# Shortwave Listening Special

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- Building Ten-Tec's 1253 Shortwave Receiver
- Make Your Own All-band HF DX Loop
- MT Reviews: Uniden's HomePatrol-1™

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# AR2300 "Black Box" Professional Grade Communications Receiver

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- Fast Fourier Transform algorithms
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- Analog composite video output connector
- CTCSS and DCS squelch operation
- Two selectable Type N antenna input ports
- Adjustable analog 45 MHz IF output with 15 MHz bandwidth
- Optional AR-I/Q Windows software facilitates the easy storage and playback of transmissions captured within up to 1 MHz bandwidth or, signals can be subjected to further analysis.
- An optional GPS board can be used for an accurate time base and for time stamping digital I/Q data.
- The triple-conversion receiver exhibits excellent sensitivity across its tuning range.
- Powered by 12 volts DC (AC Adapter included), it may be operated as a base or mobile unit.
- Software-driven operating selections include IF bandwidth, frequency, mode, filters, a screen-displayed graphical "S-meter," memory inputs, volume and squelch settings and more
- Professional (government) version is equipped with a standard voice-inversion monitoring feature

*\*Cellular blocked for US consumer version. Unblocked version available to qualified purchasers with documentation. Specifications subject to change without notice or obligation.*

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## Shortwave Listening Special ..................... 8

This month *MT* celebrates the return of the fall/winter shortwave DX season with an all-shortwave issue.

Despite what you might have heard, shortwave radio is still very much alive. And, like so many other communications institutions today, international shortwave broadcasters are feeling their way into the future. In his cover story, "Whatever Happened to Wireless," Eric Bryan notes that change is the only constant in the world of radio. Even so, his list of countries, still regularly broadcasting programs in English to North America, totals more than 40.

Eric also provides a list of all the frequencies of the countries that are transmitting in Digital Radio Mondiale (DRM), the digital radio broadcast format emerging as the future for HF. He also notes which broadcasters are available on World Radio Network's vast multi-platform service; which stations provide online streaming; those that provide for online reception reports, as well as notes on programs that might be of particular interest to listeners.

### On Our Cover

*Radio studio of international shortwave broadcaster Deutsche Welle (Courtesy: Deutsche Welle); Shortwave antenna for Radio Exterior de España (Courtesy: Radio Exterior de España)*

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# COMMUNICATIONS

*by Ken Reitz*

## AMATEUR RADIO/SHORTWAVE

### League Warns OK Town on "Nuisances"

Proving that local lawmakers have way too much time on their hands, Midwest City, Oklahoma, had a local ordinance on the books banning as a nuisance "operating or using any electrical apparatus or machine which materially and unduly interferes with radios or television reception by others."

According to an ARRL report, a local Midwest City ham received a letter threatening sanctions (a minimum $100 fine and/or 15 days in jail plus the confiscation of equipment to be sold to pay for alleged damages) if claimed interference by a neighbor wasn't fixed in one day. The ham in question notified the League whose General Counsel wasted no time coming to his defense, notifying Midwest City officials that "such regulation is exclusively within the jurisdiction of the Federal Communications Commission and all regulation of radio transmission and interference phenomena is preempted by Federal law."

According to a related story in the *Oklahoman*, city attorneys didn't return the reporter's calls regarding the case, but an e-mail from the assistant City Attorney explained that the city had rescinded the complaint against the ham and will direct any future complaints of interference to the FCC. Case closed.

### Sudan Ousts BBC FM Outlets in North

Among excuses international shortwave broadcasters give for no longer providing short-wave coverage to many parts of the world is that brokered time on local AM and FM outlets in-country make such shortwave broadcasts redundant. But, a story from the *Associated Press* on August 9 shows the danger of that policy. According to the article, the government of Sudan, headed by a man wanted by the International Criminal Court on genocide charges, has suspended BBC broadcasts in Arabic via FM stations in the north of the country for what it termed "license violations." Of course, the government denied the suspension had anything to do with content of the broadcasts, but human rights groups tell of a clamp-down on expression throughout the country. Luckily, BBC's Arabic service is still available to that region via shortwave.

## AM/FM/TV BROADCASTING

### Wind Topples 3 WWVA Towers

Three self-supporting 400 foot towers that comprise the 50,000 watt AM array for WWVA (1170 kHz) Wheeling, West Virginia, were brought down during straight line winds ahead of a severe thunderstorm that swept through a three-state area the afternoon of August 4. According to the station's web site, the towers, said to have survived the past 60 years and which reportedly fell independently, stretched out across the St. Clairsville, Ohio countryside in spectacular fashion.



*One of three 400' WWVA towers on the ground after wind storm (Courtesy: WWVA-AM)*

The incident left 1170 kHz quiet for a short time, enabling AM band DXers in the East a rare opportunity to log KFAQ-AM Tulsa, Oklahoma.

WWVA was back on the air, operating on reduced power with a temporary antenna, within six hours of the disaster, but was knocked off again shortly after that. By late morning on August 6th the station was again on the air at reduced power. The all-news/talk station, once the musical icon of West Virginia's cultural heritage, is owned by Clear Channel.

### Station Totals Released

The FCC updated its broadcast station count as of June 30. There were a total of 30,855 broadcast TV and radio stations in the U.S., an increase of 189 stations from the last data released at the end of March. On the radio side there were 4,786 AM stations (down 4 from the previous quarter); 6,494 commercial FM stations (a gain of 9); 3,223 non-commercial FM stations (a gain of 43), and 864 LPFM stations (a loss of one). FM translators and boosters numbered 6,168.

### Dude, Choppers at 6 o'Clock!

*National Public Radio* reported June 8 on an unusual broadcast service of community radio station KMUD-FM, located in Humboldt County, California, home to extensive legal and illegal pot growing operations. According to the story, the station has provided regular alerts regarding air and ground traffic that may be part of police enforcement activities for many years. The story reports that efforts by local police agencies to curtail the broadcasts have not been successful.

## SATELLITE NEWS

### Satellite TV Viewers Unhappy

The Better Business Bureau (BBB) handed the satellite-TV industry some figures not likely to appear in their next ad campaigns. BBB reported in early August that it had received more than 53,000 customer complaints against the two satellite TV services. DISH Network (ad slogan: "Best Customer Service"), received 13,000 complaints and DirecTV (ad slogan: "Discover the Difference") had 39,000 complaints filed against it. BBB noted that many complaints stemmed from steep cancellation fees incurred when subscribers attempted to drop the service after the initial teaser subscription rates ended.

But, how does the satellite experience compare with their cable-TV counterparts? According to a spokesperson for the BBB, it received 93,000 complaints over the last three years for the entire cable-TV satellite-TV industry. Comcast received 17,000 complaints and Time-Warner about 11,000. While it might appear that complaints against either satellite or cable-TV are fairly equal, there are about 62 million basic cable-TV subscribers, according to the National Cable & Telecommunications Association, a cable-TV industry group, while satellite TV services account for about half that number of subscribers, according to Satellite Broadcasting and Communications Association, the satellite-TV industry group.

### DISH Hits Skids in 2Q

Analysts had predicted a great second quarter for DISH Network with a net gain of some 130,000 subscribers. But, after the numbers were crunched August 9, the number two satellite TV service actually lost 19,000 customers. According to Bloomberg news, many customers, attracted by the $19.99/month promotional offer, ditched the service once the promo-period was over. Competitor DirecTV added 100,000 subscribers during the same period. But, to put the numbers in perspective, Comcast, just one major cable-TV provider, added 394,000 customers at the same time.

## DeLorme Ties GPS with SPOT

The Delorme Company, makers of GPS units, has introduced a new model, the Earthmate PN-60w, which now features a SPOT satellite communicator built in. But, this unit is not just for emergencies; the PN-60w lets users send text messages to cell phones and e-mail addresses in addition to social networking sites such as Twitter and Facebook. According to

*DeLorme PN-60w now with SPOT satellite communications built-in, but at a price. (Courtesy: DeLorme)*

DeLorme, text messaging, track progress, and emergency SOS/911 features are all activated via subscriptions from SPOT. Suggested retail price for the product is $550 plus subscriber fees ($100/year).

## FCC ENFORCEMENT

### Univision Fined $1 Million in Payola Scandal

According to a consent decree issued by the FCC in late July, Spanish language media conglomerate Univision agreed to pay $1 million to resolve allegations that "Univision radio stations or their employees secretly accepted payment from a record label in exchange for the radio stations giving more frequency airplay to the label's artists, without making the disclosures to listeners" as required by law. As part of the consent decree, Univision agrees to abide by current rules regarding gifts, cash and other gratuities, including size and value of such gifts; the appointment of a compliance officer responsible for monitoring and reporting company performance in this regard, and regular training for personnel on payola restrictions.

### EchoStar Cited by FCC on "Speculation"

On July 29, the FCC dismissed DISH Network's parent company, EchoStar's application to construct, launch and operate a C-band satellite at 84.9 ºW. According to FCC documents, over a three year period the company failed to implement five of its licensed satellites. Accusing EchoStar of "speculation," the Commission noted in a Memorandum Opinion and Order, "EchoStar has five authorized but unbuilt satellites…EchoStar cannot file additional applications until it rebuts the presumption that it had engaged in speculative activity." The FCC accused the company of trying to "hold additional orbital resources to the exclusion of others."

## QRM from BDA Leads to NOUO

A bi-directional amplifier (BDA), used to boost cell phone frequencies, has led to interference (QRM) with a licensed Sprint/Nextel transmitter in the mobile radio service in New Jersey. FCC field agents, responding to an interference complaint from the company, tracked the signal to the BDA in the basement of a private home used by a Sprint/Nextel customer in order to improve coverage inside his home. The trouble was that he had no license for the BDA, which is widely available via the Internet, hence the Notice of Unlicensed Operations (NOUO).

## The Complicated Case of Eddie Floyd

In early August the FCC issued a typical forfeiture order to a certain Eddie Floyd of Carson City, Nevada, for "failing to timely file" a license renewal application for an FM translator station he owned. Originally tagging Floyd for $7,000, the fine was reduced to $500. Sounds like anyone would be happy with that outcome. But, there was a problem that prompted the FCC to issue to Floyd, that same day, an Order to Show Cause, Hearing Designation Order and Notice of Apparent Liability for a Forfeiture. What in the world could have gone wrong?

It turns out that back in December 2006, Floyd, described in a U.S. Justice Department news release as a former radio talk show host and Reno businessman, had just pleaded guilty to laundering drug money in a complicated scheme that involved his son, among a few other persons; certain property he owned nearby in California that was used to farm marijuana, and one questionable business in which he swapped drug money for stock in that company. The upshot is that, in the process of filing for renewal and special temporary authority for the station to continue operations while he was in and out of jail and the station was on the market, he kept ticking the wrong box on the forms that asked the licensee if there had been any "adverse final action taken by a court or administrative body in a civil or criminal proceeding." Oops.

So, now Floyd, having served his prison sentence, is looking at not only the $500 fine for "failure to timely file," which, by now, is looking downright friendly, but he also faces a hearing before the FCC to revoke his station license, determine his eligibility to hold a future FCC license of any kind and, an additional fine of not more than $37,500 for each of the three instances in which Floyd lied on the forms.

Floyd had been set to sell his translator to Wilks License Company, LLC., an absorber of small market radio stations and no stranger to FCC enforcement. The company received its own Notice of Violation this past spring for splattering signals on no fewer than four places on the FM dial as well as 109.15 MHz, which happened to interfere with the Lubbock Preston Smith International Airport Instrument Landing System.

But, that's not all. It turns out that Wilks owns three FM outlets in the Lubbock area KLLL, KMMX and KONE, all three of which were cited by the FCC for transmitting spurious emissions.

### DIY Passport RFID Reader

Radio Frequency ID (RFID) tags embedded in U.S. passports might be read by a third party from as far as several hundred feet away. That was the report in a *Network World* article from July 29 telling of a demonstration at the Black Hat 2010 show in Las Vegas. A researcher, according to the report, using off-the-shelf items bought in local stores and on eBay totaling less than $2,500, lashed together a reading device that picked up the data in a U.S. passport from 217 feet away. The article noted that the U.S. government says the embedded chips contain the same information, including the photo, which is found printed in the passport. The article also noted that Canadian passports and New York State driver's licenses use the same chip.

### Pandora: 90,000 New Users/Day

An article in *Agence France Presse* from early August reports that Pandora, the free Internet audio service that creates a personalized radio station based on the listener's taste, has reached the 60 million user mark. The article quotes the founder as claiming to get 90,000 new activations per day. Of course, that includes a global market, but it is still an astounding figure.

The article notes, too, that Ford will be integrating Pandora into select models soon. The free service features on-screen and audio ads and allows only 40 hours/month listening time. However, for $36/year subscribers can listen and watch commercial-free for an unlimited amount of time via a higher quality stream.

# Whatever Happened to the Wireless?
## *The 2010-2011 Shortwave DX Season*

### By Eric Bryan

**D**o you remember the *wireless*? You know, British-English for *radio* (though radio has pretty well supplanted wireless even in British vocabulary nowadays). In the early days of radio, the enormous breakthrough of the wireless was that, unlike with the telegraph, you didn't need a wire connecting the transmitter to the receiver in order for the transmission to be heard. It was broadcast through the atmosphere to the receiver. And, even though a radio receiver itself was full of wires, because there was no wire needed between the transmitter and receiver, the clever Brits called the device a wireless.

When you think of train robbers snipping telegraph wires so warnings couldn't be tapped ahead, leaving a locomotive and its cars full of passengers and cargo sitting ducks and in the process cutting off whole towns from communications, the wireless was quite an advance.

And, when you couple the discovery of the reflective power of the ionosphere on short waves with the advent of portable, battery-operated shortwave receivers, it gave the term even greater emphasis. Now, people sitting on California beaches, or relaxing on porches on the Midwestern plains, or dining on the balconies of Manhattan apartments, could tune in London, Paris, Moscow, Cologne, Monaco, and signals from even more exotic, far-flung locales with their portable, battery-powered shortwave sets.

To us shortwave enthusiasts, this trend of shutting down shortwave broadcasts in favor of online streaming seems partly a devolution from wireless back to fully-wired, or cabled, transmissions. Though there are many advantages to being able to access international programming online, we can't help but wonder what will happen when there are infrastructure breakdowns, or, with the increasing amount of audio and video traffic streaming online, eventual bandwidth restrictions. After all, the atmosphere and ionosphere don't suffer from the same limitations, do they?

With this eventuality in mind, it would make sense that the international stations, which have ceased shortwave broadcasts to North America in favor of internet streaming, should at least keep their shortwave relay sites for North America maintained and ready to go as a back-up to their online systems. It shouldn't be an all-your-eggs-in-one-basket approach.

## The Coming Season

As we roll into the B10 (which stands for the broadcast schedule for the second half of the year) shortwave DX season, though there have been more cuts by some international broadcasters, all hope is not lost. In fact, in one respect, there has been an increase in international shortwave broadcasts.

There are some recent trends among shortwave stations which encourage interaction with listeners, such as some broadcasters' websites featuring online reception report pages. This not only eases postage costs for QSL collectors, but is even more streamlined than emailing your reception reports.

Quite a few stations, some of whom have canceled their shortwave transmissions, are carried on the World Radio Network (WRN), which is available by streaming, audio on-demand, podcast, satellite radio, Free-to-Air satellite, a number of domestic FM outlets, and via WRMI shortwave on 9955 kHz.

And finally, perhaps the most exciting shortwave development: Digital Radio Mondial (DRM). Digital broadcasting on shortwave seems to have had a shaky start, appearing to be on-again, off-again, over the last several years. Fueling this uncertainty was the commencement of DRM broadcasts by some shortwave outlets without mass-produced DRM receivers yet being available. DRM reception is now much easier, thanks to desk-top sets such as the Flex or WiNRADiO software defined radios or in a portable such as the UniWave DiWave 100.

## Who was Listening?

But, as you'll see in the broadcast schedules which follow, DRM transmissions are in full swing in Europe, throughout the Pacific/Oceania, and parts of Asia. There are some to Africa and the Middle East, and a growing number to North America. All India Radio even broadcasts four hours daily in DRM to Europe.

It's safe to say at this point that digital shortwave definitely has traction, and in some parts of the world, has arrived. Is it possible that DRM, with its near-FM quality audio, will give shortwave a second wind, creating an international broadcasting renaissance?

## The List

What follows is a list of international broadcasters, showing their English language SW schedules beamed to North America, a notation if they use DRM transmissions, whether or not they offer online reception report facilities, and if they are part of the World Radio Network line-up. Whether a station no longer transmits to North America, broadcasts to other areas, or is regularly receivable in North America is also noted. I've also made some program suggestions where appropriate. Note that all times are UTC and frequencies in kHz.

## Tune In

Judging by the number of transmissions listed in the following tables, there is still a lot of action on shortwave. If you have a DRM-capable receiver, so much the better – you have even more listening choices and opportunities. And, if the size of the DRM shortwave schedule list is anything to go by, digital broadcasting – and digital DXing possibilities – will increase over the coming years. It's time to fire up the wireless!

# INTERNATIONAL ENGLISH LANGUAGE BROADCAST SCHEDULES

## Albania: Radio Tirana
| | | |
|---|---|---|
| 1530-1600 | mtwhfa | 13640 |
| 1945-2000 | mtwhfa | 11635 |
| 2100-2130 | mtwhfa | 9895 |
| 0130-0145 | twhfas | 6130 |
| 0245-0300 | twhfas | 6130 |
| 0330-0400 | twhfas | 6150 |
| 0430-0500 | twhfas | 6100 |

## Argentina: Radio Exterior
| | | |
|---|---|---|
| 0100-0200 | twhfa | 11710 |

Online streaming of RAE faulty at time of writing.

## Australia: Radio Australia
| | | |
|---|---|---|
| 0000-0200 | Daily | 17715pa |
| 0000-0800 | Daily | 15240pa |
| 0030-0400 | Daily | 15415as |
| 0100-0900 | Daily | 12080pa |
| 0200-0500 | Daily | 15515pa |
| 0430-0500 | Daily | 15415as |
| 0500-0800 | Daily | 15160pa |
| 0500-0900 | Daily | 13630pa |
| 0530-0600 | Daily | 15415as |
| 0600-0630 | Sat/Sun | 15290as 15415as |
| 0630-0700 | Daily | 15415as |
| 0700-0800 | Daily | 9955ca |
| 0730-0930 | Daily | 11750pa |
| 0800-1400 | Daily | 9580pa |
| 1400-1700 | Daily | 7240pa |
| 2100-2200 | Daily | 12080pa |
| 2100-2300 | Daily | 13630pa |
| 2200-2330 | Daily | 15240as |
| 2200-2400 | Daily | 15560pa |
| 2300-0100 | Daily | 12080pa |
| 2300-0200 | Daily | 17795pa |

DRM broadcasts to the Pacific and Asia.
Carried by the WRN.

*Program suggestions:*
"The Philosopher's Zone," Sunday, and Wednesday: examination of philosophical questions.
"All in the Mind," Sunday, Wednesday, Friday, and Saturday: exploration of the mental universe.
"Big Ideas," Monday, Thursday, and Friday: lectures, features, conversations and specials from Australia and around the world.
"Radio Australia Today," Sunday through Friday: magazine program with interviews, music, art, finance, etc.

## Belarus: Radio Station Belarus
| | | |
|---|---|---|
| 2100-2300 | Daily | 6155eu 7360eu 7390eu |

*Program suggestions:*
"Postcard from Belarus," Thursday; about historic monuments and travel in Belarus.
"Musicbox," Monday; modern Belarusian music.

## Bulgaria: Radio Bulgaria
| | | |
|---|---|---|
| 0000-0100 | Daily | 5900 7400 |
| 0300-0400 | Daily | 5900 7400 |

DRM broadcasts to Europe.
Online reception report page and download:
www.bnr.bg/sites/en/Pages/ReceptionReport.aspx
*Program suggestion:*
"Folk Studio," Sunday, Monday, and Tuesday; Bulgarian folklore, such as symbolic numbers, forests, and ancient bridges.

## Canada: Radio Canada Int'l
| | | |
|---|---|---|
| 0005-0105 | Daily | 9755 |
| 0105-0205 | Daily | 9755 |
| 1605-1805 | Daily | 9610 |

DRM broadcasts to North America.
Some programming carried by the WRN.
*Program suggestion:*
"The Maple Leaf Mailbag," Monday; magazine program with listeners' letters, shortwave news, etc.

## China: China Radio Int'l
| | | |
|---|---|---|
| 0000-0200 | Daily | 6020 9570 |
| 0300-0400 | Daily | 6190 9690 9790 |
| 0500-0600 | Daily | 5960 |
| 1100-1200 | Daily | 5960 |
| 1300-1500 | Daily | 15230 |
| 1400-1500 | Daily | 13675 |

DRM broadcasts to North America
*Program suggestion:*
"The Beijing Hour," Monday through Friday; news and current affairs.

## Croatia: Voice of Croatia
| | | |
|---|---|---|
| 2315-2330 | Daily | 7375sa |
| 0300-0330 | Daily | 7375 |

*Program suggestions:*
"Croatia Today," daily; news focusing on Central and Eastern Europe, as well as the rest of Europe and sometimes other areas of the world. Multilingual broadcasts starting at 0000, are usually audible throughout most of the North American evening (and which include the English segments listed), are recommended for otherwise being filled with Croatian and Central and Eastern European pop.

## Cuba: Radio Havana Cuba
| | | |
|---|---|---|
| 0100-0700 | Daily | 6000 |
| 0500-0700 | Daily | 6010 |

*Program suggestion:*
"DXer's Unlimited," Sunday and Tuesday; propagation reports, radio and antenna projects, etc., from Arnie Coro CO2KK.

## Czech Republic: Radio Prague
| | | |
|---|---|---|
| 2330-2357 | Daily | 5930 |
| 0100-0127 | Daily | 7355 |
| 0200-0227 | Daily | 7355 |
| 0400-0427 | Daily | 7345 |

DRM broadcasts to Europe.
Online reception report page:
www.radio.cz/en/report
*Program suggestions:*
"Magic Carpet," one Sunday a month; Czech world music.
"Czech Books," two Sundays a month; interviews with Czech writers, and foreign writers living in the Czech Republic. "Letter from Prague," Sunday; correspondents' reports about life in and around Prague, as well as from places such as Kabul, and Prague, Nebraska.

## Egypt: Radio Cairo
| | | |
|---|---|---|
| 0200-0330 | Daily | 6270 |
| 2300-0030 | Daily | 7580 |

*Program suggestion:*
These broadcasts are recommended for the traditional Middle Eastern music they carry.

## France: Radio France Int'l
| | | |
|---|---|---|
| 0400-0430 | Daily | 7315af 9805af |
| 0500-0530 | mtwhf | 9805af 11995af |
| 0600-0630 | mtwhf | 9765af 13680af 15160af |
| 0700-0730 | mtwhf | 15605af |
| 1200-1230 | Daily | 21620af |



| | | |
|---|---|---|
| 1600-1700 | Daily | 15605af |

*Program suggestions:*
"Crossroads," Tuesday; people's struggles for survival in Africa and around the world.
"Culture in France," weekends; music, theatre, museums and more in France.
"Focus on France", daily; news and analysis devoted to France.

## Germany: Deutsche Welle
| | | |
|---|---|---|
| 0400-0500 | Daily | 5905af 5945af 15600af |
| 0400-0530 | Daily | 6180af |
| 0500-0530 | Daily | 6130af 9755af 12045af 15600af |
| 0600-0630 | Daily | 5945af 7240af 12045af |
| 1900-1930 | Daily | 9735af 11690af 13780af |
| 2000-2100 | Daily | 9690af 9735af 13780af |
| 2100-2200 | Daily | 7280af 9545af 11690af 13780af |

DRM broadcasts to Asia and Europe.
PDF reception report form:
http://www.dw-world.de/dw/article/0,,3252720,00.html
*Program suggestions:*
"Spectrum," Tuesday; science and technology.
"Living in Germany," Monday; news and human interest stories focused on Germany.



## Greece: The Voice of Greece
| | | |
|---|---|---|
| 0105-0205 | Mon | 7475 9420 12105sa |

***Program suggestion:***
The regular daily broadcasts, starting at 0000, though in Greek, are highly recommended for their mix of Greek traditional and pop music.

## India: All India Radio
| | | |
|---|---|---|
| 2045-2230 | Daily | 9445eu 11620eu |

DRM broadcasts to Europe.
*Program suggestion:*
AIR broadcasts in general recommended for the traditional Indian music which can often be heard in their programming.

## Indonesia: Voice of Indonesia
| | | |
|---|---|---|
| 1300-1400 | Daily | 9525as |

## Iran: IRIB
| | | |
|---|---|---|
| 0130-0230 | Daily | 6120 7250 |

## Israel: Kol Israel
| | | |
|---|---|---|
| 0500-0530 | mtwhf | 9955ca |

## Japan: Radio Japan
| | | |
|---|---|---|
| 0000-0020 | Daily | 6145 |
| 0200-0500 | Daily | 5960 |
| 1200-1230 | Daily | 6120 |
| 1400-1430 | Daily | 11705 |
| 1500-1700 | Daily | 9535ca |
| 2200-2220 | Daily | 13640pa |

DRM broadcasts to Europe
*Program suggestions:*
"Japan & World Update," Monday through

Friday; news, commentaries, and sketches of Japanese life. "Listening Library Special," last Sunday of each month; readings of classic Japanese stories.

### Korea, North: Voice of Korea
| | | |
|---|---|---|
| 1300-1400 | Daily | 9335 11710 |
| 1500-1600 | Daily | 9335 11710 |

### Korea, South: KBS World Radio
| | | |
|---|---|---|
| 0200-0300 | Daily | 9580sa |
| 1200-1300 | Daily | 9650 |

DRM broadcasts to Europe
Online reception report (page 1):
http://world.kbs.co.kr/english/radio/report/about_report.htm
Carried by the WRN.

*Program suggestion:*
"Seoul Calling," Monday through Friday; Korean news and culture.

### Kuwait: Radio Kuwait
| | | |
|---|---|---|
| 1800-2100 | Daily | 11990eu |

DRM broadcasts to the Middle East, Africa, and North America.

### Libya: Voice of Africa
| | | |
|---|---|---|
| 1400-1600 | Daily | 17725af 21695af |

Online streaming faulty at time of writing.

### Moldova: Radio DMR
| | | |
|---|---|---|
| 1800-1815 | mtwhf | 6240 |
| 1845-1900 | mtwhf | 6240 |
| 2315-2330 | smtwh | 6240 |

*Program suggestions:*
"Moldova and the World," Wednesday; news and events in Moldova, and from around the world relating to Moldova.
"World of Culture," Wednesday; arts and culture in Moldova.

### Netherlands: Radio Netherlands
| | | |
|---|---|---|
| 0400-0500 | mtwhf | 9955ca |
| 1800-2000 | Daily | 12045af |
| 1900-2000 | Daily | 12080af |
| 2000-2100 | Daily | 21525af |

Some programming carried by the WRN.

*Program suggestions:*
"The State We're In," Tuesday, Wednesday, Thursday, Saturday; first-person stories from around the world, such as interviews with British and Russian Cold War spies.
"Hear the World," Friday; world music. "Inside Track," Thursday/occasional series; interviews of RNW reporters about their experiences around the world.
"Radio Books," Tuesday and Friday; short stories by Dutch and Flemish writers.
("The Research Files" had vital, valuable health news, but has been canceled.)

### New Zealand: Radio New Zealand Int'l
| | | |
|---|---|---|
| 0459-0658 | Daily | 11725pa |
| 0659-1058 | Daily | 9765pa |
| 1300-1550 | Daily | 6170pa |
| 1851-2050 | Daily | 11725pa |
| 2051-2235 | Daily | 17675pa |
| 2236-0458 | Daily | 15720pa |

DRM broadcasts to the Pacific.
Online reception report page:
www.rnzi.com/pages/qsl_web.php
Carried by the WRN.

*Program suggestions:*
"Pacific Correspondent," Thursday and Friday; reports from regional correspondents.
"Mailbox," every other Monday and Tuesday; DX, utility, DRM, propagation, and other shortwave news, plus listeners' letters.

