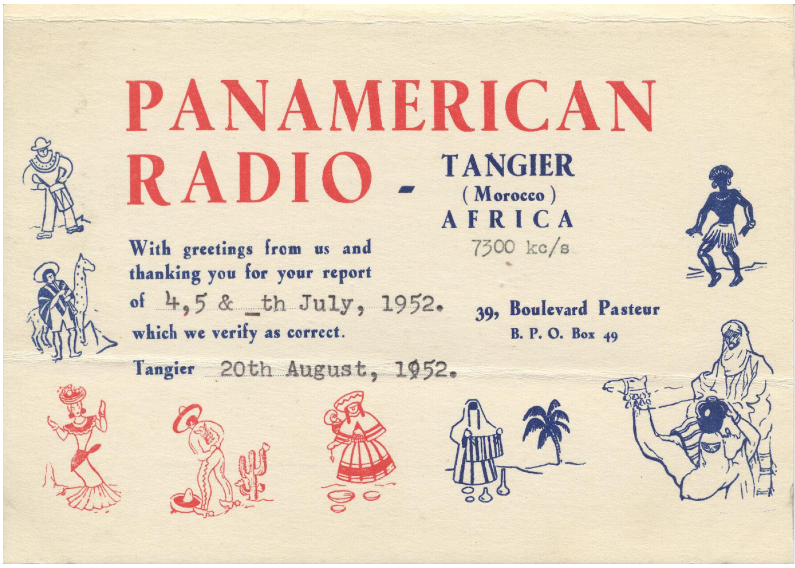
On the other side of the ledger, some QSLs are from places where private shortwave broadcasting was long forbidden but now permitted. In the former Soviet Union, private shortwave stations first appeared during the days of *glasnost* and *perestroika*. During most of the twentieth century, hearing, let alone QSLing, a religious station in Russia could hardly have been imagined. Suddenly

One of the first, if not the first, European pirate stations heard on shortwave in the United States was the Free Radio Broadcasting Co. Although its address was in Holland, it was believed to be transmitting from the U.K.; and the power shown, 6 kW, was open to question. Europirates were heard in the U.S. starting in 1978.



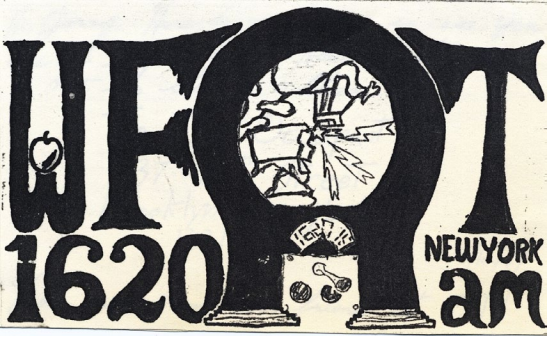


Special broadcasts may be meaningful events for those who hear them, even if their place in the broader history of radio is small. This QSL is from special low power tests on 28 MHz that were conducted by the Finnish Broadcasting Co. in 1947.



Few places have a more colorful shortwave history than Tangier, which was administered as an international city from 1945 to 1956. During that time, and until private shortwave broadcasting was closed down by the Moroccan government at the end of 1959, Tangier was host to a variety of broadcasters. Panamerican Radio was one of several Tangier anchor stations.

For over 50 years the notion of private shortwave broadcasting from the Soviet Union was unthinkable. Things changed in 1991, and Radio Center was one of many private broadcasters which, while not allowed their own transmitters, were permitted time on the state shortwave network.



Even some domestic U.S. pirate stations have made their mark in radio history. In 1978 the signal of WFAT, transmitting from Brooklyn on a frequency just above the standard broadcast band, was often heard up and down the east coast with live listener call-ins. WFAT was the subject of a major write-up in The New York Times shortly after the FCC closed it down in 1979.

it was possible.

And some QSLs are from stations with historical radio significance that may not be readily apparent. HCJB, in addition to being for decades one of the first stations heard by many novice SWLs, was the first private religious broadcaster on shortwave. And KDKA, commonly recognized as the "first" American standard broadcast station, was, by way of its shortwave outlet 8XK, also the first shortwave broadcaster.

While American pirate broadcasting, at least on shortwave, has been mainly the home of radio rascals, pirate broadcasting in Europe was a serious part of broadcast history. The Europirates, which started out on AM and FM around 1959, played a fundamental role in breaking the state monopolies on broadcasting. Eventually some went on shortwave, where they became good targets for U.S. DXers.

A QSL may not necessarily be of major historical significance but may still chronicle a memorable radio event. Hams and ham band DXers are used to QSLs from special event stations. There are also numerous "special event" QSLs from broadcast stations – for test broadcasts and for programs transmitted on special occasions, such as the opening of a new radio facility, a program dedicated to a club or to a particular historical figure, and so forth. The Radio St. Helena Day broadcasts are probably the best known of the shortwave broadcasting special events of recent years.

Many stations of long standing have marked their anniversaries with a special QSL (Deutsche Welle's 30th, Radio Canada International's 40th, Radio New Zealand's 50th, Radio France International's 60th). Alas, not every station reaches its next anniversary; shortwave closedowns are becoming all too common. Verifications from stations now silent take on new importance, as do the special QSLs that some stations have issued on their last day of broadcasting. The last day QSL from Radio Berlin International is probably the best known of these. Earlier this year, when Radio Prague left shortwave, it issued a QSL bearing a special "last day" endorsement.

Once upon a time, shortwave stations transmitted almost exclusively from their own transmitters. Then came dedicated relay stations – transmitters located in other countries but dedicated to broadcasting the programs of their owners. The VOA and BBC relay stations are examples. This was followed by exchanging time among relay station owners, and then leased-time broadcasting, where a "station" has no transmitter of its own but rather produces programs and rents transmitter time from one of the large stations selling air time. Practically all of the new shortwave broadcasters are of this type; new listening targets in terms of broadcast organizations, but not new transmitter sites. Most of the leased-time stations QSL in the same way as stations that operate their own transmitters.

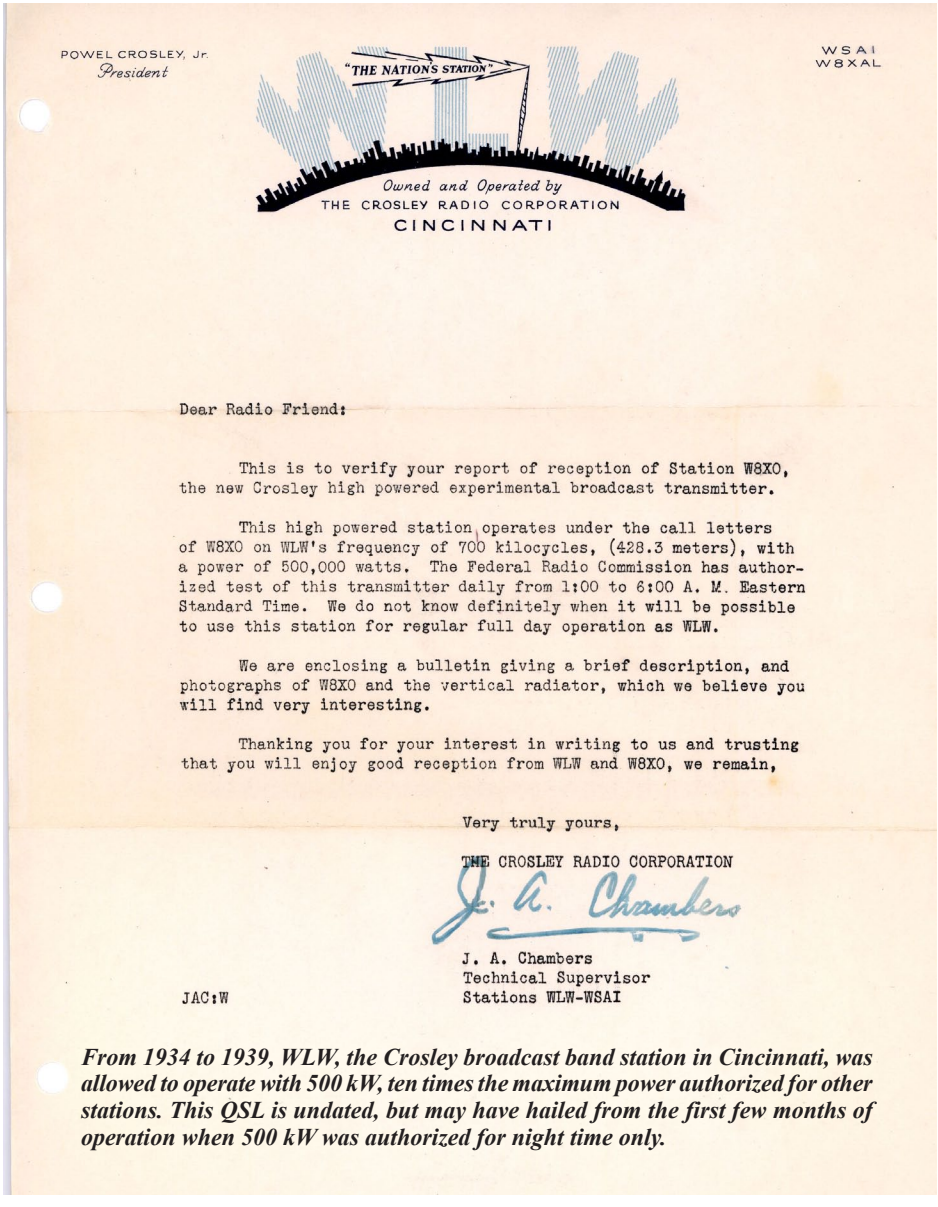
Finally, for the dedicated QSLer, history is made when QSLs begin flowing from places previously known for *not* QSLing. The best example is China, from whose regional stations a QSL was almost impossible to obtain until the policy changed in the 1980s. There are many examples of stations that have gone for long or short periods without QSLing, and then began replying. These include Radio Botswana, Radio Bhutan, even the venerable BBC. They may not have been major historical events in the grand sweep of broadcasting history, but they were welcomed by QSL-collecting DXers.

About the Author

Jerry Berg has been active in shortwave circles for over 50 years. He has written three books on shortwave history and many articles about shortwave listening. He is the chair of the Committee to Preserve Radio Verifications, a member of the NASWA Executive Council, and co-producer of www.ontheshortwaves.com. He can be reached at jsberg@rcn.com.


Official Verification
from High Fidelity Broadcasting Station
W6XAI
1000 WATTS . . . . 193.5 METERS . . . . 1550 KILOCYCLES
NAME John T. Tweedie DATE Dec. 17, 1935
This acknowledges as well as verifies your report of having received transmissions from this station on Dec. 10, 1935
Your co-operation and interest is appreciated by the entire staff.
OWNED AND OPERATED BY
PIONEER MERCANTILE CO.
BAKERSFIELD, CALIFORNIA
Operators of Television Station W6XAH and Sound Station W6XE—2000-2100 KC
SIGNED
STATION MANAGER.

In 1934, the FCC set aside a few channels above the standard broadcast band for stations wishing to experiment with wideband "high fidelity" transmissions. W6XAI in Bakersfield, California was one of four stations so licensed. The experiment ended in 1941.


POWEL CROSLEY, Jr.
President

"THE NATION'S STATION"

WSAI
W8XAL

Owned and Operated by
THE CROSLEY RADIO CORPORATION
CINCINNATI

Dear Radio Friend:

This is to verify your report of reception of Station W8XO, the new Crosley high powered experimental broadcast transmitter.

This high powered station operates under the call letters of W8XO on WLW's frequency of 700 kilocycles, (428.3 meters), with a power of 500,000 watts. The Federal Radio Commission has authorized test of this transmitter daily from 1:00 to 6:00 A. M. Eastern Standard Time. We do not know definitely when it will be possible to use this station for regular full day operation as WLW.

We are enclosing a bulletin giving a brief description, and photographs of W8XO and the vertical radiator, which we believe you will find very interesting.

Thanking you for your interest in writing to us and trusting that you will enjoy good reception from WLW and W8XO, we remain,

Very truly yours,

THE CROSLEY RADIO CORPORATION

J. A. Chambers

J. A. Chambers
Technical Supervisor
Stations WLW-WSAI

JAC:W

From 1934 to 1939, WLW, the Crosley broadcast band station in Cincinnati, was allowed to operate with 500 kW, ten times the maximum power authorized for other stations. This QSL is undated, but may have hailed from the first few months of operation when 500 kW was authorized for night time only.

A Baby Boomer's Radio Reflections

By Eric Beheim

Having been born in 1946, in the first wave of "baby boomers," I arrived on the scene while AM radio was still one of the primary means of informing, entertaining and shaping the opinions of a majority of Americans. By the time my family got its first television set late in 1951, I was already a faithful and dedicated radio listener, and remain so to this day!

Hello Boys and Girls

My earliest memories of radio are of listening to some of the local children's programs that aired daily in Cleveland, Ohio back in the late 1940s and early 1950s. These were disk jockey shows where the hosts would play records that had been specifically produced for children.

Many of these records featured top entertainers of the day: Bing Crosby, Rosemary Clooney, Dennis Day, Patti Page, Gene Autry, Burl Ives, Ray Bolger, and Danny Kaye, to name a few. Among the children's records that were popular on the radio back then were *Flick, the Little Fire Engine*, *The Little Tune that Ran Away*, *The Goonie-Bird Song*, *How the Circus Learned to Smile* (with Spike Jones and his City Slickers), *Willie and Hannibal in Mouseland*, and the various adventures of *Little Orley* as told by "Uncle Lumpy."

One of my particular favorites was *Tiger*, an adventure story about a marauding tiger that was eventually captured by Frank "Bring 'em Back Alive" Buck, a real-life hero who made his living capturing wild animals for zoos and circuses. Another popular children's record that was heard on the radio back then (and one that was probably a little *too* sophisticated for most children) featured Al "Jazzbo" Collins telling "hip" versions of familiar fairy tales like *The Three Little Pigs* and *Little Red Riding Hood*.

An RCA "King Kong" set, identical to the one owned by the author's grandparents.

The two local children's radio programs that I listened to most often were *Toddler Time*, hosted by "Uncle Ed" and sponsored by Weather Bird Shoes, and *Kousin Kay's Korner*, heard on station WJW (now WKNR). One of Kousin Kay's best-remembered features was his daily reading of birthday greetings to young listeners which had been telephoned in ahead of time by their parents. Sometimes, these greetings would include special instructions like, "Eric, look in the record cabinet," which would result in the discovery of a hidden birthday present. Both Uncle Ed and Kousin Kay later had their own local TV shows, which weren't nearly as much fun.

On Saturday mornings, there would be *No School Today*, a two-hour show hosted by Big Jon Arthur and Sparkie, "the little elf from the land of make-believe who wants more than anything else in the world to be a real boy." Sparkie was actually the recorded voice of Jon Arthur speeded up. In addition to children's records, there would be original songs and stories, and an unforgettable rendition of the program's theme song *The Teddy Bears' Picnic*.

No School Today originated from station WSAI in Cincinnati and was heard over the ABC radio network beginning in 1950. It continued to be heard on shortwave for years after it left the network. For those of us old enough to have heard the original broadcasts, *No School Today* remains one of our fondest and happiest radio memories.

Radio Memories from My Grandparents

Whenever I stayed with my grandparents, I got to hear the radio programs they listened to. Grandma Mitzi would always start off her day with Don McNeil's *Breakfast Club*, a very popular network morning program that had been on the air since 1933. The one feature I recall from that show was the "march around the breakfast table." Years later, my grandmother would remind me how she and I used to march around the dining room table whenever that segment came on.

My grandmother was also a regular listener

***Tiger*, starring Frank "Bring 'em Back Alive" Buck, was just one of the many children's records that could be heard on the radio in the late 1940s and early 1950s.**

to *Arthur Godfrey Time*, another popular network morning program featuring talk, variety, and music. In my mind's ear, I can still hear the Godfrey theme song *Seems Like Old Times*, in a musical arrangement that featured a trombone playing the lead. Arthur Godfrey's sponsor was Lipton's Tea, and so closely did I associate him with that product that, for a time, I thought that it was *his* picture on the Lipton box rather than that of tea merchant Thomas Lipton!

In the afternoon, my grandmother always listened to Art Linkletter's *House Party*. The one feature from the Linkletter program that I remember clearly was his talks with young children selected from Los Angeles' grammar schools for their intelligence and personality. Often, their forthright answers to Linkletter's questions were hilarious and sometimes a little embarrassing: "What does your mommy do?" Art asked one child. "Nothing, she's too busy having babies."

The one radio program that my grandfather always listened to was Drew Pearson's Sunday evening news broadcast. No matter if we were visiting, whatever was going on would all have to stop so that Grandpa Joe could tune in Pearson's program.

Drew Pearson always ended his broadcasts by making a prediction or two. The one Pearson prediction that I clearly remember was that Russia's then-Premier Nikita Khrushchev would someday take his own life as had Hitler. Back in those Cold War days, Khrushchev was perceived by many Americans as being as big a threat to

world peace as Hitler had been.

Grandpa Joe and Grandma Mitzi had two radio sets that I remember. The older of the two, and this one had probably been their first AC set, was an RCA "cathedral" model from the early 1930s, which they kept upstairs in their bedroom. I don't know its model number, but it was identical to the radio shown in the 1933 movie *King Kong* which broadcasts the police call saying that Kong is climbing the Empire State Building. Their other radio was a 1940 *Philco* 40-195XX console set, which they had probably bought in late 1939 or early 1940 so that my grandfather could follow the war news from Europe via shortwave.

Throughout World War II, Grandpa Joe was an "armchair general" who kept a large map of Europe close by the radio, updating it frequently with colored pins to track the war's progress. On top of the Philco's wooden cabinet was displayed one of his most prized possessions, a reproduction of the famous statue titled "End of the Trail." As a boy growing up in Vienna, he had seen Buffalo Bill's Wild West Show with its contingent of Native Americans. For the rest of his life, he was fascinated with anything having to do with the American West and American Indians.

My maternal grandfather had been an avid radio listener since the earliest days of broadcasting (see *Grandpa Walter's Scott* in the December 2010 issue of *MT*.) One of my earliest radio memories is of him tuning in ship-to-shore transmissions for me on his Zenith H-500 Trans-Oceanic. He would also tune in Canadian time signals given in both English and French, and such international powerhouse shortwave stations as the BBC and Radio Havana. Having a radio that could tune in the world made quite an impression on me!

Grandpa Walter also liked to monitor the police frequencies. One year for Christmas, the family got him a police scanner. During the holidays and on weekends when he didn't have to get up the next morning to go to work, he would sit up far into the night listening to the Cleveland police frequencies. Later, he would regale us with some of the more interesting and/or humorous police calls he had heard.

A Radio of My Own

As a young and dedicated radio listener, my first great desire was to have my own radio, which I could keep next to my bed. For a while, I had to make do with a small plastic bank fashioned to look like a radio. Then, one year for Christmas, I finally received my first radio: a little Arvin set with a metal cabinet finished in red. I'm not sure what model it was, but it closely resembled the Arvin Model 444.

Over the years, that little red radio proved to be a good and faithful companion, especially on those days when illness kept me home from school. At such times, listening to it did much to help speed me along on the road to recovery.

School Radio Memories

When I started kindergarten in the fall of 1951, radio was being used on a regular basis in the Cleveland Public Schools. The Cleveland Board of Education had its own radio station, WBOE, which had been on the air since 1938. WBOE had originally broadcast on 41.5 MHz using high-frequency AM (also referred to as Apex). By the early 1950s, it was broadcasting on 90.3 MHz, the first non-commercial FM radio station in the country. Its studios were located on the top floor of the Board of Education Building, located on East 6th Street in downtown Cleveland. In addition to its own staff of announcers, program hosts, and musicians, WBOE utilized the talents of public school students in many of its programs.

The author's personal broadcasting facility consisting of a low-power, limited–range AM transmitter plus a CD/MP3 player and a cassette tape player. From here, recordings of Golden Age radio material from the author's personal collection can be broadcast to an assortment of vintage tube radios scattered around his house.

The elementary school that I attended did not have radios in any of its classrooms (although most of those classrooms *did* have pianos). Whenever a radio was needed, which was at least two or three times a week, it would be wheeled in on a cart. Both the high school and the junior high school that I attended had PA systems with wall-mounted speakers in each classroom that were connected to a central control room. In addition to morning announcements made to the entire school, these PA systems were used to broadcast educational programs from WBOE that had been taped off the air and then patched through to the appropriate classrooms as required. On special occasions, radio news coverage of some important event, like astronaut Alan Shepard's first flight into space in 1961, would be broadcast live via the PA system to the entire school.

As a participant in the Cleveland Public School's instrumental music program, I made frequent visits to the WBOE studios for rehearsals and to record material that would later be heard in the classroom. Often, these recording sessions took place during normal school hours, which required that I be given special permission to miss classes in order to be at the studio when needed. Being able to cut classes like this was *always* a welcomed occurrence!

WBOE eventually went silent in the late 1970s. The last time that I stopped by the Board of Education Building was in the summer of 1983. During that visit, someone told me that the studios and equipment were still there, although no longer in use. WBOE's old frequency is now being used by Cleveland's WCPN-FM, which, when it first went on the air, was one of the last full-time NRP affiliates to begin broadcasting in a major market.

Origins of a Radio Hobby

When I was a senior in high school, one of the local Cleveland radio stations began airing reruns of *The Shadow* and *The Green Hornet* every Sunday afternoon. This modest revival of old time radio was a refreshing change from the usual fare that was being broadcast back then and, needless to say, I would always tune in to hear these weekly echoes from radio's golden past.

On one fateful Sunday I had to be away from home when these two programs came on. Rather than miss them, I had my father tape them for me off the air. Being able to listen and relisten to them as many times as I liked inspired me to start a new hobby: collecting recordings of old radio shows. Forty-seven years later, my collection consists of hundreds of hours of old time radio programs, contained on cassette tapes and CDs, in MP3 files, and on 12 and 16 inch transcription disks. *And, I am still adding to my collection!*

College Radio Memories

In spite of my long-standing interest in all things radio, when it came time for me to decide upon a college major, I chose music performance, figuring that music would eventually provide me access to the field of radio broadcasting, much as it had provided me access to the studios of WBOE.

The university that I attended did not have its own radio station, but did offer two radio-related courses through its speech department. Although music majors seldom ventured into the speech department, I arranged my schedule so that I could take both of these courses. They proved to be the two all-time favorites from my undergraduate years.

In Radio Survey, we learned about of the business end of radio: FCC licensing requirements, program formats, ratings, selling commercial time, etc. The course also covered the history of radio, and this included listening to recordings of famous broadcasts from the past. Back then, recordings of old radio programs were not as readily available as they are today.

One of the primary resources our instructor drew upon was the *Jack Benny Golden Memories of Radio* set that was put out by the Longines Symphonette. In addition to excerpts from some of the famous adventure and entertainment programs of the past, this set also included numerous examples of radio's *news coverage* of important historic events such as Britain's King Edward the VIII's abdication speech; Herb Morrison's eye witness description of the *Hindenburg* disaster; news bulletins about the *USS Squalus* disaster; Germany's 1939 invasion of Poland, and British Prime Minister Neville Chamberlain's announcement that England was at war with Germany. An entire disk was devoted just to radio's news coverage of World War II.

One of these World War II broadcasts *really* captured my attention and held it: the last radio transmission from the U.S. stronghold on Corregidor Island in the Philippines sent just minutes before the American troops who were trapped there surrendered to Japanese forces. Although it had been sent in Morse code, it was read aloud for the benefit of radio listeners. The radioman sending the message, and who was undoubtedly suffering from extreme fatigue and mental stress, described as best he could the chaos that was going on around him. He ended the transmission by giving his mother's name and address and asking that someone contact her and tell her what had happened to him. For me, that Corregidor broadcast was more powerful than any radio drama I had ever heard. (An interview with the radioman who had sent that message, and who had survived the war as a POW, was included in the set).

In time, collecting recordings of radio's news coverage of World War II would become my primary Old Time Radio area of interest. (See *Reliving World War II via Radio* in the July 2008 issue of *MT*.)

The other radio course offered by my university was Radio Production, which provided us with a chance to experience all aspects of producing a live radio show: writing, directing, announcing, doing sound effects, selecting the music and cueing up records, operating a studio control board, etc. At the time, few of us ever thought that old time radio would ever make a comeback, but it was fun to try our hands at putting on a radio show just as it had been done in the "good old days."

Apollo 13 and MARS

Following graduation, I enlisted in the Navy as a musician and was eventually assigned to a unit band based in San Diego. In additional to the usual military ceremonies and parades, my band participated in the Apollo 12 and Apollo 13 recovery missions. The next time you watch the Tom Hanks movie *Apollo 13*, look for the Navy band that appears at the end when the astronauts are being brought on board the recovery ship. Those musicians are impersonating the band that I was in and which was there when the actual recovery took place!

During both Apollo missions, a MARS station was set up on board the recovery vessel so that the sailors and civilian technicians could place personal phone calls to their loved ones back home. In those days the MARS operator onboard the ship would make contact with a MARS amateur radio operator in the U.S. who would place the phone call and then help patch through the conversation. During the Apollo 13 recovery mission, and while cruising in the vicinity of American Samoa, MARS put through a call for me to my parents. Listening on one of the ship's telephones, I faintly heard the phone ring at their end. Unfortunately, no one was home and the call was never completed.

Good Morning, Vietnam

In October 1970, my unit band deployed on a combat cruise to Vietnam onboard the aircraft carrier USS *Kitty Hawk*. During my free time, I volunteered to work in the ship's entertainment radio station, which operated on a 24-hour basis. The *Kitty Hawk*'s station simultaneously broadcast three different channels of music, each with a different format: Top 40, Country-Western, and Easy Listening/Classical. I chose to work in the studio that broadcast the Easy Listening/Classical programs.

Most of what we played on the air was contained on 12-inch LP records provided by the Armed Forces Radio and Television Service. There were literally hundreds of these AFRTS transcription disks in the station's library, and few of the sailors who worked there knew the full extent of the programming these disks contained. Taking the time to sort through them, I was amazed to find a wealth of old time radio programs, some of which had originally aired back in the 1940s.

In keeping with AFRTS policy, all of the original commercials and sponsor identifications had been removed. *The Fitch Bandwagon* became *The Bandwagon*, *The Lux Radio Theater* became *The Radio Theater*, etc. In place of the original commercials, there were Department of Defense service announcements advising military personnel to vote, buy U.S. Savings Bonds, not get involved with drugs, not get into trouble while on leave or liberty in a foreign country, etc.

Whenever I was "on the air," I made it a point to play as much of this old time radio material as I could work in. In addition to the AFRTS transcriptions, I also played *The Shadow* and *The Green Hornet* tapes that I had made while still in high school. These proved to be as popular with the ship's crew as they had been when they originally aired!

My active duty Navy service during the Vietnam conflict later made it possible for me to return to school under the GI Bill and earn an MA in *Radio and Television*. Although I never did work in commercial radio, I ended up in an occupation that was equally as rewarding: that of a civilian Teleproductions Specialist working for the Department of the Navy, producing and directing training videos for U.S. Navy pilots and aircrew personnel.

In 1964, re-runs of The Green Hornet and The Shadow on one of Cleveland's radio stations inspired the author to start taping and collecting old radio shows, a hobby he still engages in today.

Re-living Radio Memories

If you grew up with radio like I did, you already know that it *is* possible to re-experience many of your favorite radio memories from the past. A search of the Internet will turn up the websites of those dealers who offer recordings of some of the best that radio had to offer during its glory years: comedy, drama, adventure, sports, music and variety, news, etc.

The ideal way to experience a radio program from the past is to hear it on a *tube model radio*, preferably one that is of the same vintage as the radio show you are listening to. The easiest way to play a recorded radio program through an old tube model radio is to connect the LINE OUT of your audio source to the radio's phonograph jack.

Another easy solution, and the one that I use with most of my vintage radios, is to broadcast recorded radio material via a low-power, limited-range AM transmitter such as the SSTRAN AMT 3000. These little units connect to almost any audio device that has a LINE OUT or earphone jack, and will produce a signal strong enough to be received by most of the radios in your house, while not violating FCC regulations.

Restoring a Radio Memory

Not long ago, I encountered a 1940 Philco console set identical to the one my grandparents had. After years of banishment to a garage or basement, its physical appearance suggested that it was already beyond help: the veneer on its once-exquisite wooden cabinet was loose and, in some places, missing large sections; the gold speaker grill cloth was discolored and torn; most of the plastic pushbuttons on the front panel were broken or missing; and the frayed power cord and loose wires dangling from the chassis fairly shrieked FIRE HAZARD!

Needless to say, the seller was only too happy for me to take it off his hands and priced it accordingly. While the electronics were undergoing a complete overhaul at the *Antique Radio Store* in San Diego, I had the cabinet repaired by a local craftsman who operated a small antique furniture repair business out of his garage. He re-glued all the loose sections of veneer and then carefully pieced in sections of new veneer so that they blended in perfectly with the old veneer.

Once the cabinetwork was finished, my wife refinished it back to its original appearance. A reproduction speaker grill cloth identical to the original was located on-line from one of the dealers who sell replacement parts for antique radios. I also ordered a reproduction Philco decal to replace the one that had originally been centered above the dial. By the time work on the cabinet had been completed, the electronics had been restored and were ready to be reinstalled back into the cabinet.

That "already beyond help" set now looks and performs as good as it did in 1940, and its big electro-dynamic speaker sounds *better* than any of the speakers in my modern-day radios. It is one radio memory that can be enjoyed every time it is powered up!

A Voice in a Dream

By Roger Klingman K0RMK

This is an account of something strange that happened to me. Some terms that might be applied to the following story are "remote viewing, sixth sense, dream revelation and spiritual guidance." Deciding what to call what happened is something researchers in the field will have to figure out; my goal is to describe as clearly as possible what actually happened.

But, first some background is necessary. You need to understand where my mind was in the year leading up to what happened. Retired after 32 years of teaching, I felt it was time to pursue a childhood desire to become a ham radio operator. With help from my "Elmer," Wade Davis AA8LL, my license was issued early in 2001 only to discover that a housing covenant prevented me from building much more than a feeble amateur radio station.

Then, an article in the November 2001 issue of *QST* on the restoration of World War II military radios changed my focus. I discovered that collecting WWII radios fit with both my love of history, my family (which included a WWII pilot and an air-traffic controller in the Korean War), and my passion for ham radio. Every army surplus store in a 200 mile radius was searched. The result was a pile of bits and pieces plus two WWII receivers made for the Army Air Corp.

When I hit the brick wall of my own ignorance, Vern WA0DEA, a genius in the restoration of aircraft radios, came to my rescue. For a time, we were a team. My job was to find and clean what to the untutored eye was a pile of junk. He expertly read the schematics, assembled the parts, and brought dead sets back to life. Using the Internet to find manuals and missing components fell to me.

The search for old radios became a compulsion. I searched eBay continuously. Hamfests, flea markets, and antique stores were canvassed. I asked every ham I knew where I could find these antiquated radios. At one ham breakfast I was given the call sign of a doctor who was a ham and might have some old military gear. I left breakfast early to look up his address and send him a postcard in that day's mail. There was no response. What seemed like months went by with no results.

This was my mindset. Ham magazines showed other hams finding WWII military radios of historical significance. I had entered the competition too late. All the great radios had all been found.

Then it happened.

One morning it seemed like I should take a nap. I never took naps in the morning so I just rested on my back, not fully committed to sleeping, my feet still on the floor. Drifting off, my dream self could see a street, a sidewalk, an old closed store. Through the storefront window I could see an old backpack radio like my uncle might have used in Korea. In my dream I said, "This does me no good, I don't know where it is."

Immediately I heard a voice reply, "Sedan."

I said, "Where?"

And again, the voice said, "Sedan."

At just that moment my wife came to the bedroom door and said, "Roger, get up. The retirement home is on the phone, it's your mom." When the attendant told me what was happening, I said I would be right there to take her to the hospital.

The dream was still clear in my mind. I dialed 411 and asked for an implement dealer in Sedan, Kansas. There was one. I asked the operator to connect me. When a lady answered, I told her I had recently visited her town and through a storefront window saw an old radio. Did she know who it might belong to? She turned to someone and said, "Do you know the name of the old radio guy?" She came back to say it must belong to Russell Wemmer and volunteered to look up his phone number. I wrote the number down and headed for the retirement home.

Six hours later, mom had been admitted to the hospital and, while they didn't think it was serious, they were keeping her overnight. Back home, I phoned Russell. Did he happen to have an old military radio? Yes he did. Would it be alright if I came down to see it? That would be fine. We set a day and time. I cranked out a letter confirming our meeting plans.

The big day arrived; I drove the 100 miles to Sedan to meet Russell Wemmer. Russell was short, thin, a retired Zenith repairman. He took me to see the radio in question. The size of a breadbox, it was aluminum, louvered, built for the Army Air Corp, and nothing like the radio in my dream. Trying not to let my disappointment show, I asked if it was for sale. That was when Russell asked how I had heard about his radio. Not wanting to scare him off, I promised to tell him once we settled on a price.

I put the radio in my car and drove Russell to the Red Buffalo Restaurant for lunch. Did I think $30 was too much? That sounded fine to me and I picked up lunch tab as well. As we ate, I told Russell about my dream. He had heard of things like that but this was the first time he had been involved in one. As I left, we shook hands and he said to come back and see his old civilian radios.

Driving back to Wichita, I listened to the 2 meter transceiver in the car. How far from Wichita would I be able to pick up the area repeater? Fifty miles out I could hear hams in Wichita talking to each other. I was thinking, "What was the use of that dream?" when I heard

Russell Wemmer W0MXJ Sedan, Kansas 2007 (Courtesy: Author)

my call sign on the radio. I was shocked. No one had called me on the radio before.

Fumbling to find the microphone, I responded. It was N6ZOP. Was I still interested in old military radios? Yes. He told me he was helping friends with an estate sale and they had found some in an attic. He asked if I would come by that night to look at whatever it was and I said I would. I copied the address.

As soon as I hit town, I went to Vern's house. What was this thing I had driven 200 miles to bring back? He recognized it immediately and was glad to pay $30 for it. Then I followed him down to his radio room. There on several shelves he had reconstructed the radio operator's position from a B-17 WWII bomber. On one shelf was a rack of transmitters. There was a gaping hole. The radio he bought from me exactly fit the empty space, plugged into the connectors, and bridged the frequency gap between the transmitters on either side. For years, he had been searching for that specific transmitter. How had I found it? For the second time that day I told the story of my dream.

Now it all made sense. That dream was not for me. That dream was to help Vern.

That night I headed across town to the estate sale. Checking the address, I had no problem finding the house with all the lights on and doors open. The radio room had a world map with a colored pin in each country the ham who had lived there had contacted. It had been a month since the home owner had died.

Access to the attic was through a ladder in the garage. There were boxes and strange shapes covered with decades of dust. Rubbing the dirt from one ID plate revealed the words "Army Signal Corp." I didn't know what it was but I knew I wanted it. For $100, the mystery sets were mine. Cleaning the front of each set back in my garage showed these were WWII aircraft radios. To my surprise, one was the transmitter that was the mate to the receiver Vern had repaired for me. The vacuum tubes in that transmitter, five of them, were selling on EBay for $200 each.

Roger Klingman K0RMK (Courtesy: Author)

Then something struck me. I took the slip of paper with the address of the estate sale in to check with addresses saved on my computer. It was the address of the doctor I had written to the previous month to ask for help finding military radios.

Afterword

Later, I was glad that I had met Goldie, Russell's wife, before her Alzheimer's was in an advanced stage. Russell took on a couple of projects for me, a Hammarlund SP-600 JX-17 (the red knob, SAC logistics receiver) and a Gonset Communicator III (the yellow Civil Defense set). I visited Russell three or four times a year. He had his hands full taking care of Goldie.

When Goldie died, he was left with a big gap in his life. Suddenly, all the time he had spent watching and assisting her was empty. My goal was to help him fill that time by bringing him old AM radios to fix. Any tube type Zenith radio at a garage sale was a "godsend" to me. Dennis KF0TG assisted me in this effort. Once a month, we drove down to exchange radios and have lunch with Russell. Linda, my wife, and I drove down so he would not be alone on New Years and his first wedding anniversary following Goldie's passing.

Russell Wemmer W0MXJ left this world in November 2009. I consider his friendship to have been more valuable than any radios, and I have said prayers of thanks that Russell came into my life.

SCANNING REPORT

THE WORLD ABOVE 30MHZ

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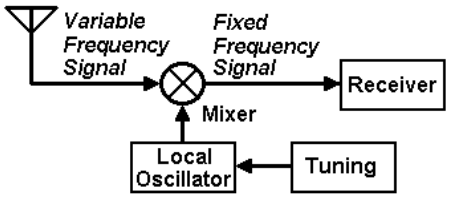
Scanning through the Decades: From Crystals to Synthesis

December has traditionally been *MT's* month to focus on nostalgia and recollection of equipment from bygone days. In the constant effort to keep up with advances in technology, it is easy to forget the how far we've come and how much we rely on improvements that have been made over the years, even in something as simple as tuning a scanning receiver.

Most receivers, at their core, are designed to operate at a single, fixed frequency. It is easier for designers to choose particular components and configurations that optimize receiver performance at one specific frequency. In general, the lower the operating frequency of a receiver the better it can be made to perform, so the core of many receivers operate at some common frequency in the kilohertz (kHz) range.

However, not everyone wants a radio that receives only a single frequency, so the designer relies on some kind of tuning mechanism to shift the desired incoming frequency down to that one common frequency. The shifting may occur in one, two, or even three stages, leading to marketing terms for the latter, like "triple conversion." Each of these stages also allows the insertion of a filter that narrows the range of frequencies that can pass. This helps to limit the amount of noise and unwanted signals that make it through.



Basic Radio Tuning Process

The actual conversion occurs in a component called a *mixer*, which takes in two signals and puts out two signals. The two input signals are the desired frequency from the antenna (usually run through an amplifier first) and a variable signal from a mechanism called a *local oscillator*. The outputs of the mixer are the sum and the difference of the two input signals. For instance, if the desired frequency is 88.5 MHz and the local oscillator is running at 77.8 MHz, the outputs will be 166.3 MHz and 10.7 MHz.

One of the outputs, usually the sum, is filtered, leaving the other signal to pass through to the next stage. The purpose of the mixer and local oscillator is to convert the signal from the input frequency down to a fixed *intermediate frequency* (IF) for which the receiver is designed. This type of design is called a superheterodyne receiver and is by far the most common in use today.

So, tuning is the process of controlling the local oscillator in order to get the desired frequency into the receiver at the proper IF. Design choices for how to implement a tuning mechanism have improved over the years as technology improved.

❖ Crystals

In the early days of scanning, tuning was done through the use of a physical device called a *crystal*. A slice of quartz was carefully cut and trimmed to a specific shape and size, then wired up and mounted inside a metal can. Quartz exhibits something called the *piezoelectric effect*, which basically means that when it receives the proper kind of electrical charge it will vibrate. These vibrations are very steady and very consistent, and with the right wiring, the vibrations can be turned into regular, precisely timed clock pulses. Such pulses are used in quartz watches to keep accurate time, and they are also exactly what you want inside a radio in order to keep it tuned accurately.

During the Citizen's Band (CB) craze of the 1970s, crystals were used in handheld radios ("walkie-talkies") to determine which of the 23 (later 40) allocated channels would be used. Due to the design of many of these radios, two crystals were required for each channel, one for transmitting and one for receiving.

As an aside, this type of design allowed a user to configure walkie-talkies to transmit on one channel and receive on a different channel. With a second walkie-talkie configured in a corresponding manner, it was possible to have a conversation that was difficult for other CB users to monitor. For instance, walkie-talkie one would have a Channel 5 crystal in the transmit slot and a Channel 12 crystal in the receive slot. Walkie-talkie two would have a Channel 5 crystal in the receive slot and a Channel 12 crystal in the transmit slot. Anyone monitoring either channel would only hear half of the conversation. It was in no way secure, but it did make things a bit more difficult for eavesdroppers.

So, a five-channel walkie-talkie required the purchase and installation of ten crystals.

Scanners of that time period needed only one crystal for each monitored frequency. If you wanted to listen to a particular frequency, you went down to your local Radio Shack or other electronics store and purchased a crystal for that specific frequency. Crystals were typically designed for sliding into a standard-sized plug, so "programming" a scanner for a frequency involved the following steps:

1. Turn off the scanner.
2. Remove a cover plate or other access panel.
3. Identify the proper slot on the circuit board where the crystal should be installed.
4. Remove the existing crystal from that slot, if there is one there already.
5. Insert the new crystal into the slot, being sure to seat it properly.
6. Select the proper VHF band (Hi or Lo) via a corresponding slot switch, if the scanner requires it.
7. Replace the cover plate or access panel.
8. Turn on the scanner and begin listening.

❖ Manual Tuning

Tuning a radio via a dial has been around since before the first mass-produced receivers. Users were comfortable with twisting a knob to change frequencies, which was fine as long as it didn't have to be done on a constant basis. Monitor receivers capable of tuning across the public safety bands had been available for many years, but their only "scanning" capability was whatever repetitive manual tuning the user was willing to endure. Checking multiple frequencies in quick succession required repeated and accurate adjustment of the main tuning knob.

Crystal-based scanners could continuously check multiple frequencies, but the expense and mechanical effort necessary to add new frequencies put a limit on the dynamic flexibility of these units. Physical size and circuit board layout constraints also limited the number of crystals that could be accommodated, so there was an upper boundary on the total number of frequencies a scanner could support.

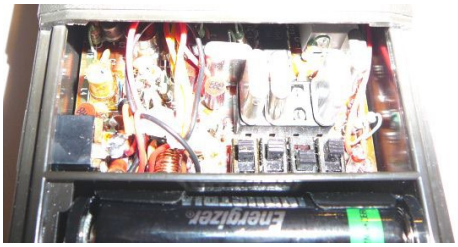
For instance, the commercial FM broadcast band runs from 88.1 MHz to 107.9 MHz, with room for 100 possible active station frequencies. A crystal-based FM receiver would require 100 crystals and a large switching matrix to select the desired station, clearly a costly and undesirable design.

Due to these operational and cost limitations, there was a market for a hybrid radio that could tune an entire band like a monitor receiver but automatically and repeatedly check multiple frequencies like a crystal scanner.

❖ General Electric Searcher

General Electric made just such a radio that is a nostalgic favorite of mine. Called *The Searcher*, this mid-1970's era portable radio offers coverage for the commercial AM and FM bands as well as four channels covering the VHF (Very High Frequency) Hi Band, noted on the radio itself as the Public Service Band (PSB). Each channel can tune independently between 150 MHz and 174 MHz via four tuning knobs located under a protective cover.

The radio can operate as a portable unit, powered by six D-cell batteries, or as a desk unit plugged into an AC power wall outlet. The carrying handle is hinged, allowing it to serve as a stand when sitting on a desk or tabletop. A telescoping whip antenna provided adequate signal gain to bring in strong and nearby transmissions.



At the time it was new and placed into service, the local police department and the county sheriff in my area were operating on VHF, so it was easy to keep up with law enforcement activity. Summertime storms often meant possible tornados, so the local volunteer sky observers could also be monitored. Local school district buses were equipped with VHF radios, so wintertime listening included their frequency.

Programming the unit (if you want to call it that) was a multi-step process that involved careful manipulation of small, sensitive tuning knobs. This was a familiar task for radio listeners of the time, since nearly all radios of that era had analog tuning knobs, but is quite foreign these days to users expecting a digital keypad and direct frequency entry. Compare the following steps needed to program *The Searcher* against the modern task of manually programming a digital scanner:

1. Turn the radio on via the power button.
2. Set the band switch to "PS/Scan".
3. Set the scanner mode to "Manual".
4. Adjust the squelch setting until the background noise ("hiss") just disappears.
5. Remove the protective plastic cover to reveal the four tuning knobs.
6. Choose one of the four possible channels by repeatedly pressing the "Man Adv" (Manual Advance) button until the corresponding red LED (light-emitting diode) is illuminated.
6. Slowly rotate the tuning knob that corresponds to the selected channel until the desired frequency is heard. Watch the combined analog battery/signal strength/frequency meter to determine roughly where in the band you are tuning. Note that there must be activity on the frequency in order to set the tuning knob correctly.
7. Repeat steps 5 and 6 for each of the remaining channels.
8. Set the scanner mode to "Scan" and wait to hear activity.
9. Put the protective plastic cover back in place to prevent inadvertent changes to the tuning knobs.

Although I don't remember the actual purchase price, it was advertised in November 1975 for $129.95, which is the inflation-adjusted equivalent of more than $540 today, about what a decent digital-capable scanner costs. (As a side note, you can check the ravages of inflation over the years through a web-based calculator on the Federal Reserve Bank of Minnesota website at **www.minneapolisfed.org.**)

Despite the high purchase price and tedious manual programming process, the radio had a definite advantage over earlier units – it did not require any crystals. The owner no longer had to trek down to a local store and buy a new crystal every time he (or she, although in those days it was almost always a 'he') wanted to listen to a new frequency. It is something we take for granted today, but at the time it was a pretty big deal.

Even today, with all of the digital and trunked radio traffic, *The Searcher* is still fun to use. The AM and FM capabilities are as useful as they were when the radio was new and the scanner channels can still catch some unexpected transmissions.

❖ Weather Radio

Since every scanner that can cover the 160 MHz band is also a weather radio, I often tune in to the local NOAA Weather Radio station. This

allows me to check the performance of the radio (and the antenna) as well as keep up with local meteorological conditions.

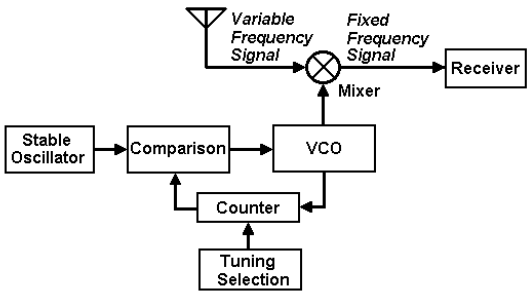
NOAA Weather Radio (NWR) stations transmit 24 hours a day, seven days a week. There are seven frequencies allocated to NWR, and if you are in or near the United States or Territories, chances are that you are close enough to hear one of the more than 1,000 NOAA transmitters. The frequencies are 162.400, 162.425, 162.450, 162.475, 162.500, 162.525 and 162.550 MHz. Keep these frequencies in mind if you're checking out a possible garage sale or flea market purchase, since it is a quick way to be sure the scanner is functioning properly.

With a lockout switch for each channel, *The Searcher* can act as an "instant weather" radio by locking out the NWR channel until a weather update is desired. Granted, it doesn't have automated alerts or SAME (Specific Area Message Encoding) capability, but it's still useful for getting current conditions and the local forecast.

❖ Frequency Synthesis

Advances in semiconductor fabrication and integrated circuit technology brought a significant change to scanner design with the introduction of frequency synthesizers.

A frequency synthesizer is an electronic device capable of generating a range of frequencies from a single, stable, fixed oscillator. It does this by linking the fixed oscillator to a device called a voltage-controlled oscillator, or VCO.



Tuning via Frequency Synthesis

The VCO can be thought of as an unstable oscillator that goes faster if its input voltage goes up and slower if its input voltage goes down. By comparing the output of the VCO against the output of the fixed oscillator, a synthesizer can vary the input voltage to keep the two synchronized. This type of feedback mechanism is sometimes referred to as a phase-locked loop (PLL).

The comparison between the stable oscillator and the unstable oscillator can be performed using a digital counter. Each output pulse of the VCO causes the counter to decrease, and when the counter eventually reaches zero, the comparison takes place and the counter value is reset. The result of the comparison controls the input voltage to the VCO, increasing it if the counter came in too late and decreasing it if the counter came in too early. In this way the VCO is "steered" to the proper rate.

Tuning is implemented by entering a value into the counter that represents the desired frequency. With the correct value in the counter, the VCO will be steered to a frequency that corresponds to the value. Because the counter operates digitally, it can be connected to a microprocessor and receive the value directly.

The first practical frequency synthesizers were bulky and expensive, but by the late 1970s the same market forces driving the computer industry, efficient semiconductor production and high volume, brought small, inexpensive synthesizers into mass-market scanners.

❖ Bearcat 100XL

The first scanner I owned that featured synthesized tuning was a handheld Bearcat 100XL, bought via mail order in the mid-1980s. It had memory storage for 16 frequencies and could scan all of them in just over one second, without me having to buy crystals or manually tune anything.

Photo courtesy radiopics.com

The 100XL provides coverage in three bands. The first is VHF low band, from 30 to 50 MHz, which at the time was mostly state police and civil defense. The second was from 118 to 174 MHz, giving me the civil air band, military land mobile and two-meter amateur radio in addition to the VHF Hi band I had in the GE radio. The third band was up in UHF (Ultra High Frequency), with more land mobile and amateur radio users, along with a number of business and industrial systems.

Having a computer-controlled synthesizer also gave the 100XL a couple more capabilities that would not have been feasible with a crystal-controlled or manually tuned receiver. The first is a "Priority" feature where the scanner automatically checks the frequency programmed in memory location 1 every two seconds, regardless of whatever other activity is being performed. The second is a "Search" function that causes the scanner to methodically check frequencies between programmable lower and upper limits. While these sound simple and are expected in modern scanners, at the time they gave listeners a new capability they did not have before.

Having a synthesizer also simplified the process of programming the scanner:

1. Turn on the scanner
2. Press the "Manual" key until the desired memory slot was displayed
3. Key in the frequency.
4. Press the "Enter" key.
5. Repeat steps 2 through 4 until all 16 channels were loaded.
6. Press the "Scan" key.

I remember monitoring the local police department and the county sheriff with that scanner, as well as using it at general aviation airports to hear the control tower and ATIS (Automated Terminal Information System) broadcasts.

Photo courtesy radiopics.com

Later, I moved on to a Bearcat 200XLT, not so much for the 200 memory storage locations but for the ability to monitor in the 800 MHz band. It covered 29 to 54 MHz, 108 to 174 MHz, 406 to 512 MHz, and 806 to 956 MHz. It sounded good and was very reliable, at least until the Nickel-Cadmium (NiCd) batteries finally lost their ability to hold a charge.

❖ Vintage Scanners

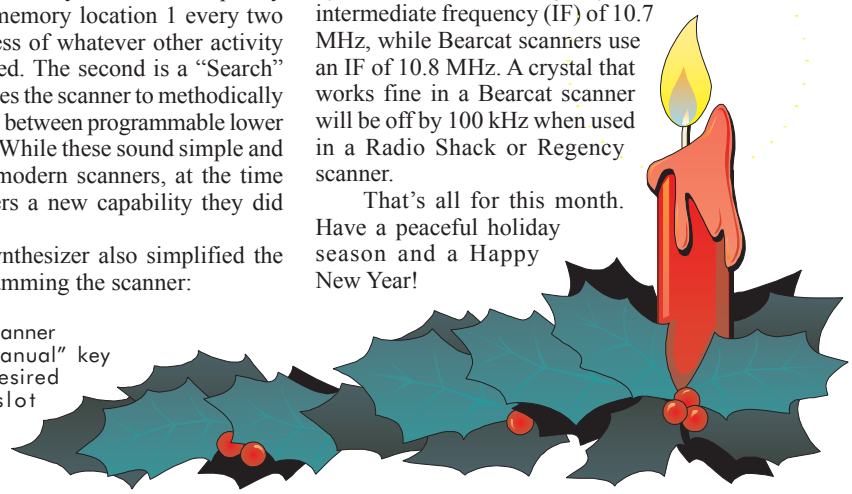
Like any other type of collector, there are many hobbyists who enjoy finding, restoring and operating old scanners. There is even an Internet-based interest group dedicated to these collectors, which can be found at **groups.yahoo.com/group/vintagescanners/**

The group has more than 1,000 members and averages about 20 messages per month. It serves as a focal point for discussion, repair and operating tips, and sources of spare parts and crystals.

Crystals for scanners are still being sold, like everything else, on the Internet. Prices are generally a few dollars per crystal, although not all frequencies are commonly available.

Crystals are not always interchangeable between scanners, so you need to be specific when purchasing them. For instance, units sold by Radio Shack and Regency use an intermediate frequency (IF) of 10.7 MHz, while Bearcat scanners use an IF of 10.8 MHz. A crystal that works fine in a Bearcat scanner will be off by 100 kHz when used in a Radio Shack or Regency scanner.

That's all for this month. Have a peaceful holiday season and a Happy New Year!



ASK BOB

GENERAL QUESTIONS RELATED TO RADIO

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

Q. *I've got a run of 3-wire barbed wire fence that is over a 1/4 mile in length. Would the top strand of barbed wire make an acceptable longwave receiving antenna? Or would the resistance in the barbed wire reduce the received signal beyond any benefit? (John Bishop, Hawthorne, FL)*

A. I would say that the length of the wire, especially if uncorroded and zinc plated, should do a good job in capturing VLF/ELF ground wave signals. You might even consider tying the three strands together at the close end to decrease the resistance.

Q. *I need a splitter for my antenna lead that passes signal down to the AM broadcast band, but the Grove SPL01 is marked "5-900 MHz." Why is it being sold as being usable from 500 kHz-1000 MHz? (Chris, email)*

A. Commercial TV-style splitters are marked for the frequency range that TV broadcast and cable channels need, thus 5-900 MHz. In actual fact, the Grove SPL01 has been tested as low as 300 kHz with virtually no loss (except the expected 3 dB drop because the signal voltage is split into two channels).

Q. *With so few high-quality shortwave receivers on the market, how do the receivers in ham transceivers qualify as general-coverage receivers for serious shortwave listeners? (Joe Schierer, KC2BZB)*

A. General-coverage-reception ham transceivers actually make excellent communications receivers. It's been a good many years since transceiver manufacturers like Drake, Yaesu, Kenwood, and Icom made receive-only radios utilizing circuitry duplicated from their transceivers. I guess it just wasn't profitable enough for them to continue.

Q. *Will an antenna originally designed for analog TV or radio reception work for receiving digital or high-definition broadcasts?*

A. Absolutely. The modulation scheme of a transmission has nothing to do with the antenna. If the new mode is on the same frequency as it was before, any antenna designed to receive that frequency will receive any mode of transmission on that frequency.

The only difference is that digital signals need to be perfect for any picture at all. In the analog days, a fringe signal could still be seen on a snowy screen, but such a digital signal now would be totally blank or a torn patchwork of distorted pixels at best.

Q. *I have heard that there are scanners which can detect the presence of old graves. I am a member of the Association of Gravestone Studies. Any idea as to how they work? (Mark Burns, Terre Haute, IN)*

A. These are only "scanners" in that they spread out a beam which scans several feet deep as they are pushed along on their wheels. Their reflected signals are painted line-by-line on a video screen to show different densities, revealing the shapes that make them. The real name for these devices is ground-penetrating radar.

Q. *What would the effect be of taking hundreds of feet of wire and winding multiple turns around the perimeter of the attic? Would there be a benefit over having just a single loop of wire? Would the much longer length of wire enable the lower bands? (Judy May, W1ORO, Union, KY)*

A. The aperture (capture area) of a loop antenna is defined by the dimensions of the loop, not the number of turns. Multiple turns make it a big coil, allowing it to be tuned with a variable capacitor so that it will resonate on certain frequencies. This makes it frequency selective, attenuating off-frequency signals which might cause interference from strong-signal overload.

Multiple times around the room will raise its impedance for a more efficient match to your receiver; the lower the frequency, the more turns will be required for the impedance to rise to the nominal 50 ohms impedance of most longwave/shortwave receivers. While this may deliver slightly stronger signals, it will also proportionately increase the received natural noise, so there's no real net gain of signal above noise.

Q. *Why does it make a difference whether I put a preamplifier close to the antenna or right next to my receiver after the coax run?*

A. Close to the antenna, you can amplify the weakest signals so they aren't absorbed by coax losses down the line. If you put the preamp at the radio end of the coax, those weakest signals will have been absorbed by coax losses, leaving nothing to amplify.

Q. *If I change the 18 feet of RG-58/U cable on my mobile scanner antenna to RG-6/U, will I get better reception? (Robert Young, email)*

A. With such a short length, the difference would only be about 1 dB even at 800 MHz, and less than that on lower frequencies, probably imperceptible even on extremely weak signals.

Q. *I don't trust a car battery with more than five years on it. A three-year-old battery once failed on me without warning. I recently purchased a 100 amp load tester. If the tester indicates a good battery, can I trust it regardless of the age? (M.B., email)*

A. The main problem that automotive lead-acid storage batteries face is sulfate deposits building up on the lead plates. Batteries should be continuously "exercised" (charge/discharge/charge/discharge, etc). The best recharging seems to be with pulse-type chargers, and the worse lifetimes are batteries that just sit with trickle chargers always on.

Five years with a well-maintained vehicle battery is not unusual, nor is only three years with a poorly maintained battery. Your 100 amp load tester should dependably indicate the state of a battery. Since sulfation of the lead is a slow process, the load tester should show when it's on its way out.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. Mail your questions along with a self-addressed stamped envelope in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.)

UTILITY WORLD

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Here Comes the Sun: HF is Back!

It's *finally* time to write this column. A lot of people thought it would never come, amid all the speculation on 100-year solar slumbers and "little ice ages." Now, though, the time has come.

As we go to press, daily Penticton (WWV) solar fluxes have been around 150 for about a week, and headed higher; 200 is within reach. This is a definite improvement from the 70 range that we were stuck in for so long.

With the coming of fall, the bands are going crazy. It's especially dramatic on the frequencies above 25 MHz. These have been quiet for so long that some newcomers might wonder why they are included on shortwave receivers. Well, this is why.

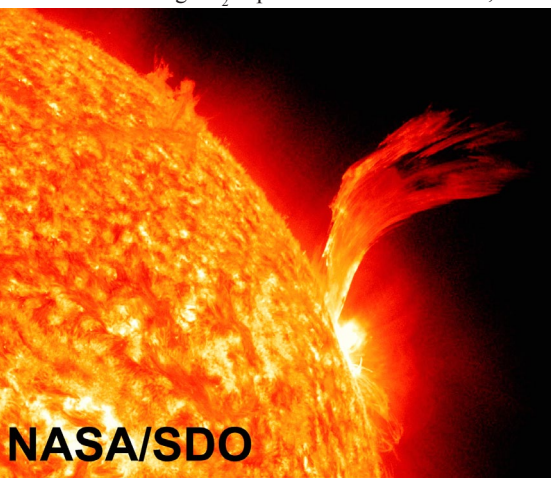
Hams who chase DX (distant stations) look forward to active sun years. Efficient propagation combines with low noise to make weaker signals as audible (or copyable) as the huge ones. Up here, little pistols can become as mighty as the big guns that rule the lower bands.

For utility DX, it's like suddenly getting a bigger antenna in a quieter location. Copy from digital signals benefits from more efficient propagation and lower multipath. Voice has lower noise and more intelligibility. Very distant places pop in and out, causing some real surprises. When conditions get really good, as in the past few days here, the entire daylight side of the planet becomes available for hours at a time.

❖ How It Works

For this discussion, the ionospheric layer of concern is the F_2 region, about 150-200 miles up. This dense region forms out of a larger, thinner F layer when the sun irradiates it in daytime.

Single F_2 hops are around 2000 miles, often with a "skip zone" of low or no signal in the middle. Multiple hops are common and world-spanning. On occasion, the best path is actually the long way around the planet. High-powered broadcast stations, especially those beaming the opposite direction, often have a dual-path echo when both routes are audible.



In the listener's local morning, the high bands begin to wake up with spotty single-hop skip, usually to the east, where the F_2 region has had longer to form. For similar reasons, the long-haul skip usually switches to the west in the late afternoon.

As conditions improve, skip zones become smaller and more paths open up. Usable frequencies move higher, often well above the supposed "upper band limit" of 30 MHz, to 50 MHz or even higher. Scanners with good outdoor antennas can reach out thousands of miles.

A few US public safety agencies, such as the California Highway Patrol, still use this band. While they complain about "skip," we seek it.

❖ What to Hear

Here's a breathless list of frequencies heard in California in the past few weeks.

In US Government, we have the **Federal Emergency Management Agency** in upper sideband (USB) sounding in Automatic Link Establishment (ALE). This is on 24526 kHz. The **Civil Air Patrol** is on 24553, 25354, and 26617 kHz ALE. The busiest frequency, however, is 25350, part of the **US Customs Over-The-Horizon Enforcement Network** (COTHEN). There's ALE and occasional voice from the **US Coast Guard**, plus assets involved in customs and drug interdiction operations.

Globe Wireless operates a worldwide network of high-powered stations. Most of these are the famous old maritime traffic handlers, now converted to data nodes. They still have the same world-spanning signals. Markers sound like Packet Teleprinting Over Radio (Pactor), though they are actually in a proprietary mode. Lately, these have been heard on 26119, 26133, and 26143 kHz. As is typical with digital modes, dial frequencies can vary up to two kHz.

One hears a lot of funny oddities up here. For years, a number of very weak signals that sounded like radioteletype (RTTY) defied all attempts at identification. It was only about a month ago that these were identified as **data telemetry from research buoys** in the ocean. Similarly, there are still quite a few long-line fishing beacons using this range.

Finally, there's all the chatter on the hundred or so unauthorized frequencies between 26 and 29 MHz. These can sound like the Citizens' Band (CB) authorized by many countries. However, they're a more anarchic activity with several names. Most commonly, it's "**freeband**."

Some operators aspire to a fully professional technique. They have nets, procedures, and sometimes call signs. Others show a considerable aversion to any radio discipline at all. For this reason, the on-air result can range from slick drawl to absolute chaos.

Here, the stations heard are mostly in Spanish, and definitely trending toward chaos mode. Operators use digital looping devices, echo boxes, and roger beeps to make some very odd sounds indeed. One ratchet-jaw plays a whistling tune every time he keys the mike, which is often. Some use extreme power, with fights over channels leading to frequent hammer-down wars and pure noise.

A few recent "freeband" hits here are: 26385, 26485, 26515, 26575, 26585, 27870, 28015, and 28075 kHz, usually amplitude modulation (AM).

❖ Ten-Meter Propagation Beacons

This 10-meter beacon network can be useful for planning utility hunting. It is part of a larger global propagation sounding project. This is maintained by the Northern California DX Federation (NCDXF) in conjunction with the International Amateur Radio Union (IARU). These have a very comprehensive web site at **www.ncdxf.org/beacon/beacons.html**

A tightly coordinated cycle of 5-band soundings is transmitted in 10-second time slots, by 18 stations worldwide. Each beacon moves sequentially through the bands. Any given station and frequency will repeat every 3 minutes.

The frequencies are 14100, 18110, 21150, 24930, and 28200 kHz CW. Each beacon sends its call sign in Morse code, at a quick 22 words per minute. Five one-second dashes follow. The call and first dash are sent with 100 watts. The next dashes are 10 watts, 1 watt, and 100 milliwatts.

If there's only silence, do not despair. A number of monitoring stations worldwide have web sites showing graphic plots of the past day's received signal strengths. A tremendous amount of propagation information is available here. A list of these stations is at **www.ncdxf.org/beacon/monitors.html**

Freeware programs are available to keep track of who is transmitting at any given moment. These really save a lot of work. A small, largely text-based, utility called **Beacon-Time Wizard** is in use here. A nag screen appears on shutdown, but the $25 registration remains optional.

The full list of beacon programs, for many platforms including smartphones, is at **www.ncdxf.org/beacon/beacontools.html**. Beacon-Time Wizard's web page is at **www.taborsoft.com/btw/**

The 100-kHz band above 28200 kHz has many other, louder CW beacons. Most are in the United States, but many other countries are represented. A frequently updated list of these is at **www.qsl.net/wj5o/bcn.htm**

Great holidays and good hunting to all, and see you next month.

10-Meter Propagation Beacons (28200.0 kHz CW)			
Slot	Offset (1)	Call	
1	0:40	4U1UN	United Nations, NY (2)
2	0:50	VE8AT	Eureka, Nunavut, Canada
3	1:00	W6WX	Northern CA, USA
4	1:10	KH6WO	Laie, HI, USA
5	1:20	ZL6B	Masterton, New Zealand
6	1:30	VK6RBP	Rolystone, Australia
7	1:40	JA2IGY	Mt. Asama, Japan
8	1:50	RR9O	Novosibirsk, Russia
9	2:00	VR2B	Hong Kong
10	2:10	4S7B	Colombo, Sri Lanka
11	2:20	ZS6DN	Pretoria, South Africa
12	2:30	5Z4B	Kariobangi, Kenya
13	2:40	4X6TU	Tel Aviv, Israel
14	2:50	OH2B	Lohja, Finland
15	0:00	CS3B	Madeira Islands (3)
16	0:10	LU4AA	Buenos Aires, Argentina
17	0:20	OA4B	Lima, Peru
18	0:30	YV5B	Caracas, Venezuela

1. The offset is from the beginning of the 3-minute cycle at 0:00. Slot 1 is the first one transmitted on 20 meters, so the sequence gets to 10 meters at 0:40.
2. May be off-air due to work on the UN building.
3. This is a small archipelago off Morocco, which belongs to Portugal.

REFERENCES

www.ncdxf.org/pages/beacons.html
www.ncdxf.org/beacon/monitors.html

ABBREVIATIONS USED IN THIS COLUMN

AFB.....Air Force Base
AFRTS .....US Armed Forces Radio/TV Service
ALE .....Automatic Link Establishment
AM.....Amplitude Modulation
ARQ.....Automatic Repeat reQuest
AWACS .....Airborne Warning And Control System
CW .....On-off keyed "Continuous Wave" Morse telegraphy
DHFCS.....UK Defence High-Frequency Communications Service
DSC.....Digital Selective Calling
E07.....Russian machine voice in English
E17z .....Russian English female, "674" variant
EAM.....Emergency Action Message
FAX .....Radiofacsimile
FEMA .....US Federal Emergency Management Agency
FSK .....Frequency-Shift Keying
HFDL .....High-Frequency Data Link
HF-GCS .....High Frequency Global Communications System
LDOC .....Long-Distance Operational Control
LSB .....Lower Sideband
M01b.....Unknown numbers, heavy repeat variant
M89.....Chinese CW numbers, 4-figure groups sent as a call
MARS .....US Military Auxiliary Radio System
Meteo .....Meteorological (weather office).
MFA .....Ministry of Foreign Affairs
MX.....Generic for Russian single-letter markers/ beacons
NATO.....North Atlantic Treaty Organization
NCS.....US National Communications System
PACTOR .....Packet Teleprinting Over Radio, modes I-IV
PSK .....Phase-Shift Keying
RTTY .....Radio Teletype
S28.....Russian Buzzer/ UVB76, buzzes and voice messages
SAM.....USAF Special Air Mission
Selcal .....Selective Calling
SHARES.....SHAred RESources, US Government frequency pool
SITOR.....Simplex Telex Over Radio, modes A & B
Stanag 4285 .....NATO "Standardization Agreement;" 8PSK teleprinting
UK .....United Kingdom
Unid .....Unidentified
US .....United States
USAF.....US Air Force
USCG .....US Coast Guard
V13.....Taiwan "New Star," music and live female voice
Volmet.....Formatted aviation weather broadcasts
WMD-CST.....Weapons of Mass Destruction Civil Support Team
X06.....Russian 6-tone selcal

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

18.1 Unid-Russian Navy headquarters, Moscow via Krasnodar, encrypted FSK message, at 1834 (PPA-Netherlands).
21.1 Unid-Russian Navy, encrypted FSK traffic, not parallel to 18.1, at 0854 (PPA-Netherlands).
24.0 NAA-US Navy, Cutler, ME, encrypted FSK at 1903 (PPA-Netherlands).
26.7 TBB-Turkish Navy, Bafa, encrypted FSK at 1908 (PPA-Netherlands).
2680.0 4XZ-Israeli Navy, CW marker, also on 4331 and 6379, at 1742 (Ary Boender-Netherlands).
3413.0 Shannon-Shannon Volmet, Ireland, formatted aviation weather simulcast on 5505, at 0205 (Allan Stern-FL).
4553.5 ZLST-German Customs, Cuxhaven, ALE with ZEMD (Customs Boat Emden, DLVH), and ZHEL, (Customs Boat Helgoland, DBQL), at 2325 (MPJ-UK).
4625.0 MDZhB-Russian military command (S28), Russian female voice message "MDZhB 68 030 Fibrioznyj 78 93 70 65," AM at 0320 (Boender-Netherlands).
4627.0 Unid-Russian Air Defense, CW identifier "8" in tracking data strings, at 0312 (Boender-Netherlands).
5164.0 RMP-Russian Navy, Kaliningrad, CW operator chatter with RJL99, at 0415 (ALF-Germany).
5680.0 Kinloss Rescue-UK Coast Guard, Scotland, unknown traffic at 1304 (Michel Lacroix-France).
5755.0 VMW-Wiluna Meteo, Australia, FAX South Pacific/ Antarctic chart at 2009 (PPA-Netherlands).
5765.0 Unid-US Navy, Guam, retransmitting AFRTS Interruptible Voice Channel, talk show at 1911 (PPA-Netherlands).
5811.0 Unid-CW numbers (M01b) callup "158 135 135 30 30," 5-figure-group message, ended "135 135 30 30 000," at 1515 (Boender-Netherlands).
5850.0 Halifax Military-Canadian Forces, Halifax, NS, calling off search by unknown aircraft, at 0331 (Gary Cohen-NY).
5851.5 OHAASF-US Army, OH Army Aviation Support Facility, calling unknown aircraft T1Z137, ALE at 2215 (Jack Metcalfe-KY).
6364.0 P50-Indonesian military, CW plain text traffic at 1258 (Eddy Waters-Australia).
6562.0 C3ALE3-Moroccan Army, working P5, ALE at 2204 (MPJ-UK).
6745.5 CB43-Algerian military, calling CB40, ALE at 1855 (PPA-Netherlands).
6751.0 VQ30-Algerian military, calling VQ35, ALE at 1903 (PPA-Netherlands).
6767.5 NCS015-NCS auxiliary station, ALE text message to USADA1010, USA Department of the Army, DC, at 1725 (Metcalfe-KY).
6798.5 0HR-Probable Combined Endeavour 2011 exercise player, passing vessel track to 0VU, at 1851 (PPA-Netherlands).
6809.0 "V"-Russian Navy, Khiva, Uzbekistan (MX), CW single-letter marker at 1951 (PPA-Netherlands).
6834.5 KVU-Possible Combined Endeavour participant, working RX2 and P5F, at 1953 (PPA-Netherlands).
6838.0 ABA-Maltese Maritime Squadron headquarters, ALE text message for AB1, also on 8207, at 0421 (PPA-Netherlands).
6861.5 Unid-Probably Algerian government, Bechar Province, calling Kerzaz and Abadla in PACTOR-I, at 2001 (ALF-Germany).
6921.5 TV7Y-Polish military, Combined Endeavor ALE link check with unknown player DR56, at 0945. N51K-Slovakian military, Combined Endeavor ALE link check with unknown 2LKN, at 0950 (ALF-Germany).
6989.0 RAL2-Russian Navy net control, working RMW2, RHQ2, RBL66, RBL672 and RIB2; CW at 0009 (ALF-Germany).
6992.5 MFP34-British Royal Navy Sea Cadets, Isle of Man, calling MFJ99 (group call sign for all Sea Cadets), at 1330. MRV80-British Royal Air Force Air Cadets, calling MFJ04, national net control, at 1340 (ALF-Germany).
6994.0 RGR35-Unknown Russian Navy vessel, working RIT, Northern Fleet headquarters, CW at 0946 (ALF-Germany).
6995.0 ED9U-Polish Air Force, Combined Endeavor ALE link check with 5GXS, Macedonian military, at 1000. EK7B-Probable Turkish military, ALE link check with 5GXS, at 1031 (ALF-Germany).
7038.8 "P"-Russian Navy cluster beacon (MX), also on 8494.8 and 10871.8, single-letter CW identifier at 0811 (Boender-Netherlands).
7041.9 "L"-Unknown Russian marker (MX), possibly St. Petersburg, also on 8497.9, CW at 0811 (Boender-Netherlands).
7348.0 FCSFEM2-FEMA Region 2, calling ST2FEM and SJ2FEM, probably disaster related, ALE at 1452 (Metcalfe-KY).

7632.0 KOQ 900-US Immigration and Customs Enforcement, FL, SHARES Regional Net check-in with NCS057 (NCS Auxiliary, TN); KTQ316 (US Environmental Protection Agency, GA); others; at 1606 (Metcalfe-KY).
7760.0 U5UW-Polish military, Combined Endeavor ALE link check with 5GXS, Macedonian military, at 0951. K15N-Latvian military, Combined Endeavor with 5GXS, at 1015 (ALF-Germany).
7763.0 RIR98-Unknown Russian Navy vessel, calling RIW, CW at 1710 (PPA-Netherlands).
7795.0 JMH2-Japan Meteorological Agency, Kagoshima, clear FAX satellite image, at 1918 (PPA-Netherlands).
7847.0 Antenna 74-Unknown Russian military, voice traffic in Russian for an unidentified station, at 1448 (ALF-Germany).
8023.9 CZT2-Chinese military, calling RXP7, CW at 1939 (PPA-Netherlands).
8045.6 MBY-Unknown US military or government player in monthly "3-letter net," ALE and voice with GHM, at 2006 (Metcalfe-KY).
8414.5 004122100-Shanghai Radio, China, DSC with 538003781, Marshall Islands flag bulk carrier Cape Lambert (V7TC9), at 1913 (PPA-Netherlands).
8930.0 Angola 655-TAAG Angola Airlines B777 registration D2-TEF, answered selcal BP-AQ and passed status to Stockholm LDOC, at 2251 (ALF-Germany).
8942.0 Malaysian 52-Malaysia Airlines A330 reg 9M-MTA, answering selcal AB-EM from Manila, at 1849 (PPA-Netherlands).
8950.0 Unid-Male chatting with another one in Italian, should be a Russian domestic air route frequency, at 2310 (MDMonitor-MD).
9010.0 PROFETA-Brazilian Air Force, ALE sounding at 0422 (ALF-Germany).
9017.0 5JL1-Venezuelan Navy frigate Mariscal Sucre, LSB ALE link check with T5L1, Puerto Cabello, then called on 8500, 8560, and 8582, at 0451 (ALF-Germany).
9725.0 New Star Radio Station-Taiwanese numbers (V13), flute tune and Chinese female with messages, at 0500, 0600, 1200, and 1300 (Boender-Hong Kong remote).
10000.0 PPE-Brazilian Observatorio Nacional, Rio de Janeiro, standard time pips and voice announcement every 10 seconds, at 2047 (PPA-Netherlands).
10048.0 San Francisco-North Pacific oceanic air route control, giving Japan Air 1 a secondary frequency of 8951, at 0540 (Patrice Privat-France).
10066.0 "06"-HFDL ground station, Hat Yai, Thailand, uplink to B-LNY, Hong Kong Airlines A330 flight CRK9237, at 1836 (PPA-Netherlands).
10146.5 OE3XEC-Winlink 2000, Amstetten, Austria, PACTOR-III e-mail for DC1IP, at 1758 (PPA-Netherlands).
10180.0 3A7D-Chinese military (M89), continuous CW callup to DKG6, new frequency, at 1130 (Waters-Australia).
10315.0 DHN66-NATO, Germany, voice and RTTY with Magic 51, E-3D AWACS back end, at 1834 (PPA-Netherlands).
10332.0 RIS96-Russian Navy vessel, calling RIW, CW at 2000 (PPA-Netherlands).
10390.0 2418-Moroccan police, calling 2011, ALE at 1945 (PPA-Netherlands).
10404.0 Unid-NATO PSYOPS broadcast to Libyan forces, looping in English and Arabic, at 1300 (Lacroix-France).
10460.0 Unid-Unknown, very active Russian simplex net, mentioned Leningrad (now St. Petersburg), at 1734 (PPA-Netherlands).
10493.0 V020IN-US National Guard, Virgin Islands, ALE sounding at 1150 (Metcalfe-KY).
10555.0 VMW-Wiluna Meteo, FAX list of recommended frequencies, at 1702 (PPA-Netherlands).
10765.0 CLS-US Army, Fort Campbell, KY, ALE sounding at 2322 (Metcalfe-KY).
10870.0 Unid-Russian Mazielka selcal (X06), AM test sequence 123456, at 1912 (PPA-Netherlands).
10871.7 "D"-MX cluster beacon, Sevastopol, Ukraine, also on 10047.7 and 13527.7, CW at 0811 (Boender-Netherlands).
10871.9 "S"-MX cluster beacon, Severomorsk, also on 10047.9, CW at 0811 (Boender-Netherlands).
10872.2 "F"-MX cluster beacon, Vladivostok, CW at 1906 (PPA-Netherlands).
10872.4 "M"-MX cluster beacon, Magadan, CW at 1827 (PPA-Netherlands).
10888.0 Unid-Russian Air Defense, formatted CW tracking datagrams with ? for missing characters, new frequency, at 1854 (PPA-Netherlands).
11055.0 RMA2-Unknown Russian point-to-point link, calling RGK2 in FSK Morse, then coded RTTY traffic, at 0405 (PPA-Netherlands).
11062.0 "The English Man"-Russian Intelligence numbers (E07), AM null-message callup "201 201 201 000," also on 12223, at 1700 (Boender-Netherlands).
11175.0 Fish Hawk-US military, EAM at 1801. Ivory 92-US Air National Guard, patches via Offutt (HF-GCS, Offutt AFB, NE) for fuel and arrival weather, at 1843. SAM 840-USAF 89th Air Wing Distinguished Visitor flight, working Andrews HF-GCS (Andrews AFB, MD), at 1919 (Stern-FL).
11201.0 Unid-Fishing boats off Eastern Australia, usual chatter and "salty language," at 0907 (Waters-Australia).
11232.0 Unid-Unknown Canadian Forces aircraft, at 1319 (Lacroix-France).
11235.0 61-Italian Air Force C-130J, working Charlie 46, 46th Brigade headquarters at Pisa-San Giusto Air Base, ALE at 1310 (MPJ-UK).
11238.0 GHM-Unknown "3-letter net" player, calling GWOFEM3 (FEMA), ALE at 1617 (Metcalfe-KY).
11250.0 RT1CMD-Possible US National Guard, calling RT2CMD, also on 13250 and 13500, ALE at 1940 (Metcalfe-KY).
11288.0 "16"-HFDL ground station, Agana, Guam, uplink to B-6332, China Eastern Airlines A321, at 1729. HL8213-Air Busan flight ABL712, HFDL position for Guam, at 1912. N454PA-Polar Air Cargo B747 freighter flight PAC212, HFDL position for Guam, at 1737 (PPA-Netherlands).
11300.0 Khartoum-African air route control, Sudan, trying to raise Jordanian Air Force RJZ344, who had been calling on 11330 [Wrong frequency. -Hugh], at 1841 (PPA-Netherlands).
11418.5 OEY80-Austrian Army, Villach, working OEY61, ALE at 1243 (MPJ-UK).
11500.0 3261-Turkish Red Crescent, ALE sounding at 0506 (PPA-Netherlands).
11585.0 RDI-Unknown Russian point-to-point, duplex FSK Morse and RTTY with RQF (on 12184), at 0428 (PPA-Netherlands).
12087.0 A090ZN-AZ National Guard, calling CTC14NG, (14th WMD-CST, CT), ALE at 2259 (Metcalfe-KY).
12133.5 American Forces Network-US Navy, Saddlebunch Key, FL, retransmitting various syndicated news programs from AFRTS, at 0140 (William Hassig-IL).
12140.0 Unid-Vietnamese Siren Jammer, AM audio sweep covering Radio Free Asia, at 1435 (Mike-West Sussex, UK).
12184.0 RQF-Unknown Russian point-to-point, duplex FSK Morse and RTTY with RDI (on 11585), at 0420 (PPA-Netherlands).
12315.0 ABA-Maltese Maritime Squadron, ALE text message for AB3 (Patrol Boat P-23), at 1418. ABA, working AB1, Patrol Boat P-21, at 1715. 3205-Alternate ALE call for AB3, working 3201 (ABA), at 1718 (MPJ-UK).
12333.1 Unid-Possible Saudi Arabian Navy, RY and foxes in bit-masked RTTY, at 2048 (PPA-Netherlands).
12431.0 CAGLIARI-Italian Financial Police, Cagliari, working PRATICA01 (Air Central Command, Pratica di Mare), at 1445. CAGLIARI, calling LAMPEDUSA (Financial Police, Lampedusa Island), at 1446 (MPJ-UK).
12577.0 005030001-Australian Maritime Safety Authority, Charleville/Wiluna, calling 419088700, Indian registry tug PFS Brave (ABVH), DSC at 1408. 006221111-Alexandria, Egypt, calling 351498000, Panamanian flag container ship Hanjin Irene (H3QD), at 1424. 003669995-USCG, Portsmouth, VA, DSC safety test to self at 1757. 005741040-Hai Phong Radio, Viet Nam, calling 371305000, Panamanian flag dry carrier Sunrise Star (3EBZ7), DSC at 1804 (PPA-Netherlands).
12585.0 NRV-USCG, Apra Harbour, Guam, CW identifier in SITOR-A burst marker, at 1759 (PPA-Netherlands).
12779.0 LSD-Globe Wireless Maritime Digital Radio Network, Argentina, identified by modem idler bit string, at 0952 (Waters-Australia).
12930.0 "The English Lady"-Russian Intelligence (E17z), AM message "674 913 5 52255 56717 15561 54227 54221 913 5 00000," also on 14260, at 0810 (Boender-Netherlands).
13528.0 "C"-MX cluster beacon, Moscow, also on 20048, CW at 1500 (Boender-Netherlands).
13617.2 RFFXC-French Ministry of Defense, Paris, ARQ "Controle de Voie" (control channel traffic), at 1804 (PPA-Netherlands).
13910.0 TravelAustralia-Radio net for vehicles in mostly Western Australia, many mobile stations at 0850 (Waters-Australia).
13927.0 Turbo 21-USAF KC-135R, calling "Mars Radio," no joy because stations had shut down for lightning, at 0047. Hawk 82-USAF B-1B, patch via USAF MARS AFA9PF to Hawk Ops, Dyess AFB, TX, at 1820. Chill 13-USAF B-52H, patch via USAF MARS AFA7HS, KS, to Minot AFB Meteo, ND, at 1920 (Stern-FL).
14396.5 WGY 9494-FEMA Auxiliary Station, CO, on SHARES national primary at 1612 (Metcalfe-KY).
14484.0 Looking Glass-Probable US Strategic Command airborne command post, exercise voice and RTTY on a MARS frequency with Desert Eagle, Horse Trader, Step Mother, Drop Kick, and Head Master; also on 4021 and 14938, at 1909 (Metcalfe-KY). Desert Eagle, with voice, RTTY, and data for Head Master, Poker Face, Green Acres, and ABM6USA (US Army MARS, HI), at 2345 (Hugh Stegman-CA).
14631.0 Unid-Russian Mazielka selcal (X06), calling 362154, at 0829 (Waters-Australia).
14776.0 V020IN-US Army National Guard, US Virgin Islands, ALE sounding (on FEMA net) at 0620. FR1FEM-FEMA Region 1, ALE sounding at 1138 (Waters-Australia).
14818.5 XGP-UK DHFCS mobile, ALE and serial data traffic with XSS, control at Forest Moor, at 1129 (PPA-Netherlands).
14901.0 Unid-Probable UK military, Cyprus, STANAG 4285 at 1045 (PPA-Netherlands).
15043.0 ICZ-USAF, Sigonella, Italy, ALE sounding at 1307 (MPJ-UK).
16006.4 Unid-North Korean MFA, no decode of 600/600 ARQ traffic, at 1234 (PPA-Netherlands).
16227.0 Unid-Possible Chilean Navy, calling FTE, ALE at 0850 (Waters-Australia).
16338.5 A090ZN-AZ National Guard, calling FLC44NG (44th WMD-CST, FL), ALE at 0100. A090ZN, calling GAC04NG (4th WMD-CST, GA), and HIC93NG (93rd WMD-CST, HI), ALE at 0140 (Metcalfe-KY).
16402.0 ABA-Maltese Maritime Squadron, Malta, ALE text message to AB1, Patrol Boat P-21, at 1627 (MPJ-UK).
16448.1 SS6-Possibly Naples, Italy, plain text STANAG 4285 channel availability marker, at 1343 (PPA-Netherlands).
16928.5 Unid-North Korean MFA, no decode of 600/600 ARQ traffic, at 1927 (PPA-Netherlands).
17103.2 XSG-Shanghai Radio, China, weather forecast in English, at 0921 (PPA-Netherlands).
17435.0 2011-Moroccan police, calling 22123, ALE at 1828 (PPA-Netherlands).
17458.5 A090ZN-AZ National Guard, calling GUC94NG (94th WMD-CST, Guam), and HFS1NG, probable signal unit, at 0145 (Metcalfe-KY).
17468.0 RIW-Russian Navy, Moscow, CW marker at 0658 (Waters-Australia).
17952.0 New York-North Atlantic oceanic control, selcal check FH-KP with EC-KOU, Iberia Airlines A340 flight IBE6345, at 1712 (PPA-Netherlands).
18200.0 Unid-Accented male voice calling Bravo Foxtrot and several other stations, some non-standard phonetics used, at 0815 (Waters-Australia).
18365.0 6WW-Senegal Navy, Dakar, encrypted STANAG 4285, at 1234 (PPA-Netherlands).
18493.5 FUV-French Navy, Djibouti, encrypted STANAG 4285, at 1233 (PPA-Netherlands).
19688.0 Unid-Russian Navy, Murmansk, data idler at 1228 (PPA-Netherlands).
23250.0 CBE-USCG Cutter Tahoma (WMEC-908, NCBE), ALE sounding every 61 minutes, starting at 1711. I31-US Customs Cessna 550 registration N2531K, ALE sounding at 1758 (Stegman-CA).
24526.0 FR5FEM-FEMA Region 5, ALE sounding every 60 minutes, starting at 2138 (Stegman-CA).
25441.6 RHV-Unknown "3-letter net," calling HYR, ALE at 1809 (Stegman-CA).
26617.0 6700ARCAP-US Civil Air Patrol, AR, ALE sounding at 2114 (Stegman-CA).

DIGITAL DIGEST

DIGITAL MODES ON HF

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Ecuador's Naval HF Network

This month we take another look at signals you can hear from Ecuador's naval forces and patch up a few things from a previous column.

Over the past few months, the Ecuadorean Navy has expanded its operations using both PacTOR-III and MIL-STD-188-110A high speed modems. In addition, more information has come to light uncovering the many six letter acronyms used to identify participants in their network, from bases and command organizations to the naval vessels themselves. The sheer number of these routing indicators prevents their publication in full in this column (see Resources), but some of the most commonly seen ones are listed below.

Among the most active MIL-188-110A channels have been 10400 and 12400 kHz USB, which often seem to alternate from day-to-day based on prevailing conditions. Signals are very strong here on the northeastern seaboard, especially during the late evening, and they are certainly audible well into Europe at night.

Like many other protocols carried by MIL-188-110A and other high speed modems, the Ecuadorean traffic is mostly encrypted, but header information can be seen if the messages are viewed in 7bit ASCII with 1 parity bit. Here are a few examples of what you can see when intercepting traffic:

```
DATA RATE 1200 LONG INTERLEAVER
NazO.olPg-c#cFRAMOR 9`c@]^_
  USS THACHXBgYTHERRERA $,)
  cfOBALGONQUIVP~d\a\TUFTY
  z|pe{bHBALTIC Ns@elb)MAERSK g
[EOM]
```

In this case, you can see a few ship names: *Algonquin*, *Baltic Maersk* and *Tufty*. FRAMOR is one of the Ecuadorean routing indicators and corresponds to the Frigate *Moran Valverde*.

```
DATA RATE 1200 LONG INTERLEAVER
n@z/)%TK^Do(*`txXCODESC *;X@vSPSS
  ++h0@gSPLEWIS (So
[EOM]
```

In this case, the identifiers are CODESC (Squadron Command, Quito) and PLEWIS (Unknown Vessel or Base).

A few evening's worth of monitoring of these channels produced the following routing identifiers:

COOPNA	COMANDO DE OPERACIONES NAVELS (HQ, QUITO)
CODESC	COMANDANCIA DE LA ESCUADRA (Squadron Command, Quito)
CORESM	Corvette CM-11 "*Esmeraldas*"
FRAMOR	Frigate FM-02 "*Moran Valverde*"
FRAPAL	Frigate FM-01 "*Presidente Alfaro*"
LAMQUI	Missile Patrol Boat LM-21 "*Quito*"
LAMUIL	Missile Patrol Boat LM-23 "*Guayaquil*"
TRACAL	Coastal Transport TR-62 "*Calicuchima*"

Here is the list of currently known frequencies and modes used:

7667U	Clover-2000 HF modem
7667.7U	MIL-STD-188-110A HF modem
7900U	MIL-STD-188-141A ALE, MIL-STD-188-110A HF modem
8122.4cf	109bd/400 SITOR-B
8123.5cf	PacTOR-III HF modem
8165U	MIL-STD-188-141A ALE, MIL-STD-188-110A HF modem
8211.5cf	109bd/400 SITOR-B
8238.8cf	109bd/400 SITOR-B
8245U	MIL-STD-188-110A HF modem
8281.5cf	PacTOR-III HF modem
8355U	MIL-STD-188-110A HF modem
8750U	MIL-STD-188-110A HF modem
8758U	MIL-STD-188-110A HF modem
8873U	MIL-STD-188-110A HF modem
8973U	MIL-STD-188-141A ALE, MIL-STD-188-110A HF modem
8901.5cf	109bd/400 SITOR-B
9072.5U	MIL-STD-188-110A HF modem
10245U	MIL-STD-188-110A HF modem
12323.5cf	109bd/400 SITOR-B
12400U	MIL-STD-188-110A HF modem
16127.5cf	PacTOR-III HF modem
16416.4cf	109bd/400 SITOR-B
18201.5cf	109bd/400 SITOR-B
18451.5cf	109bd/400 SITOR-B

Note that operators often chat after PacTOR-III and SITOR-B traffic 1.5kHz below the center of data frequencies given below. I have yet to hear any voice on channels where ALE and 110A modems are used.

❖ Australian Mil Follow-up

My fellow writer Larry van Horn provided great in-depth coverage of the Australian military HF networks in the July 2011 issue of his *Milcom* column. Many of these channels are easily copied here in the US. In the article, Larry quoted the official emission designations assigned to each of these channels which, as you can imagine, are rather generic. Here are the digital modes that actually occupy these various channels:

6K00B9W Multi-channel, independent sideband (ISB) RTTY

The main mode used in conjunction with this description tends to be made up of two different signals. At +1350Hz above the USB point there is a 50bd/350Hz shift STANAG4481 FSK encrypted RTTY signal. On the LSB, with the same offset, is a 600bd/600Hz shift STANAG4481 FSK encrypted RTTY signal.

This mode has been copied on at least 7681, 8460, 10368, 10407, 11474, 12812, 13440, 14520, 15858 and 17002kHz USB.

Sometimes, this dual-RTTY system is replaced with 2400bd MIL-STD-188-110A HF modem signals at the usual +1800Hz offset.

3K00H9W Single sideband, digital information

Most of these channels appear to carry regular, single channel 2400bd MIL-STD-188-110A HF modem signals.

Some regular channels that don't appear in Larry's list of official frequencies carry **independent sideband 2400bd MIL-STD-188-110A HF** modem signals. These can be heard regularly on the following channels: 7823, 8225, 8560, 9056, 9100, 10368, 10421, 10513, 10516, 10595, 10965, 11441, 12230, 13440, 13525, 13530, 14913 and 18435 kHz.

That's all for this month's digital goings on. As always, please keep your letters and emails coming with your ideas for what you'd like to see here in the future.

RESOURCES

Ecuador Navy Routing Indicators
http://dl.dropbox.com/u/301213/Ecuador%20Navy%20Routing.pdf

ON THE HAM BANDS

THE FUNDAMENTALS OF AMATEUR RADIO

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Anniversaries, Interference and Spicy Coax!

Wow! It's already been a year since I started writing "On the Ham Bands!" Talk about time dilation. It seems like a few months, to be sure, but not even close to a year. Cue the *Twilight Zone* music… dim the house lights…switch on a lone, harsh spotlight…and enter Rod Serling, stage right…

I have tried to use my bully pulpit to promote a practical, common sense approach to amateur radio topics of interest to beginners and intermediate operators. Looking over the first year's headlines might reveal a bit of an "antenna bias," but antennas (and feed lines) are critically important to enjoying and exploring ham radio. Without a good antenna there's just not much radio taking place! I expect to branch out a bit in the months ahead, but I will certainly revisit antenna system topics regularly.

The columns about horizontal loop antennas, open-wire line and antenna tuners generated the most e-mail, including the most recent letter from Tony Leneis Sr, N6DXX. He commented on the ladder line columns, reminded me about WA1FFL's center insulator (designed for ladder line, see the photo), and asked me to include material in a future column about off-center-fed dipoles fed with open-wire line.

As it turns out, my original horizontal loop guru from decades past is also an OCF guru, so if I can find his hidden "ashram of RF awesomeness," I will seek answers from the Omniscient One on our behalf. I used a rather large OCF antenna in the past, fed with twinlead, with excellent results. Unfortunately, I wasn't able to compare it to my "reference" antenna, the horizontal loop.

Reader Tony Leneis Sr, N6DXX, in commenting on my open-wire line columns, reminded me about WA1FFL's *Ladder-Loc® center insulator, a patented strain-relief and mounting support for 450-ohm ladder-line. Unlike the cannibalized plastic food containers I sometimes use for this purpose, WA1FFL's center insulator is UV-stabilized and has a proven field record of durability! Check it out at* ***www.wa1ffl.com.***

Keep your e-mailed questions, comments and suggestions coming in the year ahead. I look forward to receiving them, reading your questions and seeing what's on your mind.

❖ Ubiquitous Interference

During the winter months of every year, intrepid broadcast-band listeners trek to electronically and geographically isolated locations to fire up sensitive, battery-powered radios in search of weak DX stations they can't normally hear from their RFI-infested home stations. The march of technology provides benefits and baggage. In this case, the sea of electronic devices that surrounds us (electromagnetic waste) raises hell with LF, MF and HF reception.

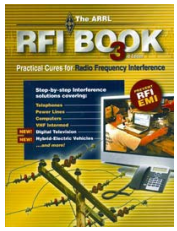
The effect is insidious, and many beginning hams don't even know that, in decades past, the bands sounded better (less background noise improves signal-to-noise ratios universally) because background electrical noise levels were much lower than they are today. Neighbors, industry, power substations, high-voltage transmission lines, wireless routers, baby monitors, touch lamps, high-tech clothes dryers, and microprocessor-controlled microwave ovens (microprocessor-controlled *anything*) conspire to produce truly horrible RF noise levels. Scientists are actually worried that there will soon be no practical places to build radio telescopes and other sensitive RF listening devices! (From an astronomer's perspective, light pollution presents a similar and serious problem.)

Hams experience this mess on a daily basis. And in addition to receiving interference from hundreds of electronic devices in our personal "space," including the computers in our homes and shacks, by transmitting we can interfere with our own non-radio devices (and those of our neighbors)!

Because of deed restrictions and draconian neighborhood associations, many hams have to "hide" their ham radio activities, which can actually make things worse. Explaining that a nearly invisible backyard dipole produces less (or no) RFI compared to a similar antenna mounted in an attic rarely sways a stone-faced condominium board (and the outcome of such a disclosure would probably be worse than just "going stealthy").

America's "new norms" are also not doing us any favors. Now that the economy is *really* on the ropes, manufacturers have absolutely no incentive to spend the extra $2 required to make consumer products that can peacefully coexist with RF – amateur or otherwise. And instead of establishing or enforcing RF immunity standards, the FCC seems to be focused on ways to give Big Media more power and more money. Like it or not, until regulatory relief arrives (don't hold your breath!), hams will have to take care of themselves in this arena.

The "one-stop shopping" solution to understanding and fixing most RFI situations for hams and SWLs is *The ARRL RFI Book 3: Practical Cures for Radio-Frequency Interference*. Now in its third major edition, this jumbo reference is a comprehensive resource for fixing every imaginable interference problem in your home or mobile shack. Your local library probably has a copy, and if you don't want to spring for the $30 third edition, the red-cover first edition sells for less than $10 at **www.half.com** or on eBay.



❖ Who's responsible for interference?

Determining exactly who's responsible for fixing RFI situations can be challenging at best. For sure, we know that hams *must* comply with all appropriate FCC regulations. At a minimum, make sure your station equipment is properly installed, has a good RF ground, and uses a low-pass filter at the transceiver output.

Despite the indignant cries of their owners, the FCC considers telephones, VCRs and other consumer electronics devices that receive RFI to be *improperly functioning* as radio receivers. On paper these design inadequacies are manufacturer issues.

The RFI susceptibility of consumer electronic devices is defined only by the manufacturers' *voluntary compliance* with committee-developed standards. These standards do not address operating the equipment in close proximity to RF sources. Hams who own transmitters being operated in a compliant manner are not responsible for RFI in such situations and, in general, if your neighbors experience RFI from your properly licensed, engineered and operated ham station, they are responsible for any corrective measures.

The FCC requires that ham transmitters not emit *spurious signals* that interfere with other *radio services*. This is a ham's sole *regulatory requirement*. So, if you mess up your neighbor's

TV reception, the FCC probably won't even notice, but if you interfere with local airport systems, a SWAT team may break your door down before you're finished with the offending QSO! The FCC recognizes a *gigantic difference* between the two situations.

If your station complies with amateur service regulations and you're using accepted operating practices, etc, interference is mostly *someone else's* problem. From a purely regulatory perspective you're on pretty solid ground, but in the real world you'll probably want to be more accommodating.

❖ Clean up your own act

As a practical first step in troubleshooting, make sure that your transmitter isn't the cause of the problem. Run a few quick tests to see what bands, modes and power levels are involved. Most RFI problems aren't mode sensitive, but they're usually power related, making low-power operation a somewhat universal RFI-mitigation tool. Most RFI problems are also frequency related, which can help in troubleshooting.

As mentioned, be sure to use good engineering practices at all times. Consider running low power. Put up a good antenna system (outdoors, if possible, the higher the better). Use a good-quality RF station ground, and use a low-pass filter at your transmitter output. Low-pass filters won't eliminate all types of RFI, but they will attenuate higher-frequency harmonics and spurious signals that might produce RFI. (As I found out the hard way, they will also "attenuate" your desired 6-meter transmissions if the low-pass filter is on the coaxial cable that also handles HF! So *that's* why my output on 6 meters is only a few milliwatts!)

❖ Transmitter-related RFI

Transmitter-related RFI has three main causes:

Fundamental overload. Even if it's clean as a whistle, your transmitted RF can simply overpower an affected device through antenna lead-ins, speaker wires, ac line cords, ground wires – or all of the above.

Intermodulation and external rectification. Corroded outdoor electrical connections, corroded joints in downspouts, antenna towers or metal-sided buildings, and bad solder joints in telephone and electrical junction boxes (and many similar "natural rectifiers") can radiate RF energy and harmonics when "excited" by your station's RF.

Spurious emissions (harmonics, mixing products, noise) and other unwanted signals generated by your transmitter. Reducing transmitter power, using a low-pass filter, or using certain antenna tuners can sometimes eliminate this type of interference.

❖ Differential-mode vs. common-mode

Fixing ham-type interference issues usually involves dealing with differential-mode and/or common-mode RFI. Using a TV receiver with an external, coax-fed antenna as a simple example, if the TV antenna receives its desired TV signals *and* your undesired ham signals, both signals will travel to the receiver through the center conductor of the coax and the ham RF will interfere with the set's reception. If you install a high-pass filter at the TV's antenna port – a typical differential-mode RFI cure – the filter will attenuate the lower-frequency ham signals while passing the desired TV signals (hopefully fixing the problem).

Because differential-mode cures can be so simple, it's unfortunate that most RFI has common-mode roots, where the interfering signal arrives on the coaxial cable's center conductor *and* the shield braid (or on multiple antenna, ground, speaker or power leads simultaneously). To make things interesting, different cures are required for different interference modes.

When RF from your transmitter is adversely impacting some other device, the first step in solving the problem is determining exactly how the RF is "being received." Don't assume, for example, that a TV set is receiving unwanted signals through its antenna. Power cords, speaker wires, audio/video input and output cables and ground leads can also receive RF.

The best way to start the tracking process is to disconnect a system's "RFI antennas."

For TVs and AV gear, disconnect the coax from the antenna input and try a few test transmissions from your shack. If the RFI stops, you know that the problem is antenna related and not related to power leads, speaker wires or interconnecting cables. If the problem is being caused by harmonics of your transmitted signal or simple front-end-overload (differential-mode RFI), installing a high-pass filter (available at your local Radio Shack) at the antenna input (and/or a low-pass filter at your transmitter output) may be all that's necessary.

If interference is still noted when a high-pass filter is in-line, or if interference is present when the antenna is disconnected, RF is entering the system through the outside of the antenna lead-in, the power cable, or some other interconnecting cable. This is the hallmark of common-mode RFI. Disconnect any cables or speaker wires running to amplifiers or other system components to see if the RFI situation changes. If it does, plugging these cables back in one at a time will often pinpoint the source of the problem.

Radio Shack and various online vendors sell ferrite cores in several shapes and sizes to help you in your plight. At a previous QTH, cleaning up my own RFI problems required quite a few cores! Treating signal cables, coaxial antenna leads, speaker wires and power cords for common-mode RFI requires similar procedures, so don't be shy about applying them to the ac line cord, too.

To make a common-mode RFI choke, wrap a few turns of the cable, cord or wire through an appropriately sized ferrite core located as close to the chassis/connector as practical, securing the windings with electrical tape or small cable ties as necessary. This will often reduce or eliminate the RFI and will let you know if you're on the right track. Eliminating severe common-mode RFI may require adding chokes to most (or all) interconnecting cables.

RF signals often enter AV systems via the speaker leads, which conduct RF energy to diodes or transistors in the audio amplifier circuits, where the solid-state devices rectify the RF and mix the distorted signal into the amplified audio chain. Adding common-mode chokes often keeps the RF from reaching the amplifier circuits. (Although once common with tube amplifiers, don't add capacitors between speaker outputs and ground when using solid-state gear.)