### Nigeria: Voice of Nigeria
| | | |
|---|---|---|
| 0500-0700 | Daily | 15120eu af |
| 1000-1500 | Daily | 9690af |
| 1700-2100 | Daily | 15120eu |



*Program suggestions:*
"Musical Heritage," Saturday and Sunday; traditional Nigerian music.
"African Safari," Wednesday and Saturday; Nigerian travelogue.
"Nigerian Popular Music," Tuesday and Friday; Nigerian Afropop.
"Time for Highlife," Sunday, Monday, Wednesday, and Saturday; Nigerian and regional highlife music.

### Oman: Radio Sultanate of Oman
| | | |
|---|---|---|
| 0300-0400 | Daily | 15355af |
| 1400-1500 | Daily | 15140eu |

### Poland: PRES
| | | |
|---|---|---|
| 1300-1400 | Daily | 11675eu 11860eu |

DRM broadcasts to Europe.
Online reception report page:
www.polskieradio.pl/zagranica/eqsl/eqsl.aspx?r=tn
Carried by the WRN.

*Program suggestions:*
"Around Poland," Wednesday; audio sightseeing around the country.
"Multi-touch," Thursday; covering topics such as the ancient pottery tradition of Poland, Polish vineyards, and the Warsaw nightingale, this program also acknowledges reception reports on air.
"EuroPol Express," Friday; monks, clay baths, coffee massages, couch-surfing – you name it.
"Galician Almanac," Saturday; focusing on an historical region in southern Poland and Ukraine, exploring, for example, the small, relatively remote villages in this mostly rural area.

### Romania: Radio Romania Int'l
| | | |
|---|---|---|
| 0100-0200 | Daily | 6145 9800 |
| 0400-0500 | Daily | 6130 7310 |
| 2130-2200 | Daily | 6115 9755 |

DRM broadcasts to Europe.
Online reception report page:
www.rri.ro/art.shtml?lang=1&sec=334&art=15152
Carried by the WRN.

*Program suggestions:*
"Traveller's Guide," Thursday; audio tourism program of Romania which also hosts contests for listeners.
"RRI Encyclopaedia," Saturday; history, writers, museums, films, beer, the classic Dacia car, spectacles, forests, opera, duels, cooking – it's all here.

### Russia: Voice of Russia
| | | |
|---|---|---|
| 0000-0300 | Daily | 6240 7250 |
| 0300-0400 | Daily | 7250ca |
| 0300-0500 | Daily | 6240ca 12040 13735 |
| 0300-0700 | Daily | 12030 |
| 0500-0700 | Daily | 9840 9855 |
| 0800-0830 | mtwhf | 9955ca |



| | | |
|---|---|---|
| 2300-2400 | Daily | 7250 7260ca |

DRM broadcasts to Asia and Europe.
Carried by the WRN.

*Program suggestions:*
"News and Views," daily; VOR views on major news stories.
"Outlook," Tuesday through Saturday; current events roundup.
"Kaleidoscope," Monday, Tuesday, Thursday, Friday, Saturday, Sunday; news and culture program about the Commonwealth of Independent States (made up of former Soviet Republics).
"Moscow Mailbag," Monday, Tuesday, Thursday, Friday, Sunday; question-and-answer, listeners' letters program.
"Music Around Us," Monday, Tuesday, Thursday, Friday, Sunday; a blending of songs, folklore, and classical music. (VOR also carries much more classical music on various programs.)
"Folk Box," Tuesday, Wednesday, Thursday, Saturday; Russian folk music.
"Jazz Show," Wednesday, Friday; the world of jazz.

### Saudi Arabia: BSKSA
| | | |
|---|---|---|
| 0930-1230 | Daily | 15250af |
| 1000-1300 | Daily | 15470af |

*Program suggestion:*
BSKSA broadcasts in general recommended for the traditional Middle Eastern music they often carry.

### Serbia: Int'l Radio Serbia
| | | |
|---|---|---|
| 0130-0200 | mtwhfa | 6190 |

### Slovakia: Radio Slovakia Int'l
| | | |
|---|---|---|
| 0100-0130 | Daily | 6040 9440ca sa |

Carried by the WRN.

*Program suggestion:*
"Slovakia Today," daily; news and magazine program, with history, arts, and culture segments. Friday's broadcast includes a recap of the week's headlines.

### South Africa: Channel Africa
| | | |
|---|---|---|
| 0300-0400 | Daily | 3345af 6120af |
| 0400-0700 | Daily | 7230af |
| 0600-0655 | Daily | 15255af |
| 0700-1200 | Daily | 9625af |
| 1400-1600 | Daily | 9625af |
| 1700-1755 | Daily | 15235af |

*Program suggestion:*
"Africa Rise & Shine," news, current affairs, economy, sports, etc.
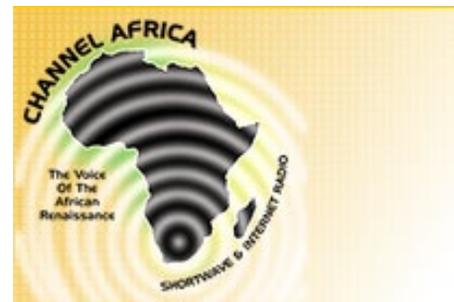


### Spain: Radio Exterior de España
| | | |
|---|---|---|
| 0000-0100 | Daily | 6055 |

DRM broadcasts to Europe.

*Program suggestion:*
"Airwaves," weekly with weekend repeats; culture and human interest program, with topics ranging from the burkha controversy to Spanish Harley-Davidson gatherings, plus listeners' letters.

### Sweden: Radio Sweden
Carried by the WRN.

*Program suggestions:*
"Inside Sweden," Friday; society, culture, and politics program about Sweden, which aims to "be your guide to Sweden today."
"Radio Sweden Weekend," Saturday and Sunday; weekend roundup of the Monday through Thursday "Radio Sweden Weekday" program, covering news, current affairs, technology, and culture, for expats, new immigrants, and Swedophiles.

## Syria: Radio Damascus
| | | |
|---|---|---|
| 2100-2200 | Daily | 9330eu 12085eu |

*Program suggestion:*
Broadcasts recommended for the traditional Middle Eastern music they sometimes carry.
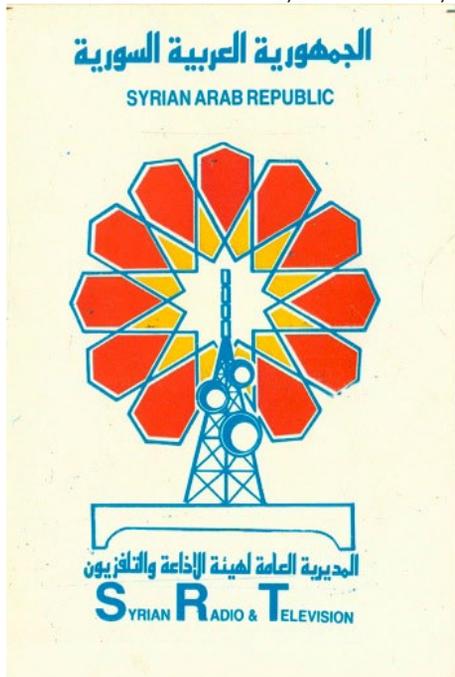


## Taiwan: Radio Taiwan Int'l
| | | |
|---|---|---|
| 0200-0300 | Daily | 5950 9680 |
| 0300-0400 | Daily | 5950 |
| 0500-0600 | Daily | 5950 |

Online reception report form:
http://english/rti.org.tw/customerservice/ReceptionForm.aspx

*Program suggestions:*
"Instant Noodles," Thursday; wacky and silly news from the Asia-Pacific region.
"Jade Bells & Bamboo Pipes," Wednesday; traditional Chinese and Taiwanese music.
"Time Traveler," Wednesday; important events in Taiwan's history.
"The Occidental Tourist," Saturday; an outsider's view on Taiwan, its history, current events, and direction for the future.

## Thailand: Radio Thailand
| | | |
|---|---|---|
| 0000-0030 | Daily | 9680 |
| 0030-0100 | Daily | 12095 |
| 0200-0230 | Daily | 15275 |

## Turkey: Voice of Turkey
| | | |
|---|---|---|
| 0400-0500 | Daily | 6020 6040 |
| 2300-2400 | Daily | 5960 |

*Program suggestions:*
"Blue Voyage," Sunday; Turkish history and archaeology.
"Hues and Colours of Anatolia," background and stories of this historic region.
"Turkish Album," Friday; magazine program covering sports, the arts, and current events.
"Istanbul Istanbul," Friday; travelogue of Istanbul, giving, for example, descriptions from 19th century British travel writers.



VOT broadcasts in general recommended for the haunting traditional Turkish music often carried by their programming.

## Ukraine: Radio Ukraine Int'l
| | | |
|---|---|---|
| 0100-0200 | Daily | 7440 |

*Program suggestions:*
"Insight," Monday; the day to day as well as spiritual life in Ukraine.
"Roots," Friday; educational, culture program.
"Reading Lounge," Monday; readings from the works of famous Ukrainian writers.

## United Kingdom: BBC World Service
| | | |
|---|---|---|
| 0200-0300 | Daily | 6005af |
| 0300-0400 | Daily | 6005af 6105af 6145af 9410as 12095as |
| 0300-0600 | Daily | 7255af |
| 0300-2200 | Daily | 6190af |
| 0330-0600 | Daily | 11945af |
| 0400-0500 | Daily | 7445af 12035af |
| 0400-0600 | Daily | 9410af 15360as |
| 0400-0700 | Daily | 6005af |
| 0500-0530 | Sun | 15420af |
| 0500-0600 | mtwhf | 15420af |
| 0500-0700 | Daily | 11765af 17640af |
| 0600-0700 | Daily | 9410af 12015af |
| 0600-0800 | Sat/Sun | 15420af |
| 0600-1600 | Daily | 9860af |
| 0700-0800 | Daily | 11765af 13820af 17830af |
| 0700-1000 | Daily | 15400af |
| 0800-1000 | Daily | 17830af |
| 0800-1300 | Daily | 17640af |
| 1000-1100 | Sat/Sun | 15400af 17830af |
| 1100-1130 | Daily | 15400af |
| 1100-1800 | Daily | 17830af |
| 1200-1300 | mtwhf | 9410ca 11860ca |
| 1300-1400 | Daily | 15420af 17640af |
| 1400-1700 | Daily | 15420af |
| 1400-1830 | Daily | 5975as |
| 1500-1530 | Daily | 11860af 15105af |
| 1500-1700 | Daily | 12095me |
| 1500-2100 | Daily | 15400af |
| 1530-1615 | Sat | 9410af 11860af 15105af |
| 1600-1700 | Daily | 9740af |
| 1600-1800 | Daily | 13820af |
| 1615-1630 | Sat/Sun | 9410af 11860af 15105af |
| 1630-1700 | Daily | 9410af |
| 1700-1746 | Daily | 9410af 11860af |
| 1700-1900 | Daily | 15420af |
| 1700-2100 | Daily | 12095af |
| 1800-1900 | Daily | 13820af |
| 1800-2100 | Daily | 11810af |
| 1830-2100 | Daily | 9410af |
| 1900-2000 | Daily | 9835af |
| 2000-2100 | Daily | 9615af |
| 2100-2300 | Daily | 9915af 12095af |

DRM broadcasts to Europe

*Program suggestions:*
"From Our Own Correspondent," Saturday and Sunday; BBC reporters from around the world tell the stories behind the headlines.
"Digital Planet," Tuesday; cutting edge and practical technology information.

"World Book Club," Saturday; interviews with world-famous authors, including questions from listeners.
"Global Arts and Entertainment," Saturday; weekly compilation of the Monday through Friday arts, culture, and entertainment program, "The Strand."
"Arts and Ideas," podcast, updated weekly; the best of BBC Radio 3's Monday through Thursday arts and ideas program, with philosophical debates and questions (such as the value of optimism).
"Newshour," twice daily; worldwide news and analysis.
"World Update," Monday through Friday; latest world news.
"The World Today," Monday through Friday; world and regional news roundup.

## USA: VOA
| | | |
|---|---|---|
| 0130-0200 | twhfa | 7405ca sa |
| 0300-0430 | Daily | 9885af |
| 0300-0600 | Daily | 4930af 6080af |
| 0300-0700 | Daily | 6080af 15580af |
| 0400-0500 | Daily | 4960af |
| 0600-0700 | Daily | 9885af |
| 1400-1500 | Daily | 15580af 17650af 17715af |
| 1400-1530 | Daily | 6080af |
| 1400-1700 | Daily | 4930af |
| 1500-1600 | Daily | 15580af 17715af 17895af |
| 1530-1700 | Daily | 6080af |
| 1600-1700 | Daily | 9395af 13600af 15445af 15580af 17895af |
| 1700-1730 | Daily | 17895af |
| 1700-1800 | Daily | 15580af |
| 1700-1830 | Daily | 13710af |
| 1730-1800 | Daily | 17895af |
| 1800-1830 | Daily | 11975af |
| 1800-1930 | Daily | 15580af |
| 1800-2000 | Daily | 17895af |

| 1830-1900 | Daily | 11975af 13710af |
|---|---|---|
| 1900-2000 | Daily | 13710af |
| 1900-2100 | Daily | 11975af |
| 1930-2000 | Daily | 15580af |
| 2000-2100 | Daily | 13710af 15580af |
| 2100-2200 | Daily | 15580af |

*Program suggestions:*

"African Beat," Monday through Friday; modern African music, plus music retrospectives.

"African Music Mix," daily; pan-African music.

"Africa News Tonight," Monday through Friday; news magazine of reports from correspondents, interviews, science and technology, business, arts and culture, and humanitarian issues.

"Daybreak Africa," Monday through Friday; headline news, interviews, correspondents' reports, and sports, all on Africa.

"Music Time in Africa," Saturday and Sunday; African music program, both traditional and Afro-pop.

"Nightline Africa," Saturday and Sunday; magazine with news, reports from correspondents, interviews, and culture and music.

### Vatican City: Vatican Radio
| 0250-0320 | Daily | 6040 7305 |
|---|---|---|

DRM broadcasts to Europe and North America.
Carried by the WRN.

### Venezuela: Radio Nacional de Venezuela
| 1500-1600 | Daily | 11680 (Spanish, some English) |
|---|---|---|
| 2300-2400 | Daily | 13680sa 15250 (Spanish, some English) |



### Vietnam: Voice of Vietnam
| 0100-0130 | Daily | 6175 |
|---|---|---|
| 0230-0300 | Daily | 6175 |
| 0330-0400 | Daily | 6175 |



### DIGITAL RADIO MONDIAL
### International Shortwave Broadcasts

**Radio Australia:**
| 1100-1200 | Daily | 12080pa | English |
|---|---|---|---|
| 1200-1400 | Daily | 5995pa | English |

**TDP Radio, Belgium:**
| 0700-0800 | Mon | 6015eu | English |
|---|---|---|---|
| 0800-0900 | Tue | 6015eu | English |
| 0900-1000 | Wed | 6015eu | English |
| 1000-1100 | Th | 6015eu | English |
| 1100-1200 | Fri | 6015eu | English |
| 1200-1300 | Sat | 6015eu | English |
| 1900-2000 | Daily | 17755na | English |
| 2300-2400 | Daily | 9790na | English |

**BNR 1 Horizont, Bulgaria:**
| 0500-0800 | Fri | 9400eu | Bulgarian |
|---|---|---|---|
| 0700-1000 | Sat/Sun | | 11900eu Bulgarian |
| 1000-1300 | mtwh | 11900eu | Bulgarian |

**Radio Bulgaria:**
| 1630-1700 | Daily | 9400eu | Russian |
|---|---|---|---|
| 1730-1800 | Daily | 9700eu | German |
| 1800-1830 | Daily | 9700eu | French |
| 1830-1900 | Daily | 9700eu | English |
| 1900-2000 | Daily | 9700eu | Bulgarian |
| 1000-1030 | Sat/Sun | | 11900eu English |

**Radio Canada Int'l:**
| 1505-1605 | Daily | 9800na | English |
|---|---|---|---|
| 1605-1805 | Daily | 9800na | English |
| 1805-2005 | Daily | 9800na | French |
| 2200-2300 | Daily | 9800na | English |

**China Radio Int'l:**
| 0100-0200 | Daily | 6080na | English |
|---|---|---|---|

**Radio Prague:**
| 1400-1430 | Sat | 9660eu | English |
|---|---|---|---|

**Agora Digital Grasse, France:**
| 0000-2400 | Daily | 25775eu | French |
|---|---|---|---|

**TDF Radio, France:**
| 0000-2400 | Daily | 25775eu | French |
|---|---|---|---|

**Deutsche Welle:**
| 0200-0300 | Daily | 15205as | English |
|---|---|---|---|
| 0700-0800 | Daily | 3995eu 6130eu | English |
| 0800-0900 | Daily | 9610eu 12005as | English |
| 1100-1400 | Daily | 9545eu 13810eu | English |
| 1800-1900 | Daily | 3995eu | English |
| 1900-2100 | Daily | 3995eu | English |

**B Fuenf Aktuell, Germany:**
| 0500-2305 | Daily | 6085eu | German |
|---|---|---|---|

**All India Radio:**
| 1745-1945 | Daily | 9950eu | English |
|---|---|---|---|
| 1945-2045 | Daily | 9950eu | Hindi |

**Vividh Bharati, India:**
| 0900-1200 | Daily | 6100as 9870as | Hindi |
|---|---|---|---|

**Radio Japan:**
| 1100-1130 | Fri | 9760eu | English |
|---|---|---|---|
| 1130-1200 | Fri | 9760eu | Russian |

**KBS World Radio:**
| 1100-1130 | Sat | 9760eu | English |
|---|---|---|---|

**Radio Kuwait:**
| 0500-0800 | Daily | 6055me | Arabic |
|---|---|---|---|
| 1315-2110 | Daily | 9880af | Arabic |
| 2200-0300 | Daily | 11675na | Arabic |

**RTL Luxembourg:**
| 0000-2400 | Daily | 25795eu | English |
|---|---|---|---|
| 1400-1700 | Daily | 6095eu | German |



**Radio New Zealand:**
| 0459-0658 | Daily | 13730pa | English |
|---|---|---|---|

| 0659-1058 | Daily | 9870pa | English |
|---|---|---|---|
| 1059-1158 | Daily | 9870pa | English |
| 1130-1200 | Sat | 9760eu | English |
| 1551-1750 | Daily | 6170pa | English |
| 1708-1735 | Mon | 6170pa | French |
| 1751-1850 | Daily | 9890pa | English |
| 1840-1850 | mtwhf | 9890pa | Samoan |
| 1851-1935 | Daily | 9890pa | English |
| 1853-1858 | mtwhf | 9890pa | Niuean |
| 1936-2050 | Daily | 11675pa | English |
| 1940-1955 | smtwh | 11675pa | Tongan |
| 1955-2000 | Fri | 11675pa | Hindi |
| 2051-2150 | Daily | 11675pa | English |
| 2115-2135 | Sun | 11675pa | French |
| 2115-2135 | Mon | 11675pa | Pidgin |
| 2140-2150 | Mon | 11675pa | French |
| 2151-2200 | Mon | 15720pa | French |
| 2151-2235 | Daily | 15720pa | English |
| 2236-0458 | Daily | 17675pa | English |

**PRES, Poland:**
| 1800-1900 | Daily | 6130eu | English |
|---|---|---|---|
| 2030-2100 | Daily | 3975eu | German |

**Radio Portugal:**
| 0930-1100 | Sat/Sun | | 9815eu Portuguese |
|---|---|---|---|

**Radio Romania:**
| 0530-0600 | Daily | 6175eu | Russian |
|---|---|---|---|
| 0600-0630 | Daily | 6100eu | French |
| 0630-0700 | Daily | 6020eu | English |
| 0700-0730 | Daily | 6025eu | German |
| 1600-1700 | Daily | 6030eu | Russian |
| 1700-1730 | Daily | 5875eu | German |
| 1800-1830 | Daily | 5895eu | English |
| 1800-1900 | Daily | 6065eu | English |
| 1900-1930 | Daily | 6180eu | Italian |
| 1900-2000 | Daily | 5930eu | German |
| 2100-2130 | Daily | 6030eu | French |

**Voice of Russia:**
| 0200-0400 | Daily | 15735as | Russian |
|---|---|---|---|
| 0400-0600 | Daily | 15735as | English |
| 0700-0900 | Daily | 11635eu | English |
| 0900-1100 | Daily | 7325eu | Russian |
| 1100-1300 | Daily | 7325eu | German |
| 1200-1300 | Daily | 7340as | English |
| 1300-1400 | Daily | 7340as | Hindi |
| 1300-1400 | Daily | 7325eu | Russian |
| 1400-1500 | Daily | 7340as | English |
| 1400-1500 | Daily | 5905eu 9675eu | English |
| 1500-1600 | Daily | 5905eu 9675eu | English |
| 1500-1600 | Daily | 7340as | Hindi |
| 1600-1700 | Daily | 9675eu | German |
| 1700-1800 | Daily | 6145eu | French |
| 1800-1900 | Daily | 6145eu | Italian |
| 2000-2200 | Daily | 6105eu | French |

**REE Spain:**
| 0500-0900 | Daily | 9780eu | Spanish |
|---|---|---|---|

**BBC:**
| 0500-0700 | Daily | 3995eu | English |
|---|---|---|---|
| 0900-1000 | Daily | 9610eu | English |
| 0900-1100 | Daily | 13810eu | English |
| 1000-1100 | Daily | 9545eu | English |
| 1400-1500 | Daily | 9545eu | English |
| 1400-1600 | Daily | 13590eu | English |
| 1500-1700 | Daily | 5790eu | English |
| 1600-1800 | Daily | 3995eu | English |
| 2100-2300 | Daily | 3995eu | English |

**Disco Palace, USA:**
| 1400-1500 | Daily | 6015eu | English |
|---|---|---|---|
| 2000-2100 | Daily | 17755na | English |

**Vatican Radio:**
| 1500-1515 | Daily | 6060eu | German |
|---|---|---|---|
| 1515-1530 | Daily | 6060eu | Polish |
| 2045-2130 | Daily | 9800na | English |
| 2300-2330 | Daily | 7370na | English |

# Ten-Tec 1253: A Great First Radio Project!

## By Robert Gulley AK3Q
### (photos courtesy the author except where noted)



*Photo 1. Ten-Tec 1253 Regenerative Radio Kit*

Have you ever read about folks whose interest in radio started when they built their first receiver, usually under the watchful eyes of their father? I must confess to a bit of envy whenever I read stories like that, because I always wanted to build a radio as a kid, but never got the opportunity.

The '50s and '60s were in some ways the golden era of amateur radio, because of the many build-it-yourself kits available on the market. Unfortunately, the advent of miniaturized circuits and the like served to discourage kit building projects for a number of years. After all, most folks want the latest technology!

Whether through nostalgia, a desire for simpler times, or merely a desire to be more hands-on with all things radio, kits are making a very welcome comeback. One such kit, the Ten-Tec 1253 nine-band regenerative shortwave receiver, helped this amateur radio operator fulfill a 35-year-old dream of building a working shortwave radio, and it was a blast!

For those of us who never had the experience of building a radio, the 1253 kit strikes a great balance between being challenging and yet "do-able." While I messed around with radios a bit as a kid, building a modern radio was intimidating to me. Being used to large components and bulky soldering irons, modern kits looked a little scary.

However, once I made it past the soldering hurdle, I gained the necessary confidence to move ahead, and the whole experience was a rewarding one. Now, far from being intimidated by a kit building project, I am already looking forward to my next one!

## Ten-Tec 1253: Old Meets New

The 1253 is what is known as a regenerative receiver, a technology that has been around since the early days of radio. The concept is pretty simple, as well as inspired: received signals are regenerated (fed back) into the receiver until their strength is powerful enough to be sent to the audio portion of the radio and out to the listener. This process allows for a relatively simple, yet quite ingenious circuit layout. Where vacuum tubes were once used, small, more efficient transistors have replaced them, allowing more radio in a much smaller size (see photo 1).

The 1253 kit comes with all parts well organized and divided by components and/or by section, and for the most part they should be left this way. A few components were unfamiliar to me, so I had to identify them by process of elimination (there, I have admitted to the world I am not an electronics genius . . . confession really *is* good for the soul!)

When identifying the various resistors (and there are a lot of them!) orient them all in the same way on a strip of wide masking tape so they can be easily retrieved later (see photo 2). Because the resistors are small and the colored bands are sometimes hard to read (especially if the ol' eyes are wearing down like mine), use a magnifying glass or a photo/jewelers loupe to identify them properly.



*Photo 2. Resistors arranged on wide masking tape for easy access*

## Tools and Set-up Tips

In addition to the loupe mentioned above, soldering will require a low-wattage (15-25W), fine point soldering iron and some thin (.032") 60/40 resin-core solder. While this kit does not use surface-mount components, the soldering requires a very fine point to avoid connecting two unrelated traces. I also purchased an inexpensive soldering station to hold the heated iron securely, as a safety precaution when not in use and as a place to occasionally wipe the tip.

If you have never tackled a project like this before, I would encourage you to go to your local Radio Shack or similar store and buy a few resistors and a small piece of "breadboard" (jargon for plastic circuit boards to which components are soldered) and firm up your soldering technique. I purchased $2 worth of parts to practice soldering a few resistors, and this helped me to overcome the fear of messing something up in the kit. But, even if something gets messed up, replacement parts are available from Ten-Tec or are likely available from the local Radio Shack store. I have included a picture of what a soldering joint should look like (see photo 3). Don't worry if every joint is not a perfect teardrop – mine certainly aren't, but this is the general shape to shoot for.
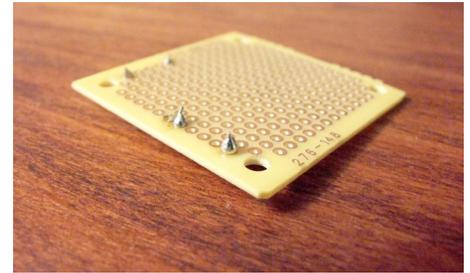


*Photo 3. Here is an example of how a soldering joint should look*

Remember to first heat the joint with the soldering iron and then lay the soldering wire on top of the iron so that the solder runs down onto the joint. Be careful not to overheat the component or the circuit board; pull the iron away if the joint may be overheating. Let it cool and then try again. While the heat of the soldering iron may produce a slight discoloration on the surface of the circuit board, discoloration should be very slight. If the surface turns dark brown or black, the board is getting much too hot.

Other useful tools include: wire snips, small gauge wire strippers, the afore-mentioned wide masking tape, needle-nose or angled needle-nose pliers, several small alligator clips, and a wick de-soldering tool. The assembly manual will also list a few specific tools such as screw drivers and an Allen wrench for case assembly.

A large, clean, well-lit work surface will help immensely both for spreading out parts and for having the "elbow room" needed to solder. Also, a bright light really helps when using the loupe to examine solder connections; sometimes "tails" left from soldering are hard to see otherwise.

## Manual and Printed Circuit Board

Having never built anything like this before, I was determined to go slowly, both as a means of understanding and enjoying the process and as a means of making sure I didn't make too many mistakes! I had waited 35 years to build my first radio, so a few more weeks wouldn't kill me. After all, there's no prize for getting the project done all in one night!

The manual is divided up into seven phases, each phase more or less building on the last. At several points you are encouraged to perform some basic tests to make sure everything is go-

ing along as it should. While I did not do every test, I did do the test which indicated whether or not the receiver worked on one specific band and the test to determine that power was being applied properly.

I have included photos of each major stage when completed, both as an indicator of how each phase comes together and as a photographic reference for what each phase actually looks like when complete, something I wish the manual had included (see "phase photos").

The circuit board is very detailed with component markings and orientation markers as needed (see photo 4). It definitely pays to double check your work as you install various components, and following the markings on the board makes everything much easier. Care taken along each step will reap rewards later, and you will have the satisfaction of hearing your radio come to life when everything is finally in the proper place.
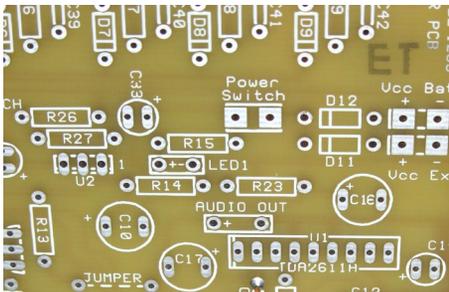

*Photo 4. Circuit board with detailed markings for components and circuit layout*

## Phase One: Getting Your Feet Wet

Phase one helped me in two ways. First, it allowed me to "get my feet wet" by working on a small, yet interrelated section. As I followed the trace lines and thought through the process, I began to see the relationship between the components, which was very educational. The second way it helped was by providing an early test of the unit so I could check my work right away. Once I knew phase one was completed properly, I had the confidence to move forward.

If you're going to build this kit, my advice is to stop after phase one and give yourself a break, both to enjoy your accomplishment and to study the circuitry in order to understand what is going on with the radio. Radio theory is great, but there is no substitute for seeing the components connecting together to form a circuit path.

## Assembly Tips

During the assembly process you will need to shape some of the components to fit properly into the circuit board. When shaping the resistors or the inductors, I recommend using your thumbnail as a bending fulcrum (see photo 5). Use smooth, slow movements and, if adjustments are needed, just straighten the wires and begin again.

In preparation for soldering components, I often found spreading the leads apart helped keep the piece secure while soldering. Press the


*Photo 5. Using thumbnail as a fulcrum for shaping leads on resistors and inductors*

component down gently until it sits solidly on the board, and then spread the leads apart underneath. Two or three pieces may be soldered as a group this way. In particularly tight places, I found doing a "test run" with the positioning of the iron and the solder helped ensure quick, accurate soldering.

Once a component is soldered properly, the leads may be trimmed back as close to the solder joint as possible. Just make sure to allow sufficient time for the joint to harden. I typically soldered two or three pieces together and then trimmed the leads.

## Phases 2-4: A Radio Is Born

In the next two phases, a significant portion of the radio is assembled. Phase 2 deals with DC voltage control, while Phase 3 builds the RF amplifier section, the regenerative detector, and the varactor tuning section. What this means is that when Phase 3 is complete, the radio is ready to be tested on a single band (Phase 4).

At this point I had things held together with clips and tape (see photo 6), but by golly, it worked! My first listening experience brought in several stations from Cuba, and I couldn't have been more excited! Even my wife got a thrill out of it.


*Photo 6. Phase 4 testing stage with tape and clips to hold it together, but it works!*

## Finishing Up Assembly

Phases 5-7 deal with assembling the band switching daughterboard/main board connections, LEDs, final wiring, and the cabinet assembly (see Phase photos). Again, take your time! There are a lot of steps involved in cutting wires to the right length, placing and adjusting LEDs, and arranging components together properly so that everything fits as it should. This is a lot of radio in a fairly small space!
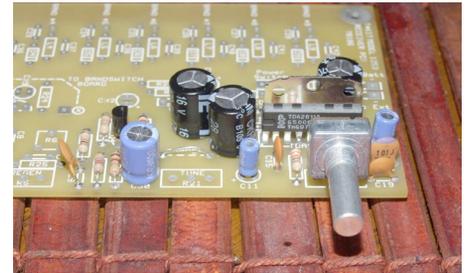

*Photo 7. Phase 1 completed*
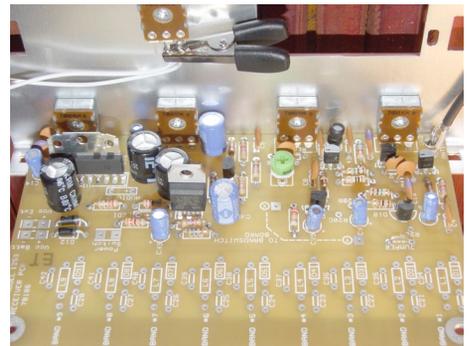

*Photo 8. Phase 3 completed*


*Photo 9. LEDs completed (daughterboard)*
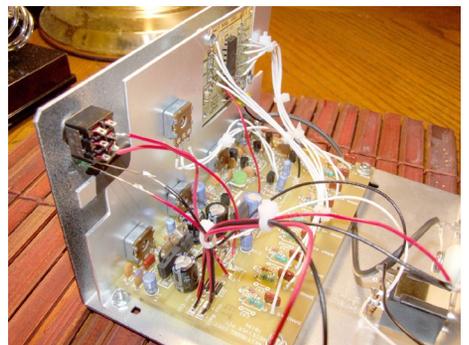

*Photo 10. Phase 5 completed*

*Photo 11. Rear view of finished kit. (Courtesy: Ten-Tec)*

Follow the directions carefully, and make sure to take into account any addendums or clarifications provided that may be in addition to the basic manual. In my case, there was a two-page Technical Reference Bulletin which had several updated part numbers and several assembly notes which were vital to completing the radio.

Once the unit was assembled and the batteries were installed, I had a great little portable radio which received quite well. The unit may also be powered by an external 12v power supply, but I prefer the radio as a portable most of the time. Fortunately, the batteries may be left in while using a power supply, because the unit is wired to bypass the batteries when hooked to external power.

## Operation

I have to admit that, in all my radio experience, I had never used a regenerative radio before, and so I was not prepared for the increased sensitivity to tuning this type of radio requires. At first I thought I must have done something wrong, even though my test in phase 4 was a success. As it turned out, a bit more reading in the operations side of the manual gave me the answer (imagine that!), and I started tuning with a much more delicate hand. I soon started hearing all kinds of stations coming in, including single sideband (SSB) amateur radio signals.

Having been used to using some sort of beat frequency oscillator (BFO) or similar tuning procedure with my other rigs, I was pleasantly surprised to discover all SSB reception requires on a regenerative radio is just an adjustment of the fine tuning control. What does take some getting used to is the sensitivity of the "REGEN" control.

While standard for this type of radio, it still came as something of a surprise to me. The slightest movement can change reception drastically, but this just adds to the fun and to the challenge. I love the feeling of working with a radio with such a history as the regenerative radio. This project has truly given me a deeper appreciation for those who came before us.

I hope you give this kit a try as your first radio project or as just a great addition to your shortwave radio collection. The completed radio not only looks professional in its design, but it also performs quite well. And the best part of all? You will be quite proud to say "I built this myself!"

The Ten-Tec 1253 kit is available for $89 from: Ten-Tec

1185 Dolly Parton Parkway
Sevierville, TN 37862 U.S.A.
Phone: (865) 453-7172
http://www.tentec.com/index.php?id=51

Ten-Tec provides on-line technical tips via its "Knowledge Base" page on its web site. Answers to customer questions on a wide range of topics covering all Ten-Tec products new and old may be found there. In addition, their service line (865-428-0364) is available from 8:00 am to 5:00 pm ET Monday through Friday. You may also e-mail your service-related questions to service@tentec.com.

*About the Author:*

*Robert Gulley's interest in amateur radio and shortwave listening began as a young boy, but he did not get his Technician license until 2007. He then quickly upgraded to General Class (Dec. 07) and then Extra Class (May of '08.). He has never lost his fascination for all things radio, and regularly listens to shortwave, AM DX, and police scanners, as well as chasing DX on the amateur bands. He is also developing a passion for "boat anchors" and plans to restore several Swan 350s as time allows.*

*Robert writes a monthly column for* antenneX *magazine focusing on antenna topics for beginners. He has also written several articles for* QST *magazine. When not using one of his many radios, Robert is a writer, adjunct college professor and a retired minister. He also teaches classes in woodturning and dabbles in photography, digital imaging and computers. You may contact him at AK3Q@ak3q.com*

# An Easy to Build All-Band Loop Antenna

By Bob Patterson K5DZE (graphics courtesy the author)

As an active amateur operator for over 50 years and a retired Army Signal Corps officer, I have built and used a *lot* of different antennas for work and play. But, of all the antennas I have used, I would select the 80-6 meter full-wave horizontal loop antenna as one of the very best all around antennas for amateur radio work.

The version of this antenna that I currently use offers the advantages of being easy to construct and highly effective on all bands from 80 through 6 meters. It's also a great antenna for short wave listening (SWL) on the frequencies between the amateur bands. Since I also enjoy listening for aviation non-directional beacons (NDBs), I also like the fact that it works reasonably well as a receiving antenna for long wave frequencies, below 500 kHz.

Considering the fact that this antenna is not overly expensive, it becomes an antenna well worth serious consideration, giving you one wire antenna to meet all of your HF needs.

## The Basic Loop Formula

The basic formula for determining the length of a full wave loop is Length=1005/Frequency in MHz. This formula figures the antenna length for the lowest frequency at which the antenna will operate effectively. While the loop will operate quite well on any frequency above the design frequency, it will exhibit a fairly sharp cut-off below the design frequency. As an example, antennas designed for the high end of 80 meters, say around 3.900 MHz, will likely not be tunable on the Morse code (CW) portion of 80 meters (the low end of the band) with your rig's internal tuner.

Since I like to operate low power (QRP) CW and digital modes such as PSK31 on 80, I configured my antenna for the low end of the band. Using L=1005/3.540 MHz, I derived a length of 283.9 feet or about 284 feet in length. If you only work the single-sideband (SSB) portion of the band and don't need the low end of 80, you could figure the length using 3.8 MHz. In this case, the antenna would be about 264.5 feet, thus saving about 20 feet in overall length.

The one perceived problem that most amateurs think about when you mention a full wave loop is the overall size of this antenna. Compare a horizontal 80-6 meter loop antenna at 284 feet to a horizontal G5RV at 102 feet, and the loop looks almost three times the length of the G5RV, but those numbers are deceiving. If you give the installation some thought, you will find that the loop can be quite reasonable to install. Let's take a look at what I mean.

Since loop antennas are normally put up in a 4 sided square or 5 sided pentagon shape, the length of any one side is between 71 and 57 feet in length. These shorter sides may make your installation easier than trying to put up a 102 foot long G5RV. To get an idea of how it will fit on your lot, lay the antenna out on the ground in a configuration that will yield the greatest amount of area enclosed within the loop.

A square is most commonly used and is the easiest to make, since it requires only four supports. It also provides the best compromise in shape and support for the loop antenna. Other shapes might include an octagon or a triangle, but in any event it is important to keep in mind that the idea is to enclose as much space inside the loop as possible.

## Components

This version of an 80-6 meter loop uses 52 Ω coax rather than open wire for the feed line, and this simplifies a number of issues. You will need antenna wire, a 4:1 balun coil (commercial or homemade), corner insulators, and some braided cord for the insulator supports. My days of climbing trees to put up antennas are long gone, so I set about to install this antenna from the ground. It worked so well that I hardly worked up a sweat for the whole project!

For the installation process, you will need a slingshot, a bow and arrow, or a really strong arm to get the line up into the trees you select for support. Add to this a fishing reel or a spool of strong monofilament line and a heavy lead fishing weight. I chose a simple slingshot to launch a small spool of fishing line lying on the ground with a lot of line pulled off and it worked out nicely.

For the antenna wire, I highly recommend aluminum electric fence wire (a 1/4 mile spool of 17 gauge wire costs $20 at your local Tractor Supply Company.) It is very strong, has a small diameter, and is much less expensive than copper antenna wire. Avoid the temptation to use steel electric fence wire, as it is heavier and a bit harder to work with, while the aluminum wire is very easy to use.

Since the two ends of the loop attach to two screw terminals on a balun coil, no soldering is needed. Be careful not to create kinks, when you're unspooling the wire, as they will become the weak points in the antenna.

For the support lines, I used an olive drab Dacron cord purchased on eBay (1/8" x 500' for ~$35). Universal Radio has a 100' roll of 1/8" dark, Polyester braided rope for $12. This kind of rope is very strong, easy to work with, and very stealthy when installed. You can substitute any similar rope you have on hand, but avoid cotton or other natural fibers, as they will deteriorate quickly in year 'round weather and become the target of squirrels or other critters for nesting material. Use braided line rather than twisted line, as the braided cord doesn't unravel as easily. Polyester or similar rope may be cut cleanly with a hot knife to seal the ends from coming unraveled.

For a feed line, the smaller diameter RG-8X coax cable with a Buxcomm or similar 4:1 balun at the feed point works nicely. Depending upon what you read, the impedance at the feed point is around 100 to 125 ohms, so a 4:1 balun
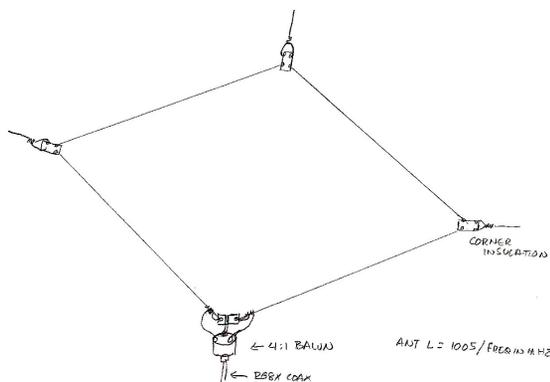


*Line drawing of the complete all-band HF loop.*

CORNER INSULATOR

4:1 BALUN

ANT L = 1005/FREQ in MHz

RG8X COAX

*Fig 1: A corner insulator, shown hanging down loose for clarity.*

is a simple way to provide a better match for 52 ohm coax. I tried a direct coax to antenna feed using no balun and quickly found tuning problems at some frequencies, so I used a 4:1 balun that I had on hand to resolve the problem. This makes loading all bands very easy on the transceiver's built-in tuner at or above the design frequency. The bottom line is, use a balun.

I also recommend using some non-oxidation aluminum paste, such as GB brand OX-GARD # OX-100, from ACE Hardware, on the two ends of the aluminum loop wire where these tie on to the balun screw terminals. This makes for a good electrical contact, and it is available from most hardware stores in a small tube. Every year you can let down the balun via the support cords to clean and check the screw terminal contacts.

To get best results at your site, you'll need four support points to make your loop into a square or something approaching a square. Five supports will make a pentagon shape and give a little more area inside the antenna loop which is even better. Support structures can be trees, poles, masts or whatever you decide to use.

I found that the best way to see how the antenna would look when installed was to measure out the 284-ft wire and then lay it out on the ground in the shape that I planned to use. This way you can see if the shape is optimum for your site and if your support lines and insulators are going to be in the right place to hold the shape.

When placing each corner insulator on the antenna, don't tie the insulator to the antenna; leave it free to slide back and forth on the wire to find the best spot after the support is pulled up (see figure 1). To do this, while the antenna is on the ground, simply slide the number of insulators that you will use on to the antenna wire and then position them to about the correct place on the antenna.

## Construction

Begin making the antenna by putting up the support lines that will hold the antenna. To see

where to put your support lines/insulators, look at your loop lying on the ground in front of the trees, poles, or masts that you will use. If you use trees for supports like I do, then simply tie a lead weight to the fishing line and, using the slingshot, launch it over the tree limb you want to use.

Pull the fishing line down and tie the Dacron/Nylon support line to the fishing line and pull it up and back over the tree limb. Tie the support line to the proper insulator on the antenna. Cut the other end of support line from the spool and tie it firmly to the tree trunk so it won't come loose, and slip it back up into the tree. Do this for each support and insulator.

To assemble the antenna's feed point, open the loop at one corner (or any convenient place on the wire) and connect an insulator at this feed point between the wires. This will be used to take the strain off the antenna where the balun coil and coax are attached. Leave enough wire (about 4") on the ends of this insulator to let you easily tie the antenna to the contacts on the balun coil. Then, using the "eye bolt" on top of the balun coil, tie the balun to the center of the insulator. (Fig.2) Tape all connections for weather protection with Coax-Seal or similar product.

For best range and DX coverage, raise the antenna corners to at least 30-40 ft. elevation, keeping the antenna horizontal. Leave a little slack in the support lines to allow for tree-sway in strong winds.

## Real-world Results

When I first tried this antenna, I cut my wire to the calculated length, fed it directly with RG-8X coax (no balun), and put it up only 20 feet' high on the corners. The centers were only about 17 feet, due to sagging.

This version of the loop was cut for use on Army MARS frequencies and was about 253 feet long or about 63 feet on a side. It replaced an effective commercial G5RV that had been at 30 feet high. The results were striking and exceeded my expectations. During comment time on our state net the first time I used it, several stations that were at least 250 miles distant immediately commented, without my asking, that my signal was considerably stronger than usual and wanted to know if I had done something different.

Results on 75 meter SSB were also excellent, but because I had cut it for 4.0 MHz, the antenna would not load up on the CW portion of 80 with my FT-920's internal tuner. This proved my point that you should cut the antenna for the lowest frequency for which you intend to use it. Incidentally, I highly recommend this antenna for MARS, state EMCOMM, or area NCS stations needing solid area coverage.

I might add that when I built this antenna, I understood the loop would work on 6 meters, but I personally doubted its effectiveness. Just for fun I gave it a try on 6 and, once again, I was very surprised at how well it worked on an area 6 meter net. The loop was as good as or better than my full-size 6 meter copper "J Pole" antenna at 30 ft, and when the band opened a bit, I worked all up and down the East Coast from my Alabama QTH where I was living at



*Fig 2: The 4:1 Balun and strain insulator.*

the time.

Loops, in general, are considered to be quieter than many other antennas, and my personal experience has shown that this antenna was quieter than my G5RV strung horizontal or than an inverted "V" at the same height. I also found that signals were stronger on the loop than on my 40-10 meter 31-ft vertical, which used with sixteen 27 foot-long buried radials and a 1:1 balun. I could copy signals with the loop that I could not copy at all on the vertical. In 120 days of operating on the loop at my new location, I have worked all states and more than 60 countries on PSK-31 using only 5 watts of power or less.

I also use this loop on my 10 meter QRP beacon anytime I am not using it on the air or listening with it on HF. I find that it performs better as a beacon antenna (more received beacon reports) than the vertical or ground plane antennas that I used before the loop. It also seems to copy other beacons better, but with the poor conditions that come and go, it's sometimes hard to tell about the receive side on 10 meters.

Simply stated, this version of the venerable 80-6 meter loop will take you about anywhere you want to go on HF without changing anything but your band switch. Simple to make, easy to put up, and very effective, **MT**

### All-Band HF Loop Antenna Parts and Price List

300 feet of 17 gauge aluminum fence wire: $20 for 1/4 mile roll from Tractor Supply Company
Rope insulator supports: $15/100' dark, braided Polyester from Universal Electronics
Dog bone insulators (4): $4 from Universal Electronics
4:1 balun: $30 from Universal Electronics
RG/8X coax (amount necessary to get from the loop to your shack): $35/100' with PL-259 connectors at each end from Universal Electronics
CoaxSeal: $3 for a 5 foot roll from Universal Electronics
Non-oxidation aluminum paste: $3 from ACE Hardware
Total cost (less shipping): About $110

# A Most Unlikely Radio Career

### By Keith Perron
### (Photos courtesy the author)



*Taiwan superstar Wang Lee Hom taken in the studios at Central Broadcasting from a series we have been doing for Taiwan radio since 2005.*

When I think back about how my interest in radio started, as a young person growing up in Canada, it seems like it was just yesterday. I remember being mesmerized by the strange sounds coming out of the radio speakers from stations like Radio Moscow, Radio Japan, Radio Netherlands and so many others.

As I got more interested in what radio could do and its power, I found myself being drawn more to the creative process of putting programs together. In the evening I would record some of my favorite programs and then listen to them over and over again, paying close attention to the details like audio mixing, presentation styles, and personalities.

## The Netherlands Connection

One of the personalities from the shortwave dial that would have a tremendous impact on my own style of presentation was Tom Meijer of Radio Netherlands Worldwide (RNW). Tom's easy, laid-back approach to radio was one of the reasons that I wanted to go into radio. From the early 1980s onwards, I would tune in every Sunday not only to the English version he presented, but also the Spanish version of Happy Station. In fact, one of my uncles has a recording I made on a small tape-recorder doing an impression of Tom during that period.

The source of inspiration for the kind of radio I do also came from others, mostly from Radio Netherlands broadcasters like Dody Cowan, Ginger de Silva, Pete Myres, Swiss Radio International's Bob Zanotti, and so many more. The list is endless. What is most fun is that I have become close friends with all of these people and in fact, since 2010, I've been freelancing for RNW.

One of the best times I've had in my over 20 years in radio was in 1993. I was in the Netherlands visiting Tom. This was just a few months after he had left Happy Station. At that time he was living in Hilversum, and I remember getting on my bike and heading to the Wereldomroep, walking past the reception area and meeting some people I already knew who were watching the activities in the newsroom.

On this particular afternoon, I ran into Pete Myres in the elevator. We got into a conversation that must have lasted hours. At one point I asked him if he would be interested in doing an interview for a show I was doing in Canada. We fixed a time the following afternoon to meet in his office on the second floor of Radio Netherlands. It was an interview I will always remember and, as I'm typing away right now, I have the original tape of that conversation running. It's fun to listen to, because both of us were insane and it shows.

At the end of the interview I asked if he could record some show IDs for me. This is when the fun really started. I'm not joking: to record two 30-second IDs took almost one hour. I never laughed so much in my life. As I listen to the tapes of that day it was just as if it happened yesterday.

## Career Changing Holiday in Cuba

Three months after I returned to Canada, I went down to Cuba for two weeks' vacation. Little did I know that a few months later I would be back, this time working at Radio Havana Cuba (RHC).

Being a person who is very curious about radio, it seemed very normal, during my holiday, to head to RHC, say hello and look at how they do things. That afternoon, while I was sitting in the English newsroom with Jorge Myaries, as a joke I asked, "Do you have any positions for foreign staff?" I didn't realize he had taken me seriously.

On a very cold Canadian afternoon, he called me up asking if I would consider coming to Havana for one year. With the outside temperature being -10 and, having just been laid off from Radio Canada International, I said "Yes!" in seconds and found myself back in Havana at RHC headquarters two months later.

Working for Radio Havana Cuba was, in all honesty, one of the best radio jobs I ever had, because I loved what I was doing there and the people. I worked with people to whom I had listened for years, including Yolanda Fisher, Telma Rodrigues (with whom I would eventually work again at China Radio International some 12 years later), and of course Arnie Coro CO2KK. I have so many fond memories of the station.

One of my closest friends at RHC was, and still is, Manolo de la Rosa who has been with RHC for over 30 years and who spent 12 years at Radio Moscow as well. I have so many memories of going over to his house on Sundays for dinner with his family, sharing a bottle of rum and talking about everything under the sun.



*Radio Havana Cuba English Service announcer Telma Rodriguez and myself standing in front of China Radio International.*

## The Road to China

I think that returning to Canada after leaving RHC was the biggest mistake in my life. A period of depression seemed to settle in. I found myself working on local radio – not that I didn't enjoy it, but from that point on for the next four years, I found myself in a rut. I still loved working in radio, but I had lost my passion for it. Then, one morning I woke up and decided to quit. Two weeks later I packed up and moved to British Columbia to do something different for a while.

I took a position at the Virgin record store in Vancouver as the jazz buyer, but after doing that for six months, I realized I wanted to get back into radio. One afternoon, as I was looking on the shelves at what Miles Davis CDs needed to be stocked, I happened to meet James Ho. James is the owner of CHMB-AM 1320 Vancouver, one of the oldest Chinese radio stations in Canada.

We started talking and a month later he called and asked if I would be interested in coming to work for him. I said, "You've got to be kidding. Why do you want me to go work for an all-Chinese radio station? What could I do?" He offered me the position of Head of International programming. It turned out that CHMB runs programs for the other large ethnic communities in Vancouver.

The job was very interesting and lots of fun. It was here that I fell in love with Chinese culture. I stayed at CHMB until 2001 when, just as had happened to me before, totally by luck, I was offered a position I could not turn down with China Radio International (CRI) in Beijing.

The job at CRI was interesting. Did I love it? That's hard to say. Did I hate it? That's hard to say, too. I think the problem I had with China Radio International was that it is so bureaucratic, that getting anything done was extremely time consuming. I had and still do have great fondness for my co-workers, but as for management, well, that's another story.

After nearly five years, I decided to call it quits and took a position at the Beijing Radio Corporation to help launch a new 24-hour English station called Radio 774. After we got



*The cast and crew, including actor Jackie Chan, from a television series I did in 2004.*

the station up and running, I started to lose my interest in radio again. So I quit, took some time off, and opened a café in the Dashanzi Art Area of Beijing.

In 2008 I was offered a job with a local radio station in Taiwan. I packed up everything I had and moved again. This time, after nearly 12 years, I found something that I felt when I was living in Cuba, and it was as if I had found a new source of energy. Being a huge jazz fan, I jumped at the chance to host a nightly two-hour live jazz show. In the move to Taiwan, it's as if everything came full circle.

## Happy Station Reborn

One night, after talking to Tom Meijer, I remembered thinking back to the late 1980s and that the show I had always wanted to do was Happy Station. Now, you need to remember that Happy Station left the airwaves in 1995, after it was cut by Radio Netherlands Worldwide. But,



*A picture of myself recording a Happy Station "On the Road" show from August, 2010 in Kenting, Taiwan.*

many years ago, Tom and I had discussed the idea of doing the show as an independent production. So, in January 2009, I thought, "Why not put together a one-off Happy Station Show, buy air time on WRMI, put it on shortwave as a tribute to Tom and his 22 years as host?"

Well, the idea kind of snowballed. The one-off special turned into a new show once every two weeks, to weekly, to three different editions weekly, to other local stations around the globe picking it up. All this led to the founding of what would be called PCJ, named for Radio Netherland's predecessor, PCJJ, a radio station founded in 1928 when Philips Radio started broadcasting. The call was later changed to PCJ, which original Happy Station host, Edward Startz, said stood for Peace, Cheer and Joy.

Eventually there were more PCJ productions, live relays of PCJ Radio, and so on. All this happened so fast that I still can't imagine how I pulled it off.

Of everything I have done in the last 20 years, the two things I am most proud of are bringing back Happy Station and starting PCJ Media and Radio. But, I need to add that I could never have done it alone. Tom plays an important role, as well as so many others. But one person, whom I have never met face to face (and would even go so far as to say is the silent voice of PCJ) is Colin Newell of the DXer.ca website. Colin took the Happy Station idea and PCJ into the 21st century by helping to build a fantastic website.

Over the years, I have learned so much and continue to do so. Now, as I'm soon to be 40 years old, I have people asking me for advice, just as I did 20 years ago.

The only advice I can really give is: if you want to go into radio, make mistakes, have fun, and find out who you are as a broadcaster. But above all, the most important thing is passion. Passion for the medium is what should drive you. Second, don't expect to be rich. If you want to be wealthy, become a lawyer. And finally, don't treat the audience like idiots. Talk *to* them, not *down* to them and have fun! If *you* have fun, your *audience* will have fun.

**MT**
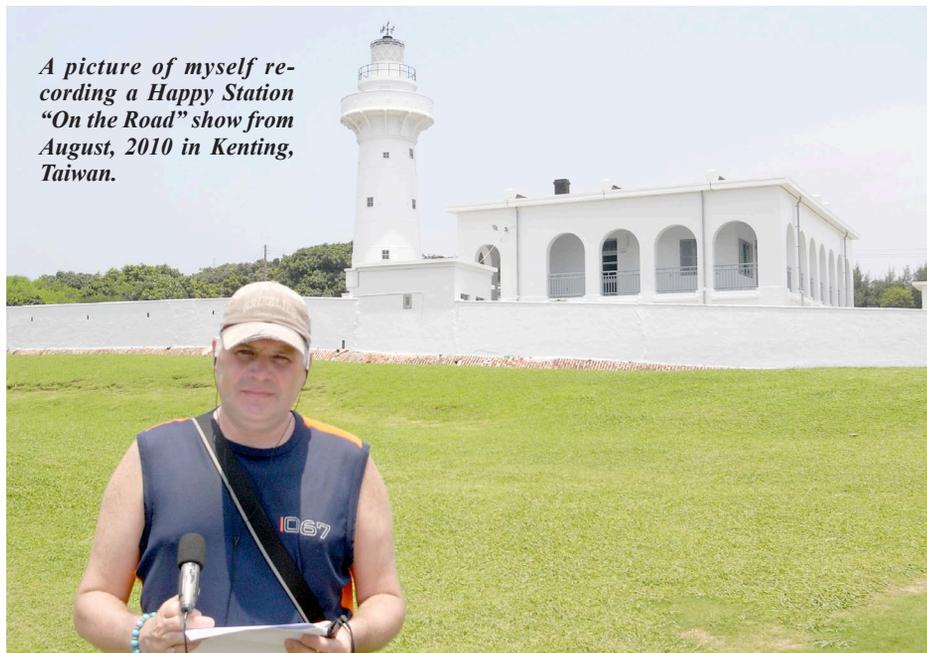
# SCANNING REPORT
**THE WORLD ABOVE 30MHZ**

*Dan Veeneman*
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# Scanning: A Moving Experience

Changes to scanner frequency assignments are a fact of life. From public safety rebanding to new services and technologies, knowing where to find your favorite activity and searching for new ones is part of the fun of our hobby.