Curing telephone RFI usually requires installation of in-line filters or common-mode chokes at the service entry, at each telephone, and sometimes in the handset lines! These filters are available from online vendors and sometimes from your local phone company.

Older phones were often built with premium-quality components and lacked the solid-state innards that make many modern phones so susceptible to "receiving" RFI. If you're using a $7 phone, consider spending a few more bucks – it might just eliminate your RFI problem in a jiffy!

❖ RFI: A Guaranteed Eventuality

Unless you move to Nunavut (and if you do, be sure to bring your rig with you!), you will encounter RFI sooner or later from your radio or to your radio (which we haven't really addressed yet). With the recent switch to digital TV, more and more viewers are receiving their TV signals off the air, and the relative protection hams enjoyed during the "cable TV only era" is a thing of the past.

Do yourself a favor and spend some time learning about how to handle basic RFI issues. At a minimum your own family will thank you!

SQUIRREL CHEWS FROM KK

I've lived in "squirrel country" for almost 50 years and, to date, none of the little critters has ever considered snacking on my coaxial cables. My cable TV installer buddy, who provided these "squirrel chew" samples, convinced me that not everyone is so lucky! Cable TV providers are plagued by squirrels that relentlessly chew through RG-6 (bottom) and even aluminum-jacketed hard line (top). A quick internet search revealed that plenty of hams have similar issues.

Some cable companies report partial relief by using cables that have cayenne pepper impregnated outer jackets! Now that's some spicy cable! Some hams in infested regions slather hot sauce, red pepper or even mace on their existing cables to repel critters. No kidding! (*NT0Z photo*)

GETTING STARTED

THE BEGINNER'S CORNER

Ken Reitz, KS4ZR
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Squeezebox Q&A and FiOS QRM

My October column on "WiFi Listening in a non-FiOS Household" brought several responses from readers. First, Dan Flynn writes, "I just finished reading your wonderfully informative article and decided to take the plunge. I looked in the Grove 2011-2012 Catalog for the Logitech Squeezebox Internet Radio and saw only the Grace WiFi radios. Now, I'm confused. Given all the options, which WiFi radio would you recommend?"

Good question, Dan! Checking out the Grove catalog, they do carry a number of different Grace and Sangean WiFi models ranging in price from $100 to $300. They apparently don't have a source for the Logitec Squeezebox. There's a lot to choose from in this field and I recommend that you sift through the GlobalNet columns over the past year or so to get a thorough education on a number of popular models including ones carried in the Grove catalog.

Grace WiFi radio (Courtesy: Grace)

Sangean Wifi radio (Courtesy: Sangean)

I've looked at many and believe they all have pretty much the same features, except for the least and most expensive. I would stay away from the least expensive; they just don't seem to be substantial. Look for features that mean the most to you (size, output/inputs, remote control included or not, rechargeable battery included or not, etc.).

I was able to hear the Squeezebox in the Crutchfield showroom so I knew the audio was excellent; the controls easy to navigate; the screen very legible and the size just right. I

Logitec Squeezebox (Courtesy: Logitec)

was sold on the spot. I would rather it have an additional line-out for plugging into a stereo instead of going through the headphone jack, but it doesn't. It's not that big of a deal.

I liked the Squeezebox because it was exactly the size I needed for the desk, it's portable and it's red. After I bought mine I found it on the Logitec web site for $150 with free shipping (I paid $180 at Crutchfield). The price on the Logitec home page is stated at $180 but, when you go to check out, it comes up as $150 with free shipping. **https://buy.logitech.com/store?Action=DisplayPage&Locale=en_US&SiteID=logib2c&id=ShoppingCartPage**

I also found a refurbished Squeezebox (black) for $120 on their site, an outstanding deal. And, after using mine for two months, I'd recommend buying the remote control and back-up battery package for $50. It's not a problem when the radio is on the desk, but when it's across the room it's nice to be able to use the remote. The battery back-up helps when you want to move the radio and need to unplug it to do so; it has to go through the boot-up routine when you plug it back in. It would also be nice to be able to take the little radio out on the deck on a nice day and listen to my favorite stations. Order accessories here: **www.logitech.com/en-us/speakers-audio/wireless-music-systems/devices/6066**

If you bought the refurbished unit and the remote/battery package you'd still pay $20 less than I did! Incidentally, I'm even more satisfied now than when I wrote the column and I did indeed cancel my XM subscription. No need for it anymore.

In a follow-up question, Dan wanted advice on buying a Part 15 FM transmitter to use with his Squeezebox. I recommend reading the September issue of *MT* which had a feature article on Part 15 broadcasting, and there is a list of FM transmitters reviewed by the author. I use the FM transmitters offered by C.Crane. They are small, frequency agile with a digital readout, dual power via wall transformer (included) or two AA batteries (not included). The transmitter has a range of 30-50 feet, adjustable audio with a red over-drive warning LED, an on/off switch, telescoping swivel antenna and audio connector with mini-stereo plug attached. The audio frequency response is from 40-16,500 Hz; coverage is from 88.3-107.7 MHz, and it is FCC certified.

I've used one of these transmitters 24/7 for many years with no drift and excellent performance. If you're using such a transmitter you might find it barely gets out 20 feet, but you can improve indoor coverage by locating the transmitter in a central location in your house and placing it as high as you can. Don't try to add a bigger antenna as that will nullify its FCC certification and could cause harmful interference to licensed broadcasters. If you live in an apartment complex, for instance, your neighbors could complain which might lead to a visit from FCC field agents.

You can buy this transmitter online at: **www.ccrane.com/radios/fm-transmitters/fm-transmitter-2.aspx** or order via toll free number: 800-522-8863. It normally sells for $60, but often C.Crane has open box and returned units at substantially lower prices (around $44) in their "orphans" section of the web site. If you want to buy one of these and you don't see one on the orphans page, keep checking over the next week or so; one will eventually show up.

❖ CBS Radio Disappears

Clark Rennie wrote, "Just reading your column in the October issue of *MT Express*. I too have a Logitech Squeezebox and noticed that many, if not all, CBS radio stations streams are not available any more on the Squeezebox. Even though I'm in Los Angeles, I prefer to listen to several Los Angeles CBS stations with the Squeezebox, but no more now. Are these streams available with any other Internet radio?"

Thanks for your question, Clark. It points up a few of the problems with Internet radio in general and Logitec Squeezebox in particular. There are, by CBS' count, 130 CBS affiliate stations nationwide. I checked into the issue of streaming CBS stations and found that the company has apparently revoked all previous content agreements. Their streams are all available online at *www.cbsradio.com/stations/index.html*, but there are no apps for Squeezebox or any other Internet radio.

Tunein.com had a prior streaming license agreement with CBS Radio but that agreement was apparently pulled as well, as I found out when visiting their website. While I was at Tunein I set up an account (free) and added the Tunein app to my Squeezebox which now lets me tune in many thousands of interesting streams, but not CBS Radio. When I went back to my Squeezebox and, using the newly loaded Tunein app, I did find a listing for KNX-AM, a CBS news/talk station in Los Angeles, but when I brought up the stream I was met with an audio loop telling me that the station was not available.

That led to a Google search on CBS Radio stations and Squeezebox, which brought me to the Logitec forum where I found the solution discussed: **http://forums.logitech.com/t5/Squeezebox-Players/CBS-Feeds-Now-Restricted-via-TuneIn-what-to-do/td-p/667208/page/7**. This information was valid as of 9-10-11. Following the instructions found on the Logitec forum, I was able to add any CBS radio station to my "Favorites" list.

It's good to remember that Internet radio is an evolving world, dependent on agreements and restrictions demanded by rights holders. What we are enjoying today may easily disappear tomorrow due to corporate policy (either by the program provider or the streaming provider), software glitches, ISP restrictions and possible government intervention (I can easily see this happening in the case of Public Service monitoring). It's my opinion that we will eventually be asked to pay for much the Internet content we currently get for free, a very easy thing for program providers to set up. But, until then, enjoy!

❖ Your Right to Listen

One thing that struck me as I read the various threads on the Logitec forum: Many listeners believe that the purchase of an Internet radio somehow entitles them to listen to anything on the Internet. One forum poster was indignant, "I paid hundreds of dollars for all my Internet radios!" As if somehow it was Logitec's fault that they couldn't hear what they wanted.

It reminded me of satellite TV in the 1980s. At that time, every TV network, every cable network (including the premium movie and adult content channels), as well as many dozens of local radio stations were all transmitting on various transponders (mostly C-band), in the clear. In order to watch or listen all you needed was a satellite TV system. They were expensive in those days, typically $2,000-4,000.

By 1986 the industry had settled on an encryption scheme that let the program providers encrypt the programming and sell to backyard dish owners who wished to subscribe, what they had been receiving for free. Oh, the humanity! You would have thought the end of the world had come. In those days there was little in the way of Internet forums, but the satellite TV guides were bristling with indignant letters from readers who had paid thousands of dollars to get "free" HBO programming. Some claimed that the signals fell into their backyard and they had a right to receive them by any means. Others claimed that taxpayer money built the space program that gave us satellite technology and that, as taxpayers, we had a right to watch anything on any satellite.

Regardless of how it began, the Internet is now just another commercial platform. And, just like satellite technology, it's all about the bottom line: how to turn a profit. Right now, few scrupulous entrepreneurs have figured out how to make it profitable.

❖ FiOS Headaches

Shawn Neel is one *MT* reader who actually is on Verizon's Fiber Optic cable Service (FiOS) and his complaint is entirely different. "I have had FiOS at my house for over two years and the interference is unbelievable; even outdoors and away from the house, the interference is still there… I did not have any of this before FiOS was installed." He has traced the noise to wall plugs, the ONT (Optical Network Terminal), to the router, coax, coax splitters etc., with the router being the biggest problem. He notes, "If I turn off the WiFi router it helps some but very little… The interference is on every part of the spectrum from 25 MHz to 800 MHz and maybe higher. Some of the tones and buzzing are unbelievable; it can knock you right out of your chair!"

The deeper into the modern, high-tech world we get, the greater the chances for interference to those of us in the radio hobby. The last few years have brought a whole new wave of interference issues to hams and shortwave listeners. Many sources of RFI, such as Broadband over Power Lines (BPL), have been well documented. Others, including everything from home routers to home appliances are becoming big headaches nationwide.

Many national Internet forums have pages and pages of complaints from non-radio hobbyists griping about all manner of RFI emanating from cable-TV and computer related equipment to otherwise normal household appliances such as microwave ovens. But, interference works both ways. Some hams have complained about their own on-air activities disrupting their own FiOS, router and computer connections (much to the dismay of the rest of the family!). One ham complained of RFI generated from a neighbor's solar power charge converter 400 feet away, another complained of RFI from his agitatorless washing machine, another found it was his refrigerator. All complained of interference up and down the bands from plasma screen TV sets.

Often RFI issues are isolated or anecdotal. One ham complained on a forum about FiOS interference only to hear from several other happy hams who had no such problems on the same service. Solutions from these sources are as plentiful as responders with mixed results. Most cable-TV companies respond to complaints of interference and that's where you should start. Explaining what steps you have taken in investigating the interference and why it's important to you to have the issue resolved will help their own investigation. It's possible they'll find improperly made or loose connections as well as faulty equipment that can easily be replaced. They may have filters that can be fitted to the various FiOS devices that will help as well.

What about other *MT* readers. Do you have interference from your cable-TV service? Let me know.

PROGRAMMING SPOTLIGHT

WHAT'S ON WHEN AND WHERE?

Fred Waterer
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My Favorite Season in Radio

December has arrived once again, the weather is colder (at least here in the Northern Hemisphere), the days are shorter, and the holiday season has snuck up on us once again. December is my favorite time of the year to be a radio listener, since the shorter days mean more opportunities to hear some medium wave stations, and shortwave reception is often better. Plus, it is quite comfortable to surf the net in a nice warm house, when it is -20 degrees outside!

Each year as December rolls around, one can look forward to hearing many radio traditions, audio gems that turn up every year, and as one tunes around the dial or the net, one can often discover other programs that may be new to you, but are someone else's long-time favorites. Many programs are heard only at this time of the year, some of which have a festive theme, some have a religious theme, others look back at the year coming to an end, and still others anticipate the New Year to come.

Forty-one years ago, as a Christmas present, I received my first transistor radio. I had no idea how significant that little gift would be, but it truly changed my life. I took that radio everywhere, listening to Top 40 radio out of Toronto. From that Christmas morning in 1970 to the present day, radio has been my constant companion, always entertaining, informing and teaching.

❖ Seasonal Fare

A new tradition:

Last Christmas, I spent a lot of time listening to **RTE Radio 1** in Ireland via the internet. Having been a regular **BBC World Service** listener for over three decades, it was interesting to hear a different take on some BBC favorites and other long-time Irish broadcasting traditions that were brand new to me.

For most of my adult life, one of my annual traditions has been listening to the BBC presentation of the *Festival of Nine Lessons and Carols* on Christmas Eve. Last year, I listened to a version from St. Patrick's Cathedral in Dublin. It was heard at 1600 UTC. Other programs heard on **RTE Radio 1** on Christmas Eve included *Mooney, With Santa* which featured an opportunity for the children to write or phone in and talk to Santa before he set out on his journey around the world. Cute stuff for the kids! Later in the evening, at 2102 UTC, RTE presented Charles Dickens' *A Christmas Carol*. It made for great listening on Christmas Eve.

On Christmas Day, specials continued with programs about the Nativity (*When a Child is Born*) and a wide variety of musical and spoken word specials. And this was just on one of RTE's radio networks. All RTE networks get into the Christmas spirit; in fact in 2010, RTE offered a 12-page pdf brochure just outlining the highlights of their special seasonal programming on radio.

This was my first time listening to Irish radio at Christmas, but it will not be my last. Check it out for yourself at **www.rte.ie/radio/**

A not so new tradition:

Australia and New Zealand present Christmas with a twist. In the Southern Hemisphere, Christmas is a summertime event. Picture Santa on a sleigh pulled by "Six White Boomers" (Kangaroos). Picnics on the beach, sports and other outdoor activities are the norm.

Christmas programming from Australia and New Zealand is an older tradition for me. For many years I would listen to **Radio Australia** and **Radio New Zealand International** when possible. During one memorable broadcast in the 1990s, I heard a lovely Maori choir sing *Silent Night* via RNZI, and despite the static of the shortwaves, that was the highlight of my Christmas listening that year.

Christmas is a big day on **Radio New Zealand National** heard in CD quality via the internet. Some of this programming may also be available via **Radio New Zealand International**. Just remember the time difference. One of the highlights for me was *Wayne's Music for Christmas Eve*, heard at 11pm Wellington time, 1000 UTC Dec 24. It is two hours of music for Christmas presented by Wayne Mowat.

At 0607 UTC on Dec 25, one can hear *Christmas Night with Peter Fry*, a four hour program of seasonal music, reminiscences and requests, followed by a church service (in 2010 this originated at The Cathedral of the Sacred Heart in Wellington).

Even older traditions:

For almost as long as I can remember, Christmas has meant listening to two programs in particular. The first is the *Queen's Christmas Message to the Commonwealth*. Each year at Christmas Queen Elizabeth broadcasts a message, continuing a tradition begun by her grandfather King George V, and continued by her father King George VI. These messages have changed with the times, available via television since the 1950s, and now available via the internet. The Queen even has a Facebook page!

There is an amusing story about the first Christmas broadcast in 1932. It was decided that the broadcast would be made at 3pm, in order that as many people in the Empire as possible should be able to hear the broadcast via shortwave. This resulted in an early morning broadcast in Western Canada. The CBC subsequently received a letter of complaint from an elderly listener complaining that it was rude of the CBC to make the King get up so early to make the broadcast! Evidently she didn't grasp the concept of time zones.

These messages have at times been quite memorable; for instance in 1992, Queen Elizabeth coined the phrase Annus Horribilis to describe the trying year the Royal Family had experienced. In 1939 her father the King had spoken words of comfort to the Empire in the early days of a war, the outcome of which could not be known. "A new year is at hand. We cannot tell what it will bring. If it brings peace, how thankful we shall all be. If it brings us continued struggle we shall remain undaunted."

The *Queen's Christmas Message* can be heard at various times around the world via the **BBC, CBC, ABC and RNZ**.

The other programming tradition that I have enjoyed for many years is the Christmas Eve broadcast of *As It Happens* on **CBC Radio One**. On Christmas Eve, the hosts of the program speak to members of the Canadian Armed Forces serving abroad.

Over the years they have heard from servicemen and women from such diverse places as Alert in the Arctic, the Golan Heights, Cyprus, Germany, Bermuda(!), Somalia, and Afghanistan and aboard various Canadian naval vessels. Military personnel in each place send greetings back home and talk about their missions. At the conclusion, they all contribute to the singing of a Christmas carol. It's oftentimes a very heart-warming program.

This is followed by a reading of the short story *The Shepherd*, a story about an RAF fighter pilot flying over the English Channel on Christmas Eve, who runs into difficulties and is guided home in a rather supernatural way. It is one of the most requested readings of the year.

Getting back to the BBC, for many years, the World Service was our window onto a British Christmas, with an extensive schedule of seasonal

programming. While the variety and accessibility of World Service programming has retreated, a whole new opportunity has opened with the availability of the many domestic BBC services and stations via the World Wide Web.

BBC Radio 4 is very much like the World Service of 20 years ago, in terms of the variety of programming available. Here you will find *The Festival of Nine Lessons and Carols* from St. Martins-in-the-Fields, *The Queen's Christmas Message* and many other seasonal favorites. In addition, **Radio 4Extra** (the former BBC Radio 7) will present many classic programs, such as Christmas editions of *Beyond Our Ken, Round the Horne, Hancock's Half Hour* and many more. Another program that has become something of a tradition on **4Extra** is *I'm Sorry I Haven't a Christmas Carol*…an outrageously funny presentation by the cast of *I'm Sorry I Haven't a Clue*, including the late Humphrey Lyttelton.

Both **Radio 4** and **Radio 4Extra** offer weekly email notifications of upcoming programming. These are very handy for planning your listening. In addition, upcoming schedules are posted regularly on all BBC websites, so one can get a flavor of Christmas in not only England, but Wales, Scotland and Northern Ireland.

❖ Internet-based Radio Stations

Radio Scooter International is a station I have recently discovered via Facebook. It is operated by long-time Ontario DX Association member and *MT* reader Bill Bergadamo in New Jersey. I really enjoy Bill's Friday night show, *The Friday Night Party*, as well as the many other offerings on the station. Bill tells me that his ratings "go through the roof" during his Christmas broadcast schedule. Be sure and check it out at **www.radioscooterinternational.net**

Many local radio stations are available worldwide thanks to the internet. Some will be wall to wall with Christmas music, others will feature special programming. My local station **CHML 900** in Hamilton presents *A Paul Reid Christmas* each year, which is fabulous listening. On Christmas Eve, Christmas Day, New Year's Eve and |New Year's Day, CHML also presents many hours of classic radio shows such as Jack Benny. **www.900chml.com/**

CKUA in Alberta will present a Christmas oriented program from Roy Forbes, who used to host his occasional *Snap, Crackle, Pop* specials featuring his massive collection of 78s on CBC Radio on statutory holidays. **www.ckua.org/**

Between Christmas and New Year`s Day, one can tune around and hear many end-of-year specials, the year in review, the year in sports, the year in business and so on.

❖ The New Year Arrives

It is always fun to "follow" the New Year around the globe as it passes from time zone to time zone. A few years ago, I did an article for *Monitoring Times* about this, which can be accessed at **www.monitoringtimes.com/Around-in-24-hrs.pdf** Radio New Zealand heralds the New Year at 1100 UTC and hour by hour it arrives in each successive time zone.

Midnight in Moscow is at 2100 UTC. It is also the name of the cool Russian folk melody, a jazz version of which used to end every hour on the old **Radio Moscow World Service**. A fabulous Dixieland jazz version by Kenny Ball charted in the sixties. But I digress.

Dating back to Soviet times, New Year's Eve and New Year's Day are the big holidays in Russia, featuring a more proletarian "Grandfather Frost" who bears a striking resemblance to Santa Claus. Grandfather Frost brings gifts to the children, who have their New Year trees decorated.

It might be interesting to check out Russian broadcasts over the course of these days for special holiday programming. In the past I have tuned in via the **Radio Rossii** website, **www.radiorus.ru/** The audio wasn't always the best, perhaps representative of the number of people trying to access it. Nevertheless, I was able to hear the Kremlin chimes and President Medvedev's brief speech to the nation. If you want to try listening in this way, go to the website and click the red button marked Прямой эфир. Or, you can let Mr. Google translate the page for you, and look around at some of the interesting programs available. This programming might just be audible on shortwave at this time if one can find a usable signal.

The Google translation option is actually not bad and very useful, but not perfect. I found it very handy when trying to get local **NRK** coverage of the Oslo massacre and bombing, and the crash of the plane carrying the Lokomotiv Yaroslavl hockey team this past summer. And it is great to be able to translate websites of international broadcasters into English. Most recently I was poking around the **Radio Educacion** website in Mexico and the **Radio Portugal** website in Lisbon. Very useful for the Hispanically and Lusophonically challenged. What would really be impressive is an application that simultaneously translates radio programs into English, but perhaps I won't hold my breath.

Much of this survey is based on listening experiences of past years. As December arrives each year I like to post a page of timely seasonal listening tips and advance programming information as it becomes available on my website. Check out **www.doghousecharlie.com** for details.

❖ What's New

(Miami, Florida) ***Blues Radio International*** will inaugurate the world's only weekly worldwide radio broadcast dedicated exclusively to Blues Music on New Year's Day, Eastern Standard Time, on January 1, 2012 (January 2 Universal Time,UTC). Blues Radio International brings Blues Music to a potential audience of tens of millions through **Radio Miami International**, a privately owned international broadcast station in Miami, Florida.

Blues Radio International will be heard every Monday at 0200 UTC, or Sunday at 9pm EST throughout the Americas, at 9955 kHz in the 31 meter shortwave band. The program also will stream simultaneously for internet listeners on **www.wrmi.net**.

"We are excited to bring Blues Music to a worldwide audience, which includes both Blues enthusiasts and tens of millions of potential new Blues music fans" said Jesse Finkelstein, who hosts and produces *Blues Radio International*. "As proud and long-time charter supporters of the Blues Foundation, we are honored to be able to share with listeners throughout the world recordings of stellar live performances from the annual Blues Music Awards in Memphis, and from the finals of the International Blues Challenge."

The thirty minute radio program features the best in classic Blues music, as well as important new music from today's most promising Blues artists.

Contact Jesse A. Finkelstein Blues Radio International 1063 Hillsboro Mile, Suite 303 Hillsboro Beach, Florida 33062 USA *bluesradio-international@gmail.com*

The Story of Pop – **Radio Australia National -** "From pop in 1956, the roots of pop in Africa, through to rhythm and blues, country music, hard rock, the protest movement, Motown, glam, punk, disco, electronica, reggae, rap, the art of re-mix, the global village and the music industry – no stone is left unrolled in this comprehensive and exciting series."

This 54-part series has been running all year, but should have a few more weeks to run as you read this. Due to the ubiquitous "rights issues" the programs are not available on demand. However, you can listen on Saturdays at 7pm local time, 0800 UTC Saturdays. It is an interesting program hosted by Nell Schofield. Listen at **www.abc.net.au/rn/storyofpop/**

THE QSL REPORT

VERIFICATIONS RECEIVED BY OUR READERS

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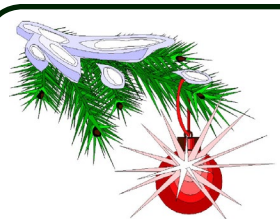
Holidays and QSLing



December is upon us, it's time to take advantage of the special holiday programming on shortwave. Stations across the globe broadcast a variety of programs of dramas, choral music, religious services, comedy, and old time radio shows. To keep up to date on holiday programming, *MT*'s *Programming Spotlight* columnist, Fred Waterer, devotes a page to *Holiday and Festive* programs on his website at **www.doghousecharlie.com**

Shortly after going to press with my November column, I received word of a new station on shortwave. XVRB Radio - The Music Museum, is a privately funded station whose goal is to bring the fun element of old style shortwave music back to the listeners. Broadcasts are every third Sunday in English on 6045 kHz, from 0900-1000 UTC. Send your comments and program details to *xvrbradio@gmail.com* or visit their website at **www.xvrb.org**

Listeners continue to log Radio Afghanistan, but now it's on 6102 kHz in English and Dari from 1530-1630 UTC. Their revised email address for their English service is *radioafghanistan@yahoo.com*

Amateur radio operators and shortwave listeners are reminded of four special events in December to QSL:

December 3, SEC Championship Football Game Special Event. 1000-1700 UTC, Maryville, TN. Amateurs Radio Clubs of the Southeastern Conference. Operating on 7.250, 14.250, MHz. Certificate and QSL. QSL card information at **www.qrz.com/db/w1bew** For certificate, send $4.00 to: Bobbie Williams, W1BEW, 2703 Chantay Dr., Maryville, TN 37803 USA.

December 4-7, Pearl Harbor Commemoration, 1400-2200 UTC. W2W, Baltimore, MD. National Electronics Museum (K3NEM). Operating on 7.041, 14.041, 14.421 MHz. Certificate and QSL. W2W, P.O. Box 1693, MS4015, Baltimore, MD 21203 USA.

December 10-17, 80th Anniversary of Shortwave Station HCJB Quito, Ecuador and 25th Anniversary of the HCJB Global Technology Center Elkhart, IN. Operating from 1530-2259 UTC on 7.265, 14.265, 21.365 MHz. QSL. HCJB/W9H, P.O. Box 9, Elkhart, IN 46515 USA. No Sunday operation. Special Anniversary QSL and brochure will be sent. *info@hcjbtech.org* or **www.hcjb.org**

December 11-24, Santa's Work Shop. 0000-2359 UTC, W6S, Bakersfield, CA. WI6J. 14.270 7.180 3.900 MHz. QSL. Mark E Slater, 247 Bighorn Meadow Dr, Bakersfield, CA 93308. **www.wi6j.com**

European DXers are predicting that pirate station Radio Bila Hora from the Czech Republic will revive their annual New Year's Eve broadcast this year. Last year they were heard on 2345 kHz at 1554 UTC. Check also 3333 kHz, a frequency that has been used previously. North American listeners may have better results by using Global Tuners, a remotely-controlled radio receiver system from radios across the world. To learn more, consult **www.globaltuners.com/** Send your program details to *rbh@email.cz*

QSL Contact Updates

Brazil: Radio Transmundial. Address: Rua Epiro 116, CEP-04635-030 São Paulo, Brasil (or) Caixa Postal 18113, CEP-04626-970 São Paulo, Brasil
Clandestine: Cotton Tree News. Address: Avenue du Temple 19C, CH-1012 Lausanne, Switzerland.
Euro Pirates: Atlantic Radio. Veri-Signer, Stephen Prendergast. Email: *atlanticradio1251@gmail.com* Address: Ballyvary, Castlebar, Co. Mayo, Ireland
Laser Hot Hits. Email: studio@lasehothits.co.uk
Northpole. Email: *radio.northpole@planet.nl*
Radio Batavia. Email: radiobatavia@hotmail.com
Radio Macaroni. Email: radiomarconi@msn.com
Radio Orion. Email: info@orionradio.nl
Cuba: Radio Habana. Email: radiohc@cnet.cu
Guatemala: TGAV Radio Verdad. Veri-Signer, Edgar Amilcar Madrid. Email: radioverdad5@yahoo.com Address: Apartado 5, Chiguimula, Guatemala.
Peru: Radio Sicuani. Veri-Signer, Edwin Sallo Diaz. Email: radiosicuani@hotmail.com
Philippines: Radio Veritas Asia. Address: P.O. Box 2642, Quezon City, Philippines (*playdx2003/NASWA*)

Happy Holidays from *QSL Report* - See you in 2012.

AMATEUR RADIO

Curacao, Netherlands Antilles, PJ2T-Caribbean Contesting Consortium, 10 meters SSB. Full data color scenery card. This QSL confirms QSO for (now deleted) Netherlands Antilles prior to 10/10/2010 and for Caracao after 10/10/2010. Received in five days via W3HNK QSL Manager, 115 Buck Run Rd., Lincoln University, PA 19352 USA. Website: **www.pj2t.org** (Larry Van Horn, NC)

AUSTRALIA

Radio Symban (Radio Universe) 2368.5 kHz. Full data Australian Native Birds card, signed by John Wright, ARDXC. Card gave reference to Greek programming and Leppington transmitter. Received in eight days for report to *dx1234@gmail.com* (Edward Kusalik, Alberta, Canada)

MOLDOVA

Voice of Russia, 7290 kHz via Kishinev-Grigoriopol. Full data State of Tretyakov Gallery/80th Anniversary card, unsigned. Received in 73 days for an email report to *world@ruvr.ru* (Kusalik)

TAIWAN

WYFR/Family Radio Worldwide relay via Bao-Zhong, 9280 kHz. Full data 50th Anniversary card with site notation. Received in seven months in response to follow up report to *inti@familyradio.com* (Kusalik).

USA

WWCR, 4840 kHz. Full data Nashville scenery card, signed by Cathy Soares, Program Director. Received in three weeks for English report and return mint postage. Station address: 1300 WWCR Avenue, Nashville, TN 37218 USA. (Larry Zamora, Garland, TX)

UTILITY

Chile-ECO02, ONEMI Région de Antofagasta, 10160 kHz. No data E-QSL from Irina Salgado. Received in 13minutes for e-report to *isalgado@onemi.gov.cl*. ECO05-ONEMI Région de Valparaíso, 17426 kHz. Full data E-QSL from Vladimir Maturana, Encargado de Comunicaciones ONEMI Valpaíso. Received in seven hours for e-report to *onemi@gorevalparaiso.cl*. (Patrick Robic, Austria/UDXF)

China-VRC Hong Kong Marine Rescue, 8414.5 kHz. Full data prepared QSL card verified and stamped. Received in 51 days for a utility report. QSL address: Harbour Building, 38 Pier Road, Central, Hong Kong, PR of China. (Robic)

Non Directional Beacon, "D8" Dolbeau-St. Félicien, QC Canda, 386 kHz, 50 watts. Full data prepared QSL returned, signed by Benoît Bannon. Received in 13 days for an SASE and $2.00US. QSL address: Gestionnaire, Nav Canada Opérations Techniques Aéroport Internationale Jean Lesage, 515 rue Prinicipale, Sainte-Foy, QC Canada G2G 2T8 (Jim Pogue, Memphis, TN).

Sri Lanka-Colombo Aero, 11285 kHz. Full data prepared QSL card verified by Wimalshanthi, Head of Electronics & Air Navigation Engineering. Received in 24 days for a utility report. Station address: Aeronautical H.F. Transmitting Station, Airport & Aviation Services (Sri Lanka) Ltd., Colombo Airport, Attidiya Road, Ratmalana, Sri Lanka (Robic).

United States-NUW Whidbey Island, WA, 13528.5 MHz USB. Full data 62nd Annual Armed Forces Day card, signed by Digger O'Dell KF6NW. Also received full data NNN0NUW station card. Received in 81 days for a utility report and a SASE (used for reply). Station address: NAVMARCORMARS Station NUW, 260 W. Pioneer FSAC Bldg., NSC Whidbey Island, WA 98277 USA (Bill Wilkins, Springfield, MO).

How to Use the Shortwave Guide

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af

① ② ⑤ ③ ④ ⑥ ⑦

CONVERT YOUR TIME TO UTC

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all *dates*, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

FIND THE STATION YOU WANT TO HEAR

Look at the page which corresponds to the time you will be listening. English broadcasts are listed by UTC time on ① , then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not *daily*, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Codes	
s/Sun	Sunday
m/Mon	Monday
t	Tuesday
w	Wednesday
h	Thursday
f	Friday
a/Sat	Saturday
occ:	occasional
DRM:	Digital Radio Mondiale
irreg	Irregular broadcasts
vl	Various languages
USB:	Upper Sideband

CHOOSE PROMISING FREQUENCIES

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
ca:	Central America
do:	domestic broadcast
eu:	Europe
me:	Middle East
na:	North America
pa:	Pacific
sa:	South America
va:	various

Mode used by all stations in this guide is AM unless otherwise indicated.

MT MONITORING TEAM

Gayle Van Horn
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Additional Contributors to This Month's Shortwave Guide:

Thank You to …

Cumbre DX; DSWCI-DBS 2011; DSWCI-DX Window; DX Asia; Hard-Core DX; DX Mix News 695-698; BCDX-Top News. Alokesh Gupta, New Delhi, India; Allan Weiner/WBCQ; Caudius Dedio/AWR; Derek Kickbush/HCJB Global Australia; Gerald Theoret/R Canada Int'l; Glen Tapley, Frequency Manager/WEWN; Ivo Ivanov, Bulgaria; Jeff White/WRMI; Rachel Baughn/MT; Ron Howard, CA; Sean Gilbert UK/WRTH; Wolfgang Bueschel, Germany; Radio Netherlands Media Network Weblog.

SHORTWAVE BROADCAST BANDS

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.

Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.

Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007

Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

0000 UTC - 7PM EST / 6PM CST / 4PM PST

0000 0030 Egypt, Radio Cairo 6270na
0000 0030 USA, BBG/Voice of America 7555 as
0000 0045 India, All India Radio/External Svc 6055 as 7305 as 11645 as 13605 as
0000 0057 Canada, Radio Canada International 9880 as
0000 0057 Romania, Radio Romania International 7385na 9580na
0000 0100 Anguilla, University Network 6090na
0000 0100 Australia, ABC NT Alice Springs 4835do
0000 0100 Australia, ABC NT Katherine 5025do
0000 0100 Australia, ABC NT Tennant Creek 4910do
0000 0100 Australia, Radio Australia 9660pa 12080pa 13690pa 15240pa 17715pa 17795pa
0000 0100 Bahrain, Radio Bahrain 6010me
0000 0100 Canada, CFRX Toronto ON 6070na
0000 0100 Canada, CFVP Calgary AB 6030na
0000 0100 Canada, CKZN St Johns NF 6160na
0000 0100 Canada, CKZU Vancouver BC 6160na
0000 0100 China, China Radio International 6020eu 6075 as 6180 as 7350eu 7415 as 9570na 11790 as 11885as 13750 as 15125 as
0000 0100 Malaysia, RTM Kajang/Traxx FM 7295do
0000 0100 Micronesia, The Cross Radio/Pohnpei 4755 as
0000 0100 New Zealand, Radio NZ International 15720pa
0000 0100 DRM New Zealand, Radio NZ International 17675pa
0000 0100 Palau, T8WH/ WHRI 15700 as
0000 0100 Russia, Voice of Russia 9665va 9800va
0000 0100 Spain, Radio Exterior de Espana 6055na
0000 0100 Thailand, Radio Thailand World Svc 15275na
0000 0100 UK, BBC World Service 5970 as 6195 as 9410 as 9740 as 12095as 15335 as 15755 as 17685as
0000 0100 USA, American Forces Network/AFRTS 4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb
0000 0100 USA, EWTN/WEWN Irondale, AL 11520me
0000 0100 USA, FBN/WTJC Newport NC 9370na
0000 0100 USA, WBCQ Monticello ME 5110usb 7415usb 9330usb
0000 0100 USA, WHRI Cypress Creek SC 5920na 7315na 9860na
0000 0100 USA, WINB Red Lion PA 9265ca
0000 0100 USA, WTWW Lebanon TN 5755va 12105va
0000 0100 USA, WWCR Nashville TN 3195eu 5070af 9980af 13845eu
0000 0100 USA, WWRB Manchester TN 2390na 3185na 3215na 5050na
0000 0100 USA, WYFR/Family Radio Worldwide 5930ca 7360sa 7520sa 15440ca
0000 0100 Zambia, CVC Radio Christian Voice 4965af
0030 0045 twhfas Albania, Radio Tirana 9860na
0030 0100 Australia, Radio Australia 15415 as 17750as
0030 0100 sfa Canada, Bible Voice Broadcasting 7405 as
0030 0100 mtwhfa Serbia, International Radio Serbia 9685na
0030 0100 Thailand, Radio Thailand World Svc 15275na
0030 0100 USA, BBG/Voice of America/Special English 7430va 9715va 9780va 11725va 12005va 15205va 15290va 17820va
0035 0045 India, All India Radio/Aizawl 5050do
0035 0045 India, All India Radio/Chennai 4920do
0035 0045 India, All India Radio/Guwahati 4940do
0035 0045 India, All India Radio/Hyderbad 4800do
0035 0045 India, All India Radio/Imphal 4775do
0035 0045 India, All India Radio/Port Blair 4760do
0035 0045 India, All India Radio/Shillong 4970do
0035 0045 India, All India Radio/Shimla 4965do
0035 0045 India, All India Radio/Thiruvananthapuram 5010do

0100 UTC - 8PM EST/ 7PM CST / 5PM PST

0100 0130 Vietnam, Voice of Vietnam/Overseas Svc 6175na
0100 0157 North Korea, Voice of Korea 7220 as 9345 as 9730 as 11735ca 15180sa
0100 0200 Anguilla, University Network 6090na
0100 0200 Australia, ABC NT Alice Springs 4835do
0100 0200 Australia, ABC NT Katherine 5025do
0100 0200 Australia, ABC NT Tennant Creek 4910do
0100 0200 Australia, Radio Australia 9660pa 12080pa 13690pa 15240pa 15415 as 17715pa 17750 as 17795pa
0100 0200 Bahrain, Radio Bahrain 6010me
0100 0200 Canada, CFRX Toronto ON 6070na
0100 0200 Canada, CFVP Calgary AB 6030na
0100 0200 Canada, CKZN St Johns NF 6160na
0100 0200 Canada, CKZU Vancouver BC 6160na
0100 0200 China, China Radio International 6020eu 6175eu 6180 as 9410eu 9470eu 9535 as 9570na 9580na 9675eu 9790na 11870 as 15215as 15785 as
0100 0200 Cuba, Radio Havana Cuba 6000na 6050na
0100 0200 Malaysia, RTM Kajang/Traxx FM 7295do
0100 0200 Micronesia, The Cross Radio/Pohnpei 4755 as
0100 0200 Mongolia, Mongolian Radio 2/Ulaanbaatar 7260do
0100 0200 New Zealand, Radio NZ International 15720pa
0100 0200 DRM New Zealand, Radio NZ International 17675pa
0100 0200 Palau, T8WH/ WHRI 15700 as
0100 0200 Russia, Voice of Russia 9665va 9800va
0100 0200 Taiwan, Radio Taiwan International 11875 as
0100 0200 UK, BBC World Service 7395 as 9410 as 9740 as 11750 as 11955as 12095 as 15310 as 15335as 15360 as 15755 as 17685as
0100 0200 USA, American Forces Network/AFRTS 4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb
0100 0200 USA, BBG/Voice of America 7430va 9780va 11705va
0100 0200 USA, EWTN/WEWN Irondale, AL 11520me
0100 0200 USA, FBN/WTJC Newport NC 9370na
0100 0200 USA, KJES Vado NM 7555na
0100 0200 USA, WBCQ Monticello ME 5110usb 7415usb 9330usb
0100 0200 USA, WHRI Cypress Creek SC 9840na 9860na
0100 0200 mtwhf USA, WHRI Cypress Creek SC 5920na
0100 0200 Sat/Sun USA, WHRI Cypress Creek SC 7315na
0100 0200 USA, WINB Red Lion PA 9265ca
0100 0200 USA, WTWW Lebanon TN 5755va 12105va
0100 0200 USA, WWCR Nashville TN 3195eu 4840na 5935af 9980af
0100 0200 USA, WWRB Manchester TN 2390va 3185na 5050na
0100 0200 USA, WYFR/Family Radio Worldwide 15440ca
0100 0200 Zambia, CVC Radio Christian Voice 4965af
0120 0200 Sri Lanka, SLBC 6005 as 9770 as 15745as
0130 0200 twhfa USA, BBG/Voice of America/Special English 7465va 9820va
0130 0200 twhfa USA, WRMI/Radio Slovakia Intl relay 9955am
0145 0200 twhfas Albania, Radio Tirana 7425na

0200 UTC - 9PM EST / 8PM CST / 6PM PST

0200 0215 Croatia, Voice of Croatia 3985eu 7375am
0200 0230 Thailand, Radio Thailand World Svc 15275na
0200 0230 USA, KJES Vado NM 7555na
0200 0230 USA, WINB Red Lion PA 9265ca
0200 0245 USA, WYFR/Family Radio Worldwide 5985ca
0200 0257 North Korea, Voice of Korea 13650 as 15100as
0200 0300 Anguilla, University Network 6090na
0200 0300 twhfa Argentina, RAE 11710am
0200 0300 Australia, ABC NT Alice Springs 4835do
0200 0300 Australia, ABC NT Katherine 5025do
0200 0300 Australia, ABC NT Tennant Creek 4910do
0200 0300 Australia, Radio Australia 9660pa 12080pa 13690pa 15240 as 15415 as 15515pa 17750 as 21725pa
0200 0300 Bahrain, Radio Bahrain 6010me
0200 0300 Bulgaria, Radio Bulgaria 9700na 11700na
0200 0300 Canada, CFRX Toronto ON 6070na
0200 0300 Canada, CFVP Calgary AB 6030na
0200 0300 Canada, CKZN St Johns NF 6160na
0200 0300 Canada, CKZU Vancouver BC 6160na
0200 0300 China, China Radio International 11770 as 13640as
0200 0300 Cuba, Radio Havana Cuba 6000na 6050na
0200 0300 Egypt, Radio Cairo 9315na
0200 0300 Indonesia, Voice of Indonesia 9526va
0200 0300 Malaysia, RTM Kajang/Traxx FM 7295do
0200 0300 Micronesia, The Cross Radio/Pohnpei 4755 as
0200 0300 New Zealand, Radio NZ International 15720pa

0200 0300 DRM New Zealand, Radio NZ International 17675pa
0200 0300 Palau, T8WH/ WHRI 17800 as
0200 0300 Philippines, PBS/ Radyo Pilipinas 11880me
15285me 17700me
0200 0300 Russia, Voice of Russia 9665sa 15425na
0200 0300 South Korea, KBS World Radio 9580sa
0200 0300 Sri Lanka, SLBC 6005 as 9770 as
15745as
0200 0300 Taiwan, Radio Taiwan International 5950na
9680ca
0200 0300 UK, BBC World Service 6005af 6195 as
12095as 15310 as 17790 as
0200 0300 USA, American Forces Network/AFRTS 4319usb
5446usb 5765usb 7812usb 12133usb
12759usb 13362usb
0200 0300 USA, EWTN/WEWN Irondale, AL 11520me
0200 0300 USA, FBN/WTJC Newport NC 9370na
0200 0300 USA, WBCQ Monticello ME 5110usb 7415usb
9330usb
0200 0300 USA, WHRI Cypress Creek SC 5920na
9840na 9860na
0200 0300 USA, WRNO New Orleans LA 7505am
0200 0300 USA, WTWW Lebanon TN 5755va 12105va
0200 0300 USA, WWCR Nashville TN 3215eu 4840na
5890af 5935af
0200 0300 USA, WWRB Manchester TN 2390va 3185na
5050na
0200 0300 USA, WYFR/Family Radio Worldwide 9385ca
0200 0300 Zambia, CVC Radio Christian Voice 4965af
0215 0300 Nepal, Radio Nepal 5005 as
0230 0300 twhfas Albania, Radio Tirana 7425na
0230 0300 Myanmar, Myanma Radio/National Svc 5915do
5920al
0230 0300 Vietnam, Voice of Vietnam/Overseas Svc 6175na
0245 0300 Australia, HCJB Global Australia 15400 as
0245 0300 India, All India Radio/Bhopal 7430do
0245 0300 India, All India Radio/Delhi 4860do 6030do
7235do 11830do 15135do
0245 0300 India, All India Radio/Gorakhpur 3945do
6030do 7235do 11830do 15135do
0245 0300 India, All India Radio/Guwahati 4940do
0245 0300 India, All India Radio/Hyderbad 7420do
0245 0300 India, All India Radio/Imphal 7335do
0245 0300 India, All India Radio/Itanagar 4990do
0245 0300 India, All India Radio/Jaipur 4910do
0245 0300 India, All India Radio/Kolkata 7210do
0245 0300 India, All India Radio/Kurseong 4895do
0245 0300 India, All India Radio/Lucknow 4880do
0245 0300 India, All India Radio/Radio Kashmir 4760do
0245 0300 India, All India Radio/Shillong 4970do
0245 0300 India, All India Radio/Shimla 6020do
0245 0300 India, All India Radio/Thiruvananthapuram
7290do
0245 0300 Zambia, ZNBC/Radio Two 6165do
0250 0300 Vatican City State, Vatican Radio 6040am
7305am 9610am
0255 0300 Sat Swaziland, TWR Africa 3200af

0300 UTC - 10PM EST / 9PM CST / 7PM PST

0300 0315 India, All India Radio/Imphal 7335do
0300 0315 India, All India Radio/Itanagar 4990do
0300 0315 India, All India Radio/Shillong 4970do
0300 0325 Sun Swaziland, TWR Africa 3200af
0300 0327 Iran, IRIB/ VOIRI 11920na
0300 0330 Egypt, Radio Cairo 9315na
0300 0330 Myanmar, Myanma Radio/National Svc 9731do
0300 0330 Philippines, PBS/ Radyo Pilipinas 11880me
15285me 17700me
0300 0330 Vatican City State, Vatican Radio 7305af
7360af 9660af
0300 0355 mtwhf South Africa, Channel Africa 5980af
0300 0355 Turkey, Voice of Turkey 6165 as
9515va
0300 0357 North Korea, Voice of Korea 7220 as 9345
as 9730 as
0300 0357 Romania, Radio Romania International 7335na
9645na 11895 as 15340 as
0300 0400 Anguilla, University Network 6090na
0300 0400 Australia, ABC NT Alice Springs 4835do
0300 0400 Australia, ABC NT Katherine 5025do
0300 0400 Australia, ABC NT Tennant Creek 4910do
0300 0400 Australia, Radio Australia 9660pa 12080pa
13690pa 15240 as 15415 as
15515pa 17750 as 21725pa
0300 0400 Bahrain, Radio Bahrain 6010me
0300 0400 twhfas Canada, CBC Northern Quebec Svc 9625na
0300 0400 Canada, CFRX Toronto ON 6070na
0300 0400 Canada, CFVP Calgary AB 6030na
0300 0400 Canada, CKZN St Johns NF 6160na
0300 0400 Canada, CKZU Vancouver BC 6160na
0300 0400 China, China Radio International 9690am
9790na 11770 as 13750 as
15110as 15120 as 15785 as
0300 0400 Cuba, Radio Havana Cuba 6000na 6050na
0300 0400 Malaysia, RTM Kajang/Traxx FM 7295do
0300 0400 Micronesia, The Cross Radio/Pohnpei 4755 as
0300 0400 New Zealand, Radio NZ International 15720pa
0300 0400 DRM New Zealand, Radio NZ International 17675pa
0300 0400 Oman, Radio Sultanate of Oman 15355af
0300 0400 Palau, T8WH/ WHRI 17800 as
0300 0400 Russia, Voice of Russia 9665sa 15425na
15585as
0300 0400 mtwhf South Africa, Channel Africa 3345af
0300 0400 Sat Sri Lanka, SLBC 6005 as 9770 as
15745as
0300 0400 Taiwan, Radio Taiwan International 5950na
15320as
0300 0400 UK, BBC World Service 3255af 5875af
6005af 6145af 6190af 6195af
7255eu 9410af 9750af 12035 as
12095as 15310 as 15365 as
17790as
0300 0400 USA, American Forces Network/AFRTS 4319usb
5446usb 5765usb 7812usb 12133usb
12759usb 13362usb
0300 0400 USA, BBG/Voice of America/African Svc 4930af
6080af 9885af 15580af
0300 0400 USA, EWTN/WEWN Irondale, AL 11520me
0300 0400 USA, FBN/WTJC Newport NC 9370na
0300 0400 USA, WBCQ Monticello ME 5110usb 7415usb
9330usb
0300 0400 USA, WHRI Cypress Creek SC 5920na
7385na 9840na
0300 0400 USA, WTWW Lebanon TN 5755va 12105va
0300 0400 USA, WWCR Nashville TN 3215eu 4840na
5890af 5935af
0300 0400 USA, WWRB Manchester TN 2390na 3185na
5050na
0300 0400 USA, WYFR/Family Radio Worldwide 11740ca
0300 0400 Zambia, CVC Radio Christian Voice 4965af
0300 0400 Zambia, ZNBC/Radio Two 6165do
0315 0400 Australia, Radio Australia 15240pa
0330 0400 twhfas Albania, Radio Tirana 7425na
0330 0400 Iran, IRIB/ VOIRI 9605na 11920na
0330 0400 Vietnam, Voice of Vietnam/Overseas Svc 6175na
0335 0345 India, All India Radio/Aizawl 5050do
0335 0345 India, All India Radio/Delhi 7235do 11830do
15135do
0335 0345 India, All India Radio/Kolkata 7210do

0400 UTC - 11PM EST / 10PM CST / 8PM PST

0400 0427 Iran, IRIB/ VOIRI 9605na 11920na
0400 0430 USA, BBG/Voice of America/African Svc 4930af
4960af 6080af 9855af 11670af
15580af
0400 0457 Germany, Deutsche Welle 6180af 7350af
9855af
0400 0458 New Zealand, Radio NZ International 15720pa
0400 0458 DRM New Zealand, Radio NZ International 17675pa
0400 0500 Anguilla, University Network 6090na
0400 0500 Australia, ABC NT Alice Springs 4835do
0400 0500 Australia, ABC NT Katherine 5025do
0400 0500 Australia, ABC NT Tennant Creek 4910do
0400 0500 Australia, Radio Australia 9660pa 12080pa
13690pa 15240 as 15515pa
17750pa 21725pa
0400 0500 Bahrain, Radio Bahrain 6010me
0400 0500 twhfas Canada, CBC Northern Quebec Svc 9625na
0400 0500 Canada, CFRX Toronto ON 6070na
0400 0500 Canada, CKZN St Johns NF 6160na
0400 0500 Canada, CKZU Vancouver BC 6160na
0400 0500 China, China Radio International 6020na
6080na 13750 as 15120 as
15785as 17730va 17855va
0400 0500 Cuba, Radio Havana Cuba 6000na 6050na
0400 0500 mtwhf France, Radio France Internationale 9805af
11995af
0400 0500 Malaysia, RTM Kajang/Traxx FM 7295do