This month we examine the ongoing effects of moving 800 MHz public safety operations to avoid interference and explore a little-known segment of the VHF band. We finish up with some frequencies and tips from a reader in Arizona.

## ❖ Rebanded

*Dan,*
*I have a 396T that I use in my travels. I wish to track both 866-869 MHz Motorola systems and their re-banded 851-854 MHz systems.*
*1. Will a reprogrammed 396T still track the 866-869 MHz systems?*
*2. Do new scanners programmed for re-banded Motorola systems still track the 866-869 MHz systems?*
*3. Must I take two scanners to track both types of systems?*
*Thanks,*

*Larry via the Internet*

As we've discussed previously in this column, the Federal Communications Commission (FCC) reorganized a portion of the 800 MHz frequency band used by public safety agencies. Prior to the reorganization, both public safety and private radio operators shared the spectrum between 851 and 861 MHz. In much of that space, frequency assignments were interleaved, meaning that public safety systems and private networks operated right next to each other.

Over time, as private radio operators like Sprint/Nextel expanded their network and added transmitters across the country, public safety agencies began to experience interference. The numerous, lower power Nextel transmitters were spilling over into the adjacent public safety frequencies and overwhelming the few, higher power public safety repeater sites, resulting in police and fire departments having difficulty communicating with their personnel in the field.

As these episodes of interference increased in duration and intensity, complaints were filed with the FCC to correct the problem. The primary culprit, Nextel, was either unwilling or unable to keep their transmissions within their assigned frequency slots, and older public safety radios had insufficient filtering and selectivity to keep out the Nextel signals.
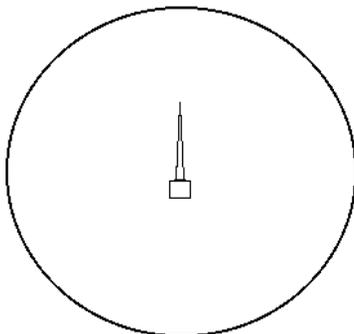


Large coverage area of typical public safety repeater.

After a long period of bureaucratic wrangling, in 2004 the FCC finally issued an order to "reband" the part of the 800 MHz band where interference was occurring. The plan was, in essence, to separate the two sides and give each of them their own contiguous blocks of spectrum. The result is that public safety now has the exclusive use of frequencies between 851 and 854 MHz, and shared use from 854 to 860 MHz.

Nextel and the other Enhanced Specialized Mobile Radio (ESMR) have the exclusive use of frequencies between 862 and 869 MHz. Any public safety systems that previously operated in the old allocation between 866 and 869 MHz must "vacate" that segment and move down into available space below 860 MHz.
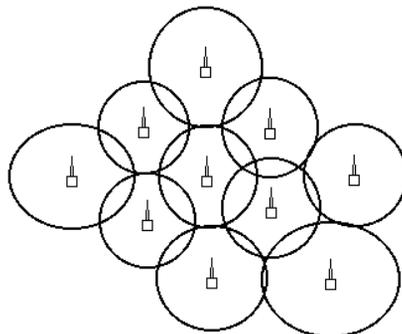


Numerous small sites for typical Nextel coverage area.

The frequencies dedicated to public safety in this band are referred to as NPSPAC (National Public Safety Planning Advisory Committee) and run from 851 to 854 MHz.

Public safety and non-cellular Specialized Mobile Radio (SMR) share the spectrum between 854 and 860 MHz. These SMR operators work more like public safety systems, with a few high-power repeater sites and are far less likely to cause interference.

The FCC also allocated a one-MHz expansion band from 860 to 861 MHz as a set-aside for future needs and an additional one-MHz guard band from 861 to 862 MHz to help prevent interference.

Remember that channels are actually pairs of radio frequencies; the frequencies listed here are for the output of the repeater site, which is what scanner listeners usually monitor. There is also an input frequency to the repeater that is exactly 45 MHz lower than the output frequency. Both frequencies were rebanded and maintained their 45 MHz separation.
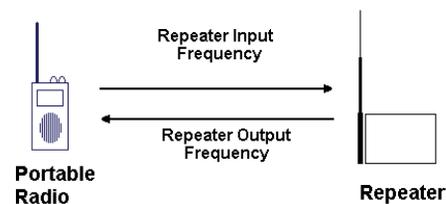


Under the FCC order, Sprint/Nextel must pay for the cost of the rebanding effort public safety agencies undergo. The vast majority of these license holders have completed agreements with Sprint/Nextel, although systems located along the U.S. borders have been slow to begin the process. As of July, about half of the 800-MHz public safety license holders not near a U.S. border have finished moving to their new frequencies.

What rebanding means for scanner listeners depends on the type of system that had to move down. First, regardless of type, whether Motorola, EDACS, LTR or Project 25, the rebanded system will have a new list of frequencies that must be programmed or loaded into the scanner. For EDACS, LTR and pure Project 25 digital systems, this is all that has to be done – just plug in the new frequencies and you're good to go. Unfortunately, Motorola systems have an additional complication, due to the way channel information is transferred across the control channel.

Motorola Type I and Type II systems use the standard SmartNet control channel, usually called "3600-baud" in reference to the rate of data transfer, which conveys channel information through the use of channel

## 800 MHz CONFIGURATION (OLD)

### Mobile Transmit Frequencies

| 806 | 809.75 | 816 | 821 | 824 |

| General Category | Interleaved Spectrum | ESMR | NPSPAC |

| 851 | 854.75 | 861 | 866 | 869 |

### Repeater Transmit Frequencies

## 800 MHz CONFIGURATION (REBANDED)

### Mobile Transmit Frequencies

| 806 | 809 | 815 816 817 | 824 |

| NPSPAC | Public Safety Non-cell SMR | E | G | ESMR |

| 851 | 854 | 860 861 862 | 869 |

### Repeater Transmit Frequencies

numbers rather than actual frequencies. When a radio receives a Motorola control channel message with a channel number, it performs a mathematical algorithm to determine the radio frequency it should tune to. Because the channel numbers were originally set up and assigned long before rebanding, the algorithm produces the wrong frequency for channels between 851 and 854 MHz.

So, for any rebanded Motorola system that has any frequencies between 851 and 854 MHz, something has to be done. The question becomes, can the algorithm in the scanner somehow be fixed or updated? As you might expect, the answer depends on the particular scanner.

Older trunk-tracking scanners have the algorithm built into hardware and it cannot be upgraded without changing a circuit board, if such a board were even available. More recent scanner models have the algorithm implemented in firmware, which is something a user might be able to upgrade, depending on the specific model.

Manufacturers have corrected the algorithm in the firmware for newer scanners to allow them to properly track both the old (866 to 869 MHz) as well as the new (851 to 854 MHz) rebanded systems. The corrected algorithm, along with other fixes and improvements, are included in new versions of firmware. These new versions are typically provided via a download link on the manufacturer's web page, so if you have a newer model scanner it is worth checking to see if you have the latest version.

| Manufacturer | Web Site |
| --- | --- |
| GRE | www.greamerica.com |
| MFJ Enterprises | www.mfjenterprises.com |
| Radio Shack | www.radioshack.com |
| Uniden | www.uniden.com |

The following is a list of scanners that are known to support rebanded Motorola systems, either through a firmware update or a change to internal settings.

| Manufacturer | Scanners |
| --- | --- |
| GRE America | PSR-300, PSR-310, PSR-400, PSR-410, PSR-500, PSR-600 and PSR-700 |
| MFJ | MFJ-8322 |

Radio Shack PRO-106, PRO-107, PRO-160, PRO-162, PRO-163, PRO-164, PRO-197, PRO-2096, PRO-92 and PRO-96

Uniden BC246T, BC296D, BC346XT, BC796D, BC898T, BCD396T, BCD396XT, BCD996T, BCD996XT, BCT15, BCT15X, BCT8, BR330T and the Home Patrol

## ❖ Uniden BCD396T

The Uniden BCD396T is a handheld scanner introduced in 2005. It has memory for 6,000 channels and is capable of scanning both analog and digital Project 25 networks, including Motorola, EDACS and LTR trunked systems.

Support for rebanding requires firmware version 3.0 or newer. You can read all about firmware versions and the upgrade process for the BCD396T at http://info.uniden.com/twiki/bin/view/UnidenMan4/BCD396FirmwareUpdate

So, for Larry's questions: Yes, a BCD396T with most recent firmware will properly track both rebanded and non-rebanded systems. Yes, new scanners with the proper firmware will also track both types of systems. No, you don't need to bring two scanners just to cover rebanded and non-rebanded systems – one modern scanner with updated firmware will handle both types.

## ❖ Low Band

*Greetings!*

*Just above the 10-Meter amateur radio band, what are the frequencies between 29.700-30.000 MHz used for?*

*I know of logging and papermaking operations: 29.710 to 29.790 MHz every 20 kHz and US Military: 29.900 and 30.000 MHz.*

*As the solar cycle improves, who else uses this 300 kHz sub-band?*

*In the past, I once heard about a local disgruntled ham that heard "pirates" on 29.710 FM, and he went out of the amateur band to berate them. This continued until the polite operator informed him that they were a logging company in Washington State...and would he kindly repeat his call sign so they could report him to the FCC. He vanished.*

*Are there any other FM-mode frequencies in the 25-30 MHz range to monitor now? I recall oil rigs used to use the 25 MHz range, and some business radios use FM in the 27 MHz range between 11M and 10M.*

*Bob via the Internet*

The low end of the VHF (Very High Frequency) band can be an interesting place to explore. Scanner listeners usually spend their time monitoring frequencies in the UHF (Ultra High Frequency) band or higher, hunting for transmitters that are located a few dozen miles

away, at most. Radio waves at these frequencies typically travel short distances and are blocked or absorbed close to where they originate.

In contrast, transmitters operating at low end of the VHF band around 30 MHz are capable of carrying significantly further. Under the right conditions, these radio waves can travel hundreds and even thousands of miles as they bounce off the ionosphere high above the Earth. This phenomenon is sometimes referred to as *skywave* propagation.

The daily day/night (diurnal) cycle affects long distance propagation of low frequency signals as the energy from the daytime Sun energizes the upper atmosphere and increases the likelihood of signal "skip." The longer-term output variability of our Sun also affects signal propagation, as periods of increased sunspot activity charge the ionosphere. Sunspots typically wax and wane in an 11-year cycle, and we are currently coming out of a low in that cycle. Historically, the low frequency signals around 30 MHz are more likely to reach distant radio listeners during periods of increased sunspots.

## ❖ Ten Meters

Way back at the dawn of the radio era, the segment between 28 and 30 MHz, called the "10-Meter Band" due to the length of radio waves at those frequencies, was allocated to amateur radio. Early hams used these frequencies to make long distance contact, often communicating between continents.

Two decades later, just after World War II, the small segment of spectrum from 29.7 MHz to 30 MHz was reallocated for government and private use. The same propagation advantages were used to provide longer distance communication between mobile units and their fixed location headquarters.

The 300 kHz sub-band is allocated as follows:

| Frequency Range | User | Category | Use |
|---|---|---|---|
| 29.70 to 29.80 | Non-Federal | Land Mobile | Mobile operations |
| 29.80 to 29.89 | Non- Federal | Fixed Site | International, Aviation |
| 29.89 to 29.91 | Federal | Fixed and Mobile | varies |
| 29.91 to 30.00 | Non- Federal | Fixed Site | International, Aviation |

Currently there are more than two dozen active, standard license holders in the non-Federal portion of this sub-band, including oil service, forestry and papermaking companies. For instance, the International Paper Company



operates from a number of locations on 29.73 MHz. Weyerhaeuser uses 29.75 and 29.77 MHz (as well as 31.08 and 31.12 MHz). A couple of towing companies out of New Hampshire use 29.71 and 29.77 MHz to coordinate the operation of their vehicles and personnel. Two different professional search and



rescue operations are licensed for a number of frequencies in VHF, including 29.71 and 29.75 MHz. There is even a food service operation in Virginia licensed to use 29.79 MHz.

Although there are more than 500 active licenses granted in this sub-band for demonstration purposes, you may not hear much from them. Equipment manufacturers and dealers often use these licenses to show potential customers the capabilities of particular products, where one of the capabilities is to be able to operate in this sub-band.

Federal government use is centered at 29.90 MHz and covers 10 kHz on either side, making it a 20 kHz wide channel.

The two segments on either side of the Federal slice, from 29.80 to 29.89 and from 29.91 to 30.00 MHz, are allocated to International Fixed Public Radio Communication services and to Aeronautical fixed site stations. Here you may find long distance data transmission services that carry news, weather and other "public" information for hire as well as aviation-related data feeds.

Other countries also make use of this sub-band. Because the radio signals can travel such great distances, you may hear Brazilian taxicabs, Spanish delivery services, British military operations, Mexican telephones, and a variety of other voice traffic in many foreign languages.

I would recommend setting up a limit search between 29.70 and 30.00 MHz in narrowband FM (NBFM) and let it run. When the propagation characteristics are right, you may hear quite a few interesting transmissions. Please keep a log and let us know what you find!

## ❖ Phoenix Update

*Thank you for printing up my fast food window intercepts from Phoenix, Arizona. I do not have a digital capable scanner, yet, so I focus on non-trunked, non-digital scanner communications.*

*To discover even more retail and restaurant frequencies, it's helpful to ask the people who work there what brand and model of radio they use, because you would like to purchase said model for your business. That way, they don't have to tell you what frequency they are on...even if they know.*

*Then look up the radio model on Google. For our local "Castles N' Coasters" amusement park in Phoenix, near Metro Center, I asked the manager about his Motorola BPR40 radio, then simply looked up the VHF factory programmed channels: 151.625, 151.655, 151.685, 151.715, 151.775, 151.955, 154.570 and 154.600 MHz.*

*Note that 154.570 and 154.600 do not need an FCC license under MURS (Multiuser Radio Service) regulations.*

*Likewise, a number of Phoenix area businesses operate Motorola radios using these common frequencies: 464.500, 464.550, 467.7625, 467.8125, 467.850, 467.900 and 467.925 MHz.*

*Bridge and highway repair contractors*



*Scottsdale Fashion Square (courtesy mall-hall-of-fame.blogspot.com/)*

*use Special Industrial frequencies around Phoenix: 158.400 and 451.800 MHz*

*Check www.scannerstuff.com for the "Southwest Frequency Directory" and the "Phoenix/Tucson Metro Guide" for exhaustive and confirmed Arizona scanner frequencies collected by local public safety officials and scanner hobbyists. They have a long list of even more business frequencies in the appendix, but the above VHF and UHF frequencies will offer an amazing variety of users.*

*Some local scanner fans got a visit from mall security in our valley Westcor Malls. It seems like scanners aren't welcome inside the malls – but signals have an annoying habit of travelling beyond mall property. So, I just sit in a restaurant outside mall property, put my scanners on limit search, or automatically log frequencies with the Yaesu Smart Search.*

*And, when I go into the malls, I always dress like I work there, and listen only with an earphone. I've followed this policy for years – and never had security ask anything about the scanner. Police, mall security, and mall management have told me they thought I was a janitor, sales representative, or even a security officer myself.*

*Yes, I can hear an amazing variety of behind-the-scenes business and recreation radio with only analog, non-trunking scanners!*

*Federal agencies such as the DEA and Bureau of Land Management still use some non-P25 radios, too.*

*And, even though our police agencies use trunked digital communications, the helicopters must go on the VHF aero band to keep a safe distance from each other:*

| | |
|---|---|
| 123.025 | Police, Fire and Air Ambulance Helicopters. |
| 123.550 | "Company", used by PD helicopters, air-to-air |
| 154.280 | Fire Department Intersystem. No PL tones, but many helicopters! |

*73, Robert in Arizona*

That's all for this month. More information is available on my web site at **www.signal harbor.com**, including links and additional scanner data. Please continue to send your questions, comments and frequency lists to me at danveeneman@monitoringtimes.com . Until next month, Happy Halloween and happy scanning!

# ASK BOB

## GENERAL QUESTIONS RELATED TO RADIO

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

Sharp-eyed engineer David Hindin pointed out an error in my August column. In my discussion about two-way signal splitters, I should have said "…you will lose 3 dB since the original signal power *[not voltage]* is now divided in half to feed both receivers." I should also point out that, in addition, there will be some minor resistive loss in the windings as well.

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**Q.** *I have a problem with two local AM broadcasters. I hear them not only on their assigned frequencies of 1480 kHz and 1300 kHz, but on multiples of 1480 kHz. Does this mean my radio is defective? (MB, IN)*

**A.** While radios can be overloaded producing spurious responses like this, in some cases, external environmental objects like corroded metal junctions can do the mixing and radiate the products you are hearing. It's also possible that the local broadcaster is radiating harmonics at a level that can produce mixing under the right circumstances. There are some things you can do to test whether it's the radio or not.

First, try another antenna like a short piece of wire that reduces the signal strengths. If the radio has an attenuator switch, you can use that instead. With the radio on its present antenna, mark down the S-meter level when you are listening to 1480 kHz or 1300 kHz, and also the level from one of the spurs (spurious signals).

Now use the shorter antenna or attenuator and mark down those new, lower levels. If the drop in level on a spur is much greater than the drop on the fundamental signal, the problem is overload intermodulation ("intermod") of the radio. If the drop in level is about the same, then it's external to the radio.

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**Q.** *I'm getting a continuous scratching sound on my scanner that I think may be coming from my home. How can I tell what's causing it? (Raymond C. Wood, Brattleboro, VT)*

**A.** In order to thoroughly diagnose the problem, I would need to know
1. Is it a hand-held scanner or a desktop unit?
2. Are you using the attached whip or an outdoor antenna?
3. Do you get the interference on all frequencies or just some?
4. Do you sometimes receive desired signals or not?
5. Can you set the squelch to a level that eliminates the static?
6. If you remove the antenna, does the noise disappear or become noticeably less?

If the noise does disappear or reduce when the antenna is removed, then the source of interference is in your home. If that's the case, and you have a hand-held scanner, you can walk from room to room, adjusting the squelch as you go, even removing the antenna (or shortening it if it's adjustable) if it's too strong, to find the offending source.

Sources of electrical interference in the home may include washers and dryers, wall adapters and chargers (switching type), home entertainment centers, computers, and other electronic accessories.

If the source is local, say, one room location, you must either move the offending device or your antenna further away from the device. Usually, an outdoor antenna with well-shielded coax lead-in is the best solution.

---

**Q.** *When transmitting roughly 100 watts on the 17 and 20 meter ham bands, my CO2 alarm goes off. Could you elaborate on just what causes this? (Mark Morgan, N8QIK, Cincinnati, OH)*

**A.** When RF voltages are impinged on wiring, they do strange things. Often they are rectified and delivered to parts of the affected equipment that are sensitive to any change in voltage levels, such as detectors of various sorts.

I suspect that's probably what happens to your CO2 detector – it interprets the increase in electrical voltage the same as if its sensor was sending the voltage, thus triggering the alarm.

---

**Q.** *Since switching-type power supplies generate high-frequency AC (typically in the tens of kilohertz) from DC for more efficient and compact power conversion, can commercial switching power supplies like the Jetstream JTPS30M operate from both AC and DC 120 volt sources? (JJ Owens, NC)*

**A.** We checked with Jetstream and they said no, their power supply will only operate from an AC power line.

---

**Q.** *What is Litz wire and why was it used in early radio? (Mark Burns, Terre Haute, IN)*

**A.** Radio frequency (RF) currents have a tendency to travel near the surface of a wire, not all through it; hollow wire would work just as well. The higher the frequency, the more the RF currents migrate toward the wire's "skin."

The principle advantage of Litz wire over other kinds of wire is its ability to reduce the resistive nature of "skin effect" below 1 MHz or so; that's why it was popular in the early days of radio, but is rarely used now at radio's higher frequencies.

Litz wire is a woven wire – fine wires separated from each other by interwoven strands of cloth insulation. As a result, the RF currents have several conductors for them to travel near the surface, thus reducing the resistance they would encounter with only one conductor.

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**Q.** *Growing up with radio, I survived the change from megacycles to megahertz. I learned that resistance is measured in ohms, kilohms (x1000) and megohms (x1,000,000). Capacitance was in microfarads and picofarads, so what the heck is a nanofarad?*

**A.** As in your example, most scientific units of measurement are conveniently classified in intervals of 1000, indicated by the prefixes pico, nano, micro, milli, kilo, and mega. Exceptions to these units are found commonly.

Capacitance is usually measured in microfarads and picofarads, separated by a multiplier of 1,000,000 (1 microfarad = 1,000,000 picofarads). To conform to the standard classification scale and thus avoid awkward decimal values, the nanofarad is sometimes used. Thus, a 0.001 microfarad (1000 picofarad) capacitor is also 1 nanofarad – simply a shift of the decimal three places. Here's the way it looks:

| pF (picofarad) | nF(nanofarad) | uF microfarad | Farad |
|---|---|---|---|
| 1,000 | 1.0 | 0.001 | * |
| 10,000 | 10.0 | 0.01 | * |
| 1,000,000 | 1,000 | 1.0 | * |
| * | 10,000 | 10. | * |
| * | 100,000 | 100.0 | * |
| * | 1,000,000 | 1000.0 | 0.001 |
| * | * | 10,000 | 0.01 |
| * | * | 100,000 | 0.1 |
| * | * | 1,000,000 | 1.0 |

But cheer up, the use of microfarads and picofarads is still far more common.

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# UTILITY WORLD

**HF COMMUNICATIONS**

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http://mt-utility.blogspot.com

# New Arctic NAVAREAs Promise Utility Catches

On July 1, three international agencies began their one-year phase-in of five new NAVAREAs and METAREAs for the Arctic waters. These new areas, by definition, will provide maritime safety and weather information to ships anywhere inside their boundaries. This will certainly require some building onto existing radio assets and, conceivably, even an expansion.

A NAVAREA is a specific world oceanic zone in which a coordinating agency, usually a government, is responsible for navigational warnings. Up until July, there had been 16 of these, given the Roman numerals I through XVI. This previously existing system had been agreed upon before climate change increased navigation in the Arctic. Therefore, all areas stopped at a northern boundary of 65-69 degrees north latitude.

A METAREA is a similar zone, with the same boundaries, in which a coordinator becomes responsible for the timely broadcast of weather information. Arctic conditions can deteriorate very rapidly, making such a service essential. The five new METAREAs will have the same lead agencies as the NAVAREAs.

Radio schedules are going to need some adjustment to make this all work within the internationally defined Global Maritime Distress and Safety System (GMDSS). In particular, this affects the GMDSS SafetyNET broadcasts.

Due to presently limited satellite coverage in the higher latitudes of this region, the compulsory SafetyNET system will at least start out relying heavily on narrowband direct printing. This will bring some changes to Navigational Telex (Navtex) schedules, and in fact some listeners have noticed testing has already begun. Navtex is on 518 and 490 kilohertz (kHz) in a printing system called SITOR-B (Simplex Telex Over Radio, mode B).

Similar SITOR-B schedules may also appear on high frequency (HF), with its greater propagation range providing the hobbyist a good opportunity for distant transmitter chasing (DXing). Of course, it's also possible to DX Navtex, and in fact the intended low coverage makes it quite a challenge. Fortunately, propagation down there can be very steady on long winter nights. Periods of low noise allow some amazing catches.

The new NAVAREAs and METAREAs are numbered XVII (17) through XXI (21). While other such world areas in this system are sharply defined, these new ones will ultimately overlap to ensure timely warnings.

In some cases, this will require installation of new firmware in GMDSS equipment.

Here are the locations of the new NAVAREAs/ METAREAs, minus this future overlap:

**XVII**: North from 67 degrees latitude, above the Alaska and Canada coasts from 168.58 to 120 degrees west. Canada is the coordinating government.

**XVIII**: Continuing north of Canada and the 67th parallel to 35 degrees west. Again, Canada is coordinator.

**XIX**: Continuing north of Greenland at 35 degrees west to 30 degrees east. The southern boundary is 75 degrees north to a point north of the UK, then 65 north. Norway is coordinator.

**XX**: North of Norway from 30 east, continuing north of Russia to 125 east. The Russian Federation is coordinator.

**XXI**: North of Russia from 125 east back to 168.5 west and 67 north. Again, Russia is coordinator.

Here are the tentative broadcast schedules for the new areas. Since this is still in a testing mode, changes will probably occur. All times are Coordinated Universal Time (UTC).

XVII: 0300, 1130, 1500, 2330
XVIII: 0300; 1100, 1500, 2300
XIX: 0630, 1100, 1830, 2300
XX: 0530, 0600, 1730, 1800
XXI: 0600, 0630, 1800, 1830

We'll have more on this situation as it evolves. Meanwhile, keep an ear out for tests and new schedules.
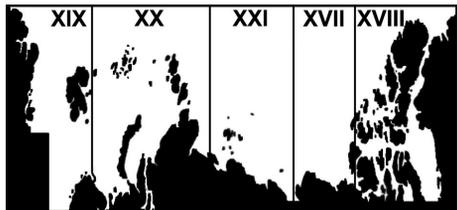


## ❖ Korean Numbers Update

After the August column, I received a great e-mail from "Token," the well-equipped California listener who specializes in Asian numbers. This listener has continuously monitored the Korean numbers stations for several years, on all known frequencies.

Cutting to the chase, let's update the frequency list that ran last month. The current frequencies for this station are 5715.0, 6215.0, 6330.0, and 6730.0 kHz amplitude modulation (AM). Not every frequency is active every day. At the beginning of 2010, the 4500.0 and 4600.0 kHz frequencies were dropped, and nothing has

been heard on these since. 4940.0, 5500.0, and 6715.0 went silent sometime earlier.

Token also filled in some good information for the Morse code sister station, which is designated M94 by the European Numbers Information Gathering and Monitoring Association (ENIGMA). M94 uses 5715.0 and 6330.0 kHz, in modulated continuous wave (MCW) mode. M94's MCW variant uses on-off keying of an audio tone with a continuous carrier wave, allowing AM reception on simpler radios.

Note that M94 uses some of the same frequencies as the voice station, which ENIGMA has designated V24. M94 has cut back somewhat in 2010, converting most of its time/day of month/frequency slots to the voice V24. More details of M94 are at **http://home.mchsi. com/~token_radio/numbers_station_m94. htm**

Interestingly, all time/day of month/ frequency slots get used two months in a row. Introductory music stays the same, but the message changes. Unlike most other musical numbers stations, V24 often changes its music. Token notes around eight songs in use as of mid-2010.

It is probably significant that all of these current musical selections are of interest primarily in North Korea. One might speculate whether a particular music choice has some kind of a message content in itself.

More details of V24 are at **http:// home.mchsi.com/~token_radio/numbers_ station_v24.htm**

All transmissions of both stations are thought to take place between 1200 and 1630 UTC. The 2200 UTC transmission mentioned last month for V24 could well have been someone writing down the wrong time, as I can find nothing more about it.

More about V24 and M94, with a somewhat dated schedule (as of press time) is at **http://home.mchsi.com/~token_radio/v24_ m94_scheduleV2.htm** . The coming autumn season should help anyone outside Southeast Asia trying to hear these stations.

## ❖ Russian Spy Update

Soon after we went to press on the US government arresting a number of alleged Russian spies, all suspects pleaded guilty to a misdemeanor charge of failure to register as foreign agents. In one of those tit-for-tat diplomatic deals, all were immediately sent back to Russia in return for that country's freeing several Americans being held over there.

This brings to an end the latest "Russian Spy" case. Since it will never go to trial, we will never know exactly how radio figured in whatever espionage activities actually happened. This is too bad. Any testimony regarding use of the Cuban numbers transmissions (ENIGMA V02a and M08a) by Russian agents operating in the USA would have answered some persistent questions. So it goes, in the numbers scene.

## ❖ COTHEN Frequency Use Update

COTHEN, as we know, stands for (US) Customs Over-The-Horizon Enforcement Network. It started out using a proprietary scanning mode, and then it modernized to a more flexible Automatic Link Establishment (ALE) system. As its use enlarged from anti-smuggling ops to include such US Coast Guard missions as flight following, COTHEN began adding new frequencies to its original 11 channels.

This column's COTHEN project began as an attempt to determine who was using the new frequencies and who wasn't.

A spreadsheet was prepared which counted the number of different stations logged on each frequency, broken down by ALE addresses (call signs).

This was done daily for about a month, at which point the same stations and frequencies were repeating pretty much all the time at this location. However, the project has since been greatly expanded to include a huge log of ALE hits graciously provided by *MT* editor Larry Van Horn, from *MT* headquarters in Brasstown, NC. B-town is clear across the US from California, and the time of year is completely different for radio propagation. These factors greatly increase the validity of the statistical sample.

Here's the quick total by frequency, in kHz, with the new ones starred. They are ranked by number of different stations heard: 8912, 105; 10242, 103; 7527, 101; 11494, 99; 13907, 84; 15867, 66; 12222*, 56; 5732, 47; 13312*, 44; 14582* and 18594, 42; 20890, 39; 5909.5*, 23; 23214, 15; 25350, 8; 20662*, 4; 4614.5* and 5250*, 1.

Two other ALE frequencies also show up on occasion in COTHEN scans. These are 11196.0 and 17988.0 kHz. Both are from the US Coast Guard's old net called TISCOM, which stands for Telecommunications and Information Systems Command.

Several conclusions become possible, especially when the individual calls are taken into account. Right off, we can see that everyone uses the old frequencies. About half the stations also use all of the new ones. Finally, a few only add in one or two of them.

There's also a pronounced skew toward the middle of the short wave band. This is undoubtedly due to usable propagation for more hours in the day. Finally, the bottom line is this: one can scan only the old net and hear a lot, but it's much better to include the whole list and hear everything.

When this project finally ends, the whole spreadsheet will go on this column's web site. Happy fall DX season, and see you next month!

## ABBREVIATIONS USED IN THIS COLUMN

AFB ................... Air Force Base
ALE .................... Automatic Link Establishment
AM .................... Amplitude Modulation
ARQ .................. Automatic Repeat reQuest
AWACS ............. Airborne Warning and Control System
BOM ................. Australian Bureau of Meteorology
COTHEN ........... US Customs Over-The-Horizon Enforcement Network
CW ................... On-off keyed "Continuous Wave" Morse telegraphy
DHFCS .............. UK Defence High Frequency Communications Service
DSC .................. Digital Selective Calling
EAM ................. Emergency Action Message
E07 .................. Russian Intelligence "male" machine voice
FAX .................. Radiofacsimile
FEMA ................ US Federal Emergency Management Agency
G11 .................. German version of "Strich" family
HFDL ................ High-Frequency Data Link
HF-GCS ............ High-Frequency Global Communication System
LDOC ............... Long-Distance Operational Control
LSB .................. Lower Sideband
M08a ............... Cuban CW/MCW numbers, cut to ANDUWRIGMT
M18 ................. Russian, continuous 24-hour times in CW text
M89 ................. Chinese military 4-figure changing CW calls
MARS ............... US Military Auxiliary Radio System
MCW ............... Modulated CW, tone or AM
Meteo .............. Meteorological Office
MFA ................. Ministry of Foreign Affairs
NASA ............... US National Aeronautics and Space Administration
NAT ................. North Atlantic air route control, families A-F
PR .................... Puerto Rico
RSA .................. Republic of South Africa
RTTY ................ Radio Teletype
Selcal .............. Selective Calling
SHARES ............ SHAred RESources, US Federal frequency pool
SITOR ............... Simplex Telex Over Radio, modes A & B
UK ................... United Kingdom
Unid ................ Unidentified
US .................... United States
USAF ................ US Air Force
USCG ............... US Coast Guard
V02a ................ Cuban Intelligence, Spanish 3-message format

*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 ().*

| | |
|---|---|
| 60.0 | MSF-UK National Physical Laboratory, Anthorn, CW standard time signals at 0002 (Ary Boender-Netherlands). |
| 75.0 | HBG-Swiss Federal Metrology Office, Prangins (Geneva), CW standard time signals at 0003 (Boender-Netherlands). |
| 77.5 | DCF77-German Physical and Technical Institute, Mainflingen, AM and phase-modulated standard time signals, at 0004 (Boender-Netherlands). |
| 426.0 | KPH-Maritime Radio Historical Society (MRHS) "Night of Nights" CW event, Pt. Reyes, CA, at 0500 (Hugh Stegman-CA). |
| 472.0 | NMC-USCG Camspac Pt. Reyes, CA, for CW "Night of Nights," also on 6382.9 and 8573.9, working possible call KTMV195, at 0446 (Stegman-CA). |
| 2070.4 | BPLEZS-German Water Police, Cuxhaven, working BP26 (Police Boat Eschwege), also on 2505, 4618, 5258, and 8132; ALE and data at 2221 (MPJ-UK). |
| 2142.5 | ZLST-German Customs, Cuxhaven, working ZPRI (Customs Boat Priwall), and ZSHO (Customs Boat Schleswig- Holstein), also on 2673 and 3831; ALE at 2050 (MPJ-UK). |
| 2216.0 | XSS-UK DHFCS, Forest Moor, also on 2219, 2784, 4168.5, 4703, 5295, 8182, 9019, 11208, 12230, and 15040; ALE sounding at 2100 (MPJ-UK). |
| 2971.0 | Shanwick-NAT-D, Shannon/Prestwick, position and selcal check EQ-KS with USAF Air Mobility Command transport Reach 258, at 0300 (Prez-MD). |
| 3890.0 | UWS3-Kiev Radio, Ukraine, CW weather and then working river traffic, at 1934 (MPJ-UK). |
| 3924.0 | "7-L-F"-Unknown military, working Kinloss Rescue, UK, at 1944 (Michel Lacroix-France). |
| 4247.0 | KPH-MRHS, CA, CW marker, also on 6477.5, 8642.0, 12808.5, 17016.8, and 22477.5; at 0333 (Stegman-CA). |
| 4343.0 | WLO-Mobile Radio/Shipcom, AL, CW "Night of Nights," simulkeying on 8658, 12992, and 16968.5, markers and station info at 0255 (Stegman-CA). |
| 4362.0 | TARANT-Italian Financial Police, Taranto, working DENARO (Coast guard Patrol Boat Denaro), ALE at 1912 (MPJ-UK). |
| 4426.0 | VMC-BOM, Charleville, weather at 0416 (Eddy Waters-Australia). |
| 4460.0 | 10111-Moroccan Civil Defense, working 11116, also on 5435, 5792, 5823, and 10390; ALE at 2025 (MPJ-UK). |
| 4490.0 | KGD34-US National Communications Center, SHARES Master Coordination Station, VA; ALE sounding at 0500 (MDMonitor-MD). |
| 4503.0 | Unid-Russian military time string station (M18), continuous CW local time at 2127 (Boender-Netherlands). |
| 4540.0 | Architect-UK Royal Air Force flight watch, working "0-6-X" and others, at 0721 (Lacroix-France). |
| 4593.5 | AFA3AJ-USAF MARS NE2S1 net control, checking in AFF3WV, WV, AFA1BT, NH, and AFA3LF, PA, at 2332 (MDMonitor-MD). |
| 4655.0 | FREDGAS-WPPY393, Washington Gas and Light Company, Frederick, MD, sounding in LSB ALE, at 0900, 1000, and 1030 (MDMonitor-MD). |
| 4721.0 | JDG-USAF, Diego Garcia, also on 4730, ALE sounding at 1926 (MPJ-UK). |
| 4742.0 | Tascomm-UK Tactical Air-Sea Communications, Forest Moor, working unknown station at 0913 (Lacroix-France). |
| 5000.5 | GS3-US military or government, calling AED (USAF, Elmendorf AFB, AK), also on 8000.5 and 11400.5, ALE at 1736 (Jack Metcalfe-KY). |
| 5278.0 | Q7NW-Chinese Military (M89), CW marker for GKVZ, at 1057 (Waters-Australia). |
| 5583.0 | "05"-Auckland HFDL, New Zealand, uplinks and squitters at 1105 (Waters-Australia). |
| 5646.0 | Unid-Saudia Airlines LDOC, Jeddah, selcal GH-JK to A330 HZ-AQB, Saudia 160, at 1938 (PPA-Netherlands). |
| 5649.0 | G-FDZE-Thomson Airlines flight 54J, a Boeing 737, position for Shannon after selcal BK-MQ, at 1939 (MPJ-UK). |
| 5680.0 | Rescue 8966-German Navy helicopter, working Helgoland and Glucksburg Rescue, at 0402 (ALF-Germany). |
| 5687.0 | DHJ83-German Air Force, Koln, selcal GM-CP to C-160 registration 50+69, at 0616 (Lacroix-France). |
| 5708.0 | ARMOR-French Navy, Brest, working "DG," at 0643 (Lacroix-France). |
| 5755.0 | VMW-BOM, Wiluna, FAX weather map at 1355 (Waters-Australia). |
| 5760.1 | NCS209-National Communications System auxiliary station, ALE sounding at 2152 (Metcalfe-KY). |

5773.0 "The English Man"-Russian Intelligence, callup "147 147 147 1 37673" and message (E07), earlier on 7473, at 2042 (PPA-Netherlands).

5800.0 "Cut Number Station"-Cuban MCW callup and 5-letter-group messages (M08a), in progress at 0600 (PPA-Netherlands).

5810.0 M08a-CW in progress, at 0602 (Boender-Netherlands).

5815.0 "Strich"-Unknown intelligence, German callup "V99/00" (G11), then "Ende" after null message, at 1307 (ALF-Germany).

5855.0 G11-German null-message callup "V75/00" and "Ende," at 0938 (ALF-Germany).

5883.0 Unid-Cuban Spanish AM female (V02a), 5-number groups in progress at 0704 (Boender-Netherlands).

5898.0 M08a-MCW groups in progress at 0505 (PPA-Netherlands).

5901.0 USDAHQ1-US Department of Agriculture headquarters, DC, ALE sounding at 1647 (Metcalfe-KY).

6312.0 003669995-USCG, Portsmouth, VA, DSC safety test at 0511. 003669991-USCG, Boston, MA, DSC safety test at 0518 (PPA-Netherlands).

6474.0 KSM-MRHS, CA, simulkeyed CW with KPH, also on 8438.3, at 0630 (Waters-Australia).

6477.5 KPH-MRHS, CA, simulkeyed on 8642, 12808.5, and 17016.8; CW bulletins at 0630 (Waters-Australia).

6507.0 VMC-BOM, Charleville, voice synthesized "male" with South Australia forecasts, at 0210 (Prez-MD).

6565.0 "02"-Molokai HFDL, HI, uplinks and squitters at 0825 (Waters-Australia).

6622.0 Madang-Papua New Guinea, position from an Air New Zealand flight, at 0737 (Waters-Australia).

6661.0 "04"-Riverhead HFDL, NY, uplink to N17126, Continental Airlines B757, at 0309 (PPA-Netherlands).

6673.0 San Francisco-Pacific oceanic air control, position from American 162, at 0217 (Prez-MD).

6696.5 HBM46-Swiss Army, SITOR-B "voyez le brick" test loop, also on 6978.5, at 0925 (ALF-Germany).

6739.0 Andrews-USAF HF-GCS control, Andrews AFB, MD, 28-character EAM, parallel on 11175, at 0705 (Waters-Australia).

6765.1 HSW-Bangkok Meteo, Thailand, musical chime and female machine voice at 1826 (PPA-Netherlands).

6767.0 NSFHQ1-US government, possibly National Science Foundation, also on 6780.6, ALE sounding at 1809 (Metcalfe-KY).

6819.6 KTQ316-Probable US Environmental Protection Agency, ALE sounding at 2037 (Metcalfe-KY).

6890.0 VKL-Royal Flying Doctor Service, Western Australia, at 1045. VKJ-RFDS, Western Australia, at 1127 (Waters-Australia).

6910.0 NNN0VHA-US Navy/ Marine Corps MARS, taking check-ins on SHARES Region 6 Net, at 1638 (Metcalfe-KY).

6992.5 MFJ04-UK Royal Navy Sea Cadets, working MFM27, MFQ15, and MFM01; at 1940 (ALF-Germany).

7527.0 HSD-USCG Cutter Drummond (WPB-1323, international call sign NHSD), calling Z13, USCG Sector Key West, FL, at 0900 (MDMonitor-MD).

7535.0 VMW-BOM, Wiluna, FAX weather chart at 1255 (Waters-Australia).

7602.0 3A7D-Chinese military (M89), CW marker calling DKG6, at 1923 and 2033 (MPJ-UK).

7632.0 NMN-USCG Camslant, VA, checking into SHARES Region 4 Net, also WGY9416, FEMA auxiliary mobile, OH, at 1605 (Metcalfe-KY).

7833.0 WOXN-Chinese military (M89), CW marker calling QPZM, at 2147 (MPJ-UK).

8000.5 GS1-US military or government, calling ADW (Andrews AFB, MD), also on 11400.5 and 12000.5, ALE at 1732 (Metcalfe-KY).

8047.0 I050NN-IN National Guard, Indianapolis, calling EMERGENCY, ALE at 1315 and 1320 (MDMonitor-MD).

8131.0 Unid-Stations in Mediterranean Cruisers Net, backup frequency for 8122, at 0556 (PPA-Netherlands).

8156.0 Coral Harbour Base-Royal Bahamas Defence Force, getting status of patrol vessel C6DR, at 1155 (MDMonitor-MD).

8182.0 Unid-Several Spanish speakers, usual whistle at callup, at 0044 (MDMonitor-MD).

8187.0 Robert Crown-Unknown military, weather and status check with NA29 Brave, at 2032 (Metcalfe-KY).

8280.0 7P4S-Venezuelan Navy, possibly Training Ship Simon Bolivar, calling 1EW1, Naval Base "Amario," also on 8340, LSB ALE at 0100 (MDMonitor-MD).

8414.5 002711000-Istanbul Radio, Turkey, working 271001063, Turkish container ship Jean-Pierre A (TCRF4), DSC at 0546 (PPA-Netherlands).

8416.5 VFF-Canadian Coast Guard, Iqaluit, SITOR-B Navtex for areas XVII and XVIII, at 0330 (ALF-Germany).

8502.0 NMG-USCG New Orleans, "Iron Mike" voice with Gulf forecast and tropical storm Bonnie information, at 0415 (Prez-MD).

8582.5 KLB-Shipcom, WA, "Night of Nights" CW markers interrupted for a possible call, at 0317 (Stegman-CA).

8734.0 SVO-Olympia Radio, Greece, listening on channels 806, 1232, 1640, and 2217, English and Greek, at 0603 (PPA-Netherlands).

8764.0 NMN-USCG Camslant, VA, "Iron Mike" weather at 2200 (Lacroix-France).

8800.0 HQ3-Libyan Great Man Made River Authority, Tripoli, calling GHADAMES, ALE at 1856 (PPA-Netherlands).

8825.0 KEA5-New York Radio, working LAN Ecuador 1733, at 0421 (PPA-Netherlands).

8834.0 "08"-Johannesburg HFDL, RSA, uplink to 9V-SKC, a Singapore Airlines A380, at 1816 (PPA-Netherlands).

8840.0 "Operaciones"-Unknown company LDOC, Spanish with unknown flight at 0005 (ALF-Germany).

8867.0 Auckland-Pacific oceanic air control, New Zealand, working flights along with Sydney, Australia, at 0425 (Prez-MD).

8879.0 Mumbai, India, selcal check QR-LP with Air Arabia 457, an A320 registration A6-ABR, at 1828 (PPA-Netherlands).

8885.0 PK-GPI-Garuda Indonesia A330, flight GA0089, HFDL log-on with Muharraq, Bahrain, at 2207 (MPJ-UK).

8891.0 Gander-NAT-D, Canada, handing Air India 102 to Shanwick on 2862, at 0141 (Prez-MD).

8894.0 Algiers-African air route control Area 2, "good morning" and position from unid flight at 0147. Brazzaville, Congo Republic, working Lufthansa Cargo 8264, at 0235 (Prez-MD). N'djamena, Chad, working Afrique Air 764, also using 8903, at 1938 (PPA-Netherlands).

8912.0 P16-COTHEN at USCG Air Station Miami, FL, working L07 (USCG MH-65C #6607), ALE at 2322 (ALF-Germany).

8930.0 C-GTSH-Air Transat 194, an A310, company LDOC medical patch in English and French, at 0714 (Lacroix-France).

8951.0 Tashkent Radio, Uzbekistan, working unknown "Uzbek" flight in Russian, at 0044 (PPA-Netherlands).

8957.0 "13"-Santa Cruz HFDL, Bolivia, uplink to N205UW (US Airways B757), at 0510 (PPA-Netherlands).

8977.0 "03"-Reykjavik HFDL, Iceland, uplink to VP-BWH, an A320, Aeroflot 117, at 0947 (PPA-Netherlands).

8992.0 Reach 637-USAF, weather from Puerto Rico HF-GCS, at 0240 (ALF-Germany).

9025.0 SUN2-Unknown US military, ALE sounding at 1530 and 1924 (ALF-Germany). Bandsaw Lima-USAF E-3 AWACS back end, ALE autopatch (as E3002) via OFF (Offutt AFB, NE), then voice with (sounded like) Workshop at 1634 (Metcalfe-KY).

9067.7 Unid-Egyptian MFA, Cairo, selcalling OOVF, Pyongyang, North Korea, also on 18451.7, SITOR-A at 2053 (PPA-Netherlands).

9255.2 PWBR-Brazil Naval Patrol vessel Bracui, working PWB33, Belém, SITOR-B at 0422 (ALF-Germany).

10057.0 San Francisco-Pacific oceanic air control, position and selcal check from Hawaiian Airlines 30, gave 6673 secondary, at 0330 (Prez-MD).

10087.0 VP-BIG-AirBridge Cargo Airlines B747, flight ABW540, HFDL position for Krasnoyarsk, Russia, at 1938 (MPJ-UK).

10242.0 N04-USCG HC-144A #2304, ALE sounding, also on 14582, at 1340 (MDMonitor-MD).

11175.0 Offutt-USAF HF-GCS, NE, sending Ruler 96, MS Air National Guard C-17, to 13200 for a patch, at 1628, Offutt, working Topcat 34, a probable RC-135 surveillance aircraft, regarding status of RC-135 Snoop 55, at 1941 (MDMonitor-MD). Enormity-US military, sent to 11220 for a patch by Andrews (USAF Andrews HF-GCS, NE), at 2318 (Jeff Haverlah-TX).

11205.0 Tascomm, selcal JK-ES to Ascot 6616, UK Royal Air Force C-17A registration ZZ171, at 0915 (PPA-Netherlands).

11220.0 Enormity-US military came from 11175 for a patch to Deer Horn via Andrews HF-GCS, at 2319 (Haverlah-TX).

11232.0 Sentry 50-USAF E-3B AWACS, patch via Trenton Military to Raymond 24, Tinker AFB, OK, at 2047 (MDMonitor-MD).

11256.0 Holloway-Ethiopian airlines company LDOC, Addis Ababa, calling flight 19, at 1719 (PPA-Netherlands).

11300.0 Speedbird 064-British Airways, working Khartoum, Sudan, at 2154 (Lacroix-France).

11348.0 LY-SKR-Aurela Airlines B757, HFDL position for Las Palmas, Canary Islands, at 1033 (MPJ-UK).

11485.0 143CDCC40-Tulsa Health Department, OK, voice WNG971, ALE text message at 1656 (Metcalfe-KY).

12219.0 FC1FEM-FEMA Region 1 Communications Manager, calling PR2FEM, PR Emergency Management Agency, at 1400 (MDMonitor-MD).

12226.7 Unid-Egyptian embassy, Kampala, Uganda, SITOR-A message to "71," at 1750 (PPA-Netherlands).

12431.0 GWPWN33-Brazilian Navy, Natal, working GWPWIN, also on 17010, ALE at 1252 (MPJ-UK).

12497.0 4JIF-Russian vessel Reshid Behbudov, selcal KYVX to UAT, Moscow (duplex on 12599.5), SITOR-A auto telex at 1841 (PPA-Netherlands).

12552.0 KKUI-Restored Victory Ship American Victory, maritime mobile in FL, "Night of Nights" CW duplex working KPH, at 0100. KKUI, duplex with KSM at 0104, KFS at 0109, and WLO at 0125 (Stegman-CA).

12577.0 002241021-Bilbao Radio, Spain, answered DSC call from 538090155 (V7HF5, bulk carrier Brunhilde Salamon), at 0825 (PPA-Netherlands).

12695.5 KFS-MRHS, CA, simulkeying bulletins with KPH, CW at 0630 (Waters-Australia).

12993.0 KSM-MRHS, CA, CW maritime data, simulkeyed on 17026 KFS, at 0542 (Waters-Australia).

13134.0 SVO-Olympia Radio, Greece, voice news in Greek, at 1945 (PPA-Netherlands).

13137.0 UDK2-Murmansk Radio, Russia, maritime phone patch at 1703 (PPA-Netherlands).

13179.0 UTQ-Kiev Radio, Ukraine, operator with "radiogramma," at 0723 (PPA-Netherlands).

13468.0 E07 "English Man," null-message callup "441 000," at 1700 (Mike-West Sussex, UK).

14396.5 AAV4AR-SHARES net control, GA, working WGY 923, PA Emergency Management, at 1650 (MDMonitor-MD).

14396.5 KHA908-NASA Ames Research Center, CA, checking into national SHARES net, at 1625 (Metcalfe-KY).

14455.0 KHA908-NASA, CA, reminding KHA946 and KHA959 about KHA909 in the NASA Weekly HF Net, at 1647 (Metcalfe-KY).

14650.0 Unid-Egyptian MFA, Cairo, selcalling and working KKXU, Harare, Zimbabwe, SITOR-A at 0739 (PPA-Netherlands).

15658.0 123CDCS27-MN Department of Health, Saint Paul, raised 010CDCNHQ, US Centers for Disease Control headquarters, then voice as WNG985, at 1603 (Metcalfe-KY).

15867.0 LNT-USCG Camslant, VA, ALE and voice with N08, USCG HC-144A #2308, at 1613 (MDMonitor-MD).

16011.7 Unid-Egyptian MFA, Cairo, Arabic SITOR-A to unknown embassy, at 0710 (Waters-Australia).

16026.7 Unid-Egyptian MFA, Cairo, SITOR-A selcalling OOVF, Pyongyang, then went to 16025 for data modem, at 0530 (Waters-Australia).

16128.5 Unid-North Korean MFA, Pyongyang, encrypted 600/600 ARQ, also on 16246.5 and 19241.5, at 0905 (Waters-Australia).

16907.5 JFA-Japanese Central Fisheries, FAX weather chart at 0450 (Waters-Australia).

17026.0 KFS-MRHS, CA, CW marker at 0116 (Waters-Australia).

17405.0 Unid-Russian maritime information, in Russian SITOR-B, at 0734 (Waters-Australia).

17434.7 Unid-Egyptian MFA, selcalling KKVZ, Kampala, Uganda, SITOR-A at 0810 (Waters-Australia).

18238.1 ZSJ-South African Navy, Silvermine, FAX surface analysis at 0655 (Waters-Australia).

18261.0 GYA-UK Navy, Northwood, FAX weather at 1705 (PPA-Netherlands).

18331.7 Unid-Egyptian MFA, Cairo, SITOR-A messages to unknown embassy, at 0825 (Waters-Australia).

20890.0 D49-US Customs P-3 registration N149CS, ALE sound at 2054 (MDMonitor-MD).

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# Digital Utility Listening Tips

The idea for this month's column comes from reader Rowland H, who suggested that it was time for an update of the March 2004 article that featured some listening tips for utility listeners.

## ❖ Where to find utility signals?

One of the main goals of most of the *MT* writing staff is to help our readers find things they are interested in listening to, or to find new signals of interest. Lists of frequencies we publish in this column and elsewhere accomplish that goal, but what if you want to trawl the bands looking for new digital signals from military and commercial users, aid organizations and diplomatic stations? Where do you look?

While there are plenty of digital signals to be had in the standard worldwide allocations for aero and maritime traffic, it's most often outside of these ranges that the more interesting digital signals can be found. Of course, propagation (more about that later) plays a large part in what you'll be hearing on any given time, day and frequency, but here are my favorite, tried and tested tuning ranges for finding digital utility signals:

| Daytime | Nighttime |
|---|---|
| 9000 to 9400kHz | 4000 to 4200kHz |
| 10000 to 11500kHz | 4400 to 5850kHz |
| 12100 to 12450kHz | 6600 to 7000kHz |
| 13300 to 13600kHz | 7500 to 8400kHz |
| 13800 to 14000kHz | 9000 to 9400kHz |
| 14350 to 15100kHz | 10000 to 11500kHz |
| 15700 to 16500kHz | 12100 to 12450kHz |
| 17400 to 17500kHz | |
| 18000 to 21000kHz | |
| 21500 to 26000kHz | |

Of course, don't let these ranges discourage you from looking *inside* the broadcast, maritime and aero allocations! There are many digital utility stations that use this as a tactic to reduce the chances of being overheard, but in the main, because they are often at a significant power and antenna disadvantage to broadcasters in particular, the kinds of digital utility signals we are interested in will usually be in the ranges listed above.

## ❖ How to Find Utility Signals

Most of my time at the radio is spent manually tuning through the ranges I've indicated above hunting for new signals and logging regularly heard stations to ensure that I don't miss any changes. If you have a traditional radio, that's about as complicated as it gets. However, the advent of new SDR (Software Defined Receiver) radios that work in conjunction with your computer, like the Perseus from Microtelecom or the IQ from RFSpace, have revolutionized this aspect of listening.

Now, you can park your SDR on a chosen part of the spectrum for however long you want, and these receivers will record a large swathe of bandwidth (usually around 200kHz) at incredible levels of detail. You can simply "play back" the recording at a later time and see all of the activity in that portion of bandwidth at the same time. It really is quite amazing. Hunting for very brief signals that would simply be missed by the traditional tuning of a dial becomes an absolute breeze.

## ❖ Identifying Unknown Stations and Signals

Now that you know where to tune and what to record, the next most important question to answer in most cases, is "What and/or who have I just heard?" Fortunately, these days, there are plenty of resources (besides this very publication, of course!) to help you discover the identity of your latest catch:

- a traditional print or CD-based frequency list like Klingenfuss or Siebel
- custom-designed utility databases like PC Frequency Manager
- other peoples' logs from the UDXF mailing list
- Leif Dehio's digital signals audio clips archive
- the ITU Monitoring Service's frequency lists

In my case, I regularly download the files from the ITU Monitoring Service and convert them from Excel spreadsheets or DBF database files into a format that I can load into my Bento database. I have about 120,000 ITU-listed signals that I can search at the click of a button in this way.

To make just about everything else searchable, I use a Mac program called EagleFiler. This is a very flexible, free-format document database into which you can load PDF files, text files, emails and virtually any other kind of document. EagleFiler's job is simply to index all of the text and make it searchable. In this way, I have several tens of thousands of UDXF (and its predecessor WUN) emails, a decade's worth of *Monitoring Times* issues, and several other resources all at my fingertips. Most of the time, I'm just typing a frequency like "11430" into EagleFiler and looking at the results to see if my latest catch matches anything previously heard.

## ❖ Logging Digital Utility Signals

Now that you know where and how to find them, you'll need to keep a record of the stations you hear. As long-time readers of this column will know, the operating habits of many organizations stay the same while they may go through generations of equipment, so keeping track of as much information as possible about what you hear is important.

You can use a simple written logbook, a text document on a computer, a spreadsheet program like Microsoft Excel or Apple's Numbers, or a simple database program like Microsoft's Access or Filemaker's Bento. There are even purpose-designed logbook programs that come with many of today's radio control programs like Bonito's RadioCom.