0400	0500		Micronesia, The Cross Radio/Pohnpei			4755	as	
0400	0500		Palau, T8WH/ WHRI		17800	as		
0400	0500		Russia, Voice of Russia		13775na	15585	as	
0400	0500	mtwhf	South Africa, Channel Africa		3345af			
0400	0500	Sat	Sri Lanka, SLBC	6005	as	9770	as	
			15745as					
0400	0500		UK, BBC World Service		3255af			
			5875eu	6005af	6190af	7255af		
			7310af	11945af	12035af	12095	as	
			13840af	15310	as	15365	as	
			17790as					
0400	0500	DRM	UK, BBC World Service		3955eu			
0400	0500		USA, American Forces Network/AFRTS			4319usb		
			5446usb	5765usb	7812usb	12133usb		
			12759usb	13362usb				
0400	0500		USA, EWTN/WEWN Irondale, AL			11520me		
0400	0500		USA, FBN/WTJC Newport NC			9370na		
0400	0500		USA, WHRI Cypress Creek SC			5920na		
			7385na	9825na				
0400	0500		USA, WTWW Lebanon TN		5755va	12105va		
0400	0500		USA, WWCR Nashville TN		3215eu	4840na		
			5890af	5935af				
0400	0500		USA, WWRB Manchester TN		3185na			
0400	0500		Zambia, CVC Radio Christian Voice			4965af		
0400	0500		Zambia, ZNBC/Radio Two		6165do			
0430	0500	mtwhf	Swaziland, TWR Africa		3200af	4775af		
0430	0500		USA, BBG/Voice of America/African Svc			4930af		
			4960af	6080af	11670af	15580af		
0435	0445		India, All India Radio/Delhi		4860do			
0455	0500		Nigeria, Voice of Nigeria		15120af			
0459	0500		New Zealand, Radio NZ International			11725pa		
0459	0500	DRM	New Zealand, Radio NZ International			13730pa		

0500 UTC - 12AM EST / 11PM CST / 9PM PST

0500	0507	twhfas	Canada, CBC Northern Quebec Svc			9625na		
0500	0530		Germany, Deutsche Welle		6155af	9800af		
			12045af					
0500	0530		Japan, Radio Japan NHK World			5975va		
			6110na	11970va				
0500	0530		UK, BBC World Service		5975eu			
0500	0530		Vatican City State, Vatican Radio			5965va		
			7250eu	9660af	11625af	13765af		
0500	0557		China, China Radio International					
			6020na	6190na	11710af	11895	as	
			15350as	15465	as	17505va		
			17540as	17730va	17855va			
0500	0600		Anguilla, University Network		6090na			
0500	0600		Australia, ABC NT Alice Springs			4835do		
0500	0600		Australia, ABC NT Katherine		5025do			
0500	0600		Australia, ABC NT Tennant Creek			4910do		
0500	0600		Australia, Radio Australia		9660pa	12080pa		
			13630pa	13690pa	15160pa	15240pa		
			17750as					
0500	0600		Bahrain, Radio Bahrain		6010me			
0500	0600		Bhutan, Bhutan Broadcasting Svc			6035do		
0500	0600		Canada, CFRX Toronto ON		6070na			
0500	0600		Canada, CKZN St Johns NF		6160na			
0500	0600		Canada, CKZU Vancouver BC		6160na			
0500	0600		Cuba, Radio Havana Cuba		6010na	6050na		
			6060na	6150na				
0500	0600	mtwhf	Equatorial Guinea, Radio Africa 2			15190af		
0500	0600	Sat/Sun	Equatorial Guinea, Radio East Africa			15190af		
0500	0600	mtwhf	France, Radio France Internationale			11995af		
			13680af					
0500	0600		Malaysia, RTM Kajang/Traxx FM			7295do		
0500	0600		Micronesia, The Cross Radio/Pohnpei			4755	as	
0500	0600		New Zealand, Radio NZ International			11725pa		
0500	0600	DRM	New Zealand, Radio NZ International			13730pa		
0500	0600		Nigeria, Voice of Nigeria		15120af			
0500	0600		Palau, T8WH/ WHRI		17800	as		
0500	0600		Russia, Voice of Russia		13775na			
0500	0600	mtwhf	South Africa, Channel Africa		7230af			
0500	0600	mtwhf	Swaziland, TWR Africa		3200af	4775af		
0500	0600		Swaziland, TWR Africa		9500af			
0500	0600	Sat/Sun	Swaziland, TWR Africa		4775af			
0500	0600		Taiwan, Radio Taiwan International			6875na		
0500	0600		UK, BBC World Service		3255af	6005eu		
			6190af	7255af	9410af	11945af		
			12095af	15310	as	15365	as	
			15420af	17640	as	17790	as	
0500	0600	DRM	UK, BBC World Service		3955eu			
0500	0600		USA, American Forces Network/AFRTS			4319usb		
			5446usb	5765usb	7812usb	12133usb		
			12759usb	13362usb				
0500	0600		USA, BBG/Voice of America/African Svc			4930af		
			6080af	11670af	155870af			
0500	0600		USA, EWTN/WEWN Irondale, AL			11520me		
0500	0600		USA, FBN/WTJC Newport NC			9370na		
0500	0600		USA, WHRI Cypress Creek SC			7385va		
			9825va	11565va				
0500	0600		USA, WTWW Lebanon TN		5755va	12105va		
0500	0600		USA, WWCR Nashville TN		3215eu	4840na		
			5890af	5935af				
0500	0600		USA, WWRB Manchester TN		3185na			
0500	0600		Zambia, CVC Radio Christian Voice			4965af		
0500	0600		Zambia, ZNBC/Radio Two		6165do			
0515	0530	Sat	Greece, Voice of Greece		11645eu			
0530	0550	Sun	Greece, Voice of Greece		11645eu			
0530	0557	DRM	Romania, Radio Romania International			7305eu		
0530	0557		Romania, Radio Romania International			9655eu		
			17760eu	21500eu				
0530	0600	Sat/Sun	Clandestine, Sudan Radio Service/SRS			13720af		
0530	0600		Thailand, Radio Thailand World Svc			17655va		

0600 UTC - 1AM EST / 12AM CST / 10PM PST

0600	0615	Sat/Sun	South Africa, TWR Africa		11640af			
0600	0630		Germany, Deutsche Welle		12045af	15440af		
			17800af					
0600	0645	smtwhf	South Africa, TWR Africa		11640af			
0600	0650	DRM	New Zealand, Radio NZ International			13730pa		
0600	0655	mtwhf	South Africa, Channel Africa		15255af			
0600	0657		China, China Radio International			11710af		
			11870me	11895	as	13660	as	
			15140me	15350	as	15465	as	
			17505va	17540	as	17710	as	
0600	0700		Anguilla, University Network		6090na			
0600	0700		Australia, ABC NT Alice Springs			4835do		
0600	0700		Australia, ABC NT Katherine		5025do			
0600	0700		Australia, ABC NT Tennant Creek			4910do		
0600	0700		Australia, Radio Australia		9660pa	12080pa		
			13630pa	13690pa	15160pa	15240pa		
			15415as	17750	as			
0600	0700		Bahrain, Radio Bahrain		6010me			
0600	0700		Canada, CFRX Toronto ON		6070na			
0600	0700		Canada, CFVP Calgary AB		6030na			
0600	0700		Canada, CKZN St Johns NF		6160na			
0600	0700		Canada, CKZU Vancouver BC		6160na			
0600	0700		Cuba, Radio Havana Cuba		6010na	6050na		
			6060na	6150na				
0600	0700	mtwhf	Equatorial Guinea, Radio Africa 2			15190af		
0600	0700	Sat/Sun	Equatorial Guinea, Radio East Africa			15190af		
0600	0700	mtwhf	France, Radio France Internationale			11615va		
			15160af	17800af				
0600	0700		Malaysia, RTM Kajang/Traxx FM			7295do		
0600	0700		Malaysia, RTM/Voice of Malaysia			6175	as	
			9750 as	15295	as			
0600	0700		Micronesia, The Cross Radio/Pohnpei			4755	as	
0600	0700		New Zealand, Radio NZ International			11725pa		
0600	0700		Nigeria, Voice of Nigeria		15120af			
0600	0700		Palau, T8WH/ WHRI		17800	as		
0600	0700		Papua New Guinea, Radio Fly		5960do			
0600	0700		Russia, Voice of Russia		15405pa			
0600	0700	mtwhf	South Africa, Channel Africa		7230af			
0600	0700		South Africa, CVC 1 Africa Radio			13590af		
0600	0700		Swaziland, TWR Africa		9500af			
0600	0700		UK, BBC World Service		6005af	6190af		
			7365af	9410af	9860af	12015af		
			12095as	15310	as	15420af		
			`7640af	17790	as			
0600	0700	DRM	UK, BBC World Service		5875eu	7430eu		
0600	0700		USA, American Forces Network/AFRTS			4319usb		
			5446usb	5765usb	7812usb	12133usb		
			12759usb	13362usb				
0600	0700		USA, BBG/Voice of America/African Svc			6080af		
			11670af	15580af				
0600	0700		USA, EWTN/WEWN Irondale, AL			11520af		
0600	0700		USA, FBN/WTJC Newport NC			9370na		
0600	0700		USA, WHRI Cypress Creek SC			7385va		
			9825va	11565va				
0600	0700		USA, WTWW Lebanon TN		5755va	12105va		
0600	0700		USA, WWCR Nashville TN		3215eu	4840na		
			5890af	5935af				
0600	0700		USA, WWRB Manchester TN		3185na			
0600	0700		USA, WYFR/Family Radio Worldwide			9680na		
0600	0700		Zambia, CVC Radio Christian Voice			13590af		
0600	0700		Zambia, ZNBC/Radio Two		6165do			
0602	0700		Swaziland, TWR Africa		6120af			
0630	0645		India, All India Radio/Guwahati			7280do		

0630	0645		India, All India Radio/Hyderbad	7420do
0630	0645		India, All India Radio/Kurseong	7230do
0630	0645		India, All India Radio/Mumbai	7240do
0630	0645		India, All India Radio/Thiruvananthapuram 7290do	
0630	0700		Bulgaria, Radio Bulgaria 9600na	11600na
0630	0700		Vatican City State, Vatican Radio 13765af 15570af	11625af
0645	0700	Sun	Germany, TWR Europe 6105eu	
0645	0700	Sun	Monaco, TWR Europe 9800eu	
0651	0700	DRM	New Zealand, Radio NZ International	13730pa

0700 UTC - 2AM EST / 1AM CST / 11PM PST

0700	0730	Sun	Canada, Bible Voice Broadcasting	5945eu
0700	0745	Sat	Canada, Bible Voice Broadcasting	5945eu
0700	0745		USA, WYFR/Family Radio Worldwide	7570eu
0700	0750	mtwhf	Germany, TWR Europe 6105eu	
0700	0750	smtwhf	Monaco, TWR Europe 9800eu	
0700	0758		New Zealand, Radio NZ International	11725pa
0700	0758	DRM	New Zealand, Radio NZ International	13730pa
0700	0800		Anguilla, University Network 6090na	
0700	0800		Australia, ABC NT Alice Springs	4835do
0700	0800		Australia, ABC NT Katherine 5025do	
0700	0800		Australia, ABC NT Tennant Creek	4910do
0700	0800		Australia, Radio Australia 9475 as 9660pa 9710pa 11945 as 12080pa 13630pa 15160pa	
0700	0800		Bahrain, Radio Bahrain 6010me	
0700	0800	m/DRM	Belgium, TDP Radio 6015eu	
0700	0800		Canada, CFRX Toronto ON 6070na	
0700	0800		Canada, CFVP Calgary AB 6030na	
0700	0800		Canada, CKZN St Johns NF 6160na	
0700	0800		Canada, CKZU Vancouver BC 6160na	
0700	0800		China, China Radio International 11895 as 13660as 15125va 13710eu 15350 as 15465 as 17490eu 17540 as 17710as	
0700	0800	mtwhf	Equatorial Guinea, Radio Africa 2	15190af
0700	0800	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af
0700	0800	mtwhf	France, Radio France Internationale 17605af	15615af
0700	0800		Malaysia, RTM Kajang/Traxx FM	7295do
0700	0800		Malaysia, RTM/Voice of Malaysia 9750 as 15295 as	6175 as
0700	0800		Micronesia, The Cross Radio/Pohnpei	4755 as
0700	0800		Palau, T8WH/ WHRI 17800	as
0700	0800		Papua New Guinea, Radio Fly 5960do	
0700	0800		Russia, Voice of Russia 15405pa	
0700	0800	mtwhf	South Africa, Channel Africa 7230af	
0700	0800		South Africa, CVC 1 Africa Radio	13590af
0700	0800		Swaziland, TWR Africa 6120af	9500af
0700	0800		UK, BBC World Service 6190af 11760me 11765af 11830af 12095af 15310 as 15400af 15575 as 17640af 17790as 17830af	
0700	0800	DRM	UK, BBC World Service 5875eu	11925eu
0700	0800		USA, American Forces Network/AFRTS 4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb	
0700	0800		USA, EWTN/WEWN Irondale, AL	11520af
0700	0800		USA, FBN/WTJC Newport NC 9370na	
0700	0800		USA, WHRI Cypress Creek SC 9825va 11565va	7385va
0700	0800		USA, WTWW Lebanon TN 5755va	12105va
0700	0800		USA, WWCR Nashville TN 3215eu 5890af 5935af	4840na
0700	0800		USA, WWRB Manchester TN 3185na	
0700	0800		USA, WYFR/Family Radio Worldwide	5950ca
0700	0800		Zambia, CVC Radio Christian Voice	13590af
0700	0800		Zambia, ZNBC/Radio Two 6165do	
0715	0750	Sun	Germany, TWR Europe 6105eu	
0715	0750	Sat	Monaco, TWR Europe 9800eu	
0730	0745		India, All India Radio/Aizawl 5050do	
0730	0745		India, All India Radio/Delhi 6190do 15185do 15260do	11710do
0730	0745		India, All India Radio/Guwahati	7280do
0730	0745		India, All India Radio/Imphal 7335do	
0730	0745		India, All India Radio/Jaipur 7325do	
0730	0745		India, All India Radio/Kolkata 7210do	
0730	0745		India, All India Radio/Kurseong	7230do
0730	0745		India, All India Radio/Shimla 6020do	
0730	0800		Australia, HCJB Global Australia	11750pa
0730	0800		India, All India Radio/Chennai	4920do
0745	0800		Saudi Arabia, BSKSA/External Svc	17785af
0759	0800		New Zealand, Radio NZ International	9765pa
0759	0800	DRM	New Zealand, Radio NZ International	9870pa

0800 UTC - 3AM EST / 2AM CST / 12AM PST

0800	0830		Australia, ABC NT Alice Springs	4835do
0800	0830		Australia, ABC NT Katherine 5025do	
0800	0830		Australia, ABC NT Tennant Creek	4910do
0800	0830		Australia, HCJB Global Australia	11750pa
0800	0845		USA, WYFR/Family Radio Worldwide	5950ca
0800	0900		Anguilla, University Network 6090na	
0800	0900		Australia, Radio Australia 5995pa 9475 as 9590pa 9710pa 9580pa 11945 as 12080pa 13630pa	
0800	0900		Bahrain, Radio Bahrain 6010me	
0800	0900	t/DRM	Belgium, TDP Radio 6015eu	
0800	0900		Bhutan, Bhutan Broadcasting Svc	6035do
0800	0900		Canada, CFRX Toronto ON 6070na	
0800	0900		Canada, CFVP Calgary AB 6030na	
0800	0900		Canada, CKZN St Johns NF 6160na	
0800	0900		Canada, CKZU Vancouver BC 6160na	
0800	0900		China, China Radio International 11620 as 11895 as 13710eu 15350 as 15465as 15625va 17490eu 17540 as	
0800	0900	mtwhf	Equatorial Guinea, Radio Africa 2	15190af
0800	0900	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af
0800	0900	3rd Sat	Italy, IRRS-Shortwave/Radio City	9510eu
0800	0900		Malaysia, RTM Kajang/Traxx FM	7295do
0800	0900		Malaysia, RTM/Voice of Malaysia 9750 as 15295 as	6175 as
0800	0900		Micronesia, The Cross Radio/Pohnpei	4755 as
0800	0900		New Zealand, Radio NZ International	9765pa
0800	0900	DRM	New Zealand, Radio NZ International	9870pa
0800	0900		Palau, T8WH/ WHRI 17800	as
0800	0900		Papua New Guinea, Radio Fly 5960do	
0800	0900		Russia, Voice of Russia 15405pa	
0800	0900		Saudi Arabia, BSKSA/External Svc	17785af
0800	0900	mtwhf	South Africa, Channel Africa 9625af	
0800	0900		South Africa, CVC 1 Africa Radio	13590af
0800	0900	Sun	South Africa, SA Radio League 17570af	7205af
0800	0900		South Korea, KBS World Radio	9570 as
0800	0900		UK, BBC World Service 6190af 11760me 12095af 15310 as 15400af 15575as 17640af 17790 as 17830af 21470af	
0800	0900		USA, American Forces Network/AFRTS 4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb	
0800	0900		USA, EWTN/WEWN Irondale, AL	11520af
0800	0900		USA, FBN/WTJC Newport NC 9370na	
0800	0900		USA, WHRI Cypress Creek SC 11565va	7385va
0800	0900		USA, WTWW Lebanon TN 5755va	12105va
0800	0900		USA, WWCR Nashville TN 3215eu 5890af 5935af	4840na
0800	0900		USA, WWRB Manchester TN 3185na	
0800	0900		Zambia, CVC Radio Christian Voice	13590af
0800	0900		Zambia, ZNBC/Radio Two 6165do	
0815	0900		Nepal, Radio Nepal 5005	as
0820	0900	mtwhfa	Guam, TWR Asia/KTWR 15170	as
0830	0845		India, All India Radio/Aizawl 5050do	
0830	0845		India, All India Radio/Chennai	4920do
0830	0845		India, All India Radio/Delhi 6190do 15185do 15260do	11710do
0830	0845		India, All India Radio/Hyderbad	7420do
0830	0845		India, All India Radio/Imphal 7335do	
0830	0845		India, All India Radio/Itanagar	4990do
0830	0845		India, All India Radio/Kolkata 7210do	
0830	0845		India, All India Radio/Shillong 7315do	
0830	0845		India, All India Radio/Thiruvananthapuram 7290do	
0830	0900		Australia, ABC NT Alice Springs	2310do
0830	0900		Australia, ABC NT Katherine 2485do	
0830	0900		Australia, ABC NT Tennant Creek	2325do
0830	0900		Guam, TWR Asia/KTWR 11840	as

0900 UTC - 4AM EST / 3AM CST / 1AM PST

0900	0910		Guam, TWR Asia/KTWR 11840	as
0900	0930	Sat/Sun/DRM	Bulgaria, BNR Horizont/Home Svc 1 11900eu	
0900	1000		Anguilla, University Network 6090na	
0900	1000		Australia, ABC NT Alice Springs	2310do

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0900	1000		Australia, ABC NT Katherine	2485do		
0900	1000		Australia, ABC NT Tennant Creek	2325do		
0900	1000		Australia, Radio Australia	9475	as	
			9580pa	9590pa	11945	as
0900	1000		Bahrain, Radio Bahrain	6010me		
0900	1000	w/DRM	Belgium, TDP Radio	6015eu		
0900	1000		Canada, CFRX Toronto ON	6070na		
0900	1000		Canada, CFVP Calgary AB	6030na		
0900	1000		Canada, CKZN St Johns NF	6160na		
0900	1000		Canada, CKZU Vancouver BC	6160na		
0900	1000		China, China Radio International	11620	as	
			13790pa	15210	as	15270eu
			15350as	17490eu	17570eu	17750 as
0900	1000	3rd Sun	Germany, XVRB Radio	6045va		
0900	1000	Sun	Greece, Voice of Greece	9420va	15630va	
0900	1000		Malaysia, RTM Kajang/Traxx FM	7295do		
0900	1000		Malaysia, RTM/Voice of Malaysia	6175 as		
			9750 as	15295	as	
0900	1000		Micronesia, The Cross Radio/Pohnpei	4755 as		
0900	1000	DRM	New Zealand, Radio NZ International	9870pa		
0900	1000		New Zealand, Radio NZ International	9765pa		
0900	1000		Nigeria, Voice of Nigeria	9690af		
0900	1000		Papua New Guinea, Radio Fly	5960do		
0900	1000		Russia, Voice of Russia	15170	as	
0900	1000	mtwhf	South Africa, Channel Africa	9625af		
0900	1000		South Africa, CVC 1 Africa Radio	13590af		
0900	1000		UK, BBC World Service	6190af	6195 as	
			9740 as	11760me	12095af	15310 as
			15400af	15575	as	17640af
			17760as	17790	as	17830af
			21470af	21630	as	
0900	1000		USA, American Forces Network/AFRTS	4319usb		
			5446usb	5765usb	7812usb	12133usb
			12759usb	13362usb		
0900	1000		USA, EWTN/WEWN Irondale, AL	9390 as		
0900	1000		USA, FBN/WTJC Newport NC	9370na		
0900	1000		USA, WHRI Cypress Creek SC	7385va		
			9825va	11565va		
0900	1000		USA, WTWW Lebanon TN	5755va	12105va	
0900	1000		USA, WWCR Nashville TN	3215eu	4890na	
			5890af	5935af		
0900	1000		USA, WWRB Manchester TN	3185na		
0900	1000		USA, WYFR/Family Radio Worldwide	9465 as		
			9755ca			
0900	1000		Zambia, CVC Radio Christian Voice	13590af		
0900	1000		Zambia, ZNBC/Radio Two	6165do		
0930	1000	Sun	Italy, IRRS-Shortwave	9510va		
0930	1000	Sun	Italy, IRRS-Shortwave/Euro Gospel Radio	9510eu		
0959	1000		Netherlands, R Netherlands Worldwide	12065	as	
			15110as			

1000 UTC - 5AM EST / 4AM CST / 2AM PST

1000	1030		Japan, Radio Japan NHK World	9605 as		
			9625pa	9840pa		
1000	1030		Vietnam, Voice of Vietnam/Overseas Svc	9840 as		
			12020as			
1000	1057		Netherlands, R Netherlands Worldwide	12065	as	
			15110as			
1000	1057		North Korea, Voice of Korea	11710ca	11735	as
			13650as	15180sa		
1000	1058		New Zealand, Radio NZ International	9765pa		
1000	1100		Anguilla, University Network	11775na		
1000	1100		Australia, ABC NT Alice Springs	2310do		
1000	1100		Australia, ABC NT Katherine	2485do		
1000	1100		Australia, ABC NT Tennant Creek	2325do		
1000	1100		Australia, Radio Australia	9475	as	
			9580pa	9590pa	11945	as
1000	1100		Bahrain, Radio Bahrain	6010me		
1000	1100	h/DRM	Belgium, TDP Radio	6015eu		
1000	1100		Canada, CFRX Toronto ON	6070na		
1000	1100		Canada, CFVP Calgary AB	6030na		
1000	1100		Canada, CKZN St Johns NF	6160na		
1000	1100		Canada, CKZU Vancouver BC	6160na		
1000	1100		China, China Radio International	6040na		
			11610as	11635	as	13590
			as 13620	as	13790na	15190 as
			15210as	15350	as	17490 as
1000	1100		India, All India Radio/External Svc	7270 as		
			13695pa	15260	as	15410 as
			17510pa	17800	as	17895pa
1000	1100		Indonesia, Voice of Indonesia	9526va		
1000	1100	Sun	Italy, IRRS-Shortwave	9510va		
1000	1100	Sun	Italy, IRRS-Shortwave/Euro Gospel Radio	9510eu		
1000	1100		Malaysia, RTM Kajang/Traxx FM	7295do		
1000	1100		Micronesia, The Cross Radio/Pohnpei	4755 as		
1000	1100	DRM	New Zealand, Radio NZ International	9870pa		
1000	1100		Nigeria, Voice of Nigeria	9690af		
1000	1100		Russia, Voice of Russia	15170	as	
1000	1100		Saudi Arabia, BSKSA/External Svc	15250af		
1000	1100	mtwhf	South Africa, Channel Africa	9625af		
1000	1100		South Africa, CVC 1 Africa Radio	13590af		
1000	1100		UK, BBC World Service	6190af	6195 as	
			9740 as	11760me	12095af	15310 as
			15400af	15575	as	17640af
			17760as	17790	as	21470af
			21660as			
1000	1100	Sat/Sun	UK, BBC World Service	17830af		
1000	1100		USA, American Forces Network/AFRTS	4319usb		
			5446usb	5765usb	7812usb	12133usb
			12759usb	13362usb		
1000	1100		USA, EWTN/WEWN Irondale, AL	9390 as		
1000	1100		USA, FBN/WTJC Newport NC	9370na		
1000	1100		USA, KNLS Anchor Point AK	11870	as	
1000	1100		USA, WHRI Cypress Creek SC	7385va		
			11565va			
1000	1100		USA, WTWW Lebanon TN	5755va	12105va	
1000	1100		USA, WWCR Nashville TN	4840na	5890af	
			5935af	7465eu		
1000	1100		USA, WWRB Manchester TN	3185na		
1000	1100		USA, WYFR/Family Radio Worldwide	9465na		
1000	1100		Zambia, CVC Radio Christian Voice	13590af		
1000	1100		Zambia, ZNBC/Radio Two	6165do		
1030	1030	mtwhfa	USA, WRMI/Radio Prague relay	9955am		
1030	1100		Iran, IRIB/ VOIRI	17710	as	21630 as
1030	1100		Mongolia, Voice of Mongolia	12085	as	
1059	1100		New Zealand, Radio NZ International	15720pa		

1100 UTC - 6AM EST / 5AM CST / 3AM PST

1100	1105		Pakistan, PBC/Radio Pakistan	15725eu	17720eu	
1100	1120	f/DRM	Japan, Radio Japan NHK World	9760eu		
1100	1127		Iran, IRIB/ VOIRI	17710	as	21630 as
1100	1130	Sat/DRM	South Korea, KBS World Radio	9760eu		
1100	1130	fa	UK, BBC World Service	9760eu		
1100	1130		Vietnam, Voice of Vietnam/Overseas Svc	7285 as		
1100	1145		USA, WYFR/Family Radio Worldwide	9755ca		
1100	1157		Romania, Radio Romania International	15210eu		
			15430eu	17510af	17670af	
1100	1158	DRM	New Zealand, Radio NZ International	9870pa		
1100	1200		Anguilla, University Network	11775na		
1100	1200		Australia, ABC NT Alice Springs	2310do		
1100	1200		Australia, ABC NT Katherine	2485do		
1100	1200		Australia, ABC NT Tennant Creek	2325do		
1100	1200		Australia, Radio Australia	5995pa	6020pa	
			9475 as	9560pa	9580pa	9590pa
			11945as	12080pa		
1100	1200		Bahrain, Radio Bahrain	6010me		
1100	1200	f/DRM	Belgium, TDP Radio	6015eu		
1100	1200	Sat/Sun	Canada, CBC Northern Quebec Svc	9625na		
1100	1200		Canada, CFRX Toronto ON	6070na		
1100	1200		Canada, CFVP Calgary AB	6030na		
1100	1200		Canada, CKZN St Johns NF	6160na		
1100	1200		Canada, CKZU Vancouver BC	6160na		
1100	1200		China, China Radio International	5955 as		
			6040 as	11650	as	11660 as
			11750na	11795	as	13590
			as 13645	as	13650eu	13720 as
			17490eu			
1100	1200	Sun	Italy, IRRS-Shortwave	9510va		
1100	1200	Sun	Italy, IRRS-Shortwave/Euro Gospel Radio	9510eu		
1100	1200		Malaysia, RTM Kajang/Traxx FM	7295do		
1100	1200		New Zealand, Radio NZ International	15720pa		
1100	1200		Nigeria, Voice of Nigeria	9690af		
1100	1200		Russia, Voice of Russia	12065	as	
1100	1200		Saudi Arabia, BSKSA/External Svc	15250af		
1100	1200	mtwhf	South Africa, Channel Africa	9625af		
1100	1200		South Africa, CVC 1 Africa Radio	13590af		
1100	1200		Taiwan, Radio Taiwan International	7445 as		
			11715as			
1100	1200		UK, BBC World Service	6140	as	6195
			as 9740	as	11760me	12095af
			15285as	15310	as	15400af
			15575as	17640	as	17760 as
			17790as	17830af	21470af	
1100	1200		USA, American Forces Network/AFRTS	4319usb		
			5446usb	5765usb	7812usb	12133usb
			12759usb	13362usb		
1100	1200		USA, EWTN/WEWN Irondale, AL	9390 as		
1100	1200		USA, FBN/WTJC Newport NC	9370na		
1100	1200		USA, WHRI Cypress Creek SC	7385va		
			9410va	11565va		

1100 1200 USA, WWCR Nashville TN 4840na 5890af 5935af 7465eu
1100 1200 USA, WWRB Manchester TN 3185na
1100 1200 USA, WYFR/Family Radio Worldwide 5950na 15560sa
1100 1200 Zambia, CVC Radio Christian Voice 13590af
1100 1200 Zambia, ZNBC/Radio Two 6165do
1130 1140 f Vatican City State, Vatican Radio 15595 as 17765as
1130 1200 Vietnam, Voice of Vietnam/Overseas Svc 9840 as 12020as
1135 1145 India, All India Radio/Aizawl 5050do
1135 1145 India, All India Radio/Delhi 9595do 11710do 15185do
1135 1145 India, All India Radio/Shillong 4970do

1200 UTC - 7AM EST / 6AM CST / 4AM PST

1200 1215 Vatican City State, Vatican Radio 13730am
1200 1230 Germany, AWR Europe 17510 as
1200 1230 Saudi Arabia, BSKSA/External Svc 15250af
1200 1245 USA, WYFR/Family Radio Worldwide 5950na
1200 1258 New Zealand, Radio NZ International 15720pa
1200 1259 Poland, Polskie Radio Warsaw 11675eu 11980eu
1200 1300 Anguilla, University Network 11775na
1200 1300 Australia, ABC NT Alice Springs 2310do
1200 1300 Australia, ABC NT Katherine 2485do
1200 1300 Australia, ABC NT Tennant Creek 2325do
1200 1300 Australia, Radio Australia 5995pa 6020pa 9475 as 9560pa 9580pa 9590pa 11945as
1200 1300 Bahrain, Radio Bahrain 6010me
1200 1300 Sat/ DRM Belgium, TDP Radio 6015eu
1200 1300 Sat/Sun Canada, CBC Northern Quebec Svc 9625na
1200 1300 Canada, CFRX Toronto ON 6070na
1200 1300 Canada, CFVP Calgary AB 6030na
1200 1300 Canada, CKZN St Johns NF 6160na
1200 1300 Canada, CKZU Vancouver BC 6160na
1200 1300 China, China Radio International 5955 as 9460 as 9600 as 9645 as 9730 as 9760pa 11650 as 11660as 11690va 11760pa 11980 as 13645as 13650 as 13790eu 17490eu
1200 1300 Ethiopia, Radio Ethiopia/National Program 5990do 7110do 9705do
1200 1300 Japan, Radio Japan NHK World 6120na 9695 as
1200 1300 Malaysia, RTM Kajang/Traxx FM 7295do
1200 1300 Nigeria, Voice of Nigeria 9690af
1200 1300 DRM Russia, Voice of Russia 9445 as
1200 1300 Russia, Voice of Russia 11500 as
1200 1300 South Africa, CVC 1 Africa Radio 13590af
1200 1300 South Korea, KBS World Radio 9650na
1200 1300 UK, BBC World Service 5875 as 6140 as 6190af 6195 as 9740 as 11750as 11760me 12095af 15310 as 15575as 17640af 17790af 17830af 21470af
1200 1300 USA, American Forces Network/AFRTS 4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb
1200 1300 USA, BBG/Voice of America 7575va 9510va 12075va 12150va
1200 1300 USA, EWTN/WEWN Irondale, AL 14610eu
1200 1300 USA, FBN/WTJC Newport NC 9370na
1200 1300 USA, KNLS Anchor Point AK 11870 as
1200 1300 USA, WHRI Cypress Creek SC 7385va 9410va 11565va
1200 1300 USA, WWCR Nashville TN 4890na 5935af 9980af 15825eu
1200 1300 USA, WWRB Manchester TN 3185va
1200 1300 USA, WYFR/Family Radio Worldwide 15560 as 17520as 17880 as
1200 1300 Zambia, CVC Radio Christian Voice 13590af
1200 1300 Zambia, ZNBC/Radio Two 6165do
1215 1300 Egypt, Radio Cairo 17870 as
1230 1245 India, All India Radio/Aizawl 5050do
1230 1245 India, All India Radio/Chennai 4920do
1230 1245 India, All India Radio/Delhi 4860do 6085do
1230 1245 India, All India Radio/Hyderbad 4800do
1230 1245 India, All India Radio/Jeypore 5040do
1230 1245 India, All India Radio/Kurseong 4895do
1230 1245 India, All India Radio/Port Blair 4760do
1230 1245 India, All India Radio/Radio Kashmir 4950do
1230 1245 India, All India Radio/Shillong 4970do
1230 1245 India, All India Radio/Thiruvananthapuram 5010do
1230 1300 Thailand, Radio Thailand World Svc 9890va
1230 1300 Turkey, Voice of Turkey 15450va
1230 1300 Vietnam, Voice of Vietnam/Overseas Svc 9840 as 12020as

1300 UTC - 8AM EST / 7AM CST / 5AM PST

1300 1325 Turkey, Voice of Turkey 15450va
1300 1330 Egypt, Radio Cairo 17870 as
1300 1330 Japan, Radio Japan NHK World 15735 as 15660al
1300 1357 North Korea, Voice of Korea 9335na 11710na 13760eu 15245eu
1300 1400 Anguilla, University Network 11775na
1300 1400 Australia, ABC NT Alice Springs 2310do
1300 1400 Australia, ABC NT Katherine 2485do
1300 1400 Australia, Radio Australia 5995pa 6020pa 9560pa 9580pa 9590pa
1300 1400 Bahrain, Radio Bahrain 6010me
1300 1400 Sun/DRM Belgium, TDP Radio 6015na
1300 1400 Sat/Sun Canada, CBC Northern Quebec Svc 9625na
1300 1400 Canada, CFRX Toronto ON 6070na
1300 1400 Canada, CFVP Calgary AB 6030na
1300 1400 Canada, CKZN St Johns NF 6160na
1300 1400 Canada, CKZU Vancouver BC 6160na
1300 1400 China, China Radio International 5995 as 9570na 9650na 9730 as 9760pa 9765va 9870 as 11660as 11760pa 11980 as 13610eu 13755 as 13760eu 13790eu 15260na
1300 1400 Sat Greece, Voice of Greece 15630va
1300 1400 Sun Greece, Voice of Greece 9420va
1300 1400 Indonesia, Voice of Indonesia 9526 as
1300 1400 Italy, IRRS-Shortwave 15610va
1300 1400 Italy, IRRS-Shortwave/Overcomer Ministries 7290va
1300 1400 Malaysia, RTM Kajang/Traxx FM 7295do
1300 1400 New Zealand, Radio NZ International 5950pa
1300 1400 Nigeria, Voice of Nigeria 9690af
1300 1400 Russia, Voice of Russia 12065 as
1300 1400 South Africa, CVC 1 Africa Radio 13590af
1300 1400 South Korea, KBS World Radio 9570 as
1300 1400 Tajikistan, Voice of Tajik 7245va
1300 1400 UK, BBC World Service 5875 as 6190af 6195 as 9740 as 11760me 12095af 15310 as 15420af 15575 as 17790 as 17830af 21470af
1300 1400 USA, American Forces Network/AFRTS 4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb
1300 1400 Sat/Sun USA, BBG/Voice of America 7575va 9510va 12150va
1300 1400 USA, EWTN/WEWN Irondale, AL 15610eu
1300 1400 USA, FBN/WTJC Newport NC 9370na
1300 1400 USA, KJES Vado NM 7555na
1300 1400 USA, WBCQ Monticello ME 9330usb
1300 1400 USA, WHRI Cypress Creek SC 7385va 11565va
1300 1400 Sat/Sun USA, WHRI Cypress Creek SC 9840af
1300 1400 USA, WWCR Nashville TN 7490af 9980af 13845eu 15825eu
1300 1400 USA, WWRB Manchester TN 9385na
1300 1400 USA, WYFR/Family Radio Worldwide 11560 as 12160ca
1300 1400 Zambia, CVC Radio Christian Voice 13590af
1300 1400 Zambia, ZNBC/Radio Two 6165do
1330 1345 India, All India Radio/Delhi 6085do
1330 1400 India, All India Radio/External Svc 9690 as 11620as 13710 as
1330 1400 Vietnam, Voice of Vietnam/Overseas Svc 9840 as 12020as
1345 1400 Sun Canada, Bible Voice Broadcasting 17945 as
1359 1400 Netherlands, R Netherlands Worldwide 11835 as

1400 UTC - 9AM EST / 8AM CST / 6AM PST

1400 1415 Sun Germany, Pan American Broadcasting 15205 as
1400 1430 Japan, Radio Japan NHK World 11705 as 15735as 21560va 15660al
1400 1430 Thailand, Radio Thailand World Svc 9575va
1400 1430 Sun UK, FEBA Radio 12025 as

1400	1457		Netherlands, R Netherlands Worldwide 11835as	9800 as
1400	1500		Anguilla, University Network	11775na
1400	1500		Australia, ABC NT Alice Springs	2310do
1400	1500		Australia, ABC NT Katherine	2485do
1400	1500		Australia, ABC NT Tennant Creek	2325do
1400	1500		Australia, Radio Australia 7240pa	5995pa 9590pa 6080 as 11660 as
1400	1500		Bahrain, Radio Bahrain	6010me
1400	1500	DRM	Belgium, TDP Radio/Disco Palace	6015eu
1400	1500	Sat	Canada, Bible Voice Broadcasting	17945 as
1400	1500	Sat/Sun	Canada, CBC Northern Quebec Svc	9625na
1400	1500		Canada, CFRX Toronto ON	6070na
1400	1500		Canada, CFVP Calgary AB	6030na
1400	1500		Canada, CKZN St Johns NF	6160na
1400	1500		Canada, CKZU Vancouver BC	6160na
1400	1500		China, China Radio International 9765va 9870 as 11765as 13710eu 13760eu 13790eu 17630af	5955 as 11665me 11740na
1400	1500	Sat/Sun	Equatorial Guinea, Radio East Africa/Malabo 15190af	
1400	1500		India, All India Radio/External Svc 11620as 13710 as	9690 as
1400	1500		Libya, LJBC Voice of Africa	17725af
1400	1500		Malaysia, RTM Kajang/Traxx FM	7295do
1400	1500		New Zealand, Radio NZ International	5950pa
1400	1500		Nigeria, Voice of Nigeria	9690af
1400	1500		Oman, Radio Sultanate of Oman	15140va
1400	1500	DRM	Russia, Voice of Russia	9750eu
1400	1500		Russia, Voice of Russia	4975va 11500 as
1400	1500		South Africa, CVC 1 Africa Radio	13590af
1400	1500		UK, BBC World Service as 6190af 6195 as 9740 as 12095 as 15310as 17640af 17830af	5845 as 5875 as 7435af 13820 as 21470af
1400	1500		USA, American Forces Network/AFRTS 5446usb 5765usb 7812usb 12759usb 13362usb	4319usb 12133usb
1400	1500	mtwhf	USA, BBG/Voice of America	9405va
1400	1500		USA, BBG/Voice of America/African Svc 6080af 12080af 15580af	4930af 17545af
1400	1500		USA, EWTN/WEWN Irondale, AL	15610eu
1400	1500		USA, FBN/WTJC Newport NC	9370na
1400	1500		USA, Overcomer Ministries	9655eu 13810va
1400	1500		USA, WBCQ Monticello ME	9330usb
1400	1500		USA, WHRI Cypress Creek SC 9840va	7385va
1400	1500	Sat/Sun	USA, WHRI Cypress Creek SC 17510af	9840af
1400	1500		USA, WJHR International Milton FL	15550na
1400	1500		USA, WWCR Nashville TN 13845eu 15825eu	7490af 9980af
1400	1500		USA, WWRB Manchester TN	9385na
1400	1500		USA, WYFR/Family Radio Worldwide 11560as	9615 as
1400	1500		Zambia, CVC Radio Christian Voice	13590af
1400	1500		Zambia, ZNBC/Radio Two	6165do
1405	1435	Sat/Sun	Canada, Bible Voice Broadcasting	9345 as
1415	1430		Germany, Pan American Broadcasting	15205 as
1415	1500	Sun	Canada, Bible Voice Broadcasting	17945af
1415	1500		Nepal, Radio Nepal	5005 as
1420	1440		India, All India Radio/Itanagar	4990do
1430	1445	Sun	Germany, Pan American Broadcasting	15205 as
1430	1445		India, All India Radio/Aizawl	5050do
1430	1445		India, All India Radio/Delhi 9835do	6085do 9575do
1430	1445		India, All India Radio/Jeypore	5040do
1430	1445		India, All India Radio/Mumbai	4840do
1430	1500	mtwhfa	Albania, Radio Tirana	13625na
1430	1500		China, CNR-11/Xi'an 6010do 6130do	4905do 4920do
1430	1500	Sat	India, All India Radio/Gangtok	4835do
1430	1500		UK, BBC World Service	17780af
1445	1500		Australia, HCJB Global Australia	15340 as
1450	1500		India, All India Radio/Itanagar	4990do
1450	1500		India, All India Radio/Kurseong	4895do

1500 UTC - 10AM EST / 9AM CST / 7AM PST

1500	1515	Sun	Canada, Bible Voice Broadcasting	12035 as
1500	1525	tf	Guam, TWR Asia/KTWR	12140 as
1500	1529		Canada, Radio Canada International 11975as	9635 as
1500	1530		Australia, HCJB Global Australia	15340 as
1500	1530	Sun	Canada, Bible Voice Broadcasting	17945 as
1500	1530		Clandestine, Sudan Radio Service/SRS	17745af
1500	1530		India, All India Radio/Jeypore	5040do
1500	1530		USA, WRMI/Radio Prague relay	9955am
1500	1530		Vietnam, Voice of Vietnam/Overseas Svc 9840 as 12020 as	7285 as
1500	1535	mwhfa	Guam, TWR Asia/KTWR	12140 as
1500	1550		New Zealand, Radio NZ International	5950pa
1500	1557		North Korea, Voice of Korea 13760eu 15245eu	9335na 11710na
1500	1558		Libya, LJBC Voice of Africa	17725af
1500	1600		Anguilla, University Network	11775na
1500	1600		Australia, ABC NT Alice Springs	2310do
1500	1600		Australia, ABC NT Katherine	2485do
1500	1600		Australia, Radio Australia 7240pa 9475 as 11660as	5995pa 6080 as 9590pa
1500	1600		Bahrain, Radio Bahrain	6010me
1500	1600		Bhutan, Bhutan Broadcasting Svc	6035do
1500	1600	Sat/Sun	Canada, CBC Northern Quebec Svc	9625na
1500	1600		Canada, CFRX Toronto ON	6070na
1500	1600		Canada, CFVP Calgary AB	6030na
1500	1600		Canada, CKZN St Johns NF	6160na
1500	1600		Canada, CKZU Vancouver BC	6160na
1500	1600		China, China Radio International 6095me 7325 as 9720me 9765va 9800 as 11965eu 13640eu 13730na 17630af	5955 as 7395 as 9870 as 13760eu
1500	1600	Sat/Sun	Equatorial Guinea, Radio East Africa/Malabo 15190af	
1500	1600		Malaysia, RTM Kajang/Traxx FM	7295do
1500	1600		Nigeria, Voice of Nigeria	15120af
1500	1600		Russia, Voice of Russia 11985va 12040eu	4975va 9660 as
1500	1600	mtwhf	South Africa, Channel Africa	9625af
1500	1600		South Africa, CVC 1 Africa Radio	13590af
1500	1600		Uganda, Dunamis Shortwave	4750af
1500	1600		UK, BBC World Service 6190af 6195 as 9540 as 9740 as 13820as 15310 as 15420af 17640af 17830af 21470af	5875 as 7435af 12095 as 15400af 17780af
1500	1600	DRM	UK, BBC World Service	15640 as
1500	1600		USA, American Forces Network/AFRTS 5446usb 5765usb 7812usb 12759usb 13362usb	4319usb 12133usb
1500	1600		USA, BBG/Voice of America 15530va	12080af 13570va
1500	1600	Sat/Sun	USA, BBG/Voice of America	9405va
1500	1600		USA, BBG/Voice of America/African Svc 6080af 12080af 15580af	4930af 17895af
1500	1600		USA, BBG/Voice of America/Special English 6140af 7465va	9485va 9760va
1500	1600		USA, EWTN/WEWN Irondale, AL	15610eu
1500	1600		USA, FBN/WTJC Newport NC	9370na
1500	1600		USA, KNLS Anchor Point AK	9920 as
1500	1600		USA, Overcomer Ministries 17485af	9655eu 13810va
1500	1600		USA, WBCQ Monticello ME	9330usb
1500	1600		USA, WHRI Cypress Creek SC	7385af
1500	1600	Sat/Sun	USA, WHRI Cypress Creek SC	9840af
1500	1600	Sat	USA, WHRI Cypress Creek SC	17510af
1500	1600	Sun	USA, WHRI Cypress Creek SC	15195va
1500	1600		USA, WJHR International Milton FL	15550na
1500	1600		USA, WWCR Nashville TN 13845eu 15825eu	7490af 9980af
1500	1600		USA, WWRB Manchester TN	9385na
1500	1600		USA, WYFR/Family Radio Worldwide 17580af	11605 as
1500	1600		Zambia, CVC Radio Christian Voice	13590af
1500	1600		Zambia, ZNBC/Radio Two	6165do
1515	1545	Sat	Canada, Bible Voice Broadcasting	13670 as
1525	1555	Sat/Sun	Swaziland, TWR Africa	4760af
1530	1540	Sat	Vatican City State, Vatican Radio 13765as 15235 as	11850 as
1530	1545		India, All India Radio/Aizawl	5050do
1530	1545		India, All India Radio/Bengaluru	9425do
1530	1545		India, All India Radio/Bhopal	4810do
1530	1545		India, All India Radio/Chennai	4920do
1530	1545		India, All India Radio/Delhi	5015do
1530	1545		India, All India Radio/External Svc	9910 as
1530	1545		India, All India Radio/Guwahati	4940do
1530	1545		India, All India Radio/Hyderbad	4800do
1530	1545		India, All India Radio/Itanagar	4990do
1530	1545		India, All India Radio/Jaipur	4910do
1530	1545		India, All India Radio/Kolkata	4820do
1530	1545		India, All India Radio/Kurseong	4895do
1530	1545		India, All India Radio/Lucknow	4880do

1530	1545		India, All India Radio/Panaji, Goa	9820do
1530	1545		India, All India Radio/Port Blair	4760do
1530	1545		India, All India Radio/Radio Kashmir	4950do
1530	1545		India, All India Radio/Shillong	4970do
1530	1545		India, All India Radio/Shimla	4965do
1530	1545		India, All India Radio/Thiruvananthapuram	5010do
1530	1600		Afghanistan, Radio Afghanistan	6102 as
1530	1600	DRM	Belgium, TDP Radio/Disco Palace	15775 as
1530	1600	Sun	Canada, Bible Voice Broadcasting	13590me
1530	1600	h	Canada, Bible Voice Broadcasting	13670 as
1530	1600	smtwa	Germany, AWR Europe 15255 as	
1530	1600		Iran, IRIB/ VOIRI 9600 as	11945 as
1530	1600		Mongolia, Voice of Mongolia 12015 as	
1530	1600		Myanmar, Myanma Radio/National Svc	5985do
1530	1600	DRM	UK, BBC World Service 5845 as	
1545	1600	mtwhfa	Canada, Bible Voice Broadcasting	13590me
1551	1600		New Zealand, Radio NZ International	7440pa
1551	1600	DRM	New Zealand, Radio NZ International	5950pa

1600 UTC - 11AM EST / 10AM CST / 8AM PST

1600	1605	Sun	Croatia, Voice of Croatia 6165eu	
1600	1615	tf	Canada, Bible Voice Broadcasting	13590me
1600	1615	mtwhfa	Croatia, Voice of Croatia 6165eu	
1600	1627		Iran, IRIB/ VOIRI 9600 as	11945 as
1600	1630		Afghanistan, Radio Afghanistan	6102 as
1600	1630		Australia, Radio Australia	9965pa
1600	1630	DRM	Belgium, TDP Radio/Disco Palace	15775 as
1600	1630		Guam, AWR/KSDA 11690 as 11935as 15215 as	
1600	1630		Myanmar, Myanma Radio/National Svc	5985do
1600	1630		Vietnam, Voice of Vietnam/Overseas Svc	7220me 7280eu 9550me 9730eu
1600	1645	h	Canada, Bible Voice Broadcasting	13590me
1600	1645		USA, WYFR/Family Radio Worldwide	11865na
1600	1650	DRM	New Zealand, Radio NZ International	5950pa
1600	1650		New Zealand, Radio NZ International	7440pa
1600	1657		North Korea, Voice of Korea 9990va	11545va
1600	1700		Anguilla, University Network 11775na	
1600	1700		Australia, ABC NT Alice Springs	2310do
1600	1700		Australia, ABC NT Katherine 2485do	
1600	1700		Australia, Radio Australia 5995pa	6080 as 7240pa 9475 as 9710pa 11660as
1600	1700		Bahrain, Radio Bahrain 6010me	
1600	1700		Bhutan, Bhutan Broadcasting Svc	6035do
1600	1700	Sat/Sun	Canada, Bible Voice Broadcasting	13590me
1600	1700	Sat	Canada, CBC Northern Quebec Svc	9625na
1600	1700		Canada, CFRX Toronto ON 6070na	
1600	1700		Canada, CFVP Calgary AB 6030na	
1600	1700		Canada, CKZN St Johns NF 6160na	
1600	1700		Canada, CKZU Vancouver BC 6160na	
1600	1700		China, China Radio International	6060 as 7420af 7235 as 9570af 11900af 11940eu 11965eu 13760eu
1600	1700		Egypt, Radio Cairo 15345af	
1600	1700	Sat/Sun	Equatorial Guinea, Radio East Africa/Malabo 15190af	
1600	1700		Ethiopia, Radio Ethiopia 7235va	9560va
1600	1700		Malaysia, RTM Kajang/Traxx FM	7295do
1600	1700		Russia, Voice of Russia 4975va	11985va 12040eu
1600	1700		South Africa, CVC 1 Africa Radio	13590af
1600	1700		South Korea, KBS World Radio	9515eu 9640 as
1600	1700		Taiwan, Radio Taiwan International	9435 as 15485as
1600	1700		Uganda, Dunamis Shortwave 4750af	
1600	1700		UK, BBC World Service 3255af	5845 as 5975 as 6190af 9495 as 12095as 13820 as 15400af 15420af 17640af 17795af 17830af 21470af
1600	1700		USA, American Forces Network/AFRTS	4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb
1600	1700		USA, BBG/Voice of America/African Svc	4930af 6080af 15580af
1600	1700	mtwhf	USA, BBG/Voice of America/Special English 11890va 12080va 13750va	
1600	1700	Sat/Sun	USA, BBG/Voice of America/Special English 11890va 13570va	
1600	1700		USA, EWTN/WEWN Irondale, AL	15610eu
1600	1700		USA, FBN/WTJC Newport NC 9370na	
1600	1700		USA, WBCQ Monticello ME 9330usb	
1600	1700		USA, WHRI Cypress Creek SC	7385af 9840af 17520af
1600	1700		USA, WJHR International Milton FL	15550na
1600	1700		USA, WWCR Nashville TN 9980af	12160af 13845eu 15825eu
1600	1700		USA, WWRB Manchester TN 9385na	
1600	1700		USA, WYFR/Family Radio Worldwide	11850 as 17545af 21525af
1600	1700		Zambia, CVC Radio Christian Voice	13590af
1600	1700		Zambia, ZNBC/Radio Two 6165do	
1630	1700		Palau, T8WH/ WHRI 9930	as
1630	1700	m	South Africa, SA Radio League	3230af
1630	1700		Turkey, Voice of Turkey 15520	as
1630	1700	mtwhf	USA, BBG/Voice of America 13830af	
1630	1700	mtwhf	USA, BBG/Voice of America/Sudan in Focus 9675af 12015af 13830af	
1651	1700	DRM	New Zealand, Radio NZ International	9890pa
1651	1700	smtwhf	New Zealand, Radio NZ International	9765pa
1658	1700	Sat	New Zealand, Radio NZ International	9765pa