Whatever you use to record it, at the very least, your logbook will need to note the following items of information:

- Date First Heard
- Time First Heard (in Universal Coordinated Time)
- Date Last Heard
- Time Last Heard (in Universal Coordinated Time)
- Frequency
- Callsign or Identifier Used
- User
- Location
- System Details (speed, shift, mode, encryption used, identifying features, etc)

After many years of using Appleworks on a Mac, I now use Filemaker's Bento database to keep my logbook of 15,000+ digital stations I've heard since 1996. This makes adding, updating, sorting and searching so much more convenient than paper.

## ❖ Propagation Tools

As I mentioned earlier, a lot of what you can hear at any given time and day will depend largely on the activity of the Sun. Knowing the solar conditions at any time can help you tailor your listening to frequencies and locations that are most likely to be heard. Think of it as a weather forecast for your shortwave radio.

Propagation analysis tools are also useful for trying to place new and unknown stations, because when you can hear them – and sometimes more importantly, when you can't hear them – will help indicate a station's approximate location.

Again, there is a wealth of resources to help you gauge the current and future listening conditions:

# October is Full of Fun

Every month is a great month to be an amateur radio operator. However, for me at least, October is always one of my favorites. The static crashes of summer are abating. The nights are getting longer. HF propagation picks up and VHF is still going strong. October is a month for just relaxing and enjoying the greatest hobby in the world.

## ❖ Work While the Weather is on Your Side

With the heat of summer behind us and the winds of winter still a few weeks away, now is the time to get out and give the antennas a good going over. Break out the safety gear and get up and give all your wire and cables a visual inspection.

If your feedline is more than a few years old, especially if it is coaxial cable, this would be a good time to replace it. If you have traps on your antennas, it is a good idea to check their integrity. All too often, critters crawl in the traps and build their nests. Also, they are subject to holding moisture if the drain holes get plugged by those aforementioned critters.

Check to make sure all your connections and connectors are well sealed and really give your outside ground system a good look. You may be moving outside of the thunderstorm season, but you can still get lightning during snow storms.

In taking the time to check out your antennas, also give a thought to any antenna support structures you have in place. One year I checked out one of my dipoles and found that the tree to which one side was attached had sustained a serious crack in a large branch right above the wire. Clearing that away assured that it wouldn't come down in the middle of winter when fixing the antenna might be both cold and dangerous to do.

Remember Old Uncle Skip's maxim: "Wire is cheap!" While you are out there looking over your existing skywires, why not give a thought to trying something new this season? Break out the *ARRL Antenna Handbook* or check out one of the Web sites devoted to antenna design. If your log book is weak in a particular direction, maybe try to string up a gain antenna such as a Half Square to try to pull in a few new DX entities over the winter season.

## ❖ Work Inside, Too

If you have followed this column for any length of time, you know I am a bit obsessive when it comes to preventative maintenance on my radio gear. At least once a year, I take my primary transceivers down to the work bench to clean them up and realign things to peak performance.

If you don't feel the need to make such a serious commitment, no worries. At least give your equipment a good visual going over, maybe blow out any accumulated dust and dirt to assure clean air exchange around heat sensitive components.

One of the most common failure points in shacks seems to be the feedline connector that goes into the back of the rig. These connectors and cables often get bent at odd angles, causing intermittent contact problems. Another thing that happens is oxidation on the solder joints of the connection. The symptom that indicates this is a low volume on receive that picks up after you transmit. A quick touch with an iron to re-flow the solder on the connector, along with a swipe of sandpaper or emery cloth usually does the trick on this gremlin.

## ❖ Mobile Readiness, Too

I think we can all get a bit neglectful of our mobile rigs. Yet they are most susceptible to failure, especially due to wear and tear. When we make mobile installations of power and antenna cabling, we are, to some degree, subverting the efforts of the entire engineering and design team of the auto manufacturer.

While you're making your checks of everything ham radio this October, you might want to sight along your radio wire runs in your car or truck to check for abrasions brought on by the vibrations and movement caused in any vehicle. Again, it's easier to crawl around your car in this temperate time of year than needing to trace a wire problem in the dead of winter.

## ❖ Get Ready for Competition

The big fall and winter contests are right around the corner starting with the CQ Worldwide DX Contest (Phone) on October 30th. Even if you are a casual operator, diving into the contests is a great way to fill up the log book. October has a lot of fun contest experiences that can get you ready for the bigger events coming up in a few weeks.

One way to get geared up for the contest season is via the State QSO Parties. October has no less than six QSO Parties usually held during the month. These include activities for Arizona, California, Illinois, Iowa, New York, and Pennsylvania. If you are looking to work toward the coveted 5 Band Worked All States award (5BWAS), these parties are the way to go. If you are a County Hunter, they also offer a way
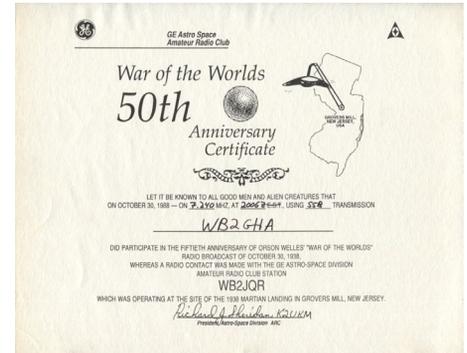


to fill in the gaps in your log for the Worked All Counties awards.

My close friend Jon WB2KKS clued me in to a fun way to play the State QSO Party game. This works best with the closer states, but can be a fun challenge regardless. Take a map of the state that indicates all of the counties. As you work each county, check it off on the map. Try to get them all, but don't feel bad if you miss a few; this is supposed to be fun, remember? Jon has been doing this for years with the PA QSO Party and it's become a point of pride to say "I've got them all!"

Another fun contest in October is the 10-10 International Club's "10-10 Day Sprint" held on (you guessed it) October 10th. Ten meters is starting to come back nicely and this contest is a great way to dip your toe into one of the most interesting bands.

When ten meters is dead, you could throw a kilowatt signal into the air and barely be heard down the block. When it is open, you can load up a light bulb with half a watt and work the world. Okay, those are extreme statements, but say that to any dedicated Ten Meter Op and he or she will nod knowingly. For more information on this event, check out the Club Website at **www.ten-ten.org**.

Another point on all these above mentioned operating events: If you are primarily a phone operator but want to give CW contesting a try, I find that these events are a bit more forgiving to slower CW ops than the Big Gun contests. Since the competition is a bit less intense, it is much easier to find some folks that are willing to slow down (QRS) to swap points with you.

And, while we are on the subject, don't forget the F.I.S.T.S Fall Sprint on October 9th this year: **www.fists.org/**

## ❖ Special Events

Special Events Stations are available on most weekends of the year, but for some reason, I always seem to gravitate to Special Events opera-

tions during the month of October.

For those of you new to amateur radio, a Special Events station is usually set up by a group of folks to commemorate a (…wait for it…) Special Event. This could be a ham club's anniversary, a local historical event, a community activity, just about anything you can imagine. Folks put up a station for the event, sometimes getting a unique callsign for the commemoration.

Once you work the station, they will usually share, over the air or through a ham radio magazine such as *QST*, the address and procedures for QSLing. Usually this will involve sending a stamped self addressed envelope (SASE) along with your QSL card. In return, you often get a nice certificate to display for your efforts.

Two of my most memorable Special Events QSOs occurred during the month of October. The first of these was when I still held the callsign WB2GHA.

October 30, 1938 was the date of the famous Mercury Theater on the Air broadcast of the radio play *War of the Worlds*, directed and narrated by Orson Welles. This radio play became known as "The Panic Broadcast" because its news bulletin format made folks think that Earth was, in fact, being invaded by strange creatures from Mars. If you recall the plot of the show, the alien space craft supposedly landed in Grover's Mills, New Jersey.

On the 50th anniversary of the broadcast, a group of hams from The GE Astro Space Amateur Radio Club WB2JQR went to a public park in Grover's Mills and set up a Special Event operation to commemorate the historic broadcast.

Collecting this Special Events certificate was only part of getting into the spirit of that evening. I also listened to a rebroadcast of the original Mercury Theater show from nearby CBS affiliate WCAU 1210 (now WPHT). To make things even more fun, I listened in on a restored 1938 Westinghouse table radio. The framed Special Events certificate hangs over that radio in my office to this day.

My second October Special Event catch of note occurred during 1999. That was a great year for QRP enthusiast in the radio hobby. It was the year that Ed Hare W1RFI discovered and restored the late great Doug DeMaw W1FB's original Tuna Tin II Transmitter. Designed and built in 1976 and lost for some time, having that little rig back on the air was a big deal for the QRP community and for any fan of Doug's great body of work.

On October 30, 1999 I worked Ed, operating as W1AW/QRP from the American Radio Relay League Headquarters, using Doug's rig. Good enough for some, but my contact was a TWO WAY Tuna Tin II contact. I was sending to Ed with my own TT2.

This was a great thrill, having the chance to work Doug's original transmitter. It was topped in March 2000, however, when I got to operate *using* the original TT2 at the Atlanticon QRP Convention. But that is another story entirely.

I hope these two stories inspire you to poke around on the bands in October in search of your own Special Event memories.

## ❖ Plan for Winter Solder Melting

When the hard winter drives me in from outdoors (quite a trick, as I have a dry suit for kayaking), I can always be found snug in my basement workshop building something or other. With the dozens of kits and hundreds of schematics out on the Web, there is always something to construct. Transmitters, receivers, transceivers and all manner of radio hobby accessories are a few mouse clicks and a few dollars away.

October is the month I usually begin my parts search and my kit buying so that my workbench will be full of fun and adventure all winter long. There is no greater point of pride than letting the ham on the other end of the QSO know that you are running something home brewed.

If you are new to building your own equipment, don't bite off more than you can chew. Start with something simple like a code practice oscillator or even the above mentioned Tuna Tin II (currently available from QRPme, PO Box 160, Limerick, Maine 04048, **http://qrpme.com.** Rex Harper W1REX runs a great little kit operation with lots of simple fun things to build. His Web site is well worth a visit.

## ❖ QRP Legacy

You no doubt read that the hobby lost one of its great writers in January of this year. Dave Ingram K4TWJ (SK) authored over 25 books and thousands of article on amateur radio, most recently as a columnist of *CQ* magazine. He was a giant in the hobby, and he will be missed now that he

has gone "Silent Key."

As my brief ham radio book review this month, I'd like to share my thoughts on Dave's final work, which was a self-published book.

**QRP ROMPS**
by Dave Ingram K4TWJ
88 Pages, $18.00
Order No. 0160 from
The American Radio Relay League
225 Main Street
Newington, CT 06111-1494
www.arrl.org/shop 1-888-277-5289



Dave always showed enormous enthusiasm for amateur radio in general and QRP operating in particular. This book – his last word on the subject – covers all aspects of the current state of the art of low power ham radio.

Ingram begins with a general explanation of QRP and how it is possible to work the world with such low power levels. He goes on to discuss operating strategies to let a low power operator compete with the Big Guns on the air. He devotes an entire chapter to QRP clubs and QRP specific contests.

The book gives a complete guide to currently available commercial equipment and the many great kit rigs and accessories that are available to the QRP op. Dave finishes out with a chapter on antennas designed to allow a low power station to put up the most efficient skywire possible.

As you can see from my comments on *QRP Romps*, it is hard to talk about Dave's work in the past tense. Dave may be gone, but his body of work, including this book, remain with us.

Well, enjoy the month of October. Enjoy ham radio every month of the year. You'll always find me at the bottom end of 40 meters, no matter what page the calendar is turned to. Have fun!

# Buying Your First Shortwave Radio

The first shortwave radio that I bought was in 1966 and it was a Knight-Kit Star Roamer from Allied Radio, whose catalog, along with Lafayette's, were as required reading for shortwave listeners as *Popular Electronics*. I think it cost about $30 and took weeks to put together, working every afternoon after school with my good friend Jack Hogan.

It was a nice entry-level shortwave radio, though to me, it was as good as anything Hammarlund or Hallicrafters ever made. Today, entry-level shortwave radios would run rings, at light speed, around the Star Roamer.

There's understandably a lot of warm nostalgia for the old tube-fired receivers, but who would give up the total portability, low power consumption, direct frequency tuning, and amazing sensitivity of today's portable shortwave radios? There's no doubt in my mind that we are living in the golden age of shortwave radio manufacturing right now. With surface mount reliability, digital signal processing, and more memory capability than early computers, radios have never been better made. The best part is that, unlike the old days, there are competent shortwave radios at just about every price point.

## ❖ What *Not* to Buy

There have always been junk radios on the market, and for some reason otherwise intelligent people are lured into buying them. Internet "auction" sites are full of them and people are often drawn to these radios because they seem to offer sensible features. The funny thing is that these junk radios don't cost that much less than ones that really work. They represent very little in actual savings.

Over the years I've heard from readers who have complained that there just wasn't much to listen to on shortwave, other than preachers or incomprehensible foreign languages. I have to tell them, it's not HF, it's your radio.

There's also a batch of cheap, look-alike "emergency" radios that, at first glance, have tons of "useful" features, including built-in flashlights, red strobe

*Radio Shack multi-tasking portable shortwave receiver. For $40 it will perform as advertised, but you'll be disappointed at its shortwave reception capabilities. (Courtesy: Radio Shack)*

lights, sirens, hand-crank driven power generators, solar power cells, and jacks for charging cell phones. I've even reviewed these radios in the pages of this magazine. They work as advertised. But, don't confuse these radios with serious shortwave receivers. Most use stiff analog tuners with miniscule band spread capability; have miniature whip antennas, and are easily overloaded by any nearby transmission source. Give them a pass.

Junk shops, antique stores, flea markets and eBay are all teeming with an endless supply of used junk radios. If it was a junk radio new in the box, why would you buy it now, just because it costs less? Now, of course, there are exceptions. If you read Michael Jacks cover story in the December issue of *MT* "The Big World of Little Radios," you'll know that there are some superb, older, solid state radios that are not only great radios still, but collector's items worth many times what they were new. Maybe you'll get lucky and find one in a junk shop and buy it cheaply. But, you'll have to look at a lot of trash to get to it.

Vintage, tube-fired shortwave sets such as those featured in Lin Robertson's cover story for the July issue of *MT*, "Restoring Vintage Broadcast and Shortwave Sets," also look attractive to first-time shortwave radio buyers. Why not get a great old, warm and fuzzy Zenith and take up pipe smoking this winter? Because, these radios make terrible choices for beginners. If you're not prepared to dive into these sets and painstakingly restore them the way that Lin or Marc Ellis, our *Radio Restorations* columnist does, then you're in for a disappointment the first time you turn on the set and it starts smoking.

There's an undeniable attraction to sitting down to a $2,500 shortwave receiver hooked up to a massive outdoor antenna. But, even if you have the money, this is not the place to start, either. If you've never spent any time tuning around the HF spectrum, you may quickly have buyer's remorse, particularly given current band conditions. The worst part is that you'll wait a long time before you find a buyer who will give you anywhere near the price you paid.

## ❖ OK, What *Do* I Buy?

Before you buy your first shortwave radio, let's consider what you really need. If you want an inexpensive, all-around, all-band, portable shortwave radio, start with something like the Kaito KA1103. It's been a perennial favorite with a number of *MT* reviewers throughout the last several years, and with good reason: It's

*Kaito 1103 is one of many quality portable shortwave radios available for less than $100. (Courtesy: Kaito U.S.A.)*

versatile, easy to use and you won't be out much if the HF bug doesn't bite you.

If portability isn't an issue and you've got more money in the budget, think about stepping up to something more expensive and capable, such as the Eton 750 ($300 at Grove Enterprises). They've got a good track record and the reviews are very positive. You'll get better reception and certainly better audio out of this radio than any portable.

*Eton 750 shortwave radio ($300 from Grove Enterprises) is a capable bridge between the $100 radios and the $700 rigs. (Courtesy: Eton)*

If computers are your second love, consider investing in a software defined radio (SDR) such as the WiNRADiO or Flex Radio series. And, if you're handy with a soldering iron, you might consider DZKit's Sienna, all-band, SDR (**www.dzkit.com/detailed_information.htm**). You can forget the computer with this radio; it's got one built in!

*WiNRADiO's Excalibur software defined radio at $850, is a feature-packed software defined radio. (Courtesy: WiNRADiO)*

You'll get twice the radio by combining "black box" receivers such as the WiNRADiO or Flex Radios with your computer. And, by adding free software, you'll get DRM (digital

*MFJ-784B DSP audio filter ($250) cleans up adjacent channel interference, tones and other problems on the frequency. It's a way to update older radios without such features. (Courtesy: Universal Radio)*

shortwave broadcasts) thrown in the bargain! You can't get that with any analog radio. SDR's are more expensive, $850-1,500, but extremely capable receivers.

Once you figure out your budget and what you think you'd like to buy, take some time to read the reviews in previous issues of *MT*. They're all neatly lined up for you on the *MT* home page. Just click on the button that says "*MT* Reviews." Next, click on "All Reviews" to see an index of reviews from 1997 to 2007. Click on the hotlink "Shortwave Receivers." An article index through July 2010 is also available on the home page that might give you more updated reviews. You can also use this list to check out used sets you might find online or in flea markets. We've done all the testing and tuning for you; now you make the choice.

You can also benefit from learning what radio enthusiasts from around the world have to say about the product you're interested in. Check out the reviews at **www.eham.net**. But, keep in mind that some reviews are colored by personal prejudices or lack of competency: Anyone can post a review. Still, you'll recognize a reviewer who's knowledgeable.

Consider giving your radio some help. There are accessories that you can buy that may enhance your shortwave listening. One is an outboard digital signal processor (DSP - *See Computers & Radio for more on DSP-ed.*). This is one way to remove adjacent channel interference or squeals or hum on a frequency you're trying to listen to, particularly on an older receiver that doesn't have such a feature. The MFJ model pictured here is a knob twister's dream with no fewer than 14 buttons and knobs you can use to peak and tweak those elusive signals. It's a good thing to have if you're a serious listener, and at $250 you won't break the bank adding it to your signal arsenal.

## ❖ Final Thoughts

Here are some final things to consider when buying your first shortwave radio. We are still wallowing in the depths of the singularly worst solar cycle anyone can remember. No radio, regardless of cost or capability can drag signals out of the air that don't exist.

Every radio benefits from a better antenna. Expecting to pull weak signals out of a shaky ionosphere with an 18" whip antenna is asking for disappointment. If you can't put up an outside antenna, you're limiting the listening potential of your radio shack.

And, finally, if you live in an electrically noisy environment, you may have to take extraordinary steps to solve that issue. Some places are simply impossible. Consider moving.



*Icom R75 is a great traditional desk-top shortwave receiver priced at $700 but can be found at Universal Radio for $620. (Courtesy: Universal Radio)*

One other thing to consider is "growing" into your shortwave hobby. If you've been reading Hugh Stegman and Chris Parris' columns regularly, you'll know that there's a lot out there to tune in. If you've got the bucks, jump right in with the Icom R75; you won't regret it. If you're not sure, go the Kaito 1103 route and work your way up. If you're still interested a year from now, you'll know what to look for.

Since the purchase of the Star Roamer decades ago, I've bought a number of short-wave radios. The best portable was a Uniden 2021cr (from Grove Enterprises in 1982). I paid $189 for it new. It was easily twice the radio the Star Roamer was and it has seen daily service the last 28 years and still works great. The



*Sony IC2010 was at the head of its class twenty years ago. If you find a used one in good shape, snap it up! (Courtesy: Universal Radio)*

last shortwave radio that I bought was the Kenwood TS-140s transceiver I bought new in 1988. It has been such a great general coverage shortwave receiver that I've never considered buying another.

If you've just upgraded your ham license to General Class, this is the time to consider getting a good transceiver. Older, reliable rigs from Kenwood, Icom and Yaesu are relatively cheap. You'll be able to talk to the world and tune in the world, all on the same radio. If you buy a good enough radio to begin with, you may never have to buy another.



*Uniden 2021cr was Uniden's answer to the Sony 2010 and at about half the price, it performed nearly as well; this preowned model still makes a good first shortwave receiver. (Courtesy: Universal Radio)*

custom-designed propagation programs like VO-ACap, ACE HF Pro and DXToolBox websites like HFRadio.org and QSL.net's Propagation Page

I use BlackCat Systems' DXToolbox, which is a simple but powerful program that reads the current conditions at regular intervals from NASA servers and allows me to see the expected best frequencies and times for many different locations around the world. DXToolbox works on Windows and Mac operating systems.

Finally, I also like to join the other listeners on Internet Relay Chat channel #wunclub, where there is always a lively exchange of live digital utility frequencies being tracked down by listeners around the world. Give it a try!

Until next time, enjoy your digital listening and do please keep your emails and letters coming with suggestions for what you want to see in the column.

# PROGRAMMING SPOTLIGHT
## WHAT'S ON WHEN AND WHERE?

*Fred Waterer*
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www.doghousecharlie.com/radio

# So Long to Sweden on SW

We open this month with a reminder to listeners that Sweden bids farewell to the international radio bands at the end of the month. As the **Radio Sweden International** website announces: "This means that from October 31, **Radio Sweden**'s programming in English will be broadcast nationally (on FM), as well as available on the Internet, and our podcast will be available here and on iTunes for downloading."

Your editor has been downloading the podcast for some time already. Sweden is the last state broadcaster of the Nordic countries to leave shortwave, joining a trend around the world.

In May 2009, we shone the *Programming Spotlight* on the Nordic countries, including Sweden. Some highlights from that report follow.

"**Radio Sweden** offers a daily email with the next day's program highlights. Here in North America, your best bet to hear Radio Sweden is at 0130-0200 and 0230-0300 via the Sackville, New Brunswick transmitters of Radio Canada International on 6010 kHz."

(Radio Sweden was heard for many years via the CBC Overnight programming block on the CBC Radio One network; however, in recent months much of the international programming has been dropped in favor of BBC and CBC programming during this block.)

"Radio Sweden programs are available online via the Radio Sweden website. In fact there is a 30-day archive of programs. Check **www.sr.se/rs/english/**. These programs can also be downloaded as a podcast via iTunes or your favorite podcatching program. And it can be heard through the World Radio Network via satellite and online.

"Monday to Thursday, one can hear "**Radio Sweden daily edition.**" According to the website 'Radio Sweden is committed to its goal of being the best source of information about Sweden in English with relevant, interesting and thought-provoking programmes for Sweden's culturally diverse society, its expatriate community, Swedes abroad and *Swedophiles* around the world.'"

"Each day, the listener gets a jam-packed half-hour program, looking at all things Swedish. It would probably be nice if they picked up the slack with news of their neighboring Nordic countries, not that they are required to make up for cutbacks abroad.

"A careful listen reveals a surprisingly multicultural nation: Surprising, because I had no idea of the extent that Sweden is a major destination for immigrants and refugees in Europe.

"Expanding on this theme, on Fridays, Radio Sweden presents **Inside Sweden** 'carried on the national P2 network Fridays at 13:30 hrs local times as well as on shortwave, (which) connects Sweden to the world and new immigrants to Sweden.

"**Radio Sweden Weekend** is a review of the week. 'Each Saturday and Sunday we bring you a round-up of the week's main stories and talk to the people who shaped them – from government ministers to the Swede in the street. What's happening in this country's social, cultural, political and entertainment scenes? If you missed a programme during the week – catch up with Radio Sweden on Saturday or Sunday!'" **www.sr.se/rs/english/index.htm**

## ❖ Hallowe'en

All Hallow's Eve occurs each year on October 31. While **Radio Sweden** leaving the shortwaves on that day is neither a trick nor a treat, almost every year at this time, on the 30th or the 31st, some radio station somewhere will play Orson Welles' original recording of *War of the Worlds*, or Jeff Wayne's *War of the Worlds* concept album from 1978, featuring the awesome narration of Sir Richard Burton and vocals by the Moody Blues' Justin Hayward (for trivia fans, the song *Forever Autumn* was a Top Ten hit in 1978). For many years, the late Chris "Punch" Andrews would run these on **Mix 99.9** in Toronto. On October 31 he would morph into "Punchkin Andrews". Great radio!

If you can't find a radio station airing Orson Welles' original famous broadcast, it can be found online via a number of sources, for listening and/or download. The Mercury Theatre On the Air website is one. Just scroll down to October 30, 1938. **www.mercurytheatre.info/** Another source is **www.archive.org/details/OrsonWellesMrBruns**. **Archive.org** has also posted (as this is typed) a copy of the Jeff Wayne version; however, it seems to me this is copyrighted.

Another person who really gets into the Hallowe'en spirit, so to speak, is Michael Godin of **Treasure Island Oldies**. It's surprising to realize just how many "spooky" and Hallowe'en novelty songs there are out there. Michael, who hosts a 4-hour show every Sunday, presents his annual **"Hallowe'en Spooktacular"** as **"Count Michael."** This year Sunday is right on October 31. Your editor has been a regular listener for over seven years; it's always a fun time. **www.treasureislandoldies.com**



And what would Hallowe'en be without **Coast to Coast AM** *aka* **The Art Bell Show**? Host **George Noory** continues the weirdness established by **Art Bell** on any number of radio stations in the overnight hour. If you can't find a station carrying **Coast to Coast AM**, you don't have your radio turned on! Before I became a reformed night crawler, I used to spend hours listening to the weird, the wacky and the downright fascinating, every night on **Coast to Coast AM**. Traditionally, on Hallowe'en, Art, and perhaps now George, often gave over the whole program to tales of a spooky nature, going so far as to rename the show **Ghost to Ghost**!

These Hallowe'en stories are always good fun, and often provoke a giggle or two, or perhaps even a shiver! Just remember to bring some grains of salt and apply liberally!

## ❖ Thanksgiving, Canadian Style

Canadian Thanksgiving Day is October 11. In Canada Thanksgiving is celebrated much earlier than in the United States, probably a function of a much shorter growing season in most of the country. Michael Godin hosts his annual Canadian Thanksgiving Day special on Sunday, October 10. Be ready to hear such songs as Mashed Potato Time and Turkey Trot.

For those readers with access to **CBC**

**Radio One** over the air (or online at **www. cbc.ca/local**), one can hear special holiday programming from Canada throughout the day as regular programming is often replaced by specials or repeats of past programming. Roy Forbes may appear in one of his **Snap, Crackle and Pop** specials early in the morning, but I am not holding my breath. Other stations such as **CFRB/CFRX** may have "Best of" programming.

## ❖ Recommended Fall Programs

While discussing **CBC Radio One**, the fall schedule is due out as I type this column. A few programs to watch out for in the coming months include:

**As It Happens** – the flagship interview program on **CBC Radio One** since the 1970s. This summer, **CBC Radio One** has been running an edited version of the program at local midnights across the country, giving one a second daily opportunity to hear the program.

**White Coat, Black Art -** hosted by Dr. Brian Goldman started as a 10-week summer replacement show in 2007. It proved so popular that it returns frequently to the **CBC Radio** schedule. "Brian has a proven knack for making sense of medical baffelgab. On 'White Coat, Black Art', he takes listeners past medical bluff and bluster and shows what really goes on at hospitals and clinics." This is one of the best and most informative programs on Canadian radio. As of August, the website tells us that the program will "return soon." Look for it in the fall schedule, which should be published by the time you read this. **www.cbc.ca/whitecoat/**

**Afghanada** – When this program first appeared, your editor was quite skeptical about it, figuring there must be an agenda behind it. Instead, I find it a compelling drama about the experiences of a group of Canadian soldiers in Afghanistan, a country where Canadians have been serving since 2001. "**Afghanada** gives us a grunts-eye perspective of the war in Afghanistan. 3 -1 Bravo is a Canadian Forces light infantry section, fighting with NATO forces deep in the heart of the conflict. Every day, Sgt. Pat Kinsella (Jenny Young), Private Dean Donaldson (Paul Fauteux) and Private Lucas Manson (Billy Maclellan), confront the chaos and violence of life 'outside the wire.' (CBC **Afghanada** website). It's not your typical war drama. It comes and goes throughout the year.
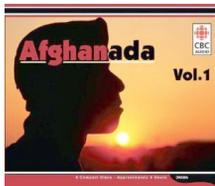
Past episodes are available...for a price. Perhaps this is the wave of the future. A link from the CBC **Afghanada** site takes you to the iTunes store where one can purchase individual episodes for two rapidly depreciating Canadian dollars. (Unless iTunes works strictly in US Dollars, which would be kind of ironic.) **www. cbc.ca/afghanada/**

**The Age of Persuasion** – Hosted by Terry O'Reilly, the program looks into the cool, interesting and sometimes wacky world of advertising. It's one of the more fascinating programs I have ever heard on the **CBC Radio One** network. According to the website, it is due to return in January 2011 (so mark your calendars!). In the meantime, while they do not podcast, you can listen to almost every past episode of the program online. **www.cbc. ca/ageofpersuasion/archives.html** Topics covered in the past year or so have included: *Opportunism, Slogans, Negative Advertising, Marketing the Unpleasant* and many many more. From politics to products, he looks at all the ways that advertisers persuade, or attempt to persuade you to buy or do something. From Vince the Slap Chop Guy to Barack Obama, Terry investigates their methods of selling. It really is engaging stuff. **www.cbc.ca/ageof persuasion/**

**BBC Radio 4 Case Notes –** is a "Medical programme exploring a different topic each week, with reports and input from experts" according to the program website. As medical programs go, I find this one to be one of the best. As you are reading this, your editor will be getting ready for gallbladder surgery: Quite by coincidence, in mid-August, the topic was …. gallbladder surgery. In the short half hour of the program, Dr Mark Porter examined both the causes and treatment of gallstones and their surgical removal. Dr Porter talked to patients and doctors, prior to surgery, sat in on the procedure (even offering something of a play-by-play) and then talked to the same patients and doctors after the procedure, to get their take on the whole thing.

I thought it might be "too much information," but in actuality it was just right. But when my turn comes I really hope there is not a radio reporter in the room making the surgeon laugh as he extracts my gallbladder. That could be mildly disturbing. Prior to the program, I had a general idea what was to take place, now I know, pretty much specifically, so, yes, the program was a real benefit.

Several weeks worth of **Case Notes** are available online at **www.bbc.co.uk/ programmes/b006th1n**. You can also listen to the current program on Tuesdays and on demand for 7 days via the Radio 4 website at **www.bbc.co.uk/radio4** or, you can download the **Medical Matters** podcast via iTunes (free) each week and listen at your leisure.

**Russia – Folk Box** is one of the few programs that are holdovers from the Soviet Era still on the Voice of Russia schedule. A quick look at my collection of old Radio Moscow schedules reveals that **Folk Box** was on the schedule as far back as 1985, if not earlier. In my younger days I wouldn't have bothered with a program like **Folk Box,** but as I have grown older and my tastes have moved beyond what one can hear on Top 40 radio (not that you hear much of that any more, either), it is really enjoyable listening to the music and the ethnic diversity of Russia. One can draw parallels with the "throat singers" of the Rus-

sian Far North and the Inuit of Canada and Greenland. It is also interesting to hear how Russian musical styles and instruments have insinuated themselves into regional cultures, along with influences from abroad. It's not all balalaikas and male choirs by any stretch of the imagination.

"An indispensable program for lovers of folk music where we take a close look at all peoples inhabiting Russia." So says the Voice of Russia website, quoting almost word for word, the description of the Soviet era program.

Tune in to **Folk Box** on Monday at 19.30, Tuesday 02.30 and 07.30, 11.30 and 22.30, Wednesday at 03.30, 09.30, 11.30, 16.30 and 21.30, Thursday 02.30, 08.30 and 20.30, Friday 17.30 and Saturday 00.30 and 06.30 and Sunday at 14.30 UTC. Or listen online and on demand at **http://english.ruvr.ru/ radio_broadcast/2360772/**

**Svetlana Yekimenko** is the host of a number of music programs on **The Voice of Russia**, including the abovementioned **Folk Box**, **Music and Musicians**, **Musical Tales**, **Russia - 1000 Years of Music** and **Music Calendar**. I really like her knowledgeable, conversational style as she introduces the listener to the wide variety of music covered in her various programs.

Almost every **VoR** program is now available on demand via the website, where you can listen online, or download the program for later listening. Often the programs are archived for several weeks, which is a nice feature if you want to revisit a past program. Sadly, as far as **VoR** music programs go, the two programs that AREN'T archived online are the two best ones: **Jazz Show** and **Russian Hits**, hosted by Carl Watts and Emil Akopov respectively.

## ❖ We get letters...

"Fred, in response to your (recent) article…AFRTS is alive and verifying reception reports. I have received several QSL cards from them, this being the most recent one. (Clinton enclosed a scan of his most recent card). The cards never seem to change, but they are usually quick to reply. Reception is usually best at night, but varies according to band conditions of course." (Clinton Hullender)

Clinton received a QSL card for reception of AFN Key West, FL on 7812.5 kHz at 2200 UTC on August 17, 2009. Clinton listens in Cleveland, TN. Thank you very much for the note, Clinton; it's good to know that AFRTS is still broadcasting!

Please feel free to contact the editor by postal mail, e-mail, Facebook, Twitter or even pony express, assuming you can find a pony! Your comments, criticisms, suggestions, ideas and contributions are always welcome! Cheers until next month!

Svetlana Yekimenko

## 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 into 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 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.*

## 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 - 8PM EDT / 7PM CDT / 5PM PDT

| | | | | | | |
|---|---|---|---|---|---|---|
| 0000 | 0004 | | Canada, Radio Canada International | 6100na | | |
| 0000 | 0015 | mtwhf | Moldova, (Transnistria) Radio PMR | 9665na | | |
| 0000 | 0027 | | Czech Republic, Radio Prague | 9790na | | |
| 0000 | 0030 | | Egypt, Radio Cairo | 11590na | | |
| 0000 | 0030 | vl | Guyana, Voice of Guyana | 3290va | | |
| 0000 | 0030 | | Thailand, Radio Thailand World Service | 15275na | | |
| 0000 | 0030 | | USA, Voice of America | 7555af | | |
| 0000 | 0045 | | India, All India Radio | 6055as | 7305as | |
| | | | 9705as | 9950as | 11645as | 13605as |
| 0000 | 0056 | | Romania, Radio Romania International | 7385na | | |
| | | | 9580na | | | |
| 0000 | 0057 | | Canada, Radio Canada International | 11700as | | |
| 0000 | 0100 | | Anguilla, Worldwide Univ Network | 6090am | | |
| 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 | 15230pa | 15415as | 17750pa |
| | | | 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 | | |
| | | | 6075as | 6180as | 7350eu | 7415eu |
| | | | 9570eu | 11790as | 11885as | 13750as |
| 0000 | 0100 | | Germany, Deutsche Welle | 9885as | 15595as | |
| | | | 17525as | | | |
| 0000 | 0100 | | Malaysia, RTM/Traxx FM | 7295do | | |
| 0000 | 0100 | | New Zealand, Radio NZ International | 15730pa | | |
| 0000 | 0100 | DRM | New Zealand, Radio NZ International | 15720pa | | |
| 0000 | 0100 | | Russia, Voice of Russia | 9890na | | |
| 0000 | 0100 | | Spain, Radio Exterior de Espana | 6055na | | |
| 0000 | 0100 | | Sri Lanka, SLBC   6005as | 9770as | 15745as | |
| 0000 | 0100 | | UK, BBC World Service | 5970as | 6195as | |
| | | | 7395as | 9740as | 12095as | 13725as |
| 0000 | 0100 | | Ukraine, Radio Ukraine International | 7440na | | |
| 0000 | 0100 | | USA, American Forces Network | 4319usb | | |
| | | | 5446usb | 5765usb | 7812usb | 12133usb |
| | | | 12759usb | 13362usb | | |
| 0000 | 0100 | | USA, WBCQ Monticello ME | 7415am | 9330am | |
| 0000 | 0100 | sm | USA, WBCQ Monticello ME | 5110am | | |
| 0000 | 0100 | | USA, WEWN Vandiver AL | 11520af | | |
| 0000 | 0100 | m | USA, WHRI Cypress Creek SC | 7315am | | |
| 0000 | 0100 | Sun | USA, WHRI Cypress Creek SC | 5875am | | |
| | | | 5920am | | | |
| 0000 | 0100 | | USA, WINB Red Lion PA | 9265ca | | |
| 0000 | 0100 | | USA, WRMI Miami FL | 9955ca | | |
| 0000 | 0100 | | USA, WTJC Newport NC | 9370na | | |
| 0000 | 0100 | | USA, WTWW Lebanon TN | 9479va | | |
| 0000 | 0100 | | USA, WWCR Nashville TN | 4840na | 7465na | |
| | | | 9980na | | | |
| 0000 | 0100 | | USA, WWRB Manchester TN | 3185va | 3215na | |
| | | | 6890va | | | |
| 0000 | 0100 | | USA, WYFR/Family Radio Worldwide | 5950na | | |
| | | | 6985na | 7360sa | 7520sa | 9505na |
| | | | 15440na | | | |
| 0005 | 0100 | twhfa | Canada, Radio Canada International | 6100na | | |
| 0030 | 0045 | twhfas | Albania, Radio Tirana | 9860na | | |
| 0030 | 0100 | | China, China Radio International | 11730as | | |
| 0030 | 0100 | mtwhfa | Serbia, International Radio of Serbia | 9675na | | |
| 0030 | 0100 | | Thailand, Radio Thailand World Service | 15275na | | |
| 0030 | 0100 | Sun | UK, Bible Voice Broadcasting | 7405as | | |
| 0030 | 0100 | | USA, Voice of America/Special English | 7430as | | |
| | | | 9715as | 9780va | 11725va | 15205va |
| | | | 15290va | 15560va | 17820va | |
| 0045 | 0100 | mtwhf | Moldova, (Transnistria) Radio PMR | 9665eu | | |
| 0045 | 0100 | Sun | Palau, T8WH/WHRI/Sound of Hope Radio | | | |
| | | | 15710as | | | |

## 0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

| | | | | | | |
|---|---|---|---|---|---|---|
| 0100 | 0105 | twhfa | Canada, Radio Canada International | 6100na | | |
| 0100 | 0127 | | Czech Republic, Radio Prague | 7345na | | |
| 0100 | 0130 | | China, China Radio International | 11730as | | |
| 0100 | 0130 | | Slovakia, Radio Slovakia International | 5930na | | |
| | | | 9440sa | | | |
| 0100 | 0130 | | Vietnam, Voice of Vietnam | 6175na | | |
| 0100 | 0157 | | North Korea, Voice of  Korea | 9345as | 9730as | |
| | | | 11735as | 13760as | 15180as | |
| 0100 | 0159 | | Canada, Radio Canada International | 9620as | | |
| 0100 | 0200 | | Anguilla, Worldwide Univ Network | 6090am | | |
| 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 | 15230pa | 15415as | 17750as |
| | | | 17715pa | 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 | 9410eu | 9470eu | 9535eu |
| | | | 9570eu | 9580na | 9790na | 11870as |
| | | | 15785as | | | |
| 0100 | 0200 | DRM | China, China Radio International | 6080na | | |
| 0100 | 0200 | | Cuba, Radio Havana Cuba | 5970na | 6000na | |
| 0100 | 0200 | vl | Guyana, Voice of Guyana | 3290va | | |
| 0100 | 0200 | | Malaysia, RTM/Traxx FM | 7295do | | |
| 0100 | 0200 | | New Zealand, Radio NZ International | 13730pa | | |
| 0100 | 0200 | DRM | New Zealand, Radio NZ International | 15720pa | | |
| 0100 | 0200 | | Russia, Voice of Russia | 9890na | | |
| 0100 | 0200 | | Sri Lanka, SLBC   6005as | 9770as | 15745as | |
| 0100 | 0200 | | Taiwan, Radio Taiwan International | 11875as | | |
| 0100 | 0200 | | UK, BBC World Service | 5970as | 6195as | |
| | | | 7395as | 9410as | 9740as | 11750as |
| | | | 12095as | 13725as | 15310as | 15335as |
| | | | 15360as | 17615as | | |
| 0100 | 0200 | | USA, American Forces Network | 4319usb | | |
| | | | 5446usb | 5765usb | 7812usb | 12133usb |
| | | | 12759usb | 13362usb | | |
| 0100 | 0200 | | USA, KJES Vado NM | 7555na | | |
| 0100 | 0200 | | USA, Voice of America | 7430va | 9780va | |
| | | | 11705va | | | |
| 0100 | 0200 | | USA, WBCQ Monticello ME | 7415am | 9330am | |
| 0100 | 0200 | sm | USA, WBCQ Monticello ME | 5110am | | |
| 0100 | 0200 | | USA, WEWN Vandiver AL | 11520af | | |
| 0100 | 0200 | twhfa | USA, WHRI Cypress Creek SC | 5920am | | |
| | | | 7315am | | | |
| 0100 | 0200 | | USA, WINB Red Lion PA | 9265ca | | |
| 0100 | 0200 | | USA, WRMI Miami FL | 9955ca | | |
| 0100 | 0200 | | USA, WRNO New Orleans LA | 7505am | | |
| 0100 | 0200 | | USA, WTJC Newport NC | 9370na | | |
| 0100 | 0200 | | USA, WTWW Lebanon TN | 5755va | | |
| 0100 | 0200 | | USA, WWCR Nashville TN | 3215na | 4840na | |
| | | | 9980na | | | |
| 0100 | 0200 | | USA, WWRB Manchester TN | 3145va | 3185va | |
| | | | 6980va | | | |
| 0100 | 0200 | | USA, WYFR/Family Radio Worldwide | 6985na | | |
| | | | 9505na | 15440na | | |
| 0130 | 0200 | | Iran, VOIRI/IRIB   7245na | 9495na | | |
| 0130 | 0200 | | Sweden, Radio Sweden | 6010na | | |
| 0130 | 0200 | twhfa | USA, Voice of America/Special English | 7465ca | | |
| | | | 9820ca | | | |
| 0140 | 0200 | | Vatican City State, Vatican Radio | 7335va | | |
| | | | 9580as | 9650va | 11850va | |
| 0145 | 0200 | twhfas | Albania, Radio Tirana | 7425na | | |

## 0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

| | | | | | |
|---|---|---|---|---|---|
| 0200 | 0215 | | Croatia, Croatian Radio | 3985eu | 9925am |
| 0200 | 0227 | | Iran, VOIRI/IRIB   7245na | 9495na | |
| 0200 | 0230 | | Thailand, Radio Thailand World Service | 15275na | |
| 0200 | 0230 | | USA, KJES Vado NM | 7555na | |
| 0200 | 0245 | | USA, WYFR/Family Radio Worldwide | 11835na | |
| 0200 | 0257 | | North Korea, Voice of  Korea | 13650as | 15100as |
| 0200 | 0300 | | Anguilla, Worldwide Univ Network | 6090am | |
| 0200 | 0300 | twhfa | Argentina, Radio Nacional 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 | 15230pa | 15415as | 15515pa |
| | | | 17750as | 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 | 11770as | |
| | | | 13640as | | |
| 0200 | 0300 | | Cuba, Radio Havana Cuba | 5970na | 6000na |
| 0200 | 0300 | | Egypt, Radio Cairo | 6270na | |
| 0200 | 0300 | vl | Guyana, Voice of Guyana | 3290va | |
| 0200 | 0300 | | Malaysia, RTM/Traxx FM | 7295do | |
| 0200 | 0300 | | New Zealand, Radio NZ International | 13730pa | |
| 0200 | 0300 | DRM | New Zealand, Radio NZ International | 15720pa | |

| | | | | |
|---|---|---|---|---|
| 0200 | 0300 | | Philippines, PBS/ Radyo Pilipinas | 11880me |
| | | | 15510me     15285me | |
| 0200 | 0300 | | Russia, Voice of Russia | 7440na     9665na |
| | | | 15425na | |
| 0200 | 0300 | | South Korea,  KBS World Radio | 9580sa |
| 0200 | 0300 | | Taiwan, Radio Taiwan International | 5950na |
| | | | 9680ca | |
| 0200 | 0300 | | UK, BBC World Service     6005af | 6195as |
| | | | 9410as     12095as     15310as | |
| 0200 | 0300 | | Ukraine, Radio Ukraine International | 7440na |
| 0200 | 0300 | | USA, American Forces Network | 4319usb |
| | | | 5446usb     5765usb     7812usb     12133usb | |
| | | | 12759usb     13362usb | |
| 0200 | 0300 | | USA, WBCQ Monticello ME     7415am | 9330am |
| 0200 | 0300 | m | USA, WBCQ Monticello ME     5110am | |
| 0200 | 0300 | | USA, WEWN Vandiver AL     11520af | |
| 0200 | 0300 | twhfa | USA, WHRI Cypress Creek SC | 5875na |
| | | | 7315am | |
| 0200 | 0300 | | USA, WINB Red Lion PA     9265ca | |
| 0200 | 0300 | | USA, WRMI Miami FL     9955ca | |
| 0200 | 0300 | | USA, WRNO New Orleans LA | 7505am |
| 0200 | 0300 | | USA, WTJC Newport NC     9370na | |
| 0200 | 0300 | | USA, WTWW Lebanon TN     5755va | |
| 0200 | 0300 | | USA, WWCR Nashville TN     3215na | 4840na |
| | | | 5890na | |
| 0200 | 0300 | | USA, WWRB Manchester TN     3145va | 3185va |
| | | | 5050va     6890va | |
| 0200 | 0300 | | USA, WYFR/Family Radio Worldwide | 5985ca |
| | | | 6100sa     6985na     9385ca     9505na | |
| 0215 | 0230 | | Nepal, Radio Nepal     5005as | |
| 0215 | 0300 | | Uganda, UBC Radio     4976do | |
| 0230 | 0300 | twhfas | Albania, Radio Tirana     7425na | |
| 0230 | 0300 | | Sweden, Radio Sweden     6010va     9510va | |
| 0230 | 0300 | | Vietnam, Voice of Vietnam     6175va | |
| 0245 | 0300 | | Australia, HCJB Global Voice Australia | 15400as |
| 0245 | 0300 | | India, All India Radio     3945do | |
| 0250 | 0300 | | Vatican City State, Vatican Radio | 7305am |
| | | | 9610am | |

### 0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

| | | | | |
|---|---|---|---|---|
| 0300 | 0315 | Sun | Swaziland, TWR Swaziland     3200af | |
| 0300 | 0327 | | Czech Republic, Radio Prague     7345na | |
| 0300 | 0330 | | Egypt, Radio Cairo     6270na | |
| 0300 | 0330 | | Philippines, PBS/ Radyo Pilipinas | 11880me |
| | | | 15510me     15285me | |
| 0300 | 0330 | | Sri Lanka, SLBC     6005as     9770as     15745as | |
| 0300 | 0330 | | Vatican City State, Vatican Radio | 7360af |
| | | | 9660af | |
| 0300 | 0355 | | South Africa, Channel Africa  6135af | |
| 0300 | 0356 | | Romania, Radio Romania International | 7335na |
| | | | 9645na     11895as     15340as | |
| 0300 | 0357 | | North Korea, Voice of  Korea  7200as | 9345as |
| | | | 9730as | |
| 0300 | 0400 | | Anguilla, Worldwide Univ Network | 6090am |
| 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     15230pa     15415as     15515pa | |
| | | | 17750as     21725pa | |
| 0300 | 0400 | | Bahrain, Radio Bahrain     6010me | |
| 0300 | 0400 | twhfas | Canada, CBC NQ SW Service | 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 | 9690na |
| | | | 9790na     11770as     15110as     15120eu | |
| | | | 15785as | |
| 0300 | 0400 | | Cuba, Radio Havana Cuba     5970na | 6000na |
| 0300 | 0400 | | Germany, Deutsche Welle     12005as | 15595as |
| 0300 | 0400 | vl | Guyana, Voice of Guyana     3290va | |
| 0300 | 0400 | | Malaysia, RTM/Traxx FM     7295do | |
| 0300 | 0400 | | New Zealand, Radio NZ International | 13730pa |
| 0300 | 0400 | DRM | New Zealand, Radio NZ International | 15720pa |
| 0300 | 0400 | | Oman, Radio Sultanate of Oman | 15355af |
| 0300 | 0400 | | Russia, Voice of Russia     9665sa | 15425na |
| | | | 15585na | |
| 0300 | 0400 | DRM | Russia, Voice of Russia     15735as | |
| 0300 | 0400 | | South Africa, Channel Africa  3345af | |
| 0300 | 0400 | | Taiwan, Radio Taiwan International | 5950na |
| | | | 15320as | |
| 0300 | 0400 | | Turkey, Voice of Turkey     5975va | 6165va |
| 0300 | 0400 | | Uganda, UBC Radio     4976do | |

| | | | | |
|---|---|---|---|---|
| 0300 | 0400 | | UK, BBC World Service     3255af | 6005af |
| | | | 6145af     6190af     6195va     7255af | |
| | | | 9750af     11945af     12035as     12095as | |
| | | | 15310as     17790as | |
| 0300 | 0400 | | USA, American Forces Network | 4319usb |
| | | | 5446usb     5765usb     7812usb     12133usb | |
| | | | 12759usb     13362usb | |
| 0300 | 0400 | | USA, Voice of America     4930af | 6080af |
| | | | 9885af     15580af | |
| 0300 | 0400 | | USA, WBCQ Monticello ME     7415am | 9330am |
| 0300 | 0400 | | USA, WEWN Vandiver AL     9455af | |
| 0300 | 0400 | Sat | USA, WHRI Cypress Creek SC | 7315am |
| 0300 | 0400 | | USA, WINB Red Lion PA     9265ca | |
| 0300 | 0400 | | USA, WRMI Miami FL     9955ca | |
| 0300 | 0400 | | USA, WRNO New Orleans LA | 7505am |
| 0300 | 0400 | | USA, WTJC Newport NC     9370na | |
| 0300 | 0400 | | USA, WTWW Lebanon TN     5755va | |
| 0300 | 0400 | | USA, WWCR Nashville TN     3215na | 4840na |
| | | | 5890na | |
| 0300 | 0400 | | USA, WWRB Manchester TN     3145va | 3185va |
| | | | 5050va     6890va | |
| 0300 | 0400 | | USA, WYFR/Family Radio Worldwide | 6985na |
| | | | 9505na     11740sa     15255sa | |
| 0315 | 0330 | | Palau, T8WH/WHRI/Sound of Hope Radio | |
| | | | 15700as | |
| 0330 | 0357 | | Czech Republic, Radio Prague | 9445me |
| 0330 | 0400 | twhfas | Albania, Radio Tirana     7425na | |
| 0330 | 0400 | Sun | Sri Lanka, SLBC  6005as     9770as     15745as | |
| 0330 | 0400 | | UK, BBC World Service     11945af | |
| 0330 | 0400 | | Vietnam, Voice of Vietnam     6175va | |
| 0340 | 0400 | | Vatican City State, Vatican Radio | 15460va |
| 0345 | 0400 | vl/Sat/Sun | Uganda, UBC Radio     4976do | |

### 0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

| | | | | |
|---|---|---|---|---|
| 0400 | 0430 | mtwhf | France, Radio France Internationale | 7425af |
| | | | 9805af | |
| 0400 | 0430 | Sun | Sri Lanka, SLBC  6005as     9770as     15745as | |
| 0400 | 0430 | | USA, Voice of America     4930af | 4960af |
| | | | 6080af     9885af     15580af | |
| 0400 | 0445 | | USA, WYFR/Family Radio Worldwide | 6985na |
| | | | 9505na | |
| 0400 | 0458 | | New Zealand, Radio NZ International | 13730pa |
| 0400 | 0458 | DRM | New Zealand, Radio NZ International | 15720pa |
| 0400 | 0500 | | Anguilla, Worldwide Univ Network | 6090am |
| 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     15230pa     15415as     15515pa | |
| | | | 17750as     21725pa | |
| 0400 | 0500 | | Bahrain, Radio Bahrain     6010me | |
| 0400 | 0500 | twhfas | Canada, CBC NQ SW Service | 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     13750as     15120eu     15785as | |
| | | | 17730af     17855af | |
| 0400 | 0500 | | Cuba, Radio Havana Cuba     5970na | 6000na |
| 0400 | 0500 | | Germany, Deutsche Welle     6180af | 7240af |
| | | | 12045af     15400af | |
| 0400 | 0500 | vl | Guyana, Voice of Guyana     3290va | |
| 0400 | 0500 | | Malaysia, RTM/Traxx FM     7295do | |
| 0400 | 0500 | | Russia, Voice of Russia     13775na | |
| 0400 | 0500 | | South Africa, Channel Africa  3345af | |
| 0400 | 0500 | | Sri Lanka, SLBC  6005as     9770as     15745as | |
| 0400 | 0500 | | Uganda, UBC Radio     4976do | |
| 0400 | 0500 | DRM | UK, BBC World Service     3995eu | |
| 0400 | 0500 | | UK, BBC World Service     3255af | 6055af |
| | | | 6190af     7255af     7310af     9410eu | |
| | | | 12035af     12095as     13675eu     15310as | |
| | | | 15360as     17790as | |
| 0400 | 0500 | | USA, American Forces Network | 4319usb |
| | | | 5446usb     5765usb     7812usb     12133usb | |
| | | | 12759usb     13362usb | |
| 0400 | 0500 | | USA, WEWN Vandiver AL     9455af | |
| 0400 | 0500 | Sun | USA, WHRI Cypress Creek SC | 7365eu |
| 0400 | 0500 | Sat | USA, WHRI Cypress Creek SC | 9825me |
| 0400 | 0500 | | USA, WRMI Miami FL     9955ca | |
| 0400 | 0500 | | USA, WRNO New Orleans LA | 7505am |
| 0400 | 0500 | | USA, WTJC Newport NC     9370na | |
| 0400 | 0500 | | USA, WTWW Lebanon TN     5755va | |
| 0400 | 0500 | | USA, WWCR Nashville TN     3215na | 4840na |
| | | | 5890na | |
| 0400 | 0500 | | USA, WWRB Manchester TN     3185na | |
| 0400 | 0500 | | USA, WYFR/Family Radio Worldwide | 9680na |

| 0400 | 0500 | | Zambia, 1 Africa-CVC Africa 5925af |
| 0430 | 0500 | Sat/Sun | Greece, Voice of Greece 11645eu |
| 0430 | 0500 | mtwhf | Swaziland, TWR Swaziland 3200af 4775af |
| 0430 | 0500 | | USA, Voice of America 4930af 4960af |
| | | | 6080af 9885af 15580af |
| 0455 | 0500 | | Nigeria, Voice of Nigeria/External Service |
| | | | 15120eu |
| 0459 | 0500 | | New Zealand, Radio NZ International 11725pa |
| 0459 | 0500 | DRM | New Zealand, Radio NZ International 11675pa |