1700 UTC - 12PM EST / 11AM CST / 9AM PST

1700	1720	t	Canada, Bible Voice Broadcasting	13590me
1700	1725		Turkey, Voice of Turkey 15520	as
1700	1729	DRM	Romania, Radio Romania International	7350eu
1700	1730	m	South Africa, SA Radio League	3230af
1700	1730		Vietnam, Voice of Vietnam/Overseas Svc	9625eu
1700	1750	DRM	New Zealand, Radio NZ International	9890pa
1700	1750	smtwhf	New Zealand, Radio NZ International	9765pa
1700	1755	mtwhf	South Africa, Channel Africa 9675af	
1700	1757	DRM	Romania, Radio Romania International	9535eu
1700	1757		Romania, Radio Romania International	11735eu
1700	1759	DRM	Poland, Polskie Radio Warsaw	7265eu
1700	1759		Poland, Polskie Radio Warsaw	9770eu
1700	1800		Anguilla, University Network 11775na	
1700	1800		Australia, ABC NT Alice Springs	2310do
1700	1800		Australia, ABC NT Katherine 2485do	
1700	1800		Australia, Radio Australia 5995pa	6080 as 9475 as 9580pa 9710pa 11880pa
1700	1800		Bahrain, Radio Bahrain 6010me	
1700	1800	Sat/Sun	Canada, Bible Voice Broadcasting	11960me
1700	1800	Sat	Canada, CBC Northern Quebec Svc	9625na
1700	1800		Canada, CFRX Toronto ON 6070na	
1700	1800		Canada, CFVP Calgary AB 6030na	
1700	1800		Canada, CKZN St Johns NF 6160na	
1700	1800		Canada, CKZU Vancouver BC 6160na	
1700	1800		China, China Radio International	6090 as 6140 as 6145eu 6165me 7235 as 7265 as 7410 as 7420 as 11900af 13760af
1700	1800		Egypt, Radio Cairo 15345af	
1700	1800	Sat/Sun	Equatorial Guinea, Radio Africa	7190af
1700	1800		Malaysia, RTM Kajang/Traxx FM	7295do
1700	1800		Palau, T8WH/ WHRI 9930	as
1700	1800		Russia, Voice of Russia 4975	as 11985af 12040eu
1700	1800		South Africa, CVC 1 Africa Radio	4965af 13590af
1700	1800		Swaziland, TWR Africa 3200af	
1700	1800	Sat	Swaziland, TWR Africa 3200af	
1700	1800		Taiwan, Radio Taiwan International	15690af
1700	1800		UK, BBC World Service 3255af	5845 as 5975 as 6190af 7405af 7565 as 9410af 9495 as 12095af 15400af 17795af 17830af
1700	1800		USA, American Forces Network/AFRTS	4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb
1700	1800		USA, BBG/Voice of America/African Svc	6080af 12015af 15580af 17895af
1700	1800		USA, EWTN/WEWN Irondale, AL	15610eu
1700	1800		USA, FBN/WTJC Newport NC 9370na	
1700	1800		USA, WBCQ Monticello ME 9330usb	15420usb
1700	1800		USA, WHRI Cypress Creek SC	7385af 9840af 17520af
1700	1800		USA, WJHR International Milton FL	15550na
1700	1800		USA, WWCR Nashville TN 9980af	12160af 13845eu 15825eu
1700	1800		USA, WWRB Manchester TN 9385na	
1700	1800		USA, WYFR/Family Radio Worldwide	7395af
1700	1800		Zambia, CVC Radio Christian Voice	4965af 13590af
1700	1800		Zambia, ZNBC/Radio Two 6165do	
1720	1740	Sat/Sun	USA, BBG/Voice of America/Studio 7	4930af 7210af 12130af

1720	2740	fas	USA, BBG/Voice of America	7210af		
1730	1745		India, All India Radio/Bhopal	4810do		
1730	1745		India, All India Radio/Delhi	5015do	7370do	
			9575do	9835do		
1730	1745		India, All India Radio/Guwahati	4940do		
1730	1745		India, All India Radio/Hyderbad	4800do		
1730	1745		India, All India Radio/Jaipur	4910do		
1730	1745		India, All India Radio/Kolkata	4820do		
1730	1745		India, All India Radio/Kurseong	4895do		
1730	1745		India, All India Radio/Lucknow	4880do		
1730	1745		India, All India Radio/Radio Kashmir	4950do		
1730	1745		India, All India Radio/Shimla	4965do		
1730	1745		India, All India Radio/Thiruvananthapuram			
			5010do			
1730	1800		Bulgaria, Radio Bulgaria	5900eu	7400eu	
1730	1800	DRM	Bulgaria, Radio Bulgaria	9700eu		
1730	1800	mtwhf	Clandestine, Sudan Radio Service/SRS	9590af		
1730	1800	Sun	Italy, IRRS-Shortwave/Overcomer Ministries			
			7290va			
1730	1800	mtwhf	Moldova, Radio PMR/Prednistrovia	9665eu		
1730	1800	mtwhf	USA, BBG/Voice of America	7210af		
1730	1800	mtwhf	USA, BBG/Voice of America/Studio 7	4930af		
			7210af	12130af		
1730	1800		Vatican City State, Vatican Radio	11625af		
			13765af	15570af		
1740	1745		India, All India Radio/Chennai	4920do		
1745	1800	DRM	India, All India Radio/External Svc	9950eu		
			11580af			
1745	1800		India, All India Radio/External Svc	7400af		
			7410af	7550eu	9415af	9445af
			11670eu	11935af		
1751	1800	DRM	New Zealand, Radio NZ International	11675pa		
1751	1800		New Zealand, Radio NZ International	11725pa		
1758	1800	DRM	New Zealand, Radio NZ International	11675pa		
1758	1800	Sat	New Zealand, Radio NZ International	11725pa		
1759	1800		Netherlands, R Netherlands Worldwide	6020af		
			15495af			

1800 UTC - 1PM EST / 12PM CST / 10AM PST

1800	1815	Sun	Canada, Bible Voice Broadcasting	13590me		
1800	1815	Sat	Canada, Bible Voice Broadcasting	11855	as	
1800	1820	f	USA, BBG/Voice of America	7210af		
1800	1830	w	Austria, AWR Europe	11690af		
1800	1830		South Africa, AWR Africa	3215af	3345af	
1800	1830	mtwhf	USA, BBG/Voice of America/African Svc	6080af		
			9850af	12015af	15580af	
1800	1830	Sat/Sun	USA, BBG/Voice of America/African Svc	4930af		
			6080af	9850af	12015af	15580af
1800	1845	Sun	Canada, Bible Voice Broadcasting	9430me		
1800	1850	DRM	New Zealand, Radio NZ International	11675pa		
1800	1857		Netherlands, R Netherlands Worldwide	6020af		
			15495af			
1800	1857		North Korea, Voice of Korea	13760eu	15425eu	
1800	1859		Canada, Radio Canada International	9740va		
			9770af	11845af	15365af	17790af
1800	1900		Anguilla, University Network	11775na		
1800	1900	mtwhf	Argentina, RAE	15345eu		
1800	1900		Australia, ABC NT Alice Springs	2310do		
1800	1900		Australia, ABC NT Katherine	2485do		
1800	1900		Australia, Radio Australia	6080pa	7240pa	
			9475 as	9580pa	9710pa	11880pa
1800	1900		Bahrain, Radio Bahrain	6010me		
1800	1900	Sat	Canada, Bible Voice Broadcasting	9430me		
1800	1900	Sun	Canada, Bible Voice Broadcasting	6030eu		
1800	1900		Canada, CFRX Toronto ON	6070na		
1800	1900		Canada, CFVP Calgary AB	6030na		
1800	1900		Canada, CKZN St Johns NF	6160na		
1800	1900		Canada, CKZU Vancouver BC	6160na		
1800	1900		China, China Radio International	6175eu		
			9600eu	13760eu		
1800	1900	Sat/Sun	Equatorial Guinea, Radio Africa	7190af		
1800	1900	DRM	India, All India Radio/External Svc	9950eu		
			11580af			
1800	1900		India, All India Radio/External Svc	7400af		
			7410af	7550eu	9415af	9445af
			11670eu	11935af		
1800	1900		Italy, IRRS-Shortwave/Overcomer Ministries			
			7290va			
1800	1900		Kuwait, Radio Kuwait	15540eu		
1800	1900		Malaysia, RTM Kajang/Traxx FM	7295do		
1800	1900		New Zealand, Radio NZ International	11725pa		
1800	1900		Nigeria, Voice of Nigeria	15120af		
1800	1900		Palau, T8WH/ WHRI	9930	as	9955
			as			
1800	1900		Russia, Voice of Russia	4975me	12040va	
1800	1900		South Africa, CVC 1 Africa Radio	4965af		
			13590af			
1800	1900		South Korea, KBS World Radio	7275eu		
1800	1900		Swaziland, TWR Africa	9500af		
1800	1900		Taiwan, Radio Taiwan International	6155eu		
1800	1900		UK, BBC World Service	3255af	7405af	
			11765va	11810af	12095af	15400af
1800	1900		USA, American Forces Network/AFRTS	4319usb		
			5446usb	5765usb	7812usb	12133usb
			12759usb	13362usb		
1800	1900		USA, EWTN/WEWN Irondale, AL	15610af		
1800	1900		USA, FBN/WTJC Newport NC	9370na		
1800	1900		USA, KJES Vado NM	15385na		
1800	1900		USA, WBCQ Monticello ME	9330usb	15420usb	
1800	1900		USA, WHRI Cypress Creek SC	7385af		
			9840af	17520af		
1800	1900		USA, WJHR International Milton FL	15550na		
1800	1900		USA, WWCR Nashville TN	9980af	12160af	
			13845eu	15825eu		
1800	1900		USA, WWRB Manchester TN	9385na		
1800	1900		USA, WYFR/Family Radio Worldwide	5905af		
			7395af	9770af	9925af	13750af
1800	1900		Zambia, CVC Radio Christian Voice	4965af		
			13590af			
1800	1900		Zambia, ZNBC/Radio Two	6165do		
1805	1810	Sat	Croatia, Voice of Croatia	6165eu		
1805	1815	mtwhf	Croatia, Voice of Croatia	6165eu		
1810	1820	f	USA, BBG/Voice of America/Studio 7	4930af		
			7210af	12130af		
1815	1845	Sat	Canada, Bible Voice Broadcasting	6030eu		
1815	1900		USA, WINB Red Lion PA	13570ca		
1830	1845		India, All India Radio/Delhi	5015do		
1830	1900		South Africa, AWR Africa	11830af		
1830	1900		Turkey, Voice of Turkey	9785eu		
1830	1900		UK, BBC World Service	9850	as	5875
			as 5905af	5950	as	5950 as
			5975 as	6190af		
1830	1900		UK, BBC World Service	9410af		
1830	1900	mtwhf	USA, BBG/Voice of America	7210af		
1830	1900		USA, BBG/Voice of America/African Svc	4930af		
			6080af	9850af	12015af	15580af
1830	1900	mtwhf	USA, BBG/Voice of America/Studio 7	7210af		
			12130af			
1845	1900	mtwhfa	Albania, Radio Tirana	7520na	13735na	
1851	1900	DRM	New Zealand, Radio NZ International	15720pa		
1858	1900	Sat/DRM	New Zealand, Radio NZ International	15720pa		
1859	1900		Netherlands, R Netherlands Worldwide	7425af		
			11610af			

1900 UTC - 2PM EST / 1PM CST / 11AM PST

1900	1925		Turkey, Voice of Turkey	9785eu		
1900	1928		Germany, Deutsche Welle	12045af		
1900	1930		Germany, Deutsche Welle	9735af	12070af	
1900	1930		USA, BBG/Voice of America/African Svc	4930af		
			4940af	6080af	9850af	15580af
			17895af			
1900	1930		Vietnam, Voice of Vietnam/Overseas Svc	7280eu		
			9730eu			
1900	1945	DRM	India, All India Radio/External Svc	9950eu		
			11580af			
1900	1945		India, All India Radio/External Svc	7400af		
			7410af	7550eu	9415af	9445af
			11670eu	11935af		
1900	1950	DRM	New Zealand, Radio NZ International	15720pa		
1900	1957		Netherlands, R Netherlands Worldwide	7425af		
			11615af	15195af		
1900	1957		North Korea, Voice of Korea	7210af	9975va	
			11535va	11910af		
1900	2000		Anguilla, University Network	11775na		
1900	2000		Australia, ABC NT Alice Springs	2310do		
1900	2000		Australia, ABC NT Katherine	2485do		
1900	2000		Australia, Radio Australia	6080pa	7240pa	
			9500 as	9580pa	9710pa	11880pa
1900	2000		Bahrain, Radio Bahrain	6010me		
1900	2000		Canada, CFRX Toronto ON	6070na		
1900	2000		Canada, CFVP Calgary AB	6030na		
1900	2000		Canada, CKZN St Johns NF	6160na		
1900	2000		Canada, CKZU Vancouver BC	6160na		
1900	2000		China, China Radio International	7295va		
			9435af	9440af		
1900	2000		Cuba, Radio Havana Cuba	11760sa		
1900	2000		Egypt, Radio Cairo	11510af		

1900	2000	Sat/Sun	Equatorial Guinea, Radio Africa	7190af
1900	2000		Indonesia, Voice of Indonesia	9526eu
1900	2000		Italy, IRRS-Shortwave/Overcomer Ministries	7290va
1900	2000		Kuwait, Radio Kuwait	15540eu
1900	2000		Malaysia, RTM Kajang/Traxx FM	7295do
1900	2000		Micronesia, The Cross Radio/Pohnpei	4755 as
1900	2000		New Zealand, Radio NZ International	11725pa
1900	2000		Palau, T8WH/ WHRI	9930 as
1900	2000		Russia, Voice of Russia	12040va
1900	2000		South Africa, CVC 1 Africa Radio	4965af
				13590af
1900	2000	mtwhf	Spain, Radio Exterior de Espana	9665eu
				11610af
1900	2000		Swaziland, TWR Africa	3200af
1900	2000	Sat	Swaziland, TWR Africa	3200af
1900	2000		Thailand, Radio Thailand World Svc	7205eu
1900	2000		UK, BBC World Service	3255af 5875 as
			5950 as 6005af 6190af	9410af
			11810af 12095af 15400af	
1900	2000		USA, American Forces Network/AFRTS	4319usb
			5446usb 5765usb 7812usb	12133usb
			12759usb 13362usb	
1900	2000		USA, BBG/Voice of America/Special English	
			7485va 9630va	
1900	2000		USA, EWTN/WEWN Irondale, AL	15610af
1900	2000		USA, FBN/WTJC Newport NC	9370na
1900	2000		USA, WBCQ Monticello ME 7415usb	9330usb
			15420usb	
1900	2000		USA, WHRI Cypress Creek SC	7385af
			9840af 17520na	
1900	2000		USA, WINB Red Lion PA	13570ca
1900	2000		USA, WJHR International Milton FL	15550na
1900	2000		USA, WWCR Nashville TN 9980af	12160af
			13845eu 15825eu	
1900	2000		USA, WWRB Manchester TN	9385na
1900	2000		USA, WYFR/Family Radio Worldwide	3230af
			6020af 7270af 7395af	9610af
			9775af 18980eu	
1900	2000		Zambia, CVC Radio Christian Voice	4965af
			13590af	
1900	2000		Zambia, ZNBC/Radio Two	6165do
1905	1920	Sat	Mali, ORTM/Radio Mali	9635do
1930	2000	Sat/Sun	Germany, Pan American Broadcasting	9515af
1930	2000		Iran, IRIB/ VOIRI 5940eu 6205eu	9780eu
			9800af	
1930	2000	mtwhf	Moldova, Radio PMR/Prednistrovia	9665eu
1930	2000		South Africa, RTE Radio Worldwide	5840af
1930	2000		USA, BBG/Voice of America/African Svc	4930af
			4940af 6080af 15580af	
1945	2000	DRM	Vatican City State, Vatican Radio	9800am
1950	2000		Vatican City State, Vatican Radio	4005va
			5885va 7250va 9645va	
1951	2000	DRM	New Zealand, Radio NZ International	17675pa
1958	2000	Sat/DRM	New Zealand, Radio NZ International	17675pa

2000 UTC - 3PM EST / 2PM CST / 12PM PST

2000	2015	Sat	Germany, Pan American Broadcasting	9515af
2000	2027		Iran, IRIB/ VOIRI 5940eu 6205eu	9780eu
			9800af	
2000	2030	mtwhfa	Albania, Radio Tirana 7465eu	13735na
2000	2030		Egypt, Radio Cairo	11510af
2000	2030		South Africa, RTE Radio Worldwide	5840af
2000	2030	Sat	Swaziland, TWR Africa	3200af
2000	2030		USA, BBG/Voice of America/African Svc	4930af
			4940af 6080af 15580af	
2000	2030		Vatican City State, Vatican Radio	7365af
			9755af 11625af	
2000	2050	DRM	New Zealand, Radio NZ International	17675pa
2000	2057		Netherlands, R Netherlands Worldwide	7425af
			11615af	
2000	2059		USA, WINB Red Lion PA	13570ca
2000	2100		Anguilla, University Network	11775na
2000	2100		Australia, ABC NT Alice Springs	2310do
2000	2100		Australia, ABC NT Katherine	2485do
2000	2100		Australia, ABC NT Tennant Creek	2325do
2000	2100		Australia, Radio Australia 6080pa	7240pa
			9500 as 11650pa 11660pa	11880pa
2000	2100		Bahrain, Radio Bahrain	6010me
2000	2100		Belarus, Radio Station Belarus	7255eu 7360eu
			7390eu	
2000	2100	DRM	Belgium, TDP Radio/Disco Palace	17755am
2000	2100		Canada, CFRX Toronto ON	6070na
2000	2100		Canada, CFVP Calgary AB	6030na
2000	2100		Canada, CKZN St Johns NF	6160na
2000	2100		Canada, CKZU Vancouver BC	6160na
2000	2100		China, China Radio International	5960eu
			5985af 7285eu 7415eu	9440af
			9600eu	
2000	2100	Sat/Sun	Equatorial Guinea, Radio Africa	7190af
2000	2100		Germany, Deutsche Welle 9655af	9735af
			12070af	
2000	2100		Kuwait, Radio Kuwait	15540eu
2000	2100		Malaysia, RTM Kajang/Traxx FM	7295do
2000	2100		Micronesia, The Cross Radio/Pohnpei	4755 as
2000	2100		New Zealand, Radio NZ International	11725pa
2000	2100		Palau, T8WH/ WHRI	9930 as
2000	2100		Russia, Voice of Russia	12040va
2000	2100		South Africa, CVC 1 Africa Radio	4965af
			9505af	
2000	2100		UK, BBC World Service 3255af	6005af
			6190af 9410af 9850af	11810af
			12095af	
2000	2100		USA, American Forces Network/AFRTS	4319usb
			5446usb 5765usb 7812usb	12133usb
			12759usb 13362usb	
2000	2100	mtwhf	USA, BBG/Voice of America 5930va	9480va
2000	2100		USA, EWTN/WEWN Irondale, AL	15610af
2000	2100		USA, FBN/WTJC Newport NC	9370na
2000	2100		USA, WBCQ Monticello ME 7415usb	9330usb
			15420usb	
2000	2100		USA, WHRI Cypress Creek SC	7385na
			15665na	
2000	2100		USA, WJHR International Milton FL	15550na
2000	2100		USA, WWCR Nashville TN 9980af	12160af
			13845eu 15825eu	
2000	2100		USA, WWRB Manchester TN 9385na	
2000	2100		USA, WYFR/Family Radio Worldwide	12060af
			15195af 17725ca	
2000	2100		Zambia, CVC Radio Christian Voice	4965af
			9505af	
2000	2100		Zambia, ZNBC/Radio Two 6165do	
2030	2045		Thailand, Radio Thailand World Svc	9680eu
2030	2057	DRM	Romania, Radio Romania International	9765eu
2030	2057		Romania, Radio Romania International	11880na
			11940na 13800na	
2030	2100		Turkey, Voice of Turkey 7205va	
2030	2100		USA, BBG/Voice of America 7555	as
2030	2100		USA, BBG/Voice of America/African Svc	4930af
			6080af 15580af	
2030	2100	Sat/Sun	USA, BBG/Voice of America/African Svc	4930af
			4940af 6080af 15580af	
2030	2100		Vietnam, Voice of Vietnam/Overseas Svc	7220me
			7280eu 9550me 9730eu	
2045	2100		India, All India Radio/External Svc	7550eu
			9445eu 9910pa 11620pa	11670eu
			11715pa	
2045	2100	DRM	India, All India Radio/External Svc	9950eu
2051	2100	DRM	New Zealand, Radio NZ International	15720pa

2100 UTC - 4PM EST / 3PM CST / 1PM PST

2100	2125		Turkey, Voice of Turkey 7205va	
2100	2130		Australia, ABC NT Alice Springs	2310do
2100	2130		Australia, ABC NT Katherine 2485do	
2100	2130		Australia, ABC NT Tennant Creek	2325do
2100	2130		Austria, AWR Europe	9830af
2100	2130	Sat	Canada, CBC Northern Quebec Svc	9625na
2100	2130		South Korea, KBS World Radio	3955eu
2100	2150		New Zealand, Radio NZ International	11725pa
2100	2150	DRM	New Zealand, Radio NZ International	15720pa
2100	2157		North Korea, Voice of Korea 13760eu	15245eu
2100	2200		Angola, Angolan National Radio	7217af
2100	2200		Anguilla, University Network 11775na	
2100	2200		Australia, Radio Australia 9500	as
			9660pa 11660pa 11650pa	11695 as
			13630pa 15515pa	
2100	2200		Bahrain, Radio Bahrain 6010me	
2100	2200		Belarus, Radio Station Belarus	7255eu 7360eu
			7390eu	
2100	2200	DRM	Belgium, TDP Radio	17555eu
2100	2200		Bulgaria, Radio Bulgaria	5900eu 7400eu
2100	2200		Canada, CFRX Toronto ON 6070na	
2100	2200		Canada, CFVP Calgary AB 6030na	
2100	2200		Canada, CKZN St Johns NF 6160na	
2100	2200		Canada, CKZU Vancouver BC	6160na

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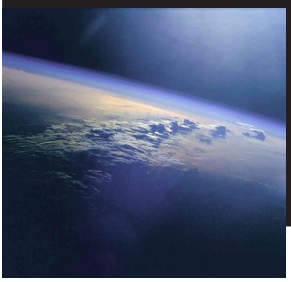
2100	2200		China, China Radio International	5960eu
			7205af 7285eu 7325af	7415eu
			9500eu	
2100	2200	Sat/Sun	Equatorial Guinea, Radio Africa	7190af
2100	2200		Germany, Deutsche Welle 12070af	
2100	2200		India, All India Radio/External Svc	7550eu
			9445eu 9910pa 11620pa	11715pa
2100	2200	DRM	India, All India Radio/External Svc	9950eu
2100	2200		Malaysia, RTM Kajang/Traxx FM	7295do
2100	2200		Micronesia, The Cross Radio/Pohnpei	4755 as
2100	2200		Palau, T8WH/ WHRI 9930	as
2100	2200		South Africa, CVC 1 Africa Radio	4965af
			9505af	
2100	2200	Sat/Sun	Spain, Radio Exterior de Espana	9650eu
2100	2200		Syria, Radio Damascus 9330va	12085va
2100	2200		UK, BBC World Service 3255af	3915 as
			5875 as 5905 as	6005af
			6190af 6195 as	9410af
			9915af 12095af	
2100	2200		USA, American Forces Network/AFRTS	4319usb
			5446usb 5765usb 7812usb	12133usb
			12759usb 13362usb	
2100	2200		USA, BBG/Voice of America 7555	as
2100	2200		USA, BBG/Voice of America/African Svc	6080af
			15580af	
2100	2200		USA, EWTN/WEWN Irondale, AL	15610af
2100	2200		USA, FBN/WTJC Newport NC	9370na
2100	2200		USA, WBCQ Monticello ME 7415usb	9330usb
2100	2200		USA, WHRI Cypress Creek SC	7385na
			13660na	
2100	2200		USA, WINB Red Lion PA 9265ca	
2100	2200		USA, WJHR International Milton FL	15550na
2100	2200		USA, WWCR Nashville TN 7465eu	9350af
			9980af 13845eu	
2100	2200		USA, WWRB Manchester TN 3215na	
2100	2200		USA, WYFR/Family Radio Worldwide	7425af
			12060af	
2100	2200		Zambia, CVC Radio Christian Voice	4965af
			9505af	
2100	2200		Zambia, ZNBC/Radio Two 6165do	
2115	2200		Egypt, Radio Cairo 6270eu	
2130	2200		Australia, ABC NT Alice Springs	4835do
2130	2200		Australia, ABC NT Katherine 5025do	
2130	2200	mtwhfa	Canada, CBC Northern Quebec Svc	9625na
2130	2200	smtwh	Moldova, Radio PMR/Prednistrovia	9665eu
2151	2200		New Zealand, Radio NZ International	15720pa
2151	2200	DRM	New Zealand, Radio NZ International	17675pa
2158	2200	Sat	New Zealand, Radio NZ International	15720pa
2158	2200	Sat/DRM	New Zealand, Radio NZ International	17675pa

2200 UTC - 5PM EST / 4PM CST / 2PM PST

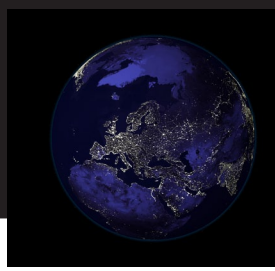
2200	2205		Zambia, ZNBC/Radio Two 6165do	
2200	2230		India, All India Radio/External Svc	7550eu
			9445eu 9445eu 9910pa	11620pa
			11670eu 11715pa	
2200	2230	DRM	India, All India Radio/External Svc	9950eu
2200	2230	smtwh	USA, BBG/Voice of America 5895va	7480va
			7575va 11955va	
2200	2245		Egypt, Radio Cairo 6270eu	
2200	2255		Turkey, Voice of Turkey 9830va	
2200	2257		Romania, Radio Romania International	5960eu
			7435eu 9790eu 11940eu	
2200	2300		Anguilla, University Network 6090na	
2200	2300		Australia, ABC NT Alice Springs	4835do
2200	2300		Australia, ABC NT Katherine 5025do	
2200	2300		Australia, Radio Australia 9660pa	9855 as
			13630pa 15230pa 15515pa	15560pa
2200	2300		Bahrain, Radio Bahrain 6010me	
2200	2300	smtwhf	Canada, CBC Northern Quebec Svc	9625na
2200	2300		Canada, CFRX Toronto ON 6070na	
2200	2300		Canada, CFVP Calgary AB 6030na	
2200	2300		Canada, CKZN St Johns NF 6160na	
2200	2300		Canada, CKZU Vancouver BC 6160na	
2200	2300		China, China Radio International	9590 as
2200	2300	Sat/Sun	Equatorial Guinea, Radio Africa	7190af
2200	2300		Malaysia, RTM Kajang/Traxx FM	7295do
2200	2300		Micronesia, The Cross Radio/Pohnpei	4755 as
2200	2300		New Zealand, Radio NZ International	15720pa
2200	2300	DRM	New Zealand, Radio NZ International	17675pa
2200	2300		Palau, T8WH/ WHRI 9930	as
2200	2300		Russia, Voice of Russia 9800va	
2200	2300		UK, BBC World Service 3915	as 5875
			as 5905 as 5935af	6195 as
			7490 as 9580 as	9915af
			12095af	
2200	2300		USA, American Forces Network/AFRTS	4319usb
			5446usb 5765usb 7812usb	12133usb
			12759usb 13362usb	
2200	2300		USA, BBG/Voice of America 7555	as
2200	2300		USA, EWTN/WEWN Irondale, AL	15610af
2200	2300		USA, FBN/WTJC Newport NC	9370na
2200	2300		USA, WBCQ Monticello ME 7415usb	9330usb
2200	2300		USA, WHRI Cypress Creek SC	9850na
			9860na 13620na	
2200	2300		USA, WINB Red Lion PA 9265ca	
2200	2300		USA, WWCR Nashville TN 7465eu	9350af
			9980af 13845eu	
2200	2300		USA, WWRB Manchester TN 3215na	5050na
2200	2300		USA, WYFR/Family Radio Worldwide	15255sa
			15440ca	
2200	2300		Zambia, CVC Radio Christian Voice	4965af
2215	2230		Croatia, Voice of Croatia 3985eu	7375ca
2230	2300		China, Xizang PBS/Lhasa 4905do	
2230	2300		Guam, AWR/KSDA 15320	as
2230	2300		USA, BBG/Voice of America/Special English	
			7460af 9570va 11840va	15340va
2245	2300		India, All India Radio/External Svc	6055 as
			7305 as 11645 as	13605 as

2300 UTC - 6PM EST / 5PM CST / 3PM PST

2300	0000		Anguilla, University Network 6090na	
2300	0000		Australia, ABC NT Alice Springs	4835do
2300	0000		Australia, ABC NT Katherine 5025do	
2300	0000		Australia, Radio Australia 9660pa	9855va
			13690pa 15230pa 15415pa	17795pa
2300	0000		Bahrain, Radio Bahrain 6010me	
2300	0000		Bulgaria, Radio Bulgaria 9700na	11700na
2300	0000	smtwhf	Canada, CBC Northern Quebec Svc	9625na
2300	0000		Canada, CFRX Toronto ON 6070na	
2300	0000		Canada, CFVP Calgary AB 6030na	
2300	0000		Canada, CKZN St Johns NF 6160na	
2300	0000		Canada, CKZU Vancouver BC 6160na	
2300	0000		China, China Radio International	5915 as
			5990ca 6145na 7350eu	7410 as
			9610 as 11690 as	11790 as
			11840na	
2300	0000		Cuba, Radio Havana Cuba 5040ca	
2300	0000		Egypt, Radio Cairo 6270na	
2300	0000		India, All India Radio/External Svc	6055 as
			7305 as 11645 as	13605 as
2300	0000		Malaysia, RTM Kajang/Traxx FM	7295do
2300	0000		Micronesia, The Cross Radio/Pohnpei	4755 as
2300	0000		New Zealand, Radio NZ International	15720pa
2300	0000	DRM	New Zealand, Radio NZ International	17675pa
2300	0000		Palau, T8WH/ WHRI 9930	as
2300	0000		Russia, Voice of Russia 9665va	9800va
2300	0000		UK, BBC World Service 5935af	7490 as
			9580 as 9740 as	9890 as
			11850as 12010 as	
2300	0000		USA, American Forces Network/AFRTS	4319usb
			5446usb 5765usb 7812usb	12133usb
			12759usb 13362usb	
2300	0000		USA, BBG/Voice of America 5895va	5915va
			7555va 7575va 11955va	
2300	0000		USA, BBG/Voice of America/Special English	
			7460af 9570va 11840va	15340va
2300	0000		USA, EWTN/WEWN Irondale, AL	15610af
2300	0000		USA, FBN/WTJC Newport NC	9370na
2300	0000		USA, WBCQ Monticello ME 7415usb	9330usb
2300	0000	mtwhfa	USA, WHRI Cypress Creek SC	9850na
2300	0000	Sun	USA, WHRI Cypress Creek SC	7315na
			17820va	
2300	0000		USA, WINB Red Lion PA 9265ca	
2300	0000		USA, WTWW Lebanon TN 5755va	12105va
2300	0000		USA, WWCR Nashville TN 3195eu	5070af
			9980af 13845eu	
2300	0000		USA, WWRB Manchester TN 3215na	5050na
2300	0000		USA, WYFR/Family Radio Worldwide	11580sa
			15440ca	
2300	0000		Zambia, CVC Radio Christian Voice	4965af
2300	2330	DRM	Vatican City State, Vatican Radio	9755am
2330	0000		Australia, Radio Australia 17750as	
2330	0000		Vietnam, Voice of Vietnam/Overseas Svc	9840as
			12020as	
2330	2345		India, All India Radio/Aligarh 9470do	



MTXtra
Shortwave Broadcast Guide



ARABIC

The following language schedule is extracted from our new MTXtra Shortwave Broadcast Guide pdf which is a free download to all MTXpress subscribers. This new online Shortwave Broadcast Guide has more than 9,100 station entries that include all languages being broadcasts via shortwave radio worldwide, sorted by time and updated monthly.

0000 UTC - 7PM EST / 6PM CST / 4PM PST

0000	0010	Tunisia, RTV/Radio Tunisia	7345af		
0000	0030	Egypt, Radio Cairo/ Voice of the Arabs	11540af		
0000	0045	Egypt, Radio Cairo	9250sa	9990sa	
0000	0100	Bahrain, Radio Bahrain	9745me		
0000	0100	Egypt, Radio Cairo/General Svc	9305na		
0000	0100	Iran, IRIB/ VOIRI	9420as		
0030	0100	Egypt, Radio Cairo	6270na		

0100 UTC - 8PM EST/ 7PM CST / 5PM PST

0100	0200	Bahrain, Radio Bahrain	9745me		
0100	0200	Egypt, Radio Cairo	6270na		
0100	0200	Egypt, Radio Cairo/General Svc	9305na		
0100	0200	Iran, IRIB/ VOIRI	9420as		

0200 UTC - 9PM EST / 8PM CST / 6PM PST

0200	0227	Iran, IRIB/ VOIRI	9420as		
0200	0300	Bahrain, Radio Bahrain	9745me		
0200	0300	Canada, Radio Canada International	5950me		
0200	0300	Egypt, Radio Cairo	6270na		
0200	0300	Egypt, Radio Cairo/General Svc	9305na		
0200	0300	Kuwait, Radio Kuwait/General Svc	5960me		
0200	0300	Oman, Radio Sultanate of Oman	15355af		
0200	0300	Sudan, Sudan Radio	7200do		
0230	0300	Iran, IRIB/ VOIRI	9420as	11660eu	11760eu

0300 UTC - 10PM EST / 9PM CST / 7PM PST

0300	0330	Canada, Bible Voice Broadcasting	7310me		
0300	0330	Clandestine, Radio Dardasha 7	7310va		
0300	0330	USA, BBG/Afia Darfur Radio	5945af	7330af	9815af
0300	0330	USA, BBG/VOA/Hello Darfur	5945af	7330af	9815af
0300	0400	Bahrain, Radio Bahrain	9745me		
0300	0400	Canada, Radio Canada International	7230me		
0300	0400	Egypt, Radio Cairo	6270na		
0300	0400	Egypt, Radio Cairo/General Svc	9305na		
0300	0400	Iran, IRIB/ VOIRI	9420as	11660eu	11760eu
0300	0400	Kuwait, Radio Kuwait/General Svc	5960me		
0300	0400	Saudi Arabia, BSKSA/General Program 2	9580va		
0300	0400	Saudi Arabia, BSKSA/Qur'an Program	9715va	15170as	17895as
0300	0400	Sudan, Sudan Radio	7200do		
0300	0400	Tunisia, RTV/Radio Tunisia	9725va	12005va	
0300	0400	UK, BBC World Service	5790me	6040me	9440me
0300	0400	Yemen, Rep of Yemen Radio	9780me		
0330	0400	Iran, IRIB/ VOIRI	9610as	11875as	
0330	0400	Iran, VO Islamic Palestinian Revol	9610me	11875me	

0400 UTC - 11PM EST / 10PM CST / 8PM PST

0400	0427	Iran, IRIB/ VOIRI	9610as	11875as	
0400	0427	Iran, VO Islamic Palestinian Revol	7295me	9610me	
0400	0430	Egypt, Radio Cairo	6270na		
0400	0430	Vatican City State, Vatican Radio	9645me	11715me	
0400	0458	Algeria, Radio Algerienne	7295af		
0400	0500	Bahrain, Radio Bahrain	9745me		
0400	0500	Clandestine, Sudan Radio Service/SRS	13720af		
0400	0500	Egypt, Radio Cairo/General Svc	9305na		
0400	0500	Germany, AWR Europe	12050va		
0400	0500	Jordan, Radio Jordan	11960eu		
0400	0500	Kuwait, Radio Kuwait/General Svc	5960me		
0400	0500	Oman, Radio Sultanate of Oman	17590af		
0400	0500	Saudi Arabia, BSKSA/General Program 2	9580va		
0400	0500	Saudi Arabia, BSKSA/Qur'an Program	9715va	15170as	17895as
0400	0500	Sudan, Sudan Radio	7200do		
0400	0500	Tunisia, RTV/Radio Tunisia	7275eu	9725va	12005va
0400	0500	UK, BBC World Service	5790af	7325af	7375me 9915af 11740me 11820me 13660me
0400	0500	Yemen, Rep of Yemen Radio	9780me		
0430	0500 th	Canada, Bible Voice Broadcasting	9735me		
0430	0500	Clandestine, Radio Dabanga	13620af	15550af	

0500 UTC - 12AM EST / 11PM CST / 9PM PST

0500	0515 f	Canada, Bible Voice Broadcasting	9735me		
0500	0527	Iran, IRIB/ VOIRI	9420as	11660eu	11760eu
0500	0530 Sun	Canada, Bible Voice Broadcasting	11810af		
0500	0530	Clandestine, Radio Dardasha 7	11810af		
0500	0530 Sat/Sun	Clandestine, Sudan Radio Service/SRS	13720af		
0500	0555	Saudi Arabia, BSKSA/General Program 2	9580va		
0500	0555	Saudi Arabia, BSKSA/Qur'an Program	9715va	15170as	17895as
0500	0558	Algeria, Radio Algerienne	9535af	9535af	
0500	0600	Bahrain, Radio Bahrain	9745me		
0500	0600	China, China Radio International	9515af	9590me	11775af
0500	0600	Clandestine, Radio Dabanga	13730af		
0500	0600	Egypt, Radio Cairo/General Svc	9305na		
0500	0600	Germany, AWR Europe	12050af		
0500	0600	Jordan, Radio Jordan	11960eu		
0500	0600	Kuwait, Radio Kuwait/General Svc	5960me		
0500	0600	Kuwait, Radio Kuwait/Holy Qu'ran	15515as		
0500	0600	Oman, Radio Sultanate of Oman	17590af		
0500	0600	Sudan, Sudan Radio	7200do		
0500	0600	Tunisia, RTV/Radio Tunisia	7275eu	9725va	12005va
0500	0600	UK, BBC World Service	7375me	9915af	11680af 11820me 13660me 15790me
0500	0600	USA, WYFR/Family Radio Worldwide	9355eu	9385eu	
0500	0600	Yemen, Rep of Yemen Radio	6135me	9780me	
0530	0600	Clandestine, Radio Dabanga	13620af		
0530	0600	Iran, IRIB/ VOIRI	13790as	13800as	15150as

0600 UTC - 1AM EST / 12AM CST / 10PM PST

0600	0610	Tunisia, RTV/Radio Tunisia	9725va	12005va	
0600	0630	Japan, Radio Japan NHK World	11975me		
0600	0630	Tunisia, RTV/Radio Tunisia	7275eu		
0600	0658	Algeria, Radio Algerienne	11985af		
0600	0700	Bahrain, Radio Bahrain	9745me		
0600	0700	China, China Radio International	9515af	9590me	11775af
0600	0700	Clandestine, Radio Nacional De La	R.A.S.D. 6297af		
0600	0700	Egypt, Radio Cairo/General Svc	9305na		

0600	0700		Iran, IRIB/ VOIRI	13790as	13800as	15150as
0600	0700		Kuwait, Radio Kuwait/General Svc	5960me		
0600	0700		Kuwait, Radio Kuwait/Holy Qu'ran	15515as		
0600	0700		Saudi Arabia, BSKSA/General Program 1	17730af	17740af	
0600	0700		Saudi Arabia, BSKSA/General Program 2	11855va		
0600	0700		Saudi Arabia, BSKSA/Qur'an Program	9715va	15380va	17895as
0600	0700		Sudan, Sudan Radio	7200do		
0600	0700		UK, BBC World Service	7375me	11680af	11820va
				13660va	15790me	
0600	0700		Yemen, Rep of Yemen Radio	6135me		
0630	0657		Romania, Radio Romania International	11730af	11790af	15180af
				15400af		
0645	0700	mtwhf	Vatican City State, Vatican Radio	5965eu	7250eu	9645me
				11740va	15595va	

0700 UTC - 2AM EST / 1AM CST / 11PM PST

0700	0755		Saudi Arabia, BSKSA/Qur'an Program	9715va	15380va	17895as
0700	0800		Bahrain, Radio Bahrain	9745me		
0700	0800		Clandestine, Radio Nacional De La	R.A.S.D.	6297af	
0700	0800		Egypt, Radio Cairo/General Svc	17510af		
0700	0800		Iran, IRIB/ VOIRI	13790as	13800as	15150as
0700	0800		Kuwait, Radio Kuwait/General Svc	5960me		
0700	0800		Kuwait, Radio Kuwait/Holy Qu'ran	15515as		
0700	0800		Saudi Arabia, BSKSA/General Program 1	17730af	17740af	
0700	0800		Saudi Arabia, BSKSA/General Program 2	11855va		
0700	0800		Sudan, Sudan Radio	7200do		
0700	0800		Tunisia, RTV/Radio Tunisia	7335af		
0700	0800		UK, BBC World Service	13660af	15180af	
0700	0800		USA, WYFR/Family Radio Worldwide	11530af		
0700	0800		Yemen, Rep of Yemen Radio	6135me		

0800 UTC - 3AM EST / 2AM CST / 12AM PST

0800	0815	w	Italy, IRRS-Shortwave	11910va		
0800	0827		Iran, IRIB/ VOIRI	13790as	13800as	15150as
0800	0830		Tunisia, RTV/Radio Tunisia	7335af		
0800	0830		UK, FEBA Radio	15280me		
0800	0855		Saudi Arabia, BSKSA/General Program 1	17730af	17740af	
0800	0855		Saudi Arabia, BSKSA/Qur'an Program	9715va	15380va	
0800	0900		Bahrain, Radio Bahrain	9745me		
0800	0900		Egypt, Radio Cairo/General Svc	17510af		
0800	0900		Kuwait, Radio Kuwait/General Svc	5960me		
0800	0900		Kuwait, Radio Kuwait/Holy Qu'ran	15515as		
0800	0900		Saudi Arabia, BSKSA/General Program 2	11855va		
0800	0900		Sudan, Sudan Radio	7200do		
0800	0900		USA, BBG/VOA/Radio Sawa	15780af	17880af	
0800	0900		Yemen, Rep of Yemen Radio	6135me		
0830	0900		Iran, IRIB/ VOIRI	13740as	13790as	13800as
				15150as		

0900 UTC - 4AM EST / 3AM CST / 1AM PST

0900	0955		Saudi Arabia, BSKSA/Qur'an Program	9715va	11935va	17570as
				17615as		
0900	0955		Turkey, Voice of Turkey	11750va		
0900	1000		Bahrain, Radio Bahrain	9745me		
0900	1000	f	Canada, Bible Voice Broadcasting	17535af		
0900	1000		Egypt, Radio Cairo/General Svc	17510af		
0900	1000		Iran, IRIB/ VOIRI	13740as	13790as	13800as
				15150as		
0900	1000		Kuwait, Radio Kuwait/Holy Qu'ran	11630af		
0900	1000		Saudi Arabia, BSKSA/General Program 1	15490eu	17805af	
0900	1000		Saudi Arabia, BSKSA/General Program 2	11855va		
0900	1000		Sudan, Sudan Radio	7200do		
0900	1000		USA, BBG/VOA/Radio Sawa	15780af	17880af	
0900	1000		Yemen, Rep of Yemen Radio	6135me		

1000 UTC - 5AM EST / 4AM CST / 2AM PST

1000	1000		USA, BBG/VOA/Radio Sawa	15780af	17880af	
1000	1027		Iran, IRIB/ VOIRI	13790as	13800as	15150as
1000	1100		Bahrain, Radio Bahrain	9745me		
1000	1100		Egypt, Radio Cairo/General Svc	17510af		
1000	1100		Kuwait, Radio Kuwait/General Svc	21540eu		
1000	1100		Kuwait, Radio Kuwait/Holy Qu'ran	11630af		
1000	1100		Morocco, Radio Marocaine	15341af		
1000	1100		Saudi Arabia, BSKSA/General Program 1	15490eu	17805af	
1000	1100		Saudi Arabia, BSKSA/General Program 2	11855va		
1000	1100		Saudi Arabia, BSKSA/Qur'an Program	11735va	11785va	17570as
				17615as		
1000	1100		Sudan, Sudan Radio	7200do		
1000	1100		Yemen, Rep of Yemen Radio	6135me		
1015	1100		Egypt, Radio Cairo	15090as		
1030	1100		Iran, IRIB/ VOIRI	13790as	13800as	15150as

1100 UTC - 6AM EST / 5AM CST / 3AM PST

1100	1155		Saudi Arabia, BSKSA/General Program 1	15490eu	17805af	
1100	1155		Saudi Arabia, BSKSA/Qur'an Program	11785va	11935va	17570as
				17615as		
1100	1200		Bahrain, Radio Bahrain	9745me		
1100	1200		Egypt, Radio Cairo	15090as		
1100	1200		Iran, IRIB/ VOIRI	13790as	13800as	15150as
1100	1200		Kuwait, Radio Kuwait/General Svc	9750af	21540eu	
1100	1200		Kuwait, Radio Kuwait/Holy Qu'ran	11630af		
1100	1200		Morocco, Radio Marocaine	15341af		
1100	1200		Saudi Arabia, BSKSA/General Program 2	11855va		
1100	1200		Sudan, Sudan Radio	7200do		
1100	1200		USA, BBG/VOA/Radio Sawa	15780af	17840af	
1100	1200		Yemen, Rep of Yemen Radio	6135me		
1130	1200		Jordan, Radio Jordan	15290va		

1200 UTC - 7AM EST / 6AM CST / 4AM PST

1200	1215		Egypt, Radio Cairo	15090as		
1200	1230		Jordan, Radio Jordan	15290va		
1200	1300		Bahrain, Radio Bahrain	9745me		
1200	1300		Iran, IRIB/ VOIRI	13740as	13800as	15150as
1200	1300		Kuwait, Radio Kuwait/General Svc	9750af	21540eu	
1200	1300		Kuwait, Radio Kuwait/Holy Qu'ran	11630af		
1200	1300		Morocco, Radio Marocaine	15341af		
1200	1300		Saudi Arabia, BSKSA/General Program 1	17705eu	21505af	
1200	1300		Saudi Arabia, BSKSA/General Program 2	11855va		
1200	1300		Saudi Arabia, BSKSA/Qur'an Program	11785va	15380va	17625as
				17895af		
1200	1300		Sudan, Sudan Radio	7200do		
1200	1300		Tajikistan, Voice of Tajik	7245me		
1200	1300		USA, BBG/VOA/Radio Sawa	15780af	17840af	
1200	1300		Yemen, Rep of Yemen Radio	6135me	9780me	

1300 UTC - 8AM EST / 7AM CST / 5AM PST

1300	1355		Saudi Arabia, BSKSA/Qur'an Program	11785va	15380va	17615af
				17625as	17895af	
1300	1400		Bahrain, Radio Bahrain	9745me		
1300	1400		Egypt, Radio Cairo	15080af		
1300	1400		Iran, IRIB/ VOIRI	13740as	13800as	15150as
1300	1400		Kuwait, Radio Kuwait/General Svc	9750af	21540eu	
1300	1400		Kuwait, Radio Kuwait/Holy Qu'ran	11630af		
1300	1400		Morocco, Radio Marocaine	15341af		
1300	1400		Saudi Arabia, BSKSA/General Program 1	17705eu	21505af	
1300	1400		Saudi Arabia, BSKSA/General Program 2	11855va		
1300	1400		Sudan, Sudan Radio	7200do		
1300	1400		USA, BBG/VOA/Radio Sawa	13690af	17530af	
1300	1400		Yemen, Rep of Yemen Radio	6135me	9780me	

1400 UTC - 9AM EST / 8AM CST / 6AM PST

1400	1415	f	Italy, IRRS-Shortwave	11910va		
1400	1427		Iran, IRIB/ VOIRI	13740as	13800as	15150as
1400	1430		USA, BBG/VOA/Radio Sawa	13690af	17530af	
1400	1455		Saudi Arabia, BSKSA/General Program 1	17705eu	21505af	
1400	1455		Saudi Arabia, BSKSA/Qur'an Program	11785va	17615af	17895af
1400	1455		Turkey, Voice of Turkey	9540va	17770va	
1400	1457		Romania, Radio Romania International	11830af	11945af	15160af
1400	1500		Bahrain, Radio Bahrain	9745me		
1400	1500		Egypt, Radio Cairo	15080af		
1400	1500		Ethiopia, Radio Ethiopia	7235va	9560va	
1400	1500		Kuwait, Radio Kuwait/General Svc	9750af	21540af	
1400	1500		Kuwait, Radio Kuwait/Holy Qu'ran	11630af		
1400	1500		Saudi Arabia, BSKSA/General Program 2	11855va		
1400	1500		Sudan, Sudan Radio	7200do		
1400	1500		Yemen, Rep of Yemen Radio	6135me	9780me	
1430	1500		Iran, IRIB/ VOIRI	13740as	13800as	15150as
1430	1500		USA, BBG/VOA/Radio Sawa	17530af	17785af	

1500 UTC - 10AM EST / 9AM CST / 7AM PST

1500	1530	mtwhfa	Canada, Bible Voice Broadcasting	11810af		
1500	1530	mwfs	Clandestine, Voice of Democratic Alliance	7235af	9560af	
1500	1555		Saudi Arabia, BSKSA/Qur'an Program	11785va	13710af	17615af
1500	1557		North Korea, Voice of Korea	9990va	11545va	
1500	1600		Bahrain, Radio Bahrain	9745me		
1500	1600		Egypt, Radio Cairo	15080af		
1500	1600		Iran, IRIB/ VOIRI	9920as	15150as	
1500	1600		Kuwait, Radio Kuwait/General Svc	9750af		
1500	1600		Kuwait, Radio Kuwait/Holy Qu'ran	11630af		
1500	1600		Morocco, Radio Marocaine	15345af		
1500	1600		Oman, Radio Sultanate of Oman	15140va		
1500	1600		Russia, Voice of Russia	5925af		
1500	1600		Saudi Arabia, BSKSA/Call of Islam	15225af	15435eu	
1500	1600		Saudi Arabia, BSKSA/General Program 2	11855va		
1500	1600		Sudan, Sudan Radio	7200do		
1500	1600		USA, BBG/VOA/Radio Sawa	17540af	17785af	
1500	1600		Yemen, Rep of Yemen Radio	9780me		
1530	1600		Clandestine, Radio Dabanga	13730af	15720af	
1530	1600		Clandestine, Sudan Radio Service/SRS	17745af		
1530	1600		Clandestine, Sudan Radio Service/SRS	17745af		
1530	1600		Vatican City State, Vatican Radio	11935va	15595va	

1600 UTC - 11AM EST / 10AM CST / 8AM PST

1600	1627		Iran, IRIB/ VOIRI	9920as	15150as	
1600	1630		Clandestine, Radio Dabanga	13730af	15720af	
1600	1645		USA, WYFR/Family Radio Worldwide	15770eu		
1600	1655		Saudi Arabia, BSKSA/General Program 2	11855va		
1600	1655		Saudi Arabia, BSKSA/Qur'an Program	11785va	13710af	15205eu
1600	1700		Bahrain, Radio Bahrain	9745me		
1600	1700		China, China Radio International	9555af	11725af	12065me
1600	1700		Clandestine, Sudan Radio Service/SRS	17745af		
1600	1700		Indonesia, Voice of Indonesia	9526me		
1600	1700		Kuwait, Radio Kuwait/General Svc	6080me		
1600	1700		Morocco, Radio Marocaine	15345af		
1600	1700		Oman, Radio Sultanate of Oman	15140va		
1600	1700		Russia, Voice of Russia	11795va		
1600	1700		Saudi Arabia, BSKSA/Call of Islam	15225af	15435eu	
1600	1700		Sudan, Sudan Radio	7200do		
1600	1700		Tunisia, RTV/Radio Tunisia	9725va	12005va	
1600	1700		USA, WYFR/Family Radio Worldwide	13645me		
1615	1630	mwf	Canada, Bible Voice Broadcasting	13600me		
1630	1700		Iran, IRIB/ VOIRI	9420as	9920as	
1655	1700	mtwhf	Canada, Bible Voice Broadcasting	13580me		

1700 UTC - 12PM EST / 11AM CST / 9AM PST

1700	1715	mthf	Canada, Bible Voice Broadcasting	13580me		
1700	1727		Iran, IRIB/ VOIRI	9420as	9920as	
1700	1730	w	Canada, Bible Voice Broadcasting	13580me		
1700	1730		Canada, Bible Voice Broadcasting	9440me		
1700	1730		Clandestine, Radio Dardasha 7	13600va		
1700	1755		Saudi Arabia, BSKSA/General Program 1	15225af	15435eu	
1700	1755		Saudi Arabia, BSKSA/Qur'an Program	13710af	15205eu	17560af
1700	1757		North Korea, Voice of Korea	9990va	11545va	
1700	1800		Bahrain, Radio Bahrain	9745me		
1700	1800		China, China Radio International	9555af	11725af	13790va
1700	1800		Clandestine, Radio Nacional De La R.A.S.D.	6297af		
1700	1800		Egypt, Radio Cairo/ Radio Waadi el Nile	9250af		
1700	1800		Kuwait, Radio Kuwait/General Svc	6080me	13650na	
1700	1800		Morocco, Radio Marocaine	15345af		
1700	1800		Oman, Radio Sultanate of Oman	15140va		
1700	1800		Russia, Voice of Russia	9360me	11795va	12060me
1700	1800		Saudi Arabia, BSKSA/General Program 2	9580va		
1700	1800		Spain, Radio Exterior de Espana	21610me		
1700	1800		Sudan, Sudan Radio	7200do		
1700	1800		Sweden, IBRA Radio	11655me		
1700	1800		Tunisia, RTV/Radio Tunisia	9725va	12005va	
1700	1800		UK, BBC World Service	5875me	6195me	7375me
1700	1800		USA, WYFR/Family Radio Worldwide	11885me	13700va	13840af
1700	1800		Yemen, Rep of Yemen Radio	9780me		
1730	1800	h	Clandestine, EPDP Radio/VO Eritrean People	13820af		
1730	1800		India, All India Radio/External Svc	9920me	11710me	13640me
1730	1800		Iran, IRIB/ VOIRI	6175as	9420as	
1730	1800		Nigeria, Voice of Nigeria	15120va		

1800 UTC - 1PM EST / 12PM CST / 10AM PST

1800	1830		Armenia, Public Radio of Armenia	4810me		
1800	1830		USA, BBG/Afia Darfur Radio	9815af	11685af	11745af
1800	1830		USA, BBG/VOA/Hello Darfur	9815af	11665af	11745af
1800	1900		Algeria, Radio Algerienne	13820af		
1800	1900		Bahrain, Radio Bahrain	9745me		
1800	1900		Clandestine, Radio Nacional De La R.A.S.D.	6297af		
1800	1900		Egypt, Radio Cairo/ Radio Waadi el Nile	9250af		
1800	1900		India, All India Radio/External Svc	9920me	11710me	13640me
1800	1900		Iran, IRIB/ VOIRI	6215as	9420as	
1800	1900		Kuwait, Radio Kuwait/General Svc	6080me	13650na	
1800	1900		Morocco, Radio Marocaine	15345af		
1800	1900		Oman, Radio Sultanate of Oman	15140va		
1800	1900		Russia, Voice of Russia	9360me	11795va	12060va
1800	1900		Saudi Arabia, BSKSA/General Program 1	9555af	9870eu	
1800	1900		Saudi Arabia, BSKSA/General Program 2	9580va		
1800	1900		Saudi Arabia, BSKSA/Qur'an Program	11820eu	11915af	11930af
1800	1900		Spain, Radio Exterior de Espana	21610me		
1800	1900		Sudan, Sudan Radio	7200do		
1800	1900		Tunisia, RTV/Radio Tunisia	7225eu	9725va	12005va
1800	1900		UK, BBC World Service	6195me	7375me	11680af
1800	1900		USA, WYFR/Family Radio Worldwide	11955af	13720af	
1830	1900		Austria, AWR Europe	11660af		

1830	1900		China, China Radio International		11640af
1830	1900		Turkey, Voice of Turkey	11690va	
1845	1900		Jordan, Radio Jordan	9830eu	

1900 UTC - 2PM EST / 1PM CST / 11AM PST

1900	1925		Turkey, Voice of Turkey	11690va	
1900	1930		Canada, Bible Voice Broadcasting		13640af
1900	1930		China, China Radio International		11640af
1900	1930		Clandestine, Radio Dardasha 7		13740af
1900	1930		Sweden, IBRA Radio	12070af	
1900	1930		UK, FEBA Radio 7230me		
1900	1930		USA, BBG/Afia Darfur Radio	9600af	9800af
			11830af		
1900	1930		USA, BBG/VOA/Hello Darfur		9600af
			9800af	11830af	
1900	1945		India, All India Radio/External Svc		9920me
			11710me	13640me	
1900	1958		Algeria, Radio Algerienne	13820af	11775af
1900	2000		Bahrain, Radio Bahrain	9745me	
1900	2000		Canada, Radio Canada International		15180va
			15235va		
1900	2000		Clandestine, Radio Nacional De La R.A.S.D.		
			6297af		
1900	2000		Egypt, Radio Cairo/ Radio Waadi el Nile		
			9250af		
1900	2000		Egypt, Radio Cairo/ Voice of the Arabs		11540af
1900	2000		Egypt, Radio Cairo/General Svc		9305eu
1900	2000		Germany, AWR Europe	9470va	
1900	2000		Iran, IRIB/ VOIRI 6215as	9420as	
1900	2000		Jordan, Radio Jordan	9830va	
1900	2000		Kuwait, Radio Kuwait/General Svc		6080me
			13650na		
1900	2000		Morocco, Radio Marocaine	15345af	
1900	2000		Oman, Radio Sultanate of Oman		15140va
1900	2000		Russia, Voice of Russia	7315me	9360me
1900	2000		Saudi Arabia, BSKSA/General Program 1		
			9555af	9870eu	
1900	2000		Saudi Arabia, BSKSA/General Program 2		
			9580va		
1900	2000		Saudi Arabia, BSKSA/Qur'an Program		11820eu
			11915af	11930af	
1900	2000	mtwhf	Spain, Radio Exterior de Espana		9570af
			12015me		
1900	2000		Sudan, Sudan Radio	7200do	
1900	2000		Tunisia, RTV/Radio Tunisia	7225eu	9725va
			12005va		
1900	2000		UK, BBC World Service	7375me	9915va
			11680af	13660va	
1900	2000		UK, FEBA Radio 9550af		
1900	2000		USA, WYFR/Family Radio Worldwide		9590af
			17750eu		
1900	2000		Yemen, Rep of Yemen Radio 9780me		

2000 UTC - 3PM EST / 2PM CST / 12PM PST

2000	2027		Iran, IRIB/ VOIRI 6215as	9420as	
2000	2030		UK, FEBA Radio 9550af		
2000	2045		USA, WYFR/Family Radio Worldwide		21525af
2000	2058		Algeria, Radio Algerienne	9375af	11775af
2000	2100		Bahrain, Radio Bahrain	9745me	
2000	2100		China, China Radio International		6100va
			6185va	7235va	
2000	2100		Clandestine, Radio Nacional De La R.A.S.D.		
			6297af		
2000	2100		Egypt, Radio Cairo	6860eu	
2000	2100		Egypt, Radio Cairo/ Radio Waadi el Nile		
			9250af		
2000	2100		Egypt, Radio Cairo/ Voice of the Arabs		11540af
2000	2100		Egypt, Radio Cairo/General Svc		9305eu
2000	2100		Germany, AWR Europe	9470va	
2000	2100		Jordan, Radio Jordan	9830va	
2000	2100		Kuwait, Radio Kuwait/General Svc		6080me
			13650na		
2000	2100		Morocco, Radio Marocaine	15345af	
2000	2100		Oman, Radio Sultanate of Oman		15140va
2000	2100		Saudi Arabia, BSKSA/General Program 1		
			9555af	9870eu	
2000	2100		Saudi Arabia, BSKSA/General Program 2		
			9580va		
2000	2100		Saudi Arabia, BSKSA/Qur'an Program		11820eu
			11915af	11930af	
2000	2100		South Korea, KBS World Radio		9620va
2000	2100	mtwhf	Spain, Radio Exterior de Espana		9570af
			12015me		
2000	2100	Sat/Sun	Spain, Radio Exterior de Espana		9570af
2000	2100		Sudan, Sudan Radio	7200do	
2000	2100		Tunisia, RTV/Radio Tunisia	7225eu	7345af
			9725va	12005va	
2000	2100	`	UK, BBC World Service	5790af	6195me
			7375me	9915va	11680af 13660me
2000	2100		USA, WYFR/Family Radio Worldwide		6115af
2000	2100		Yemen, Rep of Yemen Radio 9780me		
2030	2100		Cuba, Radio Havana Cuba	17560eu	
2030	2100		Iran, IRIB/ VOIRI 9420as		
2040	2100		Vatican City State, Vatican Radio		4005eu
			5885eu	7250me	9645va

2100 UTC - 4PM EST / 3PM CST / 1PM PST

2100	2110		Tunisia, RTV/Radio Tunisia	9725va	12005va
2100	2130		Jordan, Radio Jordan	9830va	
2100	2145		USA, WYFR/Family Radio Worldwide		18930eu
2100	2155		Saudi Arabia, BSKSA/General Program 2		
			9580va		
2100	2158		Algeria, Radio Algerienne	7495af	9375af
2100	2200		Bahrain, Radio Bahrain	9745me	
2100	2200		China, China Radio International		6100va
			6185va	7235va	
2100	2200		Clandestine, Radio Nacional De La R.A.S.D.		
			6297af		
2100	2200		Egypt, Radio Cairo	6860eu	
2100	2200		Egypt, Radio Cairo/ Radio Waadi el Nile		
			9250af		
2100	2200		Egypt, Radio Cairo/ Voice of the Arabs		11540af
2100	2200		Egypt, Radio Cairo/General Svc		9305eu
2100	2200		Iran, IRIB/ VOIRI 9420as		
2100	2200		Kuwait, Radio Kuwait/General Svc		6080me
2100	2200		Oman, Radio Sultanate of Oman		15140va
2100	2200		Saudi Arabia, BSKSA/General Program 1		
			9555af	9870eu	
2100	2200		Saudi Arabia, BSKSA/Qur'an Program		11820eu
			11915af	11930af	
2100	2200		Tunisia, RTV/Radio Tunisia	7225eu	7345af
2100	2200		USA, WYFR/Family Radio Worldwide		6115af
2100	2200		Yemen, Rep of Yemen Radio 9780me		
2115	2145		Ecuador, HCJB/La Voz de los Andes		12025af

2200 UTC - 5PM EST / 4PM CST / 2PM PST

2200	2210		Tunisia, RTV/Radio Tunisia	7225af	
2200	2245		USA, WYFR/Family Radio Worldwide		17845af
2200	2255		Saudi Arabia, BSKSA/General Program 1		
			9555af	9870eu	
2200	2255		Saudi Arabia, BSKSA/Qur'an Program		11820eu
			11915af	11930af	
2200	2258		Algeria, Radio Algerienne	7495af	
2200	2300		Bahrain, Radio Bahrain	9745me	
2200	2300		Clandestine, Radio Nacional De La R.A.S.D.		
			6297af		
2200	2300		Egypt, Radio Cairo/ Radio Waadi el Nile		
			9250af		
2200	2300		Egypt, Radio Cairo/ Voice of the Arabs		11540af
2200	2300		Egypt, Radio Cairo/General Svc		9305eu
2200	2300		Iran, IRIB/ VOIRI 9420as		
2200	2300		USA, WYFR/Family Radio Worldwide		7420af

2300 UTC - 6PM EST / 5PM CST / 3PM PST

2300	0000		Bahrain, Radio Bahrain	9745me	
2300	0000		Egypt, Radio Cairo	9250sa	
2300	0000		Egypt, Radio Cairo/ Voice of the Arabs		11540af
2300	0000		Egypt, Radio Cairo/General Svc		9305eu
2300	0000		Iran, IRIB/ VOIRI 9420as		
2300	0000		Russia, Voice of Russia	7315me	
2300	0000		Tunisia, RTV/Radio Tunisia	7345af	
2330	0000		Egypt, Radio Cairo	9290sa	

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Afghanistan, Radio Afghanistan ..... **www.rta.org.af**
Albania, Radio Tirana ..... **http://rtsh.sil.at/**
Angola, Angolan National Radio ..... **www.rna.ao/**
Anguilla, University Network ..... **www.worldwideuniversitynetwork.com/**
Argentina, RAE ..... **www.radionacional.gov.ar**
Australia, ABC NT Alice Springs ..... **www.abc.net.au/radio/**
Australia, ABC NT Katherine ..... **www.abc.net.au/radio/**
Australia, ABC NT Tennant Creek ..... **www.abc.net.au/radio/**
Australia, HCJB Global Australia ..... **www.hcjb.org.au**
Australia, Radio Australia ..... **www.abc.net.au/ra/**
Austria, AWR Europe **www.awr2.org/**
Bahrain, Radio Bahrain ..... **www.radiobahrain.fm/**
Belarus, Radio Station Belarus ..... **www.radiobelarus.tvr.by/eng/**
Belgium, TDP Radio ..... **www.airtime.be/schedule.html**
Belgium, TDP Radio/Disco Palace ..... **www.airtime.be/schedule.html**
Bhutan, Bhutan Broadcasting Svc ..... **www.bbs.com.bt**
Bulgaria, Radio Bulgaria ..... **www.bnr.bg/**
Canada, Bible Voice Broadcasting ..... **www.biblevoice.org/**
Canada, CBC Northern Quebec Svc ..... **www.cbc.ca/north/**
Canada, CFRX Toronto ON ..... **www.cfrb.com**
Canada, CFVP Calgary AB **www.classiccountryam1060.com**
Canada, CKZN St Johns NF ..... **www.cbc.ca/listen/index.html**
Canada, CKZU Vancouver BC ..... **www.cbc.ca/bc**
Canada, Radio Canada International ..... **www.rcinet.ca/**
China, China Radio International ..... **www.cri.cn/**
Clandestine, Sudan Radio Service/SRS ... **www.sudanradio.org**
Cuba, Radio Havana Cuba ..... **www.radiohc.cu/**
Egypt, Radio Cairo ..... **www.ertu.org**
Equatorial Guinea, Radio Africa ..... **www.radiopanam.com/**
Equatorial Guinea, Radio Africa 2 ..... **www.radiopanam.com/**
Equatorial Guinea, Radio East Africa ..... **www.radiopanam.com/**
Equatorial Guinea, Radio East Africa/Malabo **www.radiopanam.com/**
Ethiopia, Radio Ethiopia ..... **www.ertagov.com**
Ethiopia, Radio Ethiopia/National Program **www.ertagov.com**
France, Radio France Internationale ..... **http://rfienglish.com**
Germany, AWR Europe **www.awr2.org/**
Germany, Deutsche Welle ..... **www.dw-world.de/**
Germany, Pan American Broadcasting ... **www.radiopanam.com/**
Germany, TWR Europe ..... **www.twr.org**
Greece, Voice of Greece ..... **www.voiceofgreece.gr/**
Guam, AWR/KSDA **www.awr2.org/**
Guam, TWR Asia/KTWR ..... **http://nea.ktwr.net/**
India, All India Radio/Aizawl ..... **www.allindiaradio.org/**
India, All India Radio/Aligarh ..... **www.allindiaradio.org/**
India, All India Radio/Bengaluru ..... **www.allindiaradio.org/**
India, All India Radio/Bhopal ..... **www.allindiaradio.org/**
India, All India Radio/Chennai ..... **www.allindiaradio.org/**
India, All India Radio/Delhi ..... **www.allindiaradio.org/**
India, All India Radio/External Svc ..... **www.allindiaradio.org/**
India, All India Radio/Gangtok ..... **www.allindiaradio.org/**
India, All India Radio/Gorakhpur ..... **www.allindiaradio.org/**
India, All India Radio/Guwahati ..... **www.allindiaradio.org/**
India, All India Radio/Hyderbad ..... **www.allindiaradio.org/**
India, All India Radio/Imphal ..... **www.allindiaradio.org/**
India, All India Radio/Itanagar ..... **www.allindiaradio.org/**
India, All India Radio/Jaipur ..... **www.allindiaradio.org/**
India, All India Radio/Jeypore ..... **www.allindiaradio.org/**
India, All India Radio/Kolkata ..... **www.allindiaradio.org/**
India, All India Radio/Kurseong ..... **www.allindiaradio.org/**
India, All India Radio/Lucknow ..... **www.allindiaradio.org/**
India, All India Radio/Mumbai ..... **www.allindiaradio.org/**
India, All India Radio/Panaji, Goa ..... **www.allindiaradio.org/**
India, All India Radio/Port Blair ..... **www.allindiaradio.org/**
India, All India Radio/Radio Kashmir ..... **www.allindiaradio.org/**
India, All India Radio/Shillong ..... **www.allindiaradio.org/**
India, All India Radio/Shimla ..... **www.allindiaradio.org/**
India, All India Radio/Thiruvananthapuram **www.allindiaradio.org/**
Indonesia, Voice of Indonesia ..... **www.voi.co.id**
Iran, IRIB/ VOIRI ..... **www.irib.ir/English/**
Italy, IRRS-Shortwave ..... **www.nexus.org**
Italy, IRRS-Shortwave/Euro Gospel Radio **www.nexus.org**
Italy, IRRS-Shortwave/Overcomer Ministries **www.nexus.org**
Italy, IRRS-Shortwave/Radio City ..... **www.nexus.org**
Japan, Radio Japan NHK World ..... **www.nhk.or.jp/english/**
Kuwait, Radio Kuwait ..... **www.media.gov.kw/**
Malaysia, RTM Kajang/Traxx FM ..... **www.traxxfm.net/index.php**
Malaysia, RTM/Voice of Malaysia ..... **www.rtm.gov.my**
Mali, ORTM/Radio Mali ..... **www.ortm.ml**
Micronesia, The Cross Radio/Pohnpei ... **www.pmapacific.org/**
Monaco, TWR Europe ..... **www.twr.org/**
Nepal, Radio Nepal ..... **www.radionepal.org/**
Netherlands, R Netherlands Worldwide .. **www.radionetherlands.nl/**
New Zealand, Radio NZ International .... **www.rnzi.com**
Nigeria, Voice of Nigeria ..... **www.voiceofnigeria.org**
Oman, Radio Sultanate of Oman ..... **www.oman-tv.gov.om**
Pakistan, PBC/Radio Pakistan ..... **www.radio.gov.pk**
Palau, T8WH/ WHRI ..... **www.whr.org/**
Philippines, PBS/ Radyo Pilipinas ..... **www.pbs.gov.ph/**
Poland, Polskie Radio Warsaw ..... **www.polskieradio.pl**
Romania, Radio Romania International .. **www.rri.ro/**
Russia, Voice of Russia ..... **http://english.ruvr.ru/**
Saudi Arabia, BSKSA/External Svc ..... **www.saudiradio.net/**
Serbia, International Radio Serbia ..... **www.glassrbije.org**
South Africa, AWR Africa **www.awr2.org/**
South Africa, Channel Africa ..... **www.channelafrica.org**
South Africa, CVC 1 Africa Radio **www.1africa.tv**
South Africa, RTE Radio Worldwide **www.rte.ie/radio1/**
South Africa, SA Radio League ..... **www.sarl.org.za**
South Africa, TWR Africa ..... **www.twrafrica.org/**
South Korea, KBS World Radio ..... **www.worldkbs.co.kr**
Spain, Radio Exterior de Espana ..... **www.ree.rne.es/**
Sri Lanka, SLBC ..... **www.slbc.lk**
Swaziland, TWR Africa ..... **www.twrafrica.org**
Syria, Radio Damascus ..... **www.rtv.gov.sy/**
Taiwan, Radio Taiwan International ..... **http://english.rti.org.tw/**
Thailand, Radio Thailand World Svc **www.hsk9.org/**
Turkey, Voice of Turkey ..... **www.trt-world.com**
Uganda, Dunamis Shortwave ..... **www.biblevoice.org/stations/east-africa**
UK, BBC World Service ..... **www.bbc.co.uk/worldservice/**
UK, FEBA Radio ..... **www.febaradio.net**
USA, American Forces Network/AFRTS ... **http://myafn.dodmedia.osd.mil/**
USA, BBG/Voice of America ..... **www.voanews.com**
USA, BBG/Voice of America/African Svc. **www.voanews.com**
USA, BBG/Voice of America/Special English **www.voanews.com**
USA, BBG/Voice of America/Studio 7 ..... **www.voanews.com/zimbabwe/news**
USA, BBG/Voice of America/Sudan in Focus **www.voanews.com/zimbabwe/news**
USA, EWTN/WEWN Irondale, AL ..... **www.ewtn.com/**
USA, FBN/WTJC Newport NC ..... **www.fbnradio.com/**
USA, KNLS Anchor Point AK ..... **/www.knls.org/**
USA, Overcomer Ministries ..... **www.overcomerministry.org/**
USA, WBCQ Monticello ME ..... **www.wbcq.com/**
USA, WHRI Cypress Creek SC ..... **www.whr.org/**
USA, WINB Red Lion PA ..... **www.winb.com**
USA, WRMI/Radio Prague relay ..... **www.wrmi.net/**
USA, WRMI/Radio Prague relay ..... **www.wrmi.net/**
USA, WRMI/Radio Slovakia Intl relay ..... **www.wrmi.net/**
USA, WRNO New Orleans LA ..... **www.wrnoradio.com**
USA, WTWW Lebanon TN ..... **www.wtww.us/**
USA, WWCR Nashville TN ..... **www.wwcr.com**
USA, WWRB Manchester TN ..... **www.wwrb.org/**
USA, WYFR/Family Radio Worldwide ..... **www.familyradio.com/**
Vatican City State, Vatican Radio ..... **www.vaticanradio.org/**
Vietnam, Voice of Vietnam/Overseas Svc **www.vov.org.vn**
Zambia, CVC Radio Christian Voice ..... **www.voiceafrica.net**
Zambia, ZNBC/Radio Two ..... **www.znbc.co.zm**

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Is the HF Radio Spectrum Really Dead?

There's a common complaint that I frequently hear expressed on various radio Internet newsgroups: "HF radio is dead! I can't hear any US Government or military communications anymore in the shortwave spectrum!" Is HF really dead or do these individuals really understand the current state of the HF radio spectrum?

First, I am NOT talking about the shortwave broadcast spectrum in this column. It has been subject to a slow slide in activity over the past few years due to a number of factors. For one, other means of content delivery (i.e., Internet, satellite, etc.) have reduced activity – athough HF broadcasting in Asia is alive, well, and thriving. Also, not nearly as much broadcasting is beamed our way these days, nor are the tropical bands as active as they used to be. But, when it comes down to the majority of the HF radio spectrum, which is *non*-broadcast, the situation is much different.

A good friend who specializes in monitoring the HF radio spectrum, Joerg Klingenfuss, wrote in the introductory section to his *Guide to Utility Radio Stations,* "Today, new generations of HF radio technology provide economical long-range communications. Satellite communication channels are crowded and their cost is increasing."

Klingenfuss further notes, "The growing popularity of alternative HF data technologies will result in more intensive use of the available spectrum . . . The spectrum today does not support the full range of HF requirements and the great variety of capabilities of the equipment available. Improvements in HF technology have actually increased the importance of HF radio communications for a variety of users."

So, why am I hearing nothing?

After many years in this listening game and using my experience in monitoring the HF utility spectrum, I have discovered two possible reasons why the idea that "HF is dead" gets bounced around the Internet.

First, a majority of the HF radio listeners as a whole do not understand propagation from the high end of the sunspot cycle to the low end. This lack of understanding usually results in the common complaint that you will hear at the bottom of every sunspot cycle – HF is dead.

Yes, the higher frequencies *are* dead, but the lower HF frequencies will be active and crowded, depending on the time of day and location. These lower frequencies will not propagate as far as higher frequencies do, so you won't be able to hear as far as you would in high sunspot years.

Bottom line, you won't hear as much long distance government and military, even during daylight hours, due to propagation at the low end of the sunspot cycle. So you will have to adjust your listening habits to conform to the propagation conditions you are stuck with (*which are finally beginning to improve; see this month's Utility World-ed*). I should add that the average listener makes this situation worse by using lower end portable radios and substandard listening antennas, expecting to hear these weaker stations during poor propagation.

One thing should bring you comfort in all of this: you aren't alone with this issue. All users of the HF spectrum are in the same boat as you when it comes to propagation, so those who initiate the traffic are forced to adjust for propagation conditions in order to communicate.

The primary aids they have used to help them maintain HF communications are the use of multiple net frequencies and the use of ALE mode (Automatic Link Establishment). As a listener, you can use the ALE mode as well to maximize your listening potential. A quick examination of the frequencies in Table One will illustrate that there are many users in the fixed portions of the HF spectrum who use the ALE mode. If you don't use ALE to listen, then frankly, you won't hear as much as you used to.

The second reason one would think the HF spectrum is dead is fundamental. What do you have in your shack to monitor the "new generation of HF radio technology" being used in the shortwave spectrum today? Using hardware-based digital decoders instead of the newer sound cards/software methods in popular use today will put you at a distinct listening disadvantage.

If you're not using the ALE mode to follow communications on the various nets, then the spectrum would likely appear to you to be dead. But ask anyone with a software defined radio (SDR) who can look at large chunk of radio spectrum at one time and they will tell you that the HF utility spectrum is alive and well.

A Special Radio Frequency List for the Holidays

So, for my holiday gift to *MT* readers everywhere, I have passed along Table One, a sample list of frequencies used by U.S. government and military agencies. All of these frequencies were monitored during the two months preceding our editorial deadline by this columnist. There are enough frequencies here to keep you busy for a while and get you used to monitoring the HF spectrum as it exists today.

Finally, I want to pass along warm holiday greetings to all of you from here on the radio ranch and hope that 2011 brings you good hunting and success in your listening adventures.

US GOVERNMENT/MILITARY HF FREQS

All frequencies are in kHz. Modes are in brackets.

Air Force Whiteman AFB. MO – 509BW HF Secure Air/Air [USB] 6761.0

Air Force AMC Global HF Command Net: NIPRNet (Global Black) [ALE/USB]
3068.0 4745.0 5684.0 8965.0 13242.0 17973.0 20631.0

Air Force AMC Global HF Command Net: SIPRNet (Global Red) [ALE/USB]
3113.0 5702.0 6715.0 8968.0 11181.0 15091.0 17976.0 23337.0

Air Force HF-GCS Scope Command ALE HF Net [ALE/USB]
3137.0 4721.0 5708.0 6721.0 9025.0 11226.0 13215.0 15043.0 18003.0 23337.0

Air Force High Frequency Global Communications System (HFGCS) [USB]
4724.0 6712.0 6739.0 8992.0 11120.0 (Discrete) 11175.0 13200.0 15016.0

Air Force MARS [Modes observed include CW/MFSK16/MT63/Olivia 16-32/USB/LSB]
North Central Area Nets 3308.0 4517.0 7305.0
Northeast Area Nets 4593.5 7630.5
Region 4 Nets 4500.0 7457.0
Region 5 Nets 4517.0
Region 6 Nets 3370.5 4464.5 7302.0
Region 7 Nets 4517.0
Region 8 Nets 7329.0
Phone Patch Net 13927.0
Transcon (TRR) Voice/Digital Net 7540.0 13993.0 14405.0

Armed Forces Network Broadcasts [USB] 4319.0 (Diego Garcia)
7811.0/12133.5 (Saddlebunch)

Army MARS [Modes observed include STANAG 4285/MT63/Olivia 32-64/PacTor/Winmor/LSB/USB]
Voice Command Nets 14484.0
Digital Nets 10815.0
Region 3 Nets 4918.5
Region 4 Nets 3255.5 4002.8 4444.9 5217.0 6823.0 7314.0
Region 5 Nets 3286.0 4024.0 5217.0 7308.0
Region 6 Nets 3259.0 4020.0 4021.0 4023.0 4036.0 5202.0 5399.5 6903.5 7403.5

Region 7 Nets 4036.0 5115.0
Army/National Guard [Modes observed include ALE/USB/LSB]
Army 160 SOAR Net 6911.5 8050.0 10765.0
Army Command Emergency Operations Net 6985.0 7510.0
Army/NGB Iraq HF ALE Net 8000.0 8318.0
Army/NGB Region 1 Tri-graph Voice Net 5306.5
Army/NGB Training/Exercise Net 6911.5 7361.5 7718.5 8050.0 8171.5 8181.5 9295.0 10818.5
Fort Polk JRTC, LA – ASOC Immediate Air Request (SR-SS) [USB] 12067.0
Indiana National Guard 4780.0
Kentucky National Guard 4021.5 6911.5
NGB AASF Net – Florida 5304.0 5875.0 6911.5 7361.5
NGB AASF Net – Ohio 5851.5
NGB Headquarters Net 1 3032.0 4924.5 5847.0 8047.0 10816.5 12087.0 13568.0 14653.0 16338.5 17458.5 19233.5 20906.0 26697.0
NGB Region 6 Texas Net 2 4867.0 5878.5 7648.5 9121.0 10690.0 12057.0 14350.5
NGB T-State HF ALE Net 5208.0 5211.0 7720.0 11608.5 14483.5 14502.5 14654.5
Texas National Guard Net 3/4 4517.0 5062.0 5202.0 5877.0 6907.0 9062.0 9119.5
Texas National Guard Alpha Net 4017.0
Texas National Guard Bravo Net 4023.0
Texas National Guard Charlie Net 4020.0
Texas State Agencies Net 5 Simplex 3169.0 4924.5 5299.5 5777.0 8047.0
Udairi Range (Camp Buehring), KWT – US Army "Aviation Task Force" Operations 8101.5
Civil Air Patrol [ALE/USB]
NACOMM National Command Net [USB] 7615.0 14902.0
Northeast Region Net 1 2374.0 4576.0 4636.0 6773.0 7656.0 10557.0 12218.0 14914.0
Middle East Region Net 2 3385.0 4585.0 4633.0 5447.0 7665.0 9082.0 12124.0 14445.0
Great Lakes Region Net 3 4604.0 7630.0 10504.0 12200.0 14438.0 18513.0 24553.0
Southeast Region Net 4 2511.0 4502.0 4630.0 7704.0 10545.0 14424.0 18205.0 20873.0 22862.0
North Central Region Net 5 2371.0 4482.0 4505.0 7302.0 7341.0 10510.0 12098.0 14450.0 16353.0 20511.0
Southwest Region Net 6 4512.0 4627.0 7416.0 10550.0 12183.0 14457.0 16333.0 22872.0 26617.0
Rocky Mountain Region Net 7 4509.0 4601.0 7618.0 10542.0 14430.0 18516.0
Pacific Coast Region Net 8 4515.0 4582.0 7637.0 10518.0 12177.0 26620.0
National Command ALE Net 9 3204.0 4477.0 5006.0 6806.0 7602.0 8012.0 9047.0 10162.0 11402.0 12081.0 13415.0 14357.0 15602.0 17412.0 19814.0 23006.0 25354.0 29894.0
Coast Guard Fixed Wing Air-to-Ground [USB] 5696.0 8983.0
Coast Guard and International NAVTEX Broadcasts [SITOR-B] 518.0
Coast Guard Auxiliary HF Nets [USB] 5253.5
Coast Guard Digital Selective Calling [SITOR] 2187.5 4207.5 6312.0 8414.5 12577.0 16804.5
Coast Guard Distress and Initial Contact [USB] 4125.0 6215.0 8291.0 12290.0 16420.0
Coast Guard District 7 Ship/Shore Air/Ground/Air Tactical [ANDVT/ALE/USB] 8337.6
Coast Guard GMDSS SITOR FEC Broadcast [SITOR-B] 12579.0 16806.5 22376.0
Coast Guard Liaison and Marine Information Broadcasts [USB] 2670.0
Coast Guard/Marine Intership Safety and Operational Comms [USB] 2003.0 2082.5 2086.0 2093.0 2142.0 2203.0 2214.0 2635.0 2638.0 2738.0 2782.0 2830.0 3023.0
Coast Guard Marine Safety Information (MSI) Warnings [SITOR-B] 490.0
Coast Guard Narrowband Direct Printing (Teleprinter) Distress & Safety [NBDP] 2174.5
Coast Guard Radiofax NWS Marine Weather Charts [FAX] 2054.0 4235.0 4298.0 4317.9 4346.0 6340.5 8459.0 8503.9 8682.0 9110.0 12412.5 12750.0 12786.0 12789.9 17146.4 17151.2 22527.0
Coast Guard Radiotelex (Ship/Shore Stations) [SITOR/NBDP] 4178.0/4215.5 6268.5/6319.5 8382.0/8422.0 12482.5/12585.0 16689.0/16812.5 22290.0/22382.0
Coast Guard Special Air/Sea Operations [ANDVT/USB] 10538.6
Coast Guard TISCOM Net [ALE/USB] 6709.0
Coast Guard NMN Voice Weather Broadcast [USB] 4316.0 8502.0
Coast Guard Working Channel (Ship/Shore Stations) [USB] 4134.0/4426.0 6200.0/6501.0 8240.0/8764.0 12242.0/13089.0 16432.0/17314.0
Customs and Border Protection (CBP)/US Coast Guard COTHEN Network [ALE/USB] 4614.5 5250.0 5732.0 5909.5 7990.0 8912.0 10242.0 11494.0 12222.0 13312.0 13907.0 14582.0 15867.0 18594.0 20890.0 23214.0 24838.5 25350.0
Department of State HF Emergency and Evacuation Network [ALE/USB] 4553.6 5748.6 6902.6 8058.6 10733.6 11168.6 11472.6 13503.6 16283.6 16358.6 18248.6 18944.6 20810.6 24883.6
Federal Emergency Management Agency [Modes observed include ALE/USB]
FEMA National Radio System (FNARS) 2658.0 3341.0 3388.0 4603.0 4780.0 5211.0 5378.0 5402.0 5821.0 6809.0 7348.0 7428.0 9462.0 10194.0 10493.0 10588.0 10899.0 11108.0 12112.0 12129.0 12216.0 13446.0 13449.0 13894.0 13935.0 14450.0 14567.0 14776.0 14885.0 15708.0 15840.0 16201.0 17519.0 18744.0 19969.0 20027.0 21866.0 24526.0
FEMA HIJ Net 4610.0 4979.0 5837.0 7870.0 10424.0 11448.0 16011.0 18475.0
FEMA NECN 5211.0 (FEMA-1U/L) 10493.0 (FEMA-2U/L) 13956.0 (FEMA-4U/L) 14567.0 (FEMA-3U/L)
FEMA Pastor Net8020.0 8050.0
MARS Tri Service HF ALE Net [ALE/USB] 7462.0 9224.0 11098.5 13473.5 20740.0
National Aeronautics and Space Administration [USB] 14455.0
National Oceanographic and Atmospheric Administration – KVM70 Honolulu HI [FAX] 9982.5 11090.0 16135.0
National Public Health Radio Network [ALE/USB] 4442.0 4757.0 5820.0 8023.0 9414.5 10202.0 11485.0 12164.0 13488.0 15658.0 18264.0 20659.0 23430.0 25364.0
Naval Western Test Range Complex (NWTRC) Range Operations [USB] 5080.0
Navy CWC Voice Nets [USB] 4372.0 4703.0 6834.0 9028.0
Navy EAM Restoral Frequency [USB] 6697.0 (Pacific)
Navy NCTS Cutler ME RTTY 850/50 Ship/Shore Broadcast 7455.0 9830.0
Navy NRTF Awase, Okinawa Japan Pacific RTTY Ship/Shore Broadcast – STANAG 4481 850/75 KG-84 10832.0
Navy NRTF Dixon CA Pacific RTTY Ship/Shore Broadcast – STANAG 4481 850/75 KG-84 7596.0 9085.0 10430.0 16268.5
Navy NRTF Saddlebunch Key, FL
Atlantic RTTY Ship/Shore Broadcast – STANAG 4481 850/75 KG-84 9030.0 12120.0
Navy Seabee HF ALE Net [ALE/USB] 9053.0
Navy SESEF Test Frequency (Clear/Secure) [USB] 7535.0
Navy Tactical Surveillance Control Center (TSCC) [ANDVT/USB]
NAF Kadena, Japan: Call sign Unclouded 13321.0
NAS Jacksonville FL: Call sign Fiddle 8971.0
NAS North Island CA: Call sign Western Sky 8971.0
NAS Whidbey Island WA: Call sign Habitat 9005.4
Navy Stratcom Wing 1 Command Post – Tinker AFB OK [USB/ANDVT] 6748.0 11187.0
Navy/Marine Corps MARS [Modes observed include MT63/Olivia16/LSB/USB/MT63]
MARS National ECOM Frequency [USB] 4042.5 7381.0 14383.5
Region 2 Nets 2654.5
Region 3 Nets 2654.5
Region 4 Nets 3390.0 4013.5 4038.5 6833.5
Region 5 Nets 2025.0 2654.5 3325.0 4007.0 4041.0 4623.5 4802.0 7684.0
Region 6 Nets 4008.5 4011.0 5004.5 5383.5 5686.5
Region 7 Nets 2654.5 4007.0 4011.0 5078.5
Region 8 Nets 3320.5 4038.5 4470.5
South Area Net 7391.5
Navy/NATO Link 11 transmissions 3318.0 3372.0 3384.0 4772.0 5056.0 5124.5 5736.0 6718.0 7930.0 7990.0 8177.0 9121.5 9202.0 10895.0 11016.0 11203.0 11740.0 12165.0 13206.0
Project Secure State Nets [ALE/USB] 2812.0 5135.0 5140.0 5192.0 7447.0 7805.0
SHARES [Modes observed include ALE/PACTOR/GTOR/USB]
Region IV Southeast RCS Net 7632.0
Region IV/VI South Net 6910.0
Region V/VII/VIII North Net 6765.0
SCN Net 4490.0 5711.0 9106.0 11217.0 14396.5 17487.0
SCN BBS Net 6800.0
Telecomm NS/EP (National Security/Emergency Preparedness) [ALE/USB] 6803.1 7697.1 9496.0 10155.0 11451.0 12225.0 18063.0
Texas Department of Transportation [USB] 5195.0
US Government "OPMHQ/NSFHQ" Net [ALE/USB] 2301.0 4618.0 6767.0 6780.5 7325.0 9056.6 9064.0 11426.6
US Military 3rd week of the month, three letter net [STANAG 4197/ALE/USB] 5690.0 8045.6 9019.0 11238.0 12103.0 13438.6 15037.0 16090.0 18021.0 19458.6 20401.6
US Military Unknown "CG9" HF ALE Net [ALE/USB] 11105.0 12185.0
Worldwide Distress, Safety and Calling [USB] 2182.0

BROADCAST BANDSCAN

THE WORLD OF DOMESTIC BROADCASTING

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Playing Around with the Carrier

We haven't done a primer on AM modulation for awhile, and an FCC action in September provides a good opportunity to bring up some fundamental technology.

"AM" stands for "Amplitude Modulation." A continuous "carrier" signal is varied in strength in step with the audio program to be transmitted. During positive peaks of the audio program, the carrier is doubled in strength; during negative peaks, it's reduced to zero. Since there is no such thing as negative power, trying to reduce the carrier *below* zero results in severe distortion. It's very important to make sure there's always enough carrier for the program.

Having *too much* carrier doesn't result in distortion. But that carrier has to come from somewhere. In the end, it's converted from plain old 60Hz AC from the local electric utility. Transmitting "too much" carrier requires drawing "too much" power from the utility lines. The utility is going to charge you for that.

Older hams may remember something called "controlled carrier." I had this feature in my first voice ham rig, a Heathkit DX-60B back in 1974. What controlled carrier did was to adjust the strength of the carrier over time, to provide just enough carrier to avoid distortion.

The FCC has decided to allow broadcast stations to use this technology. It's been available on commercially-manufactured transmitters for some time and is in use on high-powered stations overseas. Under special temporary authority, KOTZ-720 Kotzebue, Alaska has tested it as well. The FCC calls it "Modulation Dependent Carrier Level" or "MDCL." AM stations wishing to use MDCL must write the Commission, requesting an "MDCL Waiver."

Time will tell how well MDCL will work. Some observers have suggested reducing carrier level will cause the "Automatic Gain Control" circuits in receivers to bring the noise up, with the bottom line that MDCL stations will experience greater noise and interference.

MDCL will probably have little effect on DXers. I doubt many stations will bother to make the necessary investment, and those that do will still work very hard to keep their modulation as high as possible for as much of the time as possible. They'll be running full carrier nearly all the time. In the few cases where MDCL will affect DX, I think it will be on the positive side. Carriers will be weaker than normal during periods of reduced modulation, making it easier for the weaker signals underneath to get through.

I should note I gave up on AM with my Heathkit when I got a 5 by 4 report from a station six miles away...

KODI-1400, Cody, Wyoming.

❖ Montreal 690/940

These two frequencies have been keeping us busy for awhile! Last time, I reported the applications to reactivate these channels as traffic-information stations had been sent to a hearing, to compete with several other applicants. That hearing was scheduled for October 17th (which is, unfortunately, after my deadline, so you're going to have to wait to find out who "won").

Multimedia CMR, the initial applicant, has withdrawn their application for the French-language all-traffic station on 690. They have already launched the all-traffic format, using their existing station CKAC on 730.

The remaining applicants for 690 are:

- Dufferin Communications, for a LGBT-oriented station, in French;
- CKGM, to move their English-language all-sports station from 990 to 690;
- 7954689 Canada Inc., for a French news/talk station.

Multimedia CMR's application for an English all-traffic station on 940 will proceed. It will compete with an application for an English news/talk station, filed by the same 7954689 Canada Inc.

CKGM's application for 690 caught me by surprise. Most observers feel the CRTC will be reluctant to approve an application for an English-language operation on the 690 channel. That frequency has been used by French-language stations for some 70 years.

7954689 Canada Inc. certainly is an unusual name for a company, at least as far as us south-of-the-border types are concerned. Actually, numbered companies are quite common in Canada. It does leave some question as to who's behind the application.

❖ Silent, or Not?

As I began to write this column, we had two hours before CBE-1550 Windsor, Ontario was to go silent forever. In May, this station received permission to delay the shutdown of the AM transmitter until an interference problem could be solved with the FM transmitter that's replacing it. That problem has reportedly been resolved, making the delay unnecessary.

(Rumor has it the "interference problem" involved a high-powered pirate station across the river in Detroit. Given the record of pirate FM stations elsewhere, I have my doubts this interference problem will remain solved.)

I'm tidying up the next morning, about twelve hours after AM 1550's supposed signoff. Last heard, the carrier was still on the air. Some CBC signoffs in the past have involved a tape loop on the AM transmitter, inviting AM listeners to switch to the new FM frequency. There is some speculation this will happen with CBE. Either way, it is unlikely this station will still be on the air by the time you read this.

❖ Frequencies Going Begging...

Under current procedure, when a new frequency becomes available for FM radio service, an auction is held. Whoever bids the most money for the frequency wins the right to apply for a permit. Bids generally run into the tens of thousands of dollars, if not millions. There are, however, some frequencies that apparently nobody wants.

The FCC has proposed to delete twenty unused FM frequencies. These channels were put up for sale in Auction #91 earlier this year and went unsold. Each had also gone unsold in at least one previous auction. Assuming nobody objects (and explains why they didn't bid in Auction #91), these channels will be deleted.

Logos for CBEW-FM Windsor & CBEW-FM-1 Leamington, which replace AM 1550. (CBC Windsor)

The action may make it possible to assign different frequencies in different communities, where someone may actually use them. It may also make upgrades possible to existing stations.

The 20 frequencies are assigned to communities in ten states. We're not necessarily talking about the Mojave Desert here: channels are being deleted in places like Grayville, Illinois; Boscobel, Wisconsin; Alton, Missouri; Cove, Arkansas; and Harrison, Michigan.

❖ Radio History

WBZ-1030 Boston celebrated its 90th anniversary in mid-September. Well-known DXer and broadcast historian (and former WBZ employee) Scott Fybush participated in a special broadcast on September 19th; fellow historian Donna Halper (and discoverer of Rush – the band, not the talk show host) appeared the next night.

❖ Arkansas Station Sued

KARN-FM has been sued for failing to inform an advertiser their commercial wasn't reaching quite the area expected. According to an article on *ArkansasBusiness.com*, the station didn't tell Custom Satellite Solutions that the FM transmitter had failed and was operating at 2,500 watts instead of the normally used 50,000.

❖ New NRC Log

The 32nd Edition of the NRC *AM Radio Log* is out. See the NRC Website (link in the sidebar) or write P.O. Box 473251, Aurora, CO 80047-3251. The NRC is also now on Twitter; look for tag **#mwdx**.

❖ Mailbag Mysteries

Mario Filippi writes from New Jersey with more TV DX, including a few mysteries. Mario regularly scans for new digital TV signals, but his recent scans have been turning up some *analog* signals. He asks, "...what's the purpose of analog signals at this time for these major broadcasters? Is it possible that they maintain a low power signal for the local viewing public? Do they need a minimal analog signal as a source to convert to digital?"

I think the solution to this mystery lies with Comcast, the cable operator in Mario's town. The analog signals he's receiving are channel 2 (too weak to identify), 3 (Home Shopping Network), 4 (WNBC-TV, New York, parallel to digital channel 4.1), and 5 (WNYW-TV, New York, parallel to digital 5.1).

New York channels 4 and 5 are carried on Comcast analog cable on channels 4 and 5. If they "leak out" of the cable – a fairly common phenomenon – they can be received at surprising distances on a decent antenna. I can't pull up a Comcast channel listing, but I'd bet they carry HSN on channel 3 in his area. I'd also bet if he could pull in channel 2 well enough to identify, it would turn out to be WCBS-TV New York.

Mario is also seeing Home Shopping Network in analog on channel 41. This one is probably legitimate. WNAI-LP is authorized to operate in analog on this channel, with fairly high power from the WCAU-TV tower in Philadelphia. As I mentioned last time in my item about "FrankenFMs," this low-power TV station has until 2015 to convert to digital. WNAI already holds a permit to do so.

Another reader with a mystery is Pat Daley of Wyoming. Pat has been hearing a station on 1440 broadcasting classical "pops." Pat has never heard any kind of announcement on this station. His loop antenna suggests the mystery signal is on a west-southwest or east-northeast bearing from his location in north-central Wyoming; as this station stays in well past sunrise, he believes it's coming from his west.

My best guess on this one is KPTO Pocatello, Idaho. KPTO is a fairly new station, and it's not in the best financial condition. It's been reported by others to be broadcasting continuous classical music. KPTO also matches Pat's technical observations – it's on the same heading he cites, and is indeed to the west of his location.

Pat notes "...but I had no idea they could broadcast without an ID of any sort." I suppose a station can broadcast continuous obscenities, as long as the FCC doesn't find out! The Commission doesn't have the field enforcement resources they once did. It's highly unlikely they'll investigate KPTO unless someone complains.

Another signal Pat heard that he wasn't supposed to was KIHU Tooele (Salt Lake City), Utah. This station on 1010 was killing his morning reception of CBR Calgary for a few days in late August – it was even stronger than powerhouse KSL-1160. Apparently KIHU's techs noticed something was wrong, as the Utah interference disappeared shortly thereafter. The moral of the story, as far as the DXer is concerned, is to always check every frequency; there may be something there you aren't expecting!

Pat's been trying to land a Tennessee station without success. Detroit, Cincinnati, and even Atlanta are occasionally heard there in the winter. New Orleans' WWL can be heard most nights, somewhat to Pat's surprise. But never anything from Tennessee, not even WSM.

WSM is probably Pat's best shot. Our other 50,000-watt station, WLAC, protects KGA Spokane – and thus radiates little power in the direction of Wyoming. There are two stations on 1030 that beam most of their power west at night; however, there's also a 50,000-watt powerhouse on 1030 in Casper, Wyoming which I'm sure holds complete control of that frequency in Pat's town!

❖ 'Till Next Month

With eight stations off the air and nothing new to replace them, this has not been a good 60 days for AM radio. Have any of your locals disappeared? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to dougsmith@monitoringtimes.com. Good DX!

URLS IN THIS MONTH'S COLUMN

http://americanbandscan.blogspot.com
My DX blog.

www.arkansasbusiness.com/article.aspx?aID=127802.54928.139940&cID=e
KARN-FM sued by advertiser

www.nrcdxas.org National Radio Club, publisher of the *AM Radio Log*.

http://airchexx.com Off-air recordings of various radio stations, including the WBZ interviews with Scott Fybush & Donna Halper

BANDSCAN STATION REPORT

Stations Deleted:

Carrollton, Alabama	590	WREN
Stettler, Alberta	1400	CKSQ (going to 93.3 FM)
Easton, California	1150	KWDO
Grande-Anse, N.B.	540	CBGA-1 (to be replaced by four FMs in Quebec)
Ticonderoga, New York	1250	WIPS
Atikokan, Ontario	1240	CFOB-1 (going to FM; long known as CKDR-6)
Somerset, Pennsylvania	1330	WBHV
White River Jct., Vt.	910	WNHV

Callsign Changes:

Eufaula, Alabama	1240	WNRA	from WULA
Sacramento, California	1240	KCVV	from KRJY
San Francisco	610	KZDG	from KFRC
Denver	1340	KVOQ	from KCFR
Toccoa, Georgia	1420	WEJY	from WLET
Boise, Idaho	950	KMHR	from KNJY
Bemidji, Minnesota	1300	KPMI	(new station)
Glencoe, Minnesota	1310	KTWN	from KGLB
Minneapolis	1130	KTCN	from KFAN
Rochester, Minnesota	1270	KTCN	from KWEB,
and then:			
Rochester, Minnesota	1270	KFAN	from KTCN
Waynesville, Missouri	1270	KIIK	from KOZQ
Middletown, New York	1400	WMJQ	from WYNY
Columbus, Ohio	820	WVSG	from WOSU
Berwick, Pennsylvania	1280	WBWX	from WFBS
Connellsville, Penna.	1340	WBGI	from WYJK
Milford, Pennsylvania	1450	WYNY	from WMJQ
Shiremanstown, Penna.	720	WHYF	from WWII
Pearsall, Texas	1280	KMFR	from KVWG
Stockdale, Texas	1520	KQQB	from KHLT
Beaver, Utah	1230	KBEV	(new station)

ND: non-directional
DA-N: directional at night only
DA-D: directional during daytime only
DA-2: directional all hours, two different patterns
DA-3: directional day, night and critical hours, three different patterns

BOATS, PLANES, AND TRAINS

TRAINS

Ernest Robl
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Back to Basics

Having written this column for some five years, with more than 20 pieces covering a wide range of topics, I sometimes have to remind myself that there are new fans discovering railroads all the time, and that, at times they start with little knowledge of railroads or railroad radio use. We all started somewhere.

A reader recently contacted me with insightful questions about some of these basics. So, let's revisit some of them. (Most of these topics have been covered in more detail in past issues. You can find a comprehensive Index of past issues and column topics on the *MT* website.)

Radio is an important tool for the efficient and safe operation of railroads of all sizes. Voice communications are key, but increasingly, railroads also use parts of the radio spectrum to communicate a wide range of data.

You can listen in on railroad voice communications with a very basic scanner that doesn't need trunking or other advanced features. In fact, I still own a decades-old scanner that uses crystals that still picks up railroad radio voice communications just fine. (Some rail-based transit systems in major metropolitan areas do use trunking.)

Let's look at some of the features that you may want if you are just getting interested in listening to railroads – and the types of messages you may hear.

❖ The Equipment

One deciding factor as to which equipment works best, is how and where you will be listening:

- ▶ At a fixed location, such as your home
- ▶ In a vehicle
- ▶ On the go, while walking around or traveling by train

As I've discussed in previous columns, a good antenna, suited for a particular application, can make a huge difference in the quality and range of reception. If you are in a fixed location, an antenna on a roof or small mast will help improve reception. But, even for a car, an external antenna (optimized for the railroad band) will help, as will a replacement for the stock antenna that comes with a hand-held scanner.

Vehicle-mounted or base-station scanners will pull in signals over greater distances than hand-held units, but even with hand-held scanners you should be able to hear most railroad radio transmissions within 5-10 miles, depending on terrain. Engine radios are more powerful than hand-held units used by employees on the ground and will therefore carry greater distances.

Remote base stations used by dispatchers usually have antennas on tall masts and will carry even further. So, it is not unusual to clearly hear only one side of a conversation, if at least one of the radios is some distance away.

If you travel on a passenger train with a hand-held scanner, bring along earphones to avoid disturbing other passengers.

❖ Finding Frequencies

Once you have a scanner or other receiver capable of receiving railroad radio communications – almost all railroad voice communications are in the VHF high band – you need to find the frequencies in use in your area or the area you plan to travel to.

While a scanner's search capabilities can help, with the intermittent nature of railroad transmissions, it could take you a long time to find all active frequencies this way. Maps often identify the owners of railroad lines. A variety of lists available on the Internet identify frequencies used by those *railroads in particular geographic regions*.

If you encounter other fans at trackside, they're usually willing to share frequencies they monitor.

Though you can find lists of all frequencies within the railroad band, I counsel against programming all of these into your scanner, even if it is capable of storing hundreds of frequencies. In this case, your scanner will spend lots of time scanning channels which are inactive in your area and may even lock onto a channel that's not in use in your area due to noise or other radio interference.

Amtrak train 74, Charlotte-Raleigh, N.C., operating with all state-owned equipment, rolls past freight cars in East Durham Yard in Durham, N.C. The train is doing main line track speed of 79 mph, in signaled territory. In a moment, the engineer will call "Clear at Sullivan," for the green signal less than a mile down the track.

❖ What you will Hear

Many insights about railroad operations have come from listening to railroad radio transmissions, though it's often not the individual messages but rather the patterns formed by these messages that has proven useful.

What you hear will depend on the operating patterns of the railroads near you. On a signaled main line in a rural area, you will mostly hear trains calling signals as they approach them. Near a yard or in an urban area, you will mostly hear crewmembers coordinating switching moves. On unsignaled lines, you will hear trains receiving track warrant or other authority to occupy track segments, though on small railroads, such operating authority may be obtained in person by the crew prior to departure.

Larger railroads have automated "talking" defect detectors, which check for one or more possible problems on passing trains, including hot bearings (and sticking brakes), dragging equipment, or overheight equipment on routes with low clearances. These detectors, often spaced about 20-30 miles apart, alert you to the presence of trains in your area.

Some detectors broadcast a brief message when the front of the train passes them; others only broadcast when the entire train has passed, either indicating no problems or an indication of possible problems. Some detectors broadcast total axle counts, the speed of the passing train, and ambient temperature.

The detector messages include identification of the detector, by milepost or named site, but *not* the direction of the passing train. (If you are trackside near a detector – they have a broadcast range of 3-5 miles – and no train has passed your location recently, assume the train being scanned is headed toward you.)

❖ Other Calls

I've also heard train crews calling dispatchers after grade crossing collisions and trying to deal with mechanical or electrical problems aboard an engine. I've also heard passenger train conductors call in to report problems with unruly passengers and many other unexpected situations.

Railroads are a seven-day-a-week, 365-day-a-year business that operates in all types of weather and over a vast range of terrain. No two days are ever the same, and anything that can go wrong will – sooner or later –- go wrong. Train crews, operating on their own, far away from their home base, have little choice but to turn to their radios to try to resolve these problems.

Railroading is also a dangerous heavy industry and radio is very important to the safe operations of trains and other equipment. On Norfolk Southern, which operates through my home area, more often than not, an exchange of radio messages will end with, "Have a safe trip. Out."

Conversations you hear on the scanner offer you insights into the different cultures of various railroads. If you are able to listen in to more than one railroad, look for these differences in what you hear.

❖ Looking Good

"Amtrak 80 to train 351: Your train looks good; marker in place and lit."

If you hear a message like this, the crew of one train is not complimenting the crew of the other by telling them their train looks good. Railroads require that when two trains meet, the crews of each train check the other train for possible problems.

Where practical and safe, the crew of a stopped train will get down on both sides of the track to check a passing train, doing a so-called "roll-by [inspection]." However, most inspections these days are running roll-bys, particularly on double track.

The "marker in place" confirms the integrity of the train – that it has not lost any cars along the way. Stopped cars on the mainline would be a major hazard.

Most trains on major railroads now have a telemetry device on the last car as the rear marker. (You can listen for data chirps from these devices with a scanner, but they won't tell you much, other than the possible presence of a train in your area. Voice communications carry further and provide more information.) On smaller railroads, a lit lamp at night or a red flag during the day may suffice as a rear marker.

On passenger trains, the red lights on the rear of the last car are lit as the formal end of train marker.

❖ System Architecture

On all but the smallest railroads, dispatchers (located at one or a handful of control centers) talk to trains and employees in the field through remote base stations. These base stations, often consisting of a simple metal equipment enclosure (sometimes called bungalows by railroaders) are connected to the dispatching center by land line or microwave link.

The remote base station's normal status is listening in a stand-by mode. If the dispatcher wants to talk to a train or employees near one of these remote stations, he selects the base station, usually by pushing a symbol for that station on a touch-screen computer monitor, and then uses his normal push-to-talk switch (usuall a foot pedal) to transmit.

Crews in the field, who want to talk to a dispatcher, transmit an alert tone from their radio. When a remote station detects the matching alert tone, the symbol for that base station on the dispatcher's display will change color or begin blinking. As the dispatcher has time, he responds to that call by selecting the base station. Many railroads have emergency alert tones for priority situations.

❖ Learning about Railroads

People sometimes ask me how I've learned what I know about railroads. I tell them that the process has been a long slow accumulation of information that is still going on, coming from many sources.

What I've heard on my scanners has helped. I've also worked as a journalist for many years, covering stories on railroads or general transportation. Many of these stories gave me the opportunity to interview railroaders and to ask questions that helped me to understand operations. But even when I'm not wearing my journalist hat, I get chances to talk to railroaders.

Most railroaders are willing to talk to fans, as long as you conduct yourself in a safe manner and don't interfere with their work. Stay well clear of tracks, and you should not have problems with railroad employees. If the employees are obviously taking a break or waiting for a train to clear before they can get back on the right of way, many are willing to answer a question or two.

I've found that the most important aspect of getting information is just being willing to listen. I cringe when I hear railfans trying to impress railroaders with how much they know about railroading, rather than using the opportunity of a conversation with a railroader to gain new knowledge. I also read as much as I can about railroading, both online and in publications. In future columns I'll look at a few of these sources.

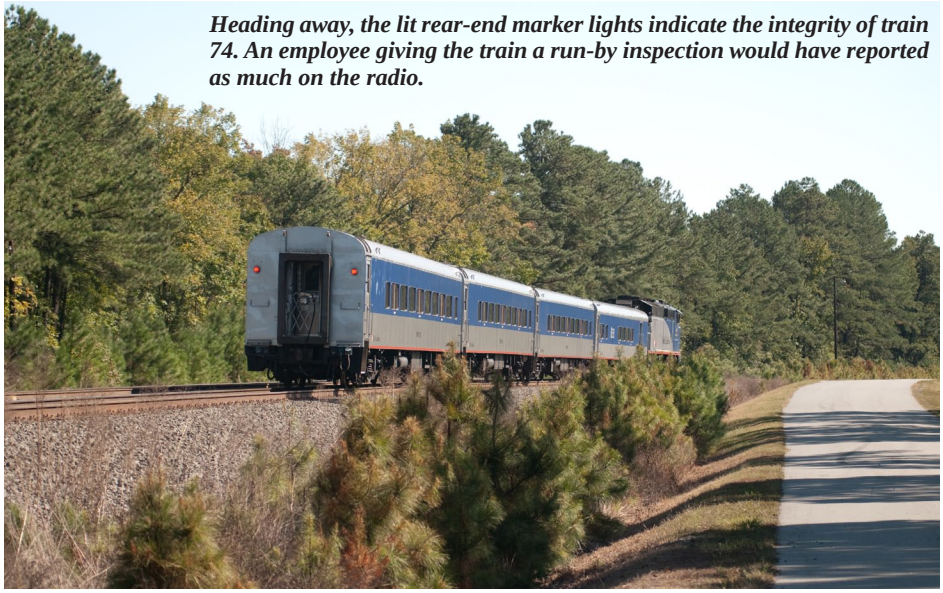
❖ Fun with Names

Control points (and their signals) have formal names assigned by the railroad, which are listed in employee timetables. These may be names related to geographic location, such as "South Selma" or names honoring a person, such as "Sullivan." Or, they may be a designation based on milepost, such as "CP225."

Officially, intermediate signals are only identified by milepost location. But railroad employees often give them their own designations. And, as long as everyone involved knows what that name means, that designation is accepted. So, for example, on trains eastbound out of Raleigh, N.C., you may hear a train crew call on the radio, "Clear at the Waffle House." Or, in my hometown of Durham, N.C., I will sometimes hear crews calling "Clear at triple-X," with reference to an adult video store located near the LaSalle St. crossing that has a large XXX sign visible from the tracks. (Other unofficial names for this location are LaSalle St. and West Durham.)

Between Raleigh and Durham, I hear crews calling "Clear at IBM," an intermediate signal located near a large IBM plant in Research Triangle Park.

One of the more unusual informal intermediate signal locations that I heard was years ago on a special passenger train between Charlotte, N.C., and Columbia, S.C. Shortly after departing Charlotte, I heard the crew call "Clear at PTL." PTL stood for the campus of the Praise the Lord Foundation, a television ministry.



Heading away, the lit rear-end marker lights indicate the integrity of train 74. An employee giving the train a run-by inspection would have reported as much on the radio.

GLOBALNET

Exploring the World of Internet Radio and Television

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2011 - A Banner Year for Internet Radio

I feel like I say it every year, but this really was a tremendous year for Internet radio.

At no point in its short history has the Internet radio industry seen such dramatic technological leaps, while at the same time gaining an even larger portion of the audience for entertainment.

On top of Internet radio, the availability of other streaming content, such as video from cable networks and other subscription-based services such as Hulu and Netflix, is rising to unprecedented levels. In addition to advances in the services offered, the technology and devices available continue to grow.

The most explosive growth came with the emergence of the tablet market. Starting with the iPad, developers have scrambled to put their own tablet devices on the market and consumers are buying them up at an increasingly high rate.

One of the most intriguing situations happened when HP announced they would halt production on their Web OS-based Touchpad tablets and slashed the price to $99. This once-ignored tablet flew off the shelves, proving that the tablet concept is one that consumers are more than willing to embrace, as long as the price point is reasonable.

Shortly after the HP incident, Amazon announced they were releasing their own tablet, the Kindle Fire. The price point for the Kindle Fire at $250 also put it within a larger segment of potential buyers than the $500 tablets from Apple and Samsung.

With all tablets, Internet radio and other streaming apps are among the most popular apps downloaded for the device.

❖ Smartphones and In-Car Systems

Along with the emerging tablet market, there has been a continued steady increase in smartphone usage and in-car penetration for Internet radio.

In the smartphone arena, we have seen an explosion of apps coming available and an overall increase in Internet radio use on these devices. Despite the onslaught of options, there are a few that have started to separate themselves from the rest of the pack.

TuneIn's smartphone app is among the most widely used, especially on the iOS platform. Even those who aren't using the TuneIn app are likely using the TuneIn service through another Internet radio app, such as the former RadioTime streaming service. There is also a **Reciva** app and, of course, the most famous and popular Internet radio app in the world – **Pandora**.

The popularity of Pandora has caused others to take notice and make alterations to their offerings in response. Most notable is the full-court press that Clear Channel is making with their **iHeartRadio** app. They are marketing the app as an all-in-one solution combining traditional Internet radio with custom-station creation along the lines of Pandora. Highlighted by a massive concert and a simultaneous announcement on all of their 850 stations, Clear Channel pulled out all of the stops to make the iHeartRadio a central point of focus for the radio giant.

At the same time, Pandora is posturing their model as the future of radio. Pandora's Tim Westergren has been hailing the potential advertising revenue for Internet radio as one of the key elements to the industry's growth. He says the consumers are ready to interact with their music in a new way by choosing what they get to hear, the advertisers are ready to spend money to reach these listeners, and now he wants the music industry and record labels to embrace this format as a viable option for their artists.

All of these advancements are combining to create a great mobile-push for Internet availability. Both information and entertainment are increasingly becoming available on the go. Consumers want to be able to take the same Internet experience they have at home with them when they are mobile. The biggest push we saw in 2011 – and will continue to see in 2012 – is in-car Internet access.

More and more car dealers are adding infotainment systems in their new production lines, with a big push for in-car WiFi coming in the next year. Not only are car dealers making this push, but third party vendors are getting on board, too.

SiriusXM will be launching version 2.0 of their satellite radios in the coming year. The new radios will feature in-car WiFi. There is also a large assortment of options: MiFi personal hotspots, smartphones that can create personal WiFi hotspots, and in-car WiFi routers that work through cell phone signals.

So, after another year of great advancement, 2012 promises to be an even greater year for Internet radio and streaming content.

❖ Coming up in 2012

Expect to see more growth in the tablet market, increases in smartphone use, greater options for in-car entertainment and Internet radio, and more streaming video integration on smartphones and other devices.

My bold prediction for 2012: The Amazon Kindle Fire is going to be a game changer. This device will help put a tablet computer in the hands of more people than ever. It won't quite be a tablet for the masses – especially not in the current economy, but those already using smartphones are perfect candidates to pick up an Amazon Kindle Fire.

If the Fire takes off in a dramatic way, expect other tablet manufacturers to follow suit and adjust their price points accordingly to reach a greater cross-section of consumers.

❖ The Tides are Turning

While 2011 was a banner year for Internet radio, we are still a long way from seeing Internet radio and other streaming products become as commonplace as regular radio or television usage. But the growth rate is encouraging.

Not unexpectedly, there are still pockets of dissension, especially among die-hard DXers who take issue with using a computer or other device to listen to radio stations. I received an email from a reader recently who took issue with a *GlobalNet* column that centered on the availability of shortwave radio stations on the Internet.

This reader argued that the term "internet radio" is a misnomer, since a "radio station" broadcasts using an over-the-air signal received by a radio receiver. That being the case, he said, stations found on the internet cannot be a "radio station" since they do not use radio transmissions to be received.

This points back to a larger issue: the overall decline of the availability of radio broadcasts on shortwave and the surge of popularity of Internet radio stations. There are two distinct camps of thought: those who have embraced the new technology as the greatest thing since Marconi first flipped on his microphone (or at least who have accepted, like it or not, that radio on the Internet isn't going to disappear); and those who cling desperately to what they know and are comfortable with.

❖ DX Challenge or Content?

I have watched the development of this situation with great interest since I first became aware of the growing Internet radio industry. One would think that my background, my former radio career, and my newfound status as an Internet radio guru would keep me in a constant state of tug-of-war between traditionalism and the embrace of new technology. But really, it is pretty cut and dried:

Growing up in a devout radio hobbyist household, I spent many hours of my younger days spinning the dials of old Kenwood, ICOM and Drake shortwave radios in hopes of pulling in elusive "DX." I found myself taking diligent notes so that I could turn my hours of careful and attentive listening into an ever-growing collection of QSL cards. These postcards from a journey that never left home seemed to be, at first, the be-all and end-all of my experience with radio.

Soon, however, I realized that what really kept me coming back for more wasn't just the chase for an album full of cards, it was the programming content. It was the music, the discussions and the fact that the people talking through my speakers were hundreds or thousands of miles away.

I completely bought into, as Steve Allen once so masterfully put it, radio's "theater for the mind." Listening to a small station from Latin America in the middle of the night had me envisioning remote beaches, rainforests and vast Mayan civilizations. Sure, I could probably turn on the television – even in the mid-to-late '80s – and see something similar to what I was imagining. But for me, the vividness of what I could dream up was far more rewarding than being spoon-fed images from television.

This same dichotomy is where we are today with Internet radio. While there are still those listeners out there who are interested solely in chasing after QSL cards and in the eternal battle between the atmosphere and their antennas, the vast majority of listeners are tuning in for content. They want news, information, sports and music with as little effort and as few barriers as possible to inhibit their experience.

With advertising revenue disappearing at a rapid rate, broadcasters have no choice but to cut costs wherever possible. Many broadcasters, especially those on shortwave, are cutting their most expensive costs – that is, over-air operations – as a source of smarter budgeting.

For many shortwave broadcasters, there simply isn't as great a need to reach listeners with a traditional broadcast signal. Look at the VOA or Radio Moscow as examples. During the Cold War, these staples of shortwave radio were broadcasting not only news and other informative content, but their main component was to put out propaganda for their respective countries.

With the Cold War over and the Internet now available to provide news for their audiences, broadcasters are making the most sensible business decision by cutting back or eliminating much of their traditional broadcasts.

While it is true that, especially in less developed countries, Internet availability is not yet entirely accessible to the masses, its reach is growing rapidly. There are studies that have shown that WiFi use on laptops and other devices is going to continue to increase every year, and that even in-car WiFi production will be at more than 50% by the end of 2013.

Whether DXers like it or not, radio stations are going to increasingly make their programming available online. There will always be broadcasters on shortwave radio, just as there will always be local radio stations and newspapers to provide information to their local audiences. The stations available might not be the same ones that people have been used to listening to for years, but there will still be something to tune in over HF for many years to come.

Also, for those who are interested in country-counting and QSL hunting, there is still amateur radio. There are more countries to be QSLed on amateur radio's HF bands than were ever available from major shortwave broadcasters. On top of the ability to collect QSLs, amateurs can provide valuable communications during disasters, gain a greater technical knowledge of the hobby they love, and can serve as a beacon for others interested in learning more about radio and keeping the hobby alive.

For those who are merely interested in listening to their favorite programming content, Internet radio is where you will find all of those old familiar voices and stations waiting for you, and it's here to stay. But this doesn't answer our reader's question, "Are these still 'stations'? Is it still 'radio'?" As it comes out of my speakers, it sure sounds like it, and it still takes me to those far-away places in my mind. How about you: how would you answer him?

BELOW 500 kHz

DXING THE BASEMENT BAND

Kevin Carey, WB2QMY
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The RDF 304: Digging Deeper

Welcome back to our troubleshooting coverage of the Columbian Hydrosonics RDF 304 receiver (Figure 1). Last month I did a benchtop evaluation of the unit, and discovered it had poor audio output. Some possible causes for this condition were given, including: A bad speaker, an alignment issue, or a component problem in the audio amplifier chain. A bad speaker would be the easiest problem to fix, so that's where I began after finishing up last month's column.

To test the unit's speaker, I disconnected it from the circuit and temporarily connected a "test" speaker with alligator clips. I was hoping for quick success, but the substitute speaker made no real difference in audio quality. I tuned in several strong signals across the AM broadcast band, and all were low and not very clear.

Upon further listening, I would more accurately describe the problem as one of "reduced volume" rather than distorted audio. I say this because the audio was quite clear at lower volume settings, yet the sound level was far too low for comfortable listening. Cranking the volume up to the point where it could be heard resulted in some distortion. I have seen this even in properly working radios when the volume control gets up past 3/4 or so of its maximum setting. Perhaps this is a normal condition and the amplifier is just going into saturation.

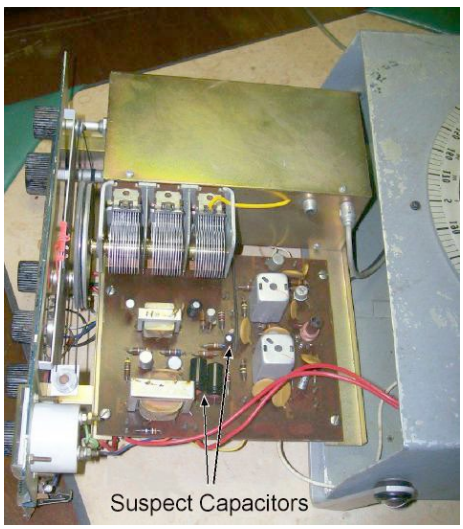
What about an alignment issue? While it is possible, my experience with AM receivers tells me it would be an unlikely cause of low audio. Alignment can have a strong effect on RF signal strength as well as dial calibration, but rarely does it directly affect audio quality. With this in mind, I chose instead to explore a possible component failure in the audio section of the set.

❖ Faulty Capacitor(s)?

One notoriously high failure item in older receivers (or any electronics) is capacitors. Through the combined effects of age and chemical changes inside their enclosures, they can either short circuit or open up, both of which can wreak havoc in audio circuits. Distortion and reduced audio are common results of capacitor failures. In fact, some restorers routinely "recap" a radio before powering it up.

I typically take a more moderate approach and evaluate a set first before replacing all capacitors. This is driven in large part by expediency (it can take a long time to change every capacitor) but also by the desire for historical accuracy. I want a set to be as original as possible, both inside and out.

As mentioned last month, I have no schematic or other servicing documentation for this set, despite a prolonged search both online and through other resources. This means I'll be "on my own" to find my way through the circuit. I'll need to use common logic and my past experience to identify possible trouble areas. Looking closely at the PC board, I see two likely suspects near the audio output transformer; a pair of electrolytic capacitors (see Figure 2). Electrolytics are very prone to drying out and losing their effectiveness.



One of the beauties of this set is the simplicity of the layout. The PC board is not crowded and it uses conventional through-hole soldering for all components. By shining a light through the board, I was able to see the traces for the suspect capacitors and locate the solder pads I needed to work on. I began by removing the two larger electrolytics that were mounted side-by-side, noting their polarity in the circuit.

Upon removal, I conducted a simple test on the capacitors that can be done with any volt-ohmmeter/multitester. First, I "charged" each capacitor by setting the meter to the Rx1 resistance position and connecting the red lead to the "+" lead of the capacitor, and my black lead to the remaining wire. Next, I switched my meter to read DC voltage and connected the leads again. A good capacitor will typically show a rapid swing of the meter, followed by a gradual decay down to zero. These capacitors didn't do that. There was little or no meter movement and I knew right away that they were bad.

The capacitors were 100 microfarad (uF) units with a working voltage of 12 volts DC. A search of my junk box netted two 47 uF capacitors rated at 35 volts DC. These units were about the same physical size as the originals in the set, and though only about half the desired capacity, I decided to try them, as the working voltage was more than sufficient, and they would certainly be better than the defective units installed before. I soldered them in place.

I powered up the set for a quick test and definitely noticed some improvement. The audio was a bit louder, but still far from optimal. I hunted around the PC board for other electrolytics and found a much smaller, vertically-mounted type not far from the original two I replaced. This was a 5 uF unit rated for 12 volts DC. Wiggling the capacitor with my fingertip resulted in a huge increase in audio, and I concluded that I had found the culprit! Was it a cold solder joint? No – things looked just fine underneath the board. I re-melted the solder pads just to be sure, but there was no difference.

Upon removing the 5 uF capacitor, I discovered the problem right away. One of its leads had snapped off flush with the bottom of the can. I dug back into my junkbox and located a similar unit rated at 3.3 uF and 24 volts DC. This was close enough. When I went to install it in the PC board, I discovered that the leads

on my new part were too short to extend fully through the board, so I opted to "tack solder" it to the underside of the board, which worked fine. Again, I was careful to install it with the proper polarity. Polarity is always marked on the outside of electrolytic capacitors.

❖ Firing It Up

Confident that the trouble was finally licked, I took a few minutes to tidy up my bench, clearing the way for a final "smoke test" of this set. I slid it back into the case (no screws yet), hooked up the antenna and switched the power on. I was immediately greeted by the full volume sound that I had been hoping for!

I spent the next 20 minutes tuning around the longwave, marine, and AM broadcast bands listening to the activity. I think I was hearing the faint sounds of WWV at 2.5 MHz, but it was early yet for that kind of reception here on the East Coast (8:30p.m. local time). Overall, I found the performance of the set to be good, but not stellar. The signal-to-noise ratio is a bit on the low side, and I found that I had to adjust the RF gain and volume controls for an optimal setting on nearly every station.

The good news is that the direction-finding capabilities of the set work well on all bands. Using the built-in signal strength meter and the rotatable set-top antenna, I was able to quickly obtain a null reading on any station and determine its direction from my receiving site. The frequency dial calibration was remarkably good for such an old set – too close to bother messing with.

Next month, I'll report on the "final button-up" steps for this set, including a cosmetic cleanup, cleaning the switch and control contacts, and securing the chassis back in the cabinet. I hope you'll join us for this final installment of the RDF 304!

❖ Mailbag

Jim Peterson (CA) writes: "I spotted your article in *Monitoring Times* Sept 2011. I have attempted to listen to SAQ 17.2 kHz only one time with no joy (Christmas 2009). I understand that there are other transmitters and other frequencies being transmitted from the same antenna array. Is there a schedule for these other transmitters, and a list of their power and frequencies? If I am able to receive any of the others, there might be a chance of hearing SAQ here in the San Francisco Bay Area."

Hi Jim, good to hear from you. I am not aware of the other transmitters using the SAQ antenna array, but I suppose it makes sense. Who wouldn't want to connect to SAQ's vast array?! I welcome input from others on these transmitters, and will share the findings in a future column. As far as hearing SAQ on the west coast goes, I think the chances are slim. A handful of well-equipped receiving stations here on the east coast have heard it occasionally – with weak signal strengths.

For anyone wanting to hear SAQ who is out of the normal receiving range, I suggest trying the online WebSDR receiver in the Netherlands (**http://websdr.pa3weg.nl/**). I have used this site with good success, as reported in recent columns. I know it's not the same as hearing it locally on your own gear, but it does let you hear the station in virtually real-time fashion.

In September, we reported that 100 kHz LORAN stations were still on the air in other parts of the world (outside the US). **Steve Ratzlaff** (OR) writes: "Per your Sept. 2011 *MT* column, only the Canadian and USA east and west coast Loran C chains were turned off, as a cost-cutting measure. They remain active in the rest of the world. I get the Asian chains here every morning just before sunrise, at S3 level. Using DSCDecoder (**www.coaa.co.uk/dscdecoder.htm**) I can decode them to tell which stations are being received."

Thanks for writing, Steve, and for this added information on LORAN. It seems that the future of these remaining chains could be limited. Aside from the expense of maintaining the transmitters, the user base is no doubt shrinking as folks migrate to the more precise GPS system. Please keep us posted on any future developments with LORAN status.

❖ Loggings

Our loggings this month (Table 1) are courtesy of Richard Palmer (MO), and Bill Smith (MA). Richard uses an ICOM R-75 receiver and an active antenna up 25 feet. Bill uses a Palstar R30A receiver with an LF Engineering pre-amp and a variety of longwire antennas in different compass directions.

Merry Christmas and happy holidays to all readers. See you next month!

TABLE 1. SELECTED NDB LOGGINGS

kHz	ID	ST/PR/ITU	CITY	BY
212	BY	SK	Beechy	R.P. (MO)
233	BR	MB	Brandon	R.P. (MO)
236	YZA	BC	Ashcroft	R.P. (MO)
242	MMI	TN	Athens	R.P. (MO)
276	YHR	QC	Chevery	B.S. (MA)
278	ADG	MI	Adrian	R.P. (MO)
278	BST	ME	Belfast	B.S. (MA)
279	CQX	MA	Chatham	B.S. (MA)
293	CJJ	IA	Cresco	R.P. (MO)
293	FBY	NE	Fairbury	R.P. (MO)
311	DVK	KY	Danville	R.P. (MO)
314	CVY	KS	Fort Riley	R.P. (MO)
326	FC	NB	Fredericton	B.S. (MA)
329	CH	SC	Charleston	B.S. (MA)
332	BE	MA	Bedford	B.S. (MA)
335	YLD	ON	Chapleau	B.S. (MA)
338	ZEM	QC	Eastmain	B.S. (MA)
344	ZIY	CYM	George Town	R.P. (MO)
346	LI	MA	Boston	B.S. (MA)
362	FM	MA	Falmouth	B.S. (MA)
382	BT	VT	Burlington	B.S. (MA)
386	D8	QC	Dolbeau	B.S. (MA)
392	CVX	MI	Charlevoix	B.S. (MA)
397	BWK	LA	Bunkie	R.P. (MO)
414	ATS	NM	Artesia	R.P. (MO)
415	CBC	CYM	Cayman Brac	R.P. (MO)

Note: A complete list of ITU codes is available at: **www.wordiq.com/definition/ITU_letter_codes**

RADIO RESTORATIONS

BRINGING OLD RADIOS BACK TO LIFE

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Picking up the Thread

Last time, most of the work session was devoted to inspecting and pondering. Though the receiver looked mostly like Meissner's "7-Tube Utility Broadcast Set," its slide rule dial, oddly, had both broadcast and shortwave scales. At first glance, its oscillator, antenna and r.f. coils looked a little more like the coils in the Meissner 2-band SW-BC set than the ones in the straight broadcast set and were laid out on the chassis similarly to the ones in the 2-band set. This was quite a head scratcher.

Taking advantage of Meissner's very clear pictorial diagrams, I compared the layout of my set with that of the straight broadcast set part for part. They were 90 percent identical, but there were some interesting differences.

First of all, though as far as I know Meissner sets were sold in kit form only, my example was *clearly* factory wired. Next, the antenna, r.f. and oscillator coils were definitely not standard to the set, but they were not two-band coils either. By comparing their part numbers to those in an early retail catalogue, I was able to confirm that these were designed to be universal replacement broadcast coils. Each was provided with an adjustment to tweak its inductance to match that needed for proper tracking in the set being repaired.

Obviously the chances would be quite slim for any radio to require replacement of all three of these coils. And even if this radio did need all three, there would be no need for a Meissner radio to use universal replacements. It would make much more sense to use the standard Meissner fixed coils intended for the set.

It was looking very much as if this were a prototype or experimental radio assembled at Meissner for some special purpose. The two-band dial might have been used simply because it was available – the use of an odd part not being important because the set was never intended to be sold. This idea isn't so far-fetched because the radio meet at which I had originally purchased my set was not far from the Illinois town that was (and is) the company's headquarters.

Ancient Eveready penlight cell had been soldered in to replace a dried-out Mallory bias cell. As it still provided 1.5 volts on the nose, I left it in place.

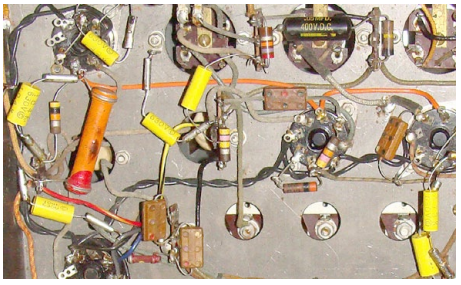
My examination of the radio turned up a couple more anomalies – both in the power supply. Instead of the specified two-section power supply filter using 15 uF electrolytic caps, this set had a three-section filter with 50 uF caps. The use of electrolytics this large in a broadcast radio filter circuit is unusual for the 1940s era in which the set was designed.

Another anomaly is in the method of picking off the d.c. from the rectifier tube. On the pictorial this connection is made to one side of the rectifier filament winding as is standard. But in my set, the winding is center-tapped and the d.c. is taken off at that tap.

If I am right about this radio being an experimental prototype, the changes in the power supply might have been part of the experiment, as might have been the adjustable "universal" coils. The latter may have even been used to adjust the receiver to a frequency range other than the standard broadcast band. Time will tell!

❖ Tube Checking and Recapping

With the detailed examination of the set complete, it was time to begin restoration. The first step was to remove all tubes, check that the right type had been installed in each socket and check the tubes themselves. In the process, I discovered yet another power supply anomaly. Instead of the 5Y4 rectifier tube, my set used a 5Y3.



Thanks to the roomy chassis, recapping the set was an easy matter. An original Black Beauty, not yet changed out, is seen at top of picture.

This couldn't have been a casual switch by a repairman. Although electrically the tube types are identical (both being octal-based versions of the venerable type 80), the pin assignments are quite different. When I queried tube expert Ludwell Sibley about this variation, he explained that the 5Y3 had come first. The 5Y4 had been registered later by Sylvania as a proprietary type for marketing purposes.

I don't imagine that the presence of a 5Y3 in the set instead of the specified 5Y4 had any special significance. Like the two-band dial, it may have simply been on hand and convenient to use in this prototype set.

The fact that I found a 6E5 magic eye tube substituted for the specified 6G5, unlike the 5Y4-5Y3 swap, was undoubtedly the result of a field change. The green phosphor used in these tubes does wear out and the eye eventually dims and needs replacement. But these eye tubes have become quite scarce and tube expert Sibley tells me that the 6E5 does make a decent substitute for the 6G5 with no rewiring required. It is a little more sensitive, however, and may close all the way on strong local stations, obscuring subtle differences in signal strength.

All tubes checked out OK on my tester. While I was at it, I also checked the voltage on the ancient Eveready penlight cell that had been soldered in to replace the original Mallory bias cell used in the first audio stage. It tested 1.5 volts on the nose, and I figured if it had lasted all this time, it was probably good for quite a bit more. So I left it in. Of course there is no electrical load on a cell used in this application.

Next came the replacement of all the paper capacitors in the radio. The originals were the infamous Sprague "Black Beauties," which give false promise of permanence because of their sleek plastic cases – but which are notoriously unreliable. The replacement process went very well because all capacitors were easily accessible in the roomy chassis.

As always, I like to leave the stubs of the old capacitor leads in place. Then I use uninsulated butt connectors, which take solder very well, to splice the leads of the new capacitors to the old ones. That way I can avoid overheating original components and wiring as I try to desolder the old connections. The connectors are available at Radio Shack in inexpensive assortments.

❖ Smoke Testing

I did elect to try to keep the original triple 50 uF filter capacitor. That meant bringing up the power supply voltage slowly to give the electrolyte within the capacitor sections chance to "re-form," or develop its full insulating properties. But in order to get voltage into the power supply filter network, I would have to plug in a dynamic speaker – an accessory that I didn't have.

Unlike the more modern "PM" or permanent magnet speakers, a dynamic speaker obtains the necessary magnetic field from an

Close shot of replacement capacitor shows use of butt connectors in making the changeover.

electromagnet or "field coil." The coil obtains its energy through serving double duty as the filter choke for the radio's power supply. With no speaker plugged in, there would be no filter choke and hence no power supply voltage.

Replacement dynamic speakers are no longer available. However, there is a workaround for this problem. A standard filter choke in series with a resistor to bring the resistance of the combination close to the value of the original field coil could be used to substitute for the coil. Then a PM speaker could be used in place of the dynamic one. That speaker, just as the dynamic speaker being replaced, would require an output transformer to match its voice coil to the radio's 6V6 output tube.

According to the radio's parts list, this set used a dynamic speaker with a field coil having a d.c. resistance of 1800 to 2000 ohms. A note in the parts list suggested that, if a PM speaker were to be used, the dynamic's field coil could be replaced with a Thordarson T22S58 filter choke in series with an 1800-ohm, 10-watt resistor. Referring again to my indispensable library of old literature, I found the specs for this choke in a 1959 Allied Radio catalogue: 12 henries, 80 mA, 375 ohms d.c. resistance.

My junk box yielded a couple of power resistors that could be paralleled to make up about 1800 ohms. When it came to the filter choke I got lucky. Not many chokes in my collection are marked, but the first one I grabbed off the shelf was a labeled Stancor unit: 13H, 65 mA, 500-ohms d.c. resistance. Close enough! I doubted that the full 80 mA rating originally specified was necessary but, even so, my substitute could certainly take a 15-mA overload long enough for me to complete my testing.

I didn't worry about hooking up a speaker at this point, but just made the substitute field coil connections to the set. The connector provided on the rear apron is a standard 5-pin tube socket with one pin unused – another departure from the original specs, which call for a 4-pin socket. I was happy about the substitution because I do have a 5-pin Amphenol plug that would fit, but not a 4-pin version.

For now, though, I just made the required connections via clip leads to the back of the socket. Replacing the 5Y3 rectifier tube, I connected a d.c. voltmeter to monitor power supply output, turned on the radio, and slowly increased the line voltage. When full power supply output was reached with no capacitor failures, I left the power on for a few minutes longer before setting up the set to test for actual operation.

❖ A Voice from the Speaker

Now I plugged in the full set of tubes and connected a speaker. I happened to have one with an output transformer of unknown specs attached and decided to take a chance on it. Powering up the set, I heard nothing – dead silence. There was not even the usual scratching heard when turning up a long disused volume control.

Then I had the light bulb: What I thought was the volume control because it carried the radio's on-off switch was actually the tone control! Advancing the other control, I found that the radio happened to be tuned to a station and I was rewarded by hearing the voice of a female announcer speaking Spanish.

See you next time, when we'll continue this adventure!

FROM THE READERS

I found the following note from ***Perry Crabill, W3HQX*** (Winchester, VA) so interesting that I'm quoting much of it verbatim.

I have read with interest your articles about the WW-II BC-1206-C Beacon Receiver. I remember when they became available as military surplus after the war, but never latched onto one because much better receivers, such as the BC-453, RAK-7, and RBA were available for very nominal prices. I have DXed the beacon band since 1934, when I was a teenager in Washington, DC. I began serious beacon DXing here in Winchester, Virginia, from January 9, 1990 to October 25, 1998.

I was quite successful, logging 1266 beacons during that period. My best NDB DX was over 5,000 miles; IPA-280 on Easter Island, 5,004 miles; also, HA-367 in French Polynesia, 5,657 miles. I logged many stations in the Caribbean and South America. The latter included Brazil, Colombia, Ecuador, Guayana, and Venezuela. BOA-405 in Brazil was the southernmost at 2,737 miles. Many Canadian stations were also heard; the farthest west was in Manitoba, and the farthest north was in Newfoundland and the Northwest Territories. The most distant U.S. stations logged were in Colorado and Montana .

I finally had to give up the hobby of monitoring beacons because of the increase in the local noise floor from the household electronics in the neighborhood, including those in my own house. The first such noise source was my own TV set, because of harmonics from its switching power supply, which is on even when the TV appears to be off. Since that time the proliferation of remote controls for other household electronics have magnified the scope of the problem, along with the electrical noise generated by computers, their printers and uninterruptible power supplies; solid state timers; lamp dimmers; and especially the compact fluorescent lamps (CFLs) now replacing incandescent light bulbs. Plasma TV sets are a special problem, due to the nature of the display, as is the electronic control system for my new central heating and air conditioning system.

Counterbalancing Perry's somewhat gloomy assessment of the prospects for LF DXing was a report forwarded by ***Steve AA7U*** (NE Oregon). It was posted on an NDB list by an LF DXer in Galena, IL. His location is not all that far from my Chicago area QTH, though, being much more rural, is undoubtedly much quieter.

Prefacing the report was a comment that conditions had been rather poor but he had taken advantage of a small opening. The report listed over 30 beacons in Canada, all over the midwest, and even Puerto Rico. It would be interesting to know what equipment and antennas he is using!

Responding to our current restoration project, ***Gordon Schlesinger, W6LBV***, writes that he remembers selling Thordarson-Meissner products when he worked in an electronic parts store while a college student in 1960. (By then Thordarson and Meissner had merged and become subsidiaries of a company called Maguire Industries.) He recalls that the customer base included many crusty old independent TV repairmen who would bypass him and stomp directly to the stock shelves to find parts that he couldn't locate.

Gordon says that he never ran into any of the Meissner kit products, and figures that their heyday was before his time. He was also kind enough to say that, though he isn't doing restorations right now himself, he enjoys reading about the ones I do in the column.

ANTENNA TOPICS

BUYING, BUILDING AND UNDERSTANDING ANTENNAS

Dan Farber, AC0LW
danfarber@monitoringtimes.com

Vintage with a Vengeance

I am a great lover and collector of books about radio, but one that has always fascinated me is a volume called Practical Radio, published in 1924. I was a 14 year old General class ham in early 1972 when my mother brought this delightful book home to me from a garage sale where she'd spotted it.

As the years go by, this portrayal of radio in its infancy becomes ever more poignant – and yet, it's also ironic to see how some things haven't changed very much. Since we're celebrating the Vintage facet of our hobby in this issue, I thought I'd share with you all some of the antenna views and notions from this perspective which is now 87 years old.

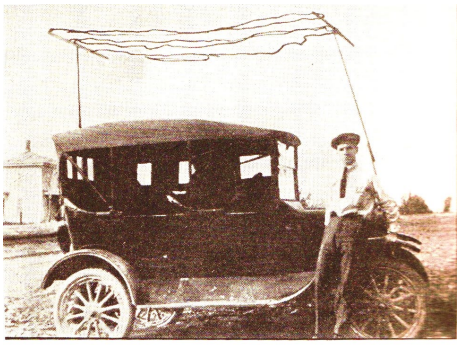
Come back with me now to a world where the Great Depression hasn't happened yet; where television, computers, the Internet, satellites, and even FM radio are only vague dreams of starry-eyed science fiction writers; where CW and AM are still fresh and dominant modes, having only recently supplanted spark; the transistor won't be invented for another quarter-century; shortwave broadcasting doesn't yet exist; and ham operators are relegated to "200 meters and down" – that is, 1.5 MHz and above, since no one in authority considers these high frequencies to have any commercial worth.

Crystal radios are all the rage, since they are cheap and simple to build, and a whole generation of young people is enthusiastically embracing this newfangled radio hobby. Those with a little more cash to spend are building tube-type, battery-powered receivers, with Major Armstrong's regenerative and superheterodyne circuits very much on the cutting edge.

In the first photo, a lady of high fashion on the streets of Paris models the very latest in portable radio style – the parasol crystal set! You can see the antenna wire strung up as a crude web in the dish of the umbrella. Note the bulky headphones, the only kind they had then. I have always wondered how this particular radio was connected to ground; crystal radios have notoriously poor performance without a good ground. Maybe it's more about cutting-edge fashion....

The next shot shows a young fellow proudly displaying the homemade antenna mounted on his car. The text calls it a "portable" antenna ... the concept of "mobile" radio operation hadn't really dawned yet. (It will be more than twenty years before police cars begin to be equipped with "two-way radio.") We're not told what sort of receiver this guy has in his car, but if not a crystal set it could very well be a tube radio of some sort, operated from dry cells.

WIRELESS ON THE PARASOL IN PARIS



A PORTABLE ANTENNA

These two views may be somewhat humorous to us modern radio hobbyists, but it's fascinating to contemplate how they portray the very dawn of portable and mobile radio antennas. Just think of how these two arts have evolved since then! And realize, too, that radio enthusiasts have sought to enjoy these "outdoor" modes of operation from the very beginning of our hobby. Poignant, yes...but not really so different from today.

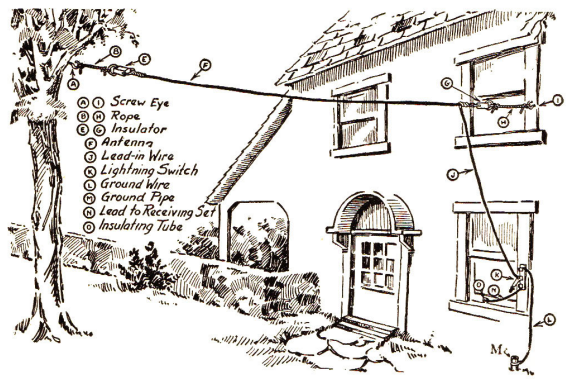
❖ No Fancy Feedlines

One thing I am struck by throughout the book is the utter simplicity of feedlines. We know that coaxial cable existed at this time, having been patented in the 1880s, but it makes no appearance in this book. Nor does open-wire feedline show up anywhere. Though twin lead and ladder line were certainly many years away from being manufactured, folks could certainly have homebrewed open-wire feeders, as indeed they still do even today.

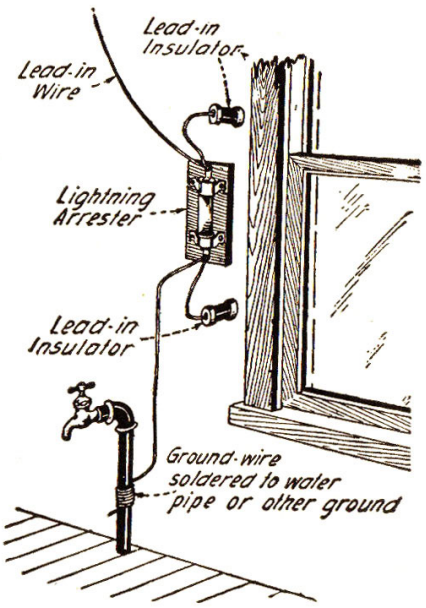
And then it hits you: nowhere do you see any balanced antennas, no dipoles, quads, Yagis, nothing that would require a two-wire feed. Instead, everything seems to have been single-wire, end-fed, against as good a ground as possible. Even where the occasional loop antenna appears, it's connected to two single terminals marked ANTENNA and GROUND.

The drawing of the inverted L antenna arranged between tree and house is interesting. Someone climbed the tree and screwed a screw eye into the trunk to attach the support rope to! And a knife switch (marked "lightning switch") is on the outside of the first floor window frame where the lead-in wire enters the house. Yet, much about the sketch is familiar; the use of insulators at both ends of the antenna wire, the solid ground connection, and the effective if crude provision for lightning safety. It does seem like an awfully short antenna, given the low frequencies then in use, and the fact that they didn't have my trusty MFJ 969 tuner to crutch it up!

Another drawing shows a lead-in wire arrangement indoors, where an air-gap lightning arrestor has been mounted on the wall (!) and the ground wire is soldered to a water pipe. Yet here again is good solid theory we would approve of today: use of an arrestor, and choice of a water pipe as an effective indoor ground. I think it would have been a lot easier to clamp to the water line, rather than solder, but what do I know? I just hope it's a cold-water line, and not a gas line.

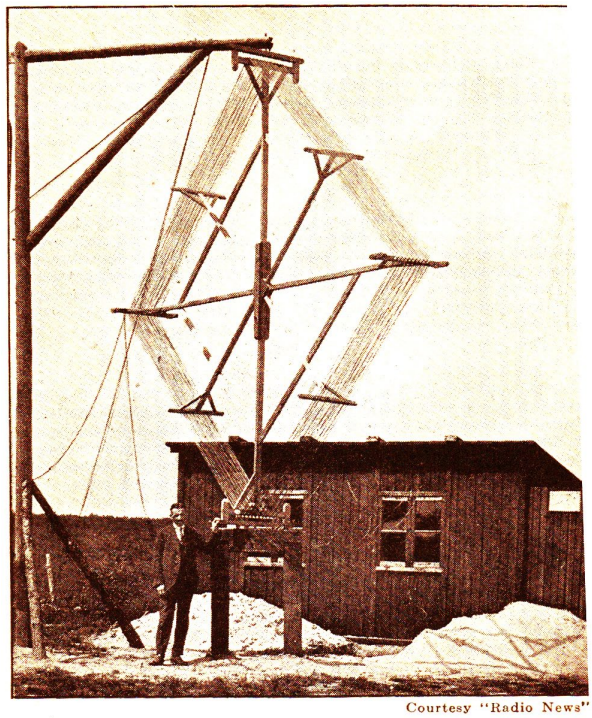


AN "INVERTED L" ANTENNA ADJUSTED BETWEEN A TREE AND THE WINDOW FRAME



DETAILS OF ADJUSTMENT OF LEAD-IN WIRE FROM ANTENNA

The gigantic loop antenna in the photo is mounted on a derrick so it can be rotated to take advantage of the loop's directional qualities. The text states that this is a seaside station, and the loop is part of a radio compass, used to determine the position of ships that have lost their bearings in storm or fog. (Remember, radar doesn't exist yet, either.)



Courtesy "Radio News"

A GIGANTIC LOOP AERIAL WITH DERRICK MOUNTING

❖ The Adventure of Radio

This is just a sampling of the gems scattered through this fine old book. What really shines through is the enthusiasm and confidence of these folks, of all ages, grasping this brand-new field of endeavor and tirelessly experimenting to bring about new methods and theories. Sure, their antennas and radios seem crude and silly to us – one schematic shows a superhet receiver with nothing but triodes (the only tubes they had), five RF amplifier stages, and all powered from dry cells – but on the other hand this superhet is connected to a recognizable Beverage antenna and was successful in hearing trans-Atlantic signals at 200 meters.

It's wonderful to observe so many aspects of radio in its infancy, and realize that, though some of our technology is light-years beyond theirs, still, many sturdy first principles of our hobby were already recognized and obeyed. And it is marvelous to see how much they enjoyed their new-found hobby, and constantly worked to improve it.

Again, all the photos and drawings presented here are taken from Practical Radio, by Henry Smith Williams, published in 1924 by the Funk & Wagnalls Company. If you get the chance, do get a look at this fine old textbook, and get some perspective on how far we've come – and how strong our roots really are.

Have a wonderful holiday season, friends. Kent and I will be back in 2012 with more antenna adventures to surprise and delight one and all. Until then, happy operating!

SKY SURFING

RADIO FROM THE OUTER REACHES

Stan Nelson, KB5VL
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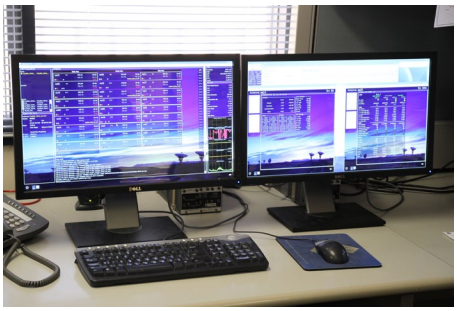
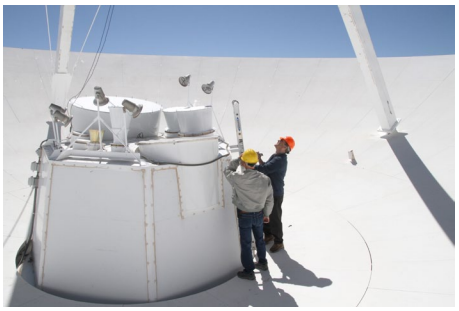
Visiting NRAO's EVLA - Part II

In my last column (September 2011) I highlighted my memorable visit to the EVLA (Enhanced Very Large Array) near Socorro, New Mexico. We'll wrap it up this month with more details of the telescope and control room.



The dish operator monitors the various parameters displayed on the screens above. Note the DC power supply behind the Dell monitors. The monitors are run by highly regulated and filtered DC (direct current) power supplies in order to minimize RF (Radio Frequency) noise often associated with switching power supplies built into standard monitors.

The Correlator – high powered processors that merge the data from all of the dishes – is in a nearby room that is highly shielded. We couldn't enter the room due to the need for protective gear.



Above is the entry point to the horn antennas/detectors. Notice that the cluster of horns are offset, aimed upwards toward the secondary reflector above. Each horn is designed for operating on different bands. The little lamps are heat elements to dispel ice and frost and even rain drops. It has been known to happen even out in the desert. We climbed up a ladder onto the surface of the dish through a trap door near the ladder.

The horns can be seen above with their analog to digital converters attached below. They are cooled to a very low temperature with a liquid helium system. Fiber optic cables route the signals to the correlator in the main building.

As I mentioned in the first installment, I had visited this site many years ago when all of the dishes communicated to the control room with waveguides. In the last two years, the system was upgraded and now provides superior performance. The array also is part of a project called VLBA (Very Long Baseline Array).

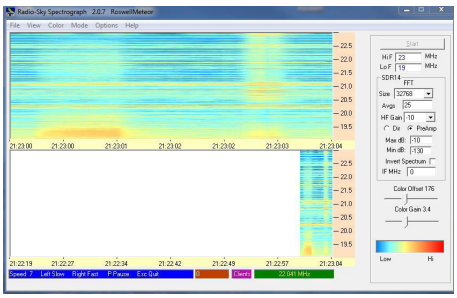
Below is a picture of the ALMA dishes in Chile that is part of the latter project. When this project is finished there will be 60 dishes in the array. The electronics were mostly assembled, integrated, and assembled at the NRAO labs in Socorro, New Mexico.

I want to especially thank Hank Newton and Dave Finley with the NARO for their hospitality and allowing me to get inside one of the marvels of technology. And, for the burger in Magdelena. Thanks Hank! *Pictures courtesy Hank Newton.*

❖ Observing the Sun's Radio Spectrum

Recently, I found a link to a newsletter for TAOSON (Tamke-Allan Observatory Solar Observation Network). The purpose of the *TAOSON Signal* is to help keep local radio astronomers in touch with each other and help coordinate their activities. The April issue includes an article by Michael Rudolph, *Radio Spectrum Observations of the Sun*, on page 15. He describes how to use an AR5000+3 broadband receiver connected to an SDR-14 software-defined spectrum analyzer. Here's the link to the TAOSON article: **www.roanestate.edu/obs/TAOSON%20Signal/TAOSON%20Signal%203%202008%20Nov.pdf**

Having recently acquired an SDR-14, I downloaded Jim Sky's free software, Radio-Sky Spectrograph (found at **http://jupiter.wcc.hawaii.edu/spectrograph_software.htm)**, as referred to in the article. I followed the steps in setting up Spectrograph and set it up to monitor 19 to 23 MHz. See chart below. I recorded some noise enhancements on July 10, 2011 at 21:23 UT using an HF dipole.



❖ SDR-14 in operation

Note the iPhone on top for size comparison. RFSpace's SDR-14 is a 14-bit software defined radio that samples the whole 0-30 MHz band. There are two SMDR connectors for RF inputs, one for direct input and the right connector is filtered, for 0.1 to 30 MHz signals.

On the front panel, the yellow *CAP* light tells you're actively gathering data. The green *USB* light is lit when you are connected to the PC running software SDR-14 aware. The *CLP* (clipping) light comes on when you are overdriving the unit. You can set the preamp-gain to a more negative setting to reduce the gain. I used the -10 dB setting.

During my first use I had accidentally entered the Hi F (High Frequency) as the Lo F (Low Frequency) and vice versa. If you do, the vertical frequency labels for both waterfall charts disappear. Also, I had to change the time zone in the Options menu to allow for Daylight Savings Time. I reside in -7 hours (MTD or Mountain Standard Time). To allow for MDT, I had to manually change the time zone to -6. The correct UT is then displayed on the chart's time scale.

The SDR-14 comes with a software package called *SpectraView.* It does pretty much the same thing as Spectrograph, which was designed to originally to work with the Radio Jove receiver, but seems to do fine with the SDR-14. I like Spectrograph's ability to play back large

blocks of recorded data at high speeds, like a movie. Incidentally, the SDR-14 has now been discontinued and RFSpace's web page refers you to a newer model, the NetSDR.

❖ National Radio Astronomy Observatory

If you're new to radio astronomy or just curious about how it works, check out this NRAO site at **www.nrao.edu/index.php/learn/radioastronomy/radiotelescopes**

On the website, there's link to "Make Your Own Radio Image." You can print out a sheet that has number squares or "pixels." The exercise gives you a good idea how a radio telescope creates image of the radio sky. Makes you feel young again, too!

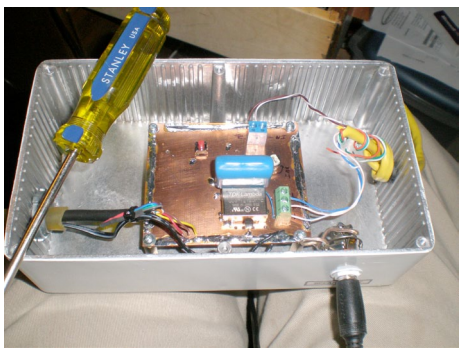
❖ RAS-VLF-1

In my last article, I discussed using the VLF receiver in detecting Sudden Ionospheric Disturbances (SIDs). As a follow-up, I recently received my unit from RAS (Radio Astronomy Supplies) in Sanger, Texas.

When I ordered the RAS-VLF 40 kHz unit several months ago, I was informed the unit was being re-designed. It now includes an antenna pre-amp and is broad-banded to cover a wider range of the VLF spectrum. Jeffery Lichtman, with RAS, recommended a 5 foot square loop.

I built one from 1 inch PVC based on a suggested layout from RAS. The loop requires 30 turns (600 feet) of insulated wire. I used #20 wire from 100 foot spools, soldering the ends as I wound the loop. The loop is temporarily mounted in a tree. At the bottom of the loop is the antenna pre-amp and interface to an Ethernet cable which runs into the shed.

Below is a picture of the power and interface unit. RAS runs +/-12 volts and ground out to the antenna, supplied by a dual voltage plug-in power supply. Audio is fed from the antenna unit to the main box via pins 7 & 8 on the Ethernet cable. The instructions indicated a 100 foot maximum on the Ethernet cable run.



There is a standard 9 pin connector terminated on a cable for serial access. Connected to a serial port, you can download the integrated audio voltage level via a PC terminal program, such as *HyperTerm* in Windows XP. There is a nice freeware program out there that also works great called *WinPutty*.

The program supplied by RAS automates the process but is kind of ancient (DOS?) and didn't work well for me. It is also limited to using COM1 or COM2. With a Belkin Serial-to-USB adapter connected to an older laptop using COM4, I made the appropriate changes in the COM setup in Windows Device Manager to match using: 2400 Baud, 8, 1, and none for the protocol. I did the same easily with WinPutty.

The technique to recover the voltage readings is simple with the terminal program. You type *!R000* to reset the unit. Then type *!D000* to get a reading in HEX code. After an adjustment on the control unit, I got a reading of D4CC. The last three digits represent the HEX code for a scale of 0-10 volts. For those who haven't used base 16 HEX code, 0=0, F=16. Using a quick Hex to Decimal conversion calculator, 4CC = 1228 and scales to 3.0 volts. Below are some points to give you an idea of the process.

HEX CODE EX.	DECIMAL VALUE	SCALED VOLTAGE
FFF	4095	10
958	2392	5.8
4CC	1228	3.0
000	0	0.0

One could develop a simple program to interrogate the voltages to log and graph them, etc. Please let me know if you are aware of one using the serial interface.

In the meantime, I use Radio SkyPipe II by Jim Sky, monitoring the audio via an audio/USB interface with *MAudio's Mobilepre*. The image below was captured using my temporary setup. RAS recommends the loop be mounted on a post perhaps 10 feet above the ground. It will be soon!

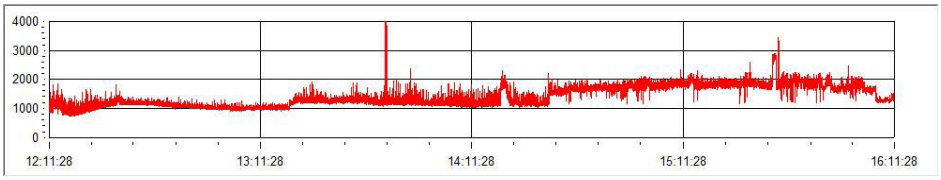
You might want to subscribe to a free mailing list, **https://lists.nasa.gov/mailman/listinfo/radiojove**. They focus on Radio Jove or Jupiter radio noise detection reports, but various users also report solar activity. They also attach charts using a variety of methods and receivers. Check them out.

❖ Radio Astronomy in the Movies

The 1998 movie, *Arrival*, opens with a shot of the Owens Valley dish. In the movie, a sign shows "ORO VALLEY." The movie credits at the end mentioned Bishop, California. An Owens Valley takeoff? One of fun lines by the character Zane was "Where do you hide a twenty meter dish?" Many of the really nice shots of the big scope occur at the end of the movie, finally destroyed by the alien's "vacuum cleaner." The huge dish came crashing down in spectacular animation.

What was interesting and creative in the movie was an array built using various neighbors' satellite dishes. Remember, this was in 1998 when some folks were still using the large 10 or 12 foot TVRO type dishes for home reception. Zane tapped into them, selecting those that fell along 3 each 120 degree radials. He 'high-jacked' or remote controlled the dishes at night and repositioned them to the star that SETI signals had emanated from earlier. Nice touch. Amazing controllers, huh? Ha.

Keep listening up. Stan



Times in UTC. Screen shot taken at 16:11:28, October 2, 2011 with Radio SkyPipe II.

Restoring the Knight Star Roamer

By Mark Haverstock, K8MSH

The Star Roamer was one of the most popular starter shortwave receivers among baby-boomer SWLs and hams. Given its minimalist four tube circuitry, this little receiver is a relatively good performer, on a par with similar receivers of the era, such as the Hallicrafters S-38 series, S-120 series, Heathkit GR-64, and Lafayette HE-40.

Allied Radio sold this Knight Kit in large quantities between 1963 and 1972 for $39.95. The original units were manufactured in the U.S. and later ones were produced in Japan. A solid state version, the Star Roamer II, appeared in the 1971 and 1972 catalogs priced at $70. Today you can routinely obtain a used Star Roamer today from eBay, garage sales, or hamfests. Ones in decent condition typically fetch between $40-60. Unbuilt kits are extremely rare–one sold on eBay back in 2007 for $1,526!

Catalog description and picture of Star Roamer from Allied Radio Catalog, 1966.

Essentially the Star Roamer is a conventional superhet broadcast receiver enhanced with longwave and shortwave coverage, plus it has a few additional features to satisfy the shortwave listener. On the front panel are antenna trimmer and bandspread controls. The sensitivity control is actually somewhat deceiving. It actually acts as a simple beat frequency oscillator (BFO) for code/sideband reception by introducing a small amount of oscillation into the IF stage. Two slide switches to the right of the tuning knob control the automatic volume control (AVC) and automatic noise limiter (ANL). A horizontal S-meter measures signal strength and can be calibrated by the S-meter adjustment control on the rear apron.

The Star Roamer also includes an unusual built-in code practice feature that utilized the receiver as a tone generator. In the *normal* position, received sound is emitted from the speaker or headphones. In the *code* position, the audio output is interrupted by the open key circuit. To practice code, you put the switch in *normal*, tune in a carrier and adjust for a constant beat note. Next you switch to *code* and operate the key. No special oscillator is involved, unless you count the station emitting the received carrier wave.

It's essential to have a schematic and a manual handy when you begin the restoration. A list of sources for both appears at the end of the article. Manuals from the Boat Anchor Manual Archive (BAMA) are free and downloadable in PDF format.

This may seem obvious, but bears repeating – ***make sure the unit is not plugged in when you open it up!***

Under the Hood

My first step was to open up the receiver by removing the four machine screws on the side of the cabinet, pop the cover and bottom plate to do a visual inspection. The underside was clean, but the chassis top was dusty and grimy – begging for a cleaning. Components and wiring looked good – no broken wires, leaking capacitors, or fried resistors. The AC cord was neither frayed nor broken, and the one amp fuse was in good condition.

I pulled the tubes – all checked as good. While they were out of the sockets, I cleaned the top of the chassis. Your favorite household spray cleaner will work fine, but spray on the cloth or Q-Tip first before applying to the chassis surface. Using CRC Contact Cleaner, I also cleaned the tube tines and sockets.

Catalog description and picture of Star Roamer from Allied Radio Catalog, 1964.

Potentiometers, switches and the headphone jack are next in line for cleaning. CRC or DeoxIT are the best contact cleaners for the job and will remove dirt and oxidation that may have built up over the years. Though many swear by tuner cleaner and WD-40 as cures for dirty controls and switches, I've found that neither is satisfactory for the long term.

Find the openings in the potentiometers for the S-meter adjustment, volume, and sensitivity controls. Attach the wand to the can of cleaning solution and spray lightly into each opening. Work the controls by turning them back and forth through their entire range several times. You may also want to mark the S-meter control position on the rear skirt before doing this.

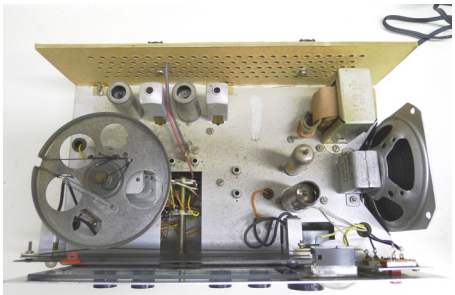
Next, spray the on-off, AVC, ANL, code/normal (on rear skirt) switches through their side openings. Slide the switches back and forth several times to work the cleaner into the contacts.

ALLIED RADIO

Allied started as the radio parts distribution arm of Columbia Radio Corporation in 1928. During the 1930s, the company built a growing business in marketing radio parts and kits to home hobbyists, and was one of the first to sell electronics through a catalog. In addition, Allied opened storefront distribution outlets to reach more amateur ham radio operators and experimenters.

After World War II, Allied continued find its niche in the retail electronics market, meeting the demand for both parts and electronics to eager hobbyists, radio enthusiasts, and Hi-Fi consumers. Knight Kits became part of their product line from 1957-1972. In 1970, Allied merged with Tandy's retail unit to become Allied Radio Shack. Three years later, due to federal court action, Tandy was ordered to divest itself of Allied Radio.

Today, their primary business focus is the industrial components/equipment market. But they have an extensive supply of parts, tools, and other items that any experimenter might be interested in. They welcome orders of any size from individuals through their website or catalog.



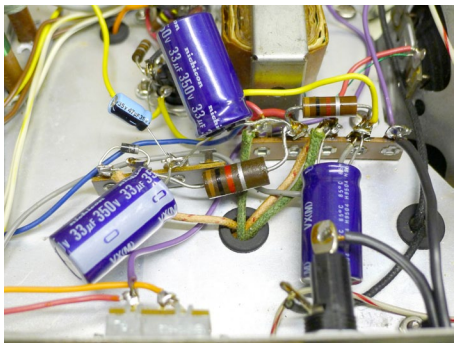
Top of chassis before restoration.

Turn the receiver over and find the headphone jack. Press gently on the rear of the jack to open the contacts and spray between them. Finally, spray the two bandswitch wafers on both sides.

❖ Rebuilding the Power Supply

One procedure common to repairing vintage radios is to replace the electrolytic filter capacitors in the power supply. Electrolytics dry out and deteriorate with age. When they fail, they might cause shorts that can destroy other components. The other capacitors in the Star Roamer are ceramic discs. They're more durable and would only need to be replaced if they are defective or damaged.

The selenium rectifier can also fail, so it's a good idea to replace it with a modern silicon diode, such as Radio Shack #276-1104, rated at 600v. Removing it leaves a hole for mounting a terminal strip that will accommodate the replacement capacitors and diode. I found a suitable four terminal strip in my junk box. Radio Shack #274-688 will also work fine – you can snip the extra terminal off the end.



Parts placement for rebuild of power supply.

When replacing the electrolytic capacitor, close is good enough given the 20% tolerances typical of these units. I found that 33uF were easier to obtain than 30 uF filter capacitors; 47 uF were more common than 50 uF. Voltage ratings should be equal to or exceed the capacitor being replaced. I snipped the wires about 1 inch from the original capacitor and removed the screw holding it to the chassis. The remaining color-coded wires helped me position the replacement capacitors correctly. See figure 3 for a photo of the parts placement. Be sure component polarities are correct and solder all connections carefully.

STAR ROAMER SPECIFICATIONS

Allied Radio part number #83YX102J

Voltage: 110-130 VAC 60 Hz
Frequency Ranges: 5 Bands. Sub-BC: 200 kHz to 400 kHz, BC: 550 to 1600 kHz, SW-1: 1.8 to 4.8 MHz, SW-2: 5.8 to 12 MHz and SW-3: 12 MHz to 30 MHz
Readout: Analog Mode
Circuit: Single Conversion Superheterodyne. 4 Tubes
Physical dimensions: 12.25 x 5.5 x 8" 10 Lbs. (311 x140 x203mm 4.5 kg)
Circuit Complement: 6BE6 Converter, 6HR6 IF Amp, 12AX7 Audio Amp and 6AK6 (6AR5 in some models) Audio Output

Features:

1/4" Headphone Jack
S-Meter
4" Speaker
Bandspread 0-100
Automatic Noise Limiter
Dial Lamp
Antenna Trimmer
Automatic Volume Control
ON/OFF
Sensitivity
MW Ferrite Antenna
CW Practice Jack

❖ Initial Testing and Checks

Since I rebuilt the power supply, I decided to fire up the radio without using a variac. The tube filaments and pilot lamps came to life, but after waiting a few minutes for warm up there was no audio. The culprit turned out to be the normal/code switch on the back. It was tight and difficult to move – something I noticed prior to cleaning. Jumping the connection brought the audio back, so I replaced with another similar slide switch. Note that a dirty or bent headphone jack can cause similar problem.

I began with the AM band and tuned in several local stations to check reception on the loopstick antenna. Be sure it is mounted on the outside of the rear panel for best reception. Continuing through bands 3, 4, and 5, I was able to receive shortwave broadcast stations, WWV, and a ham sending CW on 80 meters using a 25-foot wire strung across the floor. No signals were heard on the longwave band.

If the receiver fails to work after initial testing, check for wiring errors. This is relatively easy, thanks to the organization of the Knight assembly manual. The parts are wired in layers, each with a separate pictorial diagram – and each successive layer includes the parts and connections from the previous one, which is grayed-out. One place to start your wiring check is the dense tangle of wiring at V-3 – the 12AX7 tube – could be a source of problems. Examine this carefully for loose connections, shorts, or cold solder joints.

❖ Alignment and Tuning

The coils and IF transformers in the Star Roamer were originally pre-aligned at the factory. Since alignment was probably affected by the placement of the wires and components when the kit was built, not to mention the fact that 40-50 years have elapsed, it's a smart idea to realign the unit. Standard insulated alignment tools like Radio Shack #64-2230 will work fine. I find it helpful to make a small "flag" at the top of the tool with masking tape to track the travel of the coil slugs and capacitors.

Since space is limited in this column, please refer to the detailed alignment instructions in the Star Roamer assembly manual on pages 25-26. Directions are given for alignment with and without test equipment. Don't force the tuning slugs in the coils and IF cans. If they don't move, it's probably best to leave them alone as not to damage them.

If the tuning is sluggish, consider lubricating the bearings in the large tuning capacitor, the tuning knob shaft, and the dial cord pulleys with a few drops of light oil. Be sure you don't get any oil on the dial string.

❖ Finishing Touches

The metal cover had no rust, but the paint was dull and there were several surface scratches. A repaint was in order, so I sanded the case lightly and chose gray Rust-oleum hammered spray paint. It gives the case a slightly textured look, as well as doing a fair job of hiding flaws and imperfections.

Completed restoration of Star Roamer.

Several of the front panel knobs were out of position. I loosened the set screws and realigned them properly with the markings on the front panel. Retighten them carefully as they are prone to crack.

Basic Parts List:

(3) 33 uF electrolytic capacitors 350v.
(1) 47 uF electrolytic capacitor 25v.
(1) IN4005 diode Radio Shack 276-1104
(1) terminal strip Radio Shack 274-688

Parts Sources:

WJOE Radio **http://wjoe.com/saleitemsmain.htm#top%20of%20page**
Antique Electronic Supply **www.tubesandmore.com/**
Just Radios **www.justradios.com/**
Old Radio Parts **www.oldradioparts.net/**
West Florida Components **www.westfloridacomponents.com/**
Bob's Antique Radios and Electronics **www.radioantiques.com**

Manuals/Schematics:

Schematic can be found at: **www.mcmlv.org/Archive/Radio/KnightkitStarRoamer.pdf** (free)
BAMA manual site: **http://bama.edebris.com/manuals/knight/str-rmr%282%29/** (free)
Manual reprints: **www.radioreprints.com/index.php** (professional reproduction of manual, $11.95 +shipping)

WiNRADiO G33DDC Excalibur Pro

By Bob Grove, W8JHD

It's hard to believe that a year has gone by since we reviewed WiNRADiO's G31DDC Excalibur shortwave SDR receiver (November 2010). And now the company has recently introduced the next step up, both in performance and cost: the G33DDC Excalibur Pro.

So what are the improvements? As hard as it may be for us thoroughly-satisfied G31DDC owners to believe, there are several. For the most part, they are specification enhancements, not functional additions.

Couldn't these have been simply downloadable upgrades to the G31DDC? No: While software upgrades may address functional aspects of a product, they can't change the hard-wired limits of performance.

A look at the improvements

The new G33DDC doubles the recording and processing bandwidth from 2 to 4 MHz wide. This is the digitally-down-converted chunk of spectrum to which you want to pay particular attention. While the entire tuning range of the receiver is from 9 kHz to 50 MHz – all of which can be displayed in real time on the spectrum screen – signal details are captured only on the smaller span, which can be narrowed down to a crisp 20 kHz if desired.

Reception modes are abundant in the original G31DDC – AM, AMS (AM Synchronous), LSB, USB, CW, FMN (FM narrow), FSK, UDM (User-Defined Mode), and DRM (optional). But, the new model has added DSB (double sideband) and ISB (independent sideband) as well. Seasoned shortwave listeners know the interference-rejecting capability of these modes.

While the early model's sensitivity was excellent (0.35 uV SSB and 0.16 mV CW), it is now 0.20 uV and 0.10 uV for those modes on the new model. This gives an edge to fringe reception assignments.

While we can hardly question the frequency stability of the G31DDC with its 2.5 parts per million spec, now it's a rock-stable 0.5 ppm on the G33DDC.

But doesn't an improvement in sensitivity raise suspicions of vulnerability to strong-signal overload? Suspicions, yes. But WiNRADiO has tackled this handily by providing 119 selectable pass-band filters – 14 high pass, 14 low pass and 91 band pass, plus a bypass selection. These can be chosen manually or programmed automatically. This assures attenuation of possible interference from overly-strong, out-of-band signals.

Phantom image signals, an artifact of receiver design, are even less than on the original model, 100 dB down as compared to the former 90 dB which was excellent.

And for those picky listeners who ask "Why can't they make receivers more selective?" the demodulated signal filter is now continuously adjustable from a wide 62.5 kHz down to 1 Hz – I think that's selective enough!

Built-in test and measurement functions allow the user to assess the performance levels of his receiver at several circuit points.

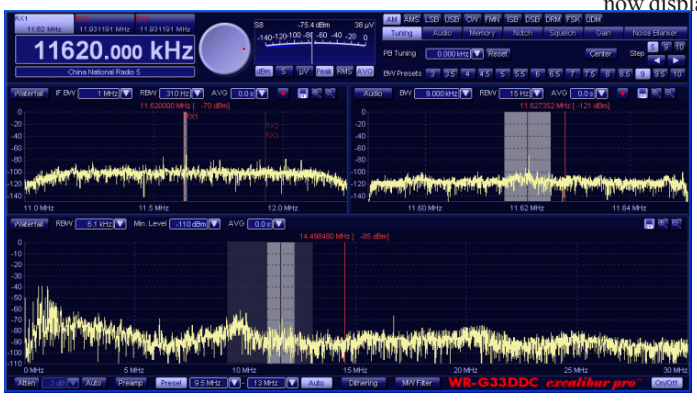
How does this translate into performance?

Not all of us are technically adept enough to nod with understanding at all of these specifications. In a word, the specs cited above are laudable. The flexibility of functions on the G33DDC allow it to suitably detect virtually any signal in its spectrum that is above the natural noise level.

Long-time radio enthusiasts who cut their teeth on radios with knobs are understandably reluctant to switch to a "brick" connected to a computer. It's a whole new experience typing in frequencies and jockeying around a screen with a mouse!

But once we make the transition, the immediate control of the spectrum at your fingertips can be addictive. The visual presentation of a dynamic spectrum with signals popping up and down as spikes on the screen adds a new dimension to radio reception.

Audibly monitoring a communications signal while simultaneously seeing the surrounding signals of the spectrum dancing in color is captivating as well as informative. I find it almost hypnotic!



Let's do some monitoring

Unpacking the G33DDC from its secure shipping box reveals a compact, metal-encased module equipped with a USB connector, an SME antenna connector, and a standard 12 VDC power jack.

On the other end of the enclosure is a pushbutton power switch and an attendant LED indicator. That's it. No knobs.

Included accessories are the USB interconnect cable, linear 120 VAC power supply, software/driver disk, and an SMA/BNC adapter.

The 16-page installation guide is well written, informatively graphic, and easy to follow. It specifies the following minimum computer system requirements: 2 GHz dual-core CPU, 1 GB RAM, an SVGA display, 20 MB of available hard drive space, Windows-supported sound card, USB 2.0 port, and a Windows XP, Vista, or 7 operating system.

While the G33DDC will operate at a slower CPU speed, the ultimate performance will be degraded in terms of selectivity, DDC bandwidth, and response to other programs which may be multi-tasking the computer.

Installation

I inserted the disk into my computer and followed the loading instructions, but after I clicked on "Finish," I received a message telling me that the device driver was not successfully installed. Not to worry. The program icon was now displayed on my desktop, so I clicked it and it loaded perfectly. Go figure.

Fortunately for the easily daunted, the program loads with usable factory presets. As soon as you see the application come up on screen, you can hear and see the activity on the band.

The startup automatically comes up on factory-preset WWV at 10000.000 kHz (frequencies are displayed to 1 Hz). The service for any frequency allocation is shown below the frequency readout, in this case, "Standard time and frequency."

Three spectrum screens are shown in their default settings: the 0-30 MHz full-span spectrum analyzer (extendable to 50 MHz), and two, separate, smaller-span displays for more detailed analysis and recording.

Even better, this spectrum display has a waterfall mode, found only on the more expensive spectrum analyzers. This mode allows a continuously-recording display over time, gradually moving upward on the screen, for as long as 17 minutes, revealing changes in band conditions and on-off signal presence at a glance.

For serious audio applications, there is a fourth spectrum analyzer function, demodulated audio, 16 kHz wide, with 1 Hz resolution bandwidth.

The presentation can be compressed or expanded to suit the requirements of your screen, such as running multiple programs requiring split screen or overlay. Background and character color selections may be applied by choice.

If you really want to be impressed – or impress your friends – click the full-screen icon in the right-hand corner of your screen and let the image take over the whole screen. (I'm impressionable – I grew up during the sci-fi days of the emerging space age!).

❖ Let's try it out

With all three screens programmed to the bandwidth limits of my choice, I let my mouse do a little playing on the screen.

Clicking on the frequency window, I could select which, or all, of the numerals to change to visit other parts of the spectrum. I could also slew up and down the bands with the automatic tuning dial, the increments of which can be custom selected (5 kHz for international broadcasters, 1 kHz for general tuning, etc.).

And for extremely wide excursions of the spectrum, I simply moved my mouse across the slide-rule-dial representation, clicking wherever I wanted to monitor.

Since the spectrum analyzer function is advertised as "real time," I decided to see whether this was really true, or whether there was a substantial sampling time delay as in many similar functions on lesser receivers.

The "echo" between a signal heard on an analog receiver and the audio coming out of the G33DDC was extremely short – barely 1/8 of a second on the widest span. I'd say that's pretty close.

The selectable RF input filters are easily configurable by simply watching the signal spikes and clicking on the start and stop frequencies to see the attenuation bandwidth you need.

Mode selection is a simple key press, and you can drag the cursor of your mouse up a down the spectrum display to select signals to monitor instantly.

The automatic noise limiter is user-adjustable in terms of response level (threshold) and DDC averaging. This allows just the right amount of audio enhancement in any noise-interference issue without seriously debilitating the quality of the sound.

While much of the process is intuitive, read the operational manual that downloaded with the program – software engineers don't always think the way you do!

❖ The menu bar

Quite a number of additional functions are menu-selectable, including saving memory, scheduler, and spectrum display; frequency calibration; task list; recording; selecting optional WiNRADiO plug-ins; and an extensive help list for the various receiver functions.

❖ The bottom line

It's tempting to describe the G33DDC as a G31DDC on steroids. Without question, the original G31DDC still remains, in my judgment, the most remarkable receiver in its price range (currently $899.95 at Grove Enterprises).

But for those stalwart souls who constantly strive for perfection, the upgraded G33DDC does have somewhat better specifications for those more demanding applications. Both models have a very high intermodulation rejection (+31 dBm), but this latest model improves sensitivity.

The G33DDC operates for long periods while staying comfortably cool. It can be sequestered safely out of the way. However, the AC power supply becomes uncomfortably hot. It would be a good idea to place it in an open, well-ventilated spot.

All told, WiNRADiO has added another winner to their growing list of high-performance receivers for serious listeners.

The new WiNRADiO WR-G33DDC is available for $1649.95 from Grove Enterprises.

TABLE OF SPECIFICATIONS, WR-G33DDC

Receiver type	Direct-sampling, digitally down-converting, software-defined receiver
Frequency range	9 kHz to 49.995 MHz
Tuning resolution	1 Hz
Mode	AM, AMS, LSB, USB, DSB, ISB, CW, FMN, FSK, UDM (user-defined mode) DRM mode (optional)
Image Rejection	100 dB
IP3	+31 dBm (preamp off) +21 dBm (preamp on)
Attenuator	0 - 21 dB, adjustable in 3 dB steps
SFDR	107 dB min. (preamp off) 103 dB min. (preamp on)
Noise figure	14 dB (preamp off) 10 dB (preamp on)
MDS	-130 dBm @ 10 MHz, 500 Hz BW (preamp off) -134 dBm @ 10 MHz, 500 Hz BW (preamp on)
Phase noise	-145 dBc/Hz @ 10 kHz
RSSI accuracy	2 dB typ.
RSSI sensitivity	-140 dBm
Processing and recording bandwidth (DDC bandwidth)	20 kHz - 4 MHz (selectable in 24 steps)
Demodulation bandwidth (selectivity)	1 Hz - 62.5 kHz (continuously variable in 1 Hz steps)
Spectrum analyzers	Input spectrum/waterfall, 30 or 50 MHz wide, 1.5 kHz resolution bandwidth DDC spectrum/waterfall, max 4 MHz wide, 1 Hz resolution bandwidth Channel spectrum, max 62.5 kHz wide, 1 Hz resolution bandwidth Demodulated audio, 16 kHz wide, 1 Hz resolution bandwidth
ADC	16 bit, 100 MSPS
Sensitivity (@ 10 MHz, with preamplifier)	AM -106 dBm (1.12 μV) @ 10 dB S+N/N, 30% modulation SSB -121 dBm (0.20 μV) @ 10 dB S+N/N, 2.1 kHz BW CW -127 dBm (0.10 μV) @ 10 dB S+N/N, 500 Hz BW FM -117 dBm (0.32 μV) @ 12 dB SINAD, 3 kHz deviation, 12 kHz BW, audio filter 300-3000 Hz, deemphasis -6dB/oct
Tuning accuracy	0.5 ppm @ 25 °C
Tuning stability	0.5 ppm (0 to 50 °C)
MW filter	Cut-off frequency 1.8 MHz @ -3 dB Attenuation 60 dB min @ 0.5 MHz
Preselection filters	119 filters available in automatic or manual mode (14 high pass, 14 low pass and 91 bandpass) + bypass
Antenna input	50 ohm (SMA connector)
Output	24-bit digitized I&Q signal over USB interface
Interface	USB 2.0 High speed
Power supply	11-13 V DC @ 510 mA typ. (preamp off) 11-13 V DC @ 620 mA typ. (preamp on) 11-13 V DC @ 55 mA typ. (power save)
Operating temperature	0 to 50 °C

What's NEW

Tell them you saw it in Monitoring Times

Larry Van Horn, New Products Editor

DXtreme Station Log - Multimedia

DXtreme Software™ has released a new version of its popular logging program for amateur radio operators: DXtreme Station Log – Multimedia Edition™ Version 7.0.

Like other logging programs, DXtreme Station Log lets hams log their contacts and import ADIF (Amateur Data Interchange Format) files from popular contest programs. But unlike other logging programs, DXtreme Station Log provides multimedia and advanced functions that can add a new dimension to amateur radio logging activities.

DXtreme Station Log includes a DX Spot Checker™ facility that lets hams receive incoming DX spot announcements from Telnet-based DX cluster and DXSpider servers. As each spot arrives, the DX Spot Checker queries the ham's station log database and lets them know by means of colorful rich-text and audio whether a QSO (contact) is needed with the station for a new or verified DXCC ® (DX Century Club) entity or band entity. The rich-text messages and audio announcements are fully customizable by the user.

The DX Spot Checker also lets ham radio operators:

- See whether a QSO is needed with the station for a new or verified grid locator, ideal for VUCC (VHF/UHF Century Club) award tracking (Buckmaster™ HamCall™ required).
- Tell at a glance whether the spotted hams are users of the ARRL's *Logbook of the World* (*LOTW*).
- Tune their supported radio to the frequency of a selected spot through integration with Afreet Omni-Rig, available free over the Web.
- Quickly check their personal DXCC status information without having to leave the DX Spot Checker window.
- Send incoming spot announcements to others by e-mail and perform web based, call sign lookups on stations spotted.

The station log window is the focal point of the electronic logbook. In addition to providing the expected logging functions, the window also:

- Retrieves the frequency and mode from supported rigs through integration with Afreet Omni-Rig.
- Displays DXCC and Grid/VUCC status information for logged stations.
- Indicates whether logged hams are users of the ARRL Logbook of the World.
- Retrieves and stores current and historic solar flux, A-index, and K-index values per station; also lets hams track the propagation mode used.
- Tracks QSLs sent and received.

Multimedia functions let hams listen to previous contacts and view QSLs whenever they browse their logs.

- The embedded audio facility lets hams create and maintain an audio archive of memorable contacts.
- The integrated QSL Imaging™ facility lets hams scan and view the physical QSL cards they receive from regular mail, and capture and view the electronic QSLs – including *LOTW* QSLs – they receive over the Internet.

The advanced functions of the DXtreme Station Log let hams:

- Create QSL and address labels for physical QSLs.
- Create signed TQ8 files (certified logbook file used by the LOTW) automatically for uploading to the LOTW server.
- Produce ADIF-based electronic QSLs for uploading to eQSL.cc.

To help hams track the performance of their stations, DXtreme Station Log offers a variety of reports. Station log can output these reports to printers, as well as to the Dxtreme Active Report Viewer.

The DXtreme Active Report Viewer lets hams view and sort reports within Microsoft® Internet Explorer® – either locally, or over the Internet. An FTP facility is embedded in Station Log to let hams upload their reports to the web automatically, where they or their friends can access the reports remotely.

DXtreme Station Log includes two "Help" systems:

- Embedded HTML procedural help.
- Context-sensitive, field-level "What's This?" help.

Station Log also provides access to the Internet-based DXtreme Station Log Information Center for late-breaking news and instructions.

DXtreme Station Log runs in 32- and 64-bit versions of Microsoft Windows® 7, Microsoft Windows Vista ®, and Windows XP. It retails for $89.95 USD in North America and $93.95 USD elsewhere. Special pricing is available for upgrading users. All prices include shipping and handling charges and lifetime product support by Internet e-mail.

DXtreme Software is based in Nashua, NH, and produces powerful, easy-to-use logging applications for all kinds of radio enthusiasts – from shortwave and mediumwave listeners and DXers to amateur radio operators. For more information about DXtreme Station Log – Multimedia Edition V7.0, visit **www.dxtreme.com** or contact Bob Raymond, NE1I, at *bobraymond@dxtreme.com.*

New Comet Antenna Analyzer

Comet has a new commercial grade antenna analyzer, the CAA-500 that measures SWR and impedance over seven frequency ranges from 1.8 to 500 MHz, including the 222 MHz band.

The precise cross-needle analog meter displays SWR and impedance simultaneously

and in real time as you sweep the selected frequency range with the thumb wheel frequency adjustment.

This instrument can check antenna installations in seconds and determine SWR and resonance of an antenna instantly. It allows you to make SWR adjustments quickly and easily. Specifications for this precision instrument include:

- Impedance measurements: 12.5-300 ohms
- Digital readout accurate to 1 kHz
- Low battery warning: Decimal point will blink
- Operates up to 14 hours from six AA cells (not included) or from an external 8-12 VDC 200 mA power source (DC cable included)
- VSWR Range – 1:1 to infinity
- Size: 3.3 x 6.9 x 2.5 inches (80x170x60mm)
- Weight: 28 oz (800g)

This antenna analyzer retails for $449; for more information, visit your favorite amateur radio dealer or **www.natcommgroup.com**.

The Worldwide Listening Guide

The W5YI Group has announced the release of a new edition of *The Worldwide Listening Guide* by John Figliozzi, a former *MT* columnist. This new 5th edition includes completely updated listings of popular radio programs that can be heard using traditional shortwave receivers, as well as today's newer listening technologies.

Program listings are classified by genre. Each listing will provide you with the time of day and day of the week they are on-the-air, and how to find them on your shortwave receiver, WiFi radio, computer or other listening device.

This new edition updates and reviews all of the ways each program can be heard "live" or on-demand via WiFi, podcast, satellite, Internet, digital and, of course, analog AM/FM and shortwave.

This is a spiral bound publication for easy hands-free reference. The new edition will be available on December 1. The book is 112 pages and will sell for $24.95 plus shipping. You can

get more information at **www.w5yi.org** or order at 1-800-669-9594.

SolderBuddy® Hobbyist HAM™

SolderBuddy® recently introduced the new Hobbyist™ HAM, a wonderful little tool for the shack workbench. The new HAM has been designed with the field location in mind. Now you have a stable platform for making repairs and upgrades to your antenna, microphones, speakers and much more.

The new HAM incorporates all of your popular connectors and even includes a vise to hold your PL259, two row D Sub connectors and other odd items. Hams get a device that has been carefully researched and manufactured with the amateur operator in mind. It includes these connector ports: 1/4 inch phone plug, 5.5mm coax plug, 3.5mm mini phone plug, male and female phono (RCA) plug and jack ports, a DIN connector and an eight pin plug port.

Other features include a screw storage-well with a threaded cap to store spare screws so they won't get lost. You also get the exclusive stainless Post N Clip system for holding your cable in proper alignment and an accessory hole for the new MAG-3™ 3X magnifier and any future accessories from the SolderBuddy company.

Hobbyist™ HAM sells for $37.50; you can get more information or order one at **http://solderbuddy.com**.

West Mountain Radio Rigblaster Advantage

The RIGblaster Advantage is West Mountain Radio's newest sound card and rig control interface. It features a simplified PC interface and expanded rig control radio compatibility, accomplished without compromising the functionality and flexibility for which the RIGblaster products are known. This new addition to the RIGblaster product line incorporates several user requested enhancements:

- Internal sound card
- Single plug and play USB cable connection to PC for audio, rig control and power
- Rig control interface for CAT/CI-V as well as RS232 through a DB9 port
- Front panel mounted transmit power level, receive audio level and VOX delay adjustment knobs

Placing the sound source for digital mode communication within the RIGblaster Advantage simplifies the PC interface. Two audio cable connections to the PC can be eliminated: receive audio from the radio and transmit audio from PC. A single USB cable connection between the PC and RIGblaster Advantage now handles audio, rig control, and power.

The internal sound card also enables the RIGblaster Advantage to generate audio completely independently of the PC's sound card, a personal preference of some hams.

The RIGblaster Advantage makes it easier to control rigs that require RS232 DB9 cables for rig control. The newest laptops and desktop PCs aren't readily available with RS232 ports or if they are offered, are an extra cost option. So, in addition to the CAT/CI-V port also used for rig control on ICOM, Ten Tec and some older Yaesu radios, the RIGblaster Advantage features an RS232 DB9 port, eliminating the need for a separate USB-to-RS232 rig control interface.

The front panel controls make it a snap to change transmit power levels on the fly without having to adjust the output volume in software. The receive audio level adjustment knob allows you to set your radio's sound level for comfortable listening while adjusting the the RIGblaster's receive level for best operation. The VOX delay knob controls the amount of time the VOX circuit waits before unkeying the transmitter.

Compatible with over 2000 radios, the RIGblaster Advantage makes it easy to switch back and forth between voice and digital modes. It features an 8-pin screw-on mic connector used by many radios, with low cost adapters available for other mics. Internal jumper blocks configure signal routing from the mic connector. PTT control can be exerted through your microphone's PTT, software or foot switch. For CW fans, a CW/FSK output jack is provided for connection to your radio's straight key input.

The RIGblaster Advantage is priced at $200 and includes microphone and USB cables, audio cables, and a CD loaded with free sound card software. It is available from West Mountain Radio (**www.westmountainradio.com**) and authorized West Mountain Radio dealers.

Books and equipment for announcement or review should be sent to What's New, c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to Larry Van Horn, *larryvanhorn@monitoringtimes.com*.

When ordering or inquiring about the products mentioned in this column, be sure to tell them that you saw it in the pages of *Monitoring Times* magazine.

to the editors

editor@monitoringtimes.com

Bell+Howell Loggings

In my review of a Bell + Howell radio in the October issue, a table with the loggings I made on the radio was cut… Since this is … the part which would be of the most interest to shortwave radio enthusiasts, I'm attaching it here to see if you would publish it in your *Letters* section.

I was happy to make some half-decent loggings on this little radio, and I know other shortwave enthusiasts would be fascinated to see them.

Eric Bryan

Stations Logged on the Bell+Howell 9 Band World Receiver

Radio Australia	5995 7240 15160 15240 17715 17795 kHz
Radiobrás, Brazil	11780
BBC	9730 17685
CHU	7850
CKZU	6160
CVC Chile	17680
China Radio Int'l	9580 9790
Radio Havana Cuba	6010 6060
Deutsche Welle	17820 (German)
Radio Japan	6145 11815 11935 (Japanese)
Voice of Korea	11710
Radio Kuwait	17550 (Arabic)
Radio New Zealand Int'l	6170 11725 15720
Voice of Russia	13775 15425
REE	5965 9630 15110 (Spanish)
Vatican Radio	7305 (weak)
Radio Nacional de Venezuela	15250 (Spanish)
VOA	15720 (French, English)
WHRI	7385 9860
WTWW	12100
WWCR	5935 6090 9980

Memories of Radio

The April article by the Frankes on wind-powered radios brought back memories of my family's car trip to Montana the summer of 1951.

My uncle and aunt operated a ranch out on the plains near the little town of Glendive, a town with wood sidewalks and swinging doors on the salon. This was a real step back in time for my brother, sister and me. With the cattle and horses it looked like the "wild west" to us. There was no telephone or electric service on the ranch as the result of the big blizzard (maybe 1948) taking down all the poles and lines. There was a large floor model radio and a few lights in the den.

Being 5 years old at the time, I didn't check it out too closely, but I gather from the article that it must have been a 32 volt system, since I remember a bank of batteries in the root cellar. The generator was mounted on the roof of the barn that was built out of bales of hay. Being totally off the grid was different for us kids, but Mom and Dad had been through the the Great Depression in the rural South so this was no new experience for them. My uncle must have had an outside antenna, because we picked up our favorite network programs like "The Lone Ranger," "Gang Busters," and on Saturday mornings "Big John and Sparky." We were "green" before it was cool.

Jimmy Clarke, KD4FRI

Front Row Seat

I just wanted to send a quick picture out from the flight I did to refuel and photograph the Thunderbirds on their way to the air show at Pease.

Kevin Burke

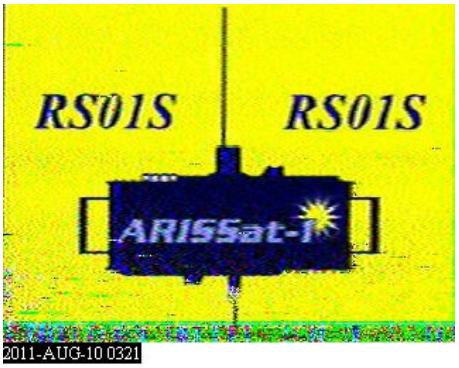
Sweet!! Don and I heard them arrive Thursday afternoon using 139.800 a/a. AR-217 was too far west for me to copy. Hope you enjoyed the ride!

Dan Myers

Pictures from Space

The nano-satellite ARISSat1, hand-launched by Russian cosmonauts during a spacewalk at the International Space Station, orbits the Earth every 93 minutes. The 30 kilogram satellite is just 22 x 22 x 16 inches and flies some 200 miles high at 4.6 miles per second (Ferncliff to Charlottesville in about 5.5 seconds). The power output of the Slow Scan TV transmitter is 250 milliwatts. As small as it is, the satellite is equipped with four TV cameras looking at the Earth from different angles. When the satellite is over sunlit regions it shows those live views. When it's over the dark side of the Earth it broadcasts the RS01S (Russian call sign) image. I captured this image as it passed over our house using a Kenwood 2 meter mobile transceiver and a 1/4 wave VHF/UHF ground plane antenna at 30 feet.

Ken Reitz KS4ZR



Ham App

Assaf VA3PCI is a local amateur and quite the electronics, computer person. Thought this might be a nice tidbit for *MT* readers – *Ron Walsh*

"For those of you who own an Idevice like and iPhone or Ipad Touch, I have written a new app recently which locates the nearest IRLP nodes using GPS, displays access information, maps and gives you a live node status report.

If there is anyone interested, it is available on the app store, simply search for IRLP. You can view screen shots on **www.sixspotsoftware.com**."

Sangean DAR-101 Review

I have posted my review on the **Sangean DAR-101** digital audio recorder up on my web site. **http://n9ewo.angelfire.com/dar101.html**

Still have not tried better quality SDHC cards with it yet (still plan to do that later).

Also working on my review with the **GRE PSR-800**. Super neat little scanner already covered by Bob, but I have a few personal comments to add (with pictures), including modification of the "scanner master" case that I did. **http://n9ewo.angelfire.com/psr800.html**

Dave Zantow N9EWO

MT Corrections

On page 16 of the October issue, in the article "Those Really Big Antennas," reference to Figures 1, 2, 3, and 4 should have been deleted from the text in editing. We regret any confusion this may have caused.

Also in the October 2011 issue, in the byline on page 18 of the First Person Radio article "A Love of Listening," the call sign should have been K4SWL not W4SWL. We regret any inconvenience this typo may have caused. (It's listed correctly in the text of the article.)

Paul Martin, WA3YZL wrote, "Ken Reitz' column in the November issue was very informative. However, on page 11 the top right photo of the Uniden 2510 vs Sangean ATS909X the Uniden shown is not a 2510. It is a Uniden CR-2021."

Of course I know it's the CR-2021 (it says so on the front of the radio!), but for some reason my brain instructed my fingers to type out the model of my other old Uniden: the venerable 2510 (which is also very much alive and doing well, thank you). It's good to see our readers have such a great recollection of radios from long ago.

Ken Reitz, Features Editor

This column is open to your considered comments. Opinions expressed here are not necessarily those of Monitoring Times. Your letters may be edited or shortened for clarity and length. Please mail to Letters to the Editor, 7540 Hwy 64 West, Brasstown, NC 28902 or email editor@monitoringtimes.com

Happy monitoring!

Rachel Baughn, Editor

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*Just downloaded the August issue, saved it in iBooks, and have read about half. Looks *great* on the iPad. This is definitely the way to go....*

- Scott D.

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These blogs and web pages were created by some of our columnists to better serve their readers. While we highly recommend these resources, they are not official instruments of Monitoring Times.

AMERICAN BANDSCAN
http://americanbandscan.blogspot.com/ - by Doug Smith

ANTENNA TOPICS
www.wa5vjb.com - by Kent Britain

BELOW 500KHZ
http://below500khz.blogspot.com/ - by Kevin Carey

FED FILES
http://mt-fedfiles.blogspot.com/ - by Chris Parris

LARRY'S MONITORING POST
http://monitor-post.blogspot.com/ - by Larry Van Horn

MILCOM
http://mt-milcom.blogspot.com/ - by Larry Van Horn

SCANNING REPORT
http://www.signalharbor.com/ - by Dan Veeneman

SHORTWAVE
http://mt-shortwave.blogspot.com/- by Gayle Van Horn

UTILITY WORLD
http://mt-utility.blogspot.com/- by Hugh Stegman
www.ominous-valve.com/uteworld.html

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