### 0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

| 0500 | 0507 | twhfas | Canada, CBC NQ SW Service 9625na |
| 0500 | 0520 | | Vatican City State, Vatican Radio 4005eu |
| | | | 5965eu 7250eu 9660af 11625af |
| | | | 13765af |
| 0500 | 0530 | | China, CNR-11/Holy Tibet 9530do 11685do |
| | | | 15570do |
| 0500 | 0530 | | Czech Republic, Radio Prague 9955ca |
| 0500 | 0530 | mtwhf | France, Radio France Internationale 11995af |
| | | | 13680af |
| 0500 | 0530 | | Germany, Deutsche Welle 6180af 7430af |
| | | | 9700af 9825af |
| 0500 | 0530 | | Japan, NHK World/ Radio Japan 5975va |
| | | | 6110na 11970as 15205as 17810as |
| 0500 | 0530 | Sun | UK, BBC World Service 15420af |
| 0500 | 0555 | | Sri Lanka, SLBC 6005as 9770as 15745as |
| 0500 | 0600 | | Anguilla, Worldwide Univ Network 6090am |
| 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 |
| | | | 13630as 15160pa 15230pa 15415as |
| | | | 17750as |
| 0500 | 0600 | | Bahrain, Radio Bahrain 6010me |
| 0500 | 0600 | | Bhutan, Bhutan Broadcasting Service 6035as |
| 0500 | 0600 | | Canada, CFRX Toronto ON 6070na |
| 0500 | 0600 | | Canada, CKZN St Johns NF 6160na |
| 0500 | 0600 | | Canada, CKZU Vancouver BC 6160na |
| 0500 | 0600 | | China, China Radio International 6020na |
| | | | 6190na 11710me 11895as 15350as |
| | | | 15465as 17505af 17540as 17730af |
| | | | 17855af |
| 0500 | 0600 | | Cuba, Radio Havana Cuba 5970na 6010na |
| | | | 6060na |
| 0500 | 0600 | DRM | Germany, Deutsche Welle 17525as |
| 0500 | 0600 | mtwhf | Greece, Voice of Greece 11645eu |
| 0500 | 0600 | vl | Guyana, Voice of Guyana 3290va |
| 0500 | 0600 | | Kuwait, Radio Kuwait 15110as |
| 0500 | 0600 | | Liberia, Star Radio 3900do 4025al |
| 0500 | 0600 | | Malaysia, RTM/Traxx FM 7295do |
| 0500 | 0600 | | New Zealand, Radio NZ International 11725pa |
| 0500 | 0600 | DRM | New Zealand, Radio NZ International 11675pa |
| 0500 | 0600 | | Nigeria, Voice of Nigeria/External Service |
| | | | 15120eu |
| 0500 | 0600 | | Russia, Voice of Russia 13775na |
| 0500 | 0600 | mtwh | Slovakia, IRRS/Euro Gospel Radio 5990va |
| 0500 | 0600 | | South Africa, Channel Africa 7230af |
| 0500 | 0600 | | Swaziland, TWR Swaziland 3200af 6120af |
| | | | 9500af |
| 0500 | 0600 | | Taiwan, Radio Taiwan International 5950na |
| 0500 | 0600 | | Uganda, UBC Radio 4976do |
| 0500 | 0600 | | UK, BBC World Service 3995eu 7255af |
| | | | 7310af 9410eu 11945af 12095va |
| | | | 15310as 15360as 15560eu 17640af |
| | | | 17790as |
| 0500 | 0600 | mtwhf | UK, BBC World Service 15420af |
| 0500 | 0600 | | Ukraine, Radio Ukraine International 9840na |
| 0500 | 0600 | | USA, American Forces Network 4319usb |
| | | | 5446usb 5765usb 7812usb 12133usb |
| | | | 12759usb 13362usb |
| 0500 | 0600 | | USA, Voice of America 4930af 6080af |
| | | | 12080af 15580af |
| 0500 | 0600 | | USA, WEWN Vandiver AL 6890va |
| 0500 | 0600 | Sun | USA, WHRI Cypress Creek SC 11565pa |
| 0500 | 0600 | | USA, WRMI Miami FL 9955ca |
| 0500 | 0600 | | USA, WTJC Newport NC 9370na |
| 0500 | 0600 | | USA, WTWW Lebanon TN 5755va |
| 0500 | 0600 | | USA, WWCR Nashville TN 3215na 4840na |
| 0500 | 0600 | | USA, WWRB Manchester TN 3185na |
| 0500 | 0600 | | USA, WYFR/Family Radio Worldwide 9680na |
| 0500 | 0600 | | Zambia, 1 Africa-CVC Africa 9430af |
| 0515 | 0530 | | Rwanda, Radio Rwanda 6055do |
| 0530 | 0556 | | Romania, Radio Romania International 9655eu |
| | | | 21500pa 17760pa |

| 0530 | 0600 | | Clandestine, Sudan Radio Service/ SRS 13720af |
| 0530 | 0600 | DRM | Romania, Radio Romania International 7305eu |
| 0530 | 0600 | | Thailand, Radio Thailand World Service 17655eu |

### 0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

| 0600 | 0630 | Sat/Sun | Australia, Radio Australia 15290as |
| 0600 | 0630 | | China, Xizang PBS/Holy Tibet 4905do 4920do |
| | | | 5240do 6110do 6130do 6200do |
| | | | 9490do 9580do |
| 0600 | 0630 | mtwhf | France, Radio France Internationale 11615af |
| | | | 15160af 17800af |
| 0600 | 0630 | | Germany, Deutsche Welle 7325af 15275af |
| 0600 | 0630 | Sat/Sun | Greece, Voice of Greece/Radio Filia 11645eu |
| 0600 | 0630 | | Laos, Lao National Radio 7145as |
| 0600 | 0645 | mtwhf | South Africa, TWR Africa 11640af |
| 0600 | 0658 | | New Zealand, Radio NZ International 11725pa |
| 0600 | 0658 | DRM | New Zealand, Radio NZ International 11675pa |
| 0600 | 0700 | | Anguilla, Worldwide Univ Network 6090am |
| 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 |
| | | | 13630as 13690pa 15160pa 15230pa |
| | | | 17750as |
| 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 | | China, China Radio International 11710me |
| | | | 11870af 11895as 13660as 15140af |
| | | | 15350as 15465as 17505af 17540as |
| 0600 | 0700 | | Cuba, Radio Havana Cuba 5970na 6010na |
| | | | 6060na |
| 0600 | 0700 | DRM | Germany, Deutsche Welle 3995eu 6130eu |
| 0600 | 0700 | vl | Guyana, Voice of Guyana 3290va |
| 0600 | 0700 | | Kuwait, Radio Kuwait 15110as |
| 0600 | 0700 | | Liberia, Star Radio 3900do 4025al |
| 0600 | 0700 | | Malaysia, RTM/Traxx FM 7295do |
| 0600 | 0700 | | Malaysia, RTM/Voice of Malaysia 6175as |
| | | | 9750as 15295as |
| 0600 | 0700 | | Nigeria, Voice of Nigeria/External Service |
| | | | 15120eu |
| 0600 | 0700 | | Papua New Guinea, Radio Wantok Light 7325do |
| 0600 | 0700 | | Russia, Voice of Russia 15405pa |
| 0600 | 0700 | | South Africa, Channel Africa 7230af |
| 0600 | 0700 | | Swaziland, TWR Swaziland 4775af 6120af |
| | | | 9500af |
| 0600 | 0700 | | Uganda, UBC Radio 7195do |
| 0600 | 0700 | | UK, BBC World Service 3995eu 6005af |
| | | | 6190af 7310af 9860af 12015af |
| | | | 12095as 15105af 15310as 17640af |
| | | | 17790as |
| 0600 | 0700 | Sat/Sun | UK, BBC World Service 15420af |
| 0600 | 0700 | DRM | UK, BBC World Service 3995eu |
| 0600 | 0700 | | USA, American Forces Network 4319usb |
| | | | 5446usb 5765usb 7812usb 12133usb |
| | | | 12759usb 13362usb |
| 0600 | 0700 | | USA, Voice of America 6080af 12080af |
| | | | 15580af |
| 0600 | 0700 | | USA, WEWN Vandiver AL 6890va |
| 0600 | 0700 | Sun | USA, WHRI Cypress Creek SC 7365eu |
| 0600 | 0700 | | USA, WRMI Miami FL 9955ca |
| 0600 | 0700 | | USA, WTJC Newport NC 9370na |
| 0600 | 0700 | | USA, WTWW Lebanon TN 5755va |
| 0600 | 0700 | | USA, WWCR Nashville TN 3215na 4840na |
| 0600 | 0700 | | USA, WWRB Manchester TN 3185na |
| 0600 | 0700 | | USA, WYFR/Family Radio Worldwide 5850ca |
| | | | 7520va 9680na 11530af 11580va |
| 0600 | 0700 | | Zambia, 1 Africa-CVC Africa 13590af |
| 0600 | 0700 | vl | Zambia, Radio Christian Voice/The Voice Africa |
| | | | 6065af |
| 0600 | 615 | Sat/Sun | South Africa, TWR Africa 11640af |
| 0630 | 0645 | | Vatican City State, Vatican Radio 4005eu |
| | | | 5965eu 7250eu 9645af 11740eu |
| | | | 15595eu |
| 0630 | 0700 | | Bulgaria, Radio Bulgaria 9600eu 11600eu |
| 0630 | 0700 | | Vatican City State, Vatican Radio 11625af |
| | | | 13765af 15570af |
| 0645 | 0700 | Sun | Germany, TWR Europe 6105eu |
| 0645 | 0700 | Sun | Monaco, TWR Europe 9800eu |
| 0659 | 0700 | | New Zealand, Radio NZ International 6170pa |
| 0659 | 0700 | DRM | New Zealand, Radio NZ International 7440pa |

## 0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

| Start | Stop | Days | Station | Freq | Freq | Freq | Freq |
|---|---|---|---|---|---|---|---|
| 0700 | 0727 | | Czech Republic, Radio Prague | 9880eu | | | |
| 0700 | 0730 | mtwhf | France, Radio France Internationale | 13675af | | | |
| 0700 | 0730 | | Slovakia, Radio Slovakia International 11650va | 9440va | | | |
| 0700 | 0730 | Sun | UK, Bible Voice Broadcasting 5945eu | | | | |
| 0700 | 0745 | Sat | UK, Bible Voice Broadcasting 5945eu | | | | |
| 0700 | 0745 | | USA, WYFR/Family Radio Worldwide | 7520va | | | |
| 0700 | 0750 | Sun | Germany, TWR Europe | 6105eu | | | |
| 0700 | 0750 | mtwhf | Germany, TWR Europe | 6105eu | | | |
| 0700 | 0750 | mtwhf | Monaco, TWR Europe | 9800eu | | | |
| 0700 | 0800 | | Anguilla, Worldwide Univ Network | 6090am | | | |
| 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 | 9475as | 9660pa | | |
| | | | 9710as | 11945pa | 12080pa | | |
| 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 | 11895as | | | |
| | | | 13660as | 13710eu | 15125me | 15350as |
| | | | 17710as | | | |
| 0700 | 0800 | mtwhf | Equatorial Guinea, Radio Africa # 2 | 15190af | | | |
| 0700 | 0800 | Sat/Sun | Equatorial Guinea, Radio East Africa | 15190af | | | |
| 0700 | 0800 | DRM | Germany, Deutsche Welle 5790eu | 9545eu | | | |
| 0700 | 0800 | vl | Guyana, Voice of Guyana | 3290va | | | |
| 0700 | 0800 | | Kuwait, Radio Kuwait | 15110as | | | |
| 0700 | 0800 | | Liberia, Star Radio | 3900do | 4025al | | |
| 0700 | 0800 | | Malaysia, RTM/Traxx FM | 7295do | | | |
| 0700 | 0800 | | Malaysia, RTM/Voice of Malaysia | 6175as | | | |
| | | | 9750as | 15295as | | | |
| 0700 | 0800 | | Myanmar, Myanma Radio 9730do | | | | |
| 0700 | 0800 | | New Zealand, Radio NZ International | 6170pa | | | |
| 0700 | 0800 | DRM | New Zealand, Radio NZ International | 7440pa | | | |
| 0700 | 0800 | | Papua New Guinea, Radio Wantok Light 7325do | | | | |
| 0700 | 0800 | | Russia, Voice of Russia | 15405pa | 17495va | | |
| 0700 | 0800 | | South Africa, Channel Africa 7230af | | | | |
| 0700 | 0800 | | Swaziland, TWR Swaziland 4775af | 6120af | | | |
| | | | 9500af | | | | |
| 0700 | 0800 | | Uganda, UBC Radio | 7195do | | | |
| 0700 | 0800 | | UK, BBC World Service | 5790eu | 6190af | | |
| | | | 9860af | 11760me | 11765af | 13830af |
| | | | 15400af | 15575as | 17790as | 17830af |
| 0700 | 0800 | Sat/Sun | UK, BBC World Service | 15420af | | | |
| 0700 | 0800 | | Ukraine, Radio Ukraine International | 11620eu | | | |
| 0700 | 0800 | | USA, American Forces Network | 4319usb | | | |
| | | | 5446usb | 5765usb | 7812usb | 12133usb |
| | | | 12759usb | 13362usb | | |
| 0700 | 0800 | | USA, WEWN Vandiver AL | 6890va | | | |
| 0700 | 0800 | Sun | USA, WHRI Cypress Creek SC | 11565pa | | | |
| 0700 | 0800 | | USA, WRMI Miami FL | 9955ca | | | |
| 0700 | 0800 | | USA, WTJC Newport NC | 9370na | | | |
| 0700 | 0800 | | USA, WTWW Lebanon TN | 5755va | | | |
| 0700 | 0800 | | USA, WWCR Nashville TN | 3215na | 4840na | | |
| 0700 | 0800 | | USA, WWRB Manchester TN | 3185na | | | |
| 0700 | 0800 | | USA, WYFR/Family Radio Worldwide | 5950na | | | |
| | | | 5985na | 6875na | 9385af | 9505ca |
| 0700 | 0800 | | Zambia, 1 Africa-CVC Africa 13590af | | | | |
| 0700 | 0800 | vl | Zambia, Radio Christian Voice/The Voice Africa | | | | |
| | | | 6065af | | | | |
| 0715 | 0750 | Sat | Germany, TWR Europe | 6105eu | | | |
| 0715 | 0750 | Sat | Monaco, TWR Europe | 9800eu | | | |
| 0730 | 0800 | | Australia, HCJB Global Voice Australia | 11750as | | | |
| 0730 | 0800 | | Clandestine, Cotton Tree News | 15220af | | | |

## 0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

| Start | Stop | Days | Station | Freq | Freq | Freq | Freq |
|---|---|---|---|---|---|---|---|
| 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 | | Myanmar, Myanma Radio 9730do | | | | |
| 0800 | 0845 | | USA, WYFR/Family Radio Worldwide | 5950na | | | |
| | | | 5985na | 9385af | | | |
| 0800 | 0900 | | Anguilla, Worldwide Univ Network | 6090am | | | |
| 0800 | 0900 | | Australia, HCJB Global Voice Australia | 11750pa | | | |
| 0800 | 0900 | | Australia, Radio Australia | 5995pa | 9475as | | |
| | | | 9580pa | 9590pa | 9710pa | 11945pa |
| | | | 12080pa | 13630as | | |
| 0800 | 0900 | | Bahrain, Radio Bahrain | 6010me | | | |
| 0800 | 0900 | t/DRM | Belgium, TDP Radio | 6015eu | | | |
| 0800 | 0900 | | Bhutan, Bhutan Broadcasting Service | 6035as | | | |

## 0800 UTC (continued)

| Start | Stop | Days | Station | Freq | Freq | Freq | Freq |
|---|---|---|---|---|---|---|---|
| 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 | 11620as | | | |
| | | | 11895as | 13710eu | 15350as | 15465as |
| | | | 15625me | 17540as | | |
| 0800 | 0900 | mtwhf | Equatorial Guinea, Radio Africa # 2 | 15190af | | | |
| 0800 | 0900 | Sat/Sun | Equatorial Guinea, Radio East Africa | 15190af | | | |
| 0800 | 0900 | DRM | Germany, Deutsche Welle | 12095as | | | |
| 0800 | 0900 | vl | Guyana, Voice of Guyana | 3290va | | | |
| 0800 | 0900 | | Liberia, Star Radio | 3900do | 4025al | | |
| 0800 | 0900 | | Malaysia, RTM/Traxx FM | 7295do | | | |
| 0800 | 0900 | | Malaysia, RTM/Voice of Malaysia | 6175as | | | |
| | | | 9750as | 15295as | | |
| 0800 | 0900 | | New Zealand, Radio NZ International | 6170pa | | | |
| 0800 | 0900 | DRM | New Zealand, Radio NZ International | 7440pa | | | |
| 0800 | 0900 | | Papua New Guinea, Radio Wantok Light 7325do | | | | |
| 0800 | 0900 | DRM | Russia, Voice of Russia | 12060eu | | | |
| 0800 | 0900 | Sun | South Africa, Amateur Radio Mirror Intl 7205af | | | | |
| | | | 17570af | | | | |
| 0800 | 0900 | | South Africa, Channel Africa 9625af | | | | |
| 0800 | 0900 | | South Korea, KBS World Radio | 9570as | | | |
| 0800 | 0900 | | Swaziland, TWR Swaziland 4775af | 6120af | | | |
| | | | 9500af | | | | |
| 0800 | 0900 | | Uganda, UBC Radio | 7195do | | | |
| 0800 | 0900 | | UK, BBC World Service | 6190af | 9860af | | |
| | | | 11760me | 15310as | 15400af | 15575as |
| | | | 17640af | 17790as | 17830af | 21470af |
| 0800 | 0900 | | Ukraine, Radio Ukraine International | 11620eu | | | |
| 0800 | 0900 | | USA, American Forces Network | 4319usb | | | |
| | | | 5446usb | 5765usb | 7812usb | 12133usb |
| | | | 12759usb | 13362usb | | |
| 0800 | 0900 | | USA, KNLS Anchor Point AK | 11765as | | | |
| 0800 | 0900 | | USA, WEWN Vandiver AL | 6890va | | | |
| 0800 | 0900 | smtwhf | USA, WHRI Cypress Creek SC | 11565pa | | | |
| 0800 | 0900 | | USA, WRMI Miami FL | 9955ca | | | |
| 0800 | 0900 | | USA, WTJC Newport NC | 9370na | | | |
| 0800 | 0900 | | USA, WTWW Lebanon TN | 5755va | | | |
| 0800 | 0900 | | USA, WWCR Nashville TN | 3215na | 4840na | | |
| 0800 | 0900 | | USA, WWRB Manchester TN | 3185na | | | |
| 0800 | 0900 | | USA, WYFR/Family Radio Worldwide | 5985na | | | |
| | | | 6875na | | | | |
| 0800 | 0900 | | Zambia, 1 Africa-CVC Africa 13590af | | | | |
| 0800 | 0900 | vl | Zambia, Radio Christian Voice/The Voice Africa | | | | |
| | | | 6065af | | | | |
| 0815 | 0825 | | Nepal, Radio Nepal | 5005as | | | |
| 0820 | 0900 | smtwhf | Guam, KTWR/TWR | 15170as | | | |
| 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 | mtwhfa | Guam, KTWR/TWR | 11840pa | | | |
| 0845 | 0900 | mtwhf | Palau, T8WH/WHRI/Sound of Hope Radio | | | | |
| | | | 9930as | | | | |

## 0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

| Start | Stop | Days | Station | Freq | Freq | Freq | Freq |
|---|---|---|---|---|---|---|---|
| 0900 | 0910 | mtwhfa | Guam, KTWR/TWR | 11840pa | | | |
| 0900 | 0915 | mtwhf | Palau, T8WH/WHRI/Sound of Hope Radio | | | | |
| | | | 9930as | | | | |
| 0900 | 0929 | | Czech Republic, Radio Prague | 17650af | | | |
| 0900 | 0930 | | Australia, HCJB Global Voice Australia | 11750pa | | | |
| 0900 | 0930 | DRM | Bulgaria, Radio Bulgaria | 11900eu | | | |
| 0900 | 0959 | | Germany, Deutsche Welle | 15640as | 17820as | | |
| 0900 | 1000 | | Anguilla, Worldwide Univ Network | 6090am | | | |
| 0900 | 1000 | | Australia, ABC NT Alice Springs | 2310do | | | |
| 0900 | 1000 | | Australia, ABC NT Katherine 2485do | | | | |
| 0900 | 1000 | | Australia, ABC NT Tennant Creek | 2325do | | | |
| 0900 | 1000 | | Australia, Radio Australia | 9475as | 9580pa | | |
| | | | 9590pa | 11945pa | | |
| 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 | 11620as | | | |
| | | | 13790pa | 15210as | 15270eu | 15350as |
| | | | 17490eu | 17570eu | 17750as | |
| 0900 | 1000 | mtwhf | Equatorial Guinea, Radio Africa # 2 | 15190af | | | |
| 0900 | 1000 | Sat/Sun | Equatorial Guinea, Radio East Africa | 15190af | | | |
| 0900 | 1000 | 2nd Sun | Germany, Blue Star Radio | 6140eu | | | |
| 0900 | 1000 | 4th Sun | Germany, Radio Gloria International | 6140eu | | | |
| 0900 | 1000 | | Malaysia, RTM/Traxx FM | 7295do | | | |
| 0900 | 1000 | | Malaysia, RTM/Voice of Malaysia | 6175as | | | |
| | | | 9750as | 15295as | | |
| 0900 | 1000 | | New Zealand, Radio NZ International | 6170pa | | | |

| | | | | |
|---|---|---|---|---|
| 0900 | 1000 | DRM | New Zealand, Radio NZ International | 7440pa |
| 0900 | 1000 | | Nigeria, Voice of Nigeria/External Service 9690af | |
| 0900 | 1000 | | Papua New Guinea, Radio Wantok Light 7325do | |
| 0900 | 1000 | | Russia, Voice of Russia | 17495pa |
| 0900 | 1000 | DRM | Russia, Voice of Russia | 12060eu |
| 0900 | 1000 | 3rd Sat | Slovakia, IRRS/Radio City | 9510va |
| 0900 | 1000 | 1st Sat | Slovakia, IRRS/Radio Joystick | 9510va |
| 0900 | 1000 | | Tajikistan, Voice of Tajik/External Service | 7245va |
| 0900 | 1000 | | Uganda, UBC Radio | 7195do |
| 0900 | 1000 | DRM | UK, BBC World Service | 9610eu  13810eu |
| 0900 | 1000 | | UK, BBC World Service | 6190af  6195as |

9740as  9860af  11760me  15105as
15285as  15310as  15400af  15575as
17640as  17760as  17830af  21470af
21660as

| 0900 | 1000 | | Ukraine, Radio Ukraine International | 11620na |
| 0900 | 1000 | | USA, American Forces Network | 4319usb |

5446usb  5765usb  7812usb  12133usb
12759usb  13362usb

| 0900 | 1000 | | USA, WEWN Vandiver AL | 11520va |
| 0900 | 1000 | Sun | USA, WHRI Cypress Creek SC | 11565pa |
| 0900 | 1000 | | USA, WRMI Miami FL | 9955ca |
| 0900 | 1000 | | USA, WTJC Newport NC | 9370na |
| 0900 | 1000 | | USA, WTWW Lebanon TN | 5755va |
| 0900 | 1000 | | USA, WWCR Nashville TN | 4840na  9985na |
| 0900 | 1000 | | USA, WWRB Manchester TN | 3185na |
| 0900 | 1000 | | USA, WYFR/Family Radio Worldwide | 5985na |

6875na  9465na  9755na

| 0900 | 1000 | | Zambia, 1 Africa-CVC Africa | 13590af |
| 0900 | 1000 | vl | Zambia, Radio Christian Voice/The Voice Africa 6065af | |
| 0930 | 1000 | | Saudi Arabia, BSKSA/Saudi Radio | 15250af |
| 0930 | 1000 | Sun | Slovakia, IRRS/Euro Gospel Radio | 9515va |

### 1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

| | | | | |
|---|---|---|---|---|
| 1000 | 1030 | | Czech Republic, Radio Prague | 9955na |
| 1000 | 1030 | | Japan, NHK World/ Radio Japan | 9605as |

9625pa  9825pa  11780as

| 1000 | 1030 | fa | Philippines, FEBC 15325as | |
| 1000 | 1030 | | Vietnam, Voice of Vietnam | 9840as  12020as |
| 1000 | 1057 | | Netherlands, R Netherlands Worldwide | 11895as |

12065as  15110as

| 1000 | 1057 | | North Korea, Voice of Korea 11710sa  11735sa | |

13650sa  15180sa

| 1000 | 1058 | | New Zealand, Radio NZ International | 6170pa |
| 1000 | 1100 | | Anguilla, Worldwide Univ Network | 11775am |
| 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 | 9475as  9580pa |

9590pa  11945pa

| 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  11635eu  13590as  13620as
13720as  13790pa  15190as  15350as
17490eu

| 1000 | 1100 | mtwhf | Equatorial Guinea,  Radio Africa # 2 | 15190af |
| 1000 | 1100 | Sat/Sun | Equatorial Guinea,  Radio East Africa | 15190af |
| 1000 | 1100 | DRM | Germany, Deutsche Welle  9545eu | 13810eu |
| 1000 | 1100 | 3rd Sun | Germany, European Music Radio | 6140eu |
| 1000 | 1100 | | India, All India Radio | 7270as  13695na |

15020as  15260as  15410pa  17800pa
17895pa

| 1000 | 1100 | | Indonesia, Voice of Indonesia 9526va | 11785al |
| 1000 | 1100 | | Malaysia, RTM/Traxx FM | 7295do |
| 1000 | 1100 | DRM | New Zealand, Radio NZ International | 7440pa |
| 1000 | 1100 | | Nigeria, Voice of Nigeria/External Service 9690af | |
| 1000 | 1100 | mt | Palau, T8WH/WHRI/Sound of Hope Radio | |

9930as  15725as

| 1000 | 1100 | hfa | Palau, T8WH/WHRI/Sound of Hope Radio | |

9930as

| 1000 | 1100 | | Papua New Guinea, Radio Wantok Light 7325do | |
| 1000 | 1100 | | Saudi Arabia, BSKSA/Saudi Radio | 15250af |

15470af

| 1000 | 1100 | Sun | Slovakia, IRRS/Euro Gospel Radio | 9515va |
| 1000 | 1100 | | Uganda, UBC Radio | 7195do |
| 1000 | 1100 | DRM | UK, BBC World Service | 9545eu  13810eu |
| 1000 | 1100 | Sat/Sun | UK, BBC World Service | 15400af  17830af |

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| | | | | |
|---|---|---|---|---|
| 1000 | 1100 | | UK, BBC World Service | 6190af  6195as |

9545eu  9740as  9860af  11760me
15285as  15310as  15575as  17640af
17790as  21470af  21660as

| 1000 | 1100 | | USA, American Forces Network | 4319usb |

5446usb  5765usb  7812usb  12133usb
12759usb  13362usb

| 1000 | 1100 | | USA, KNLS Anchor Point AK | 11765as |
| 1000 | 1100 | | USA, WEWN Vandiver AL | 11520va |
| 1000 | 1100 | | USA, WINB Red Lion PA | 9265ca |
| 1000 | 1100 | | USA, WRMI Miami FL | 9955ca |
| 1000 | 1100 | | USA, WTJC Newport NC | 9370na |
| 1000 | 1100 | | USA, WTWW Lebanon TN | 5755va |
| 1000 | 1100 | | USA, WWCR Nashville TN | 4840na  9985na |
| 1000 | 1100 | | USA, WWRB Manchester TN | 3185na |
| 1000 | 1100 | | USA, WYFR/Family Radio Worldwide | 5950na |

5985na  6875na  9450as  9465na
9755na

| 1000 | 1100 | | Zambia, 1 Africa-CVC Africa 13590af | |
| 1000 | 1100 | vl | Zambia, Radio Christian Voice/The Voice Africa 6065af | |
| 1030 | 1057 | | Czech Republic, Radio Prague | 9880eu |
| 1030 | 1100 | | Iran, VOIRI/IRIB  15600as  17660as | |
| 1030 | 1100 | | Mongolia, Voice of Mongolia 12085as | |
| 1059 | 1100 | | New Zealand, Radio NZ International | 9655pa |

### 1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

| | | | | |
|---|---|---|---|---|
| 1100 | 1105 | | Pakistan, PBC/Radio Pakistan 15100as | 17720as |
| 1100 | 1127 | | Iran, VOIRI/IRIB  15600as  17660as | |
| 1100 | 1130 | f/DRM | Japan, NHK World/ Radio Japan | 9760eu |
| 1100 | 1130 | Sat/DRM | South Korea,  KBS World Radio | 9760eu |
| 1100 | 1130 | mtwhf | UK, BBC World Service | 15400af |
| 1100 | 1130 | | Vietnam, Voice of Vietnam | 7285as |
| 1100 | 1145 | | USA, WYFR/Family Radio Worldwide | 6875na |

9550sa  9755na

| 1100 | 1156 | | Romania, Radio Romania International | 15210eu |

15430eu  17510af  17670af

| 1100 | 1158 | DRM | New Zealand, Radio NZ International | 7440pa |
| 1100 | 1200 | | Anguilla, Worldwide Univ Network | 11775am |
| 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 |

9475as  9580pa  9590pa  9965as
11945pa

| 1100 | 1200 | DRM | Australia, Radio Australia | 12080pa |
| 1100 | 1200 | | Bahrain, Radio Bahrain | 6010me |
| 1100 | 1200 | f/DRM | Belgium, TDP Radio | 6015eu |
| 1100 | 1200 | Sat/Sun | Canada, CBC NQ SW Service | 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 | 5955as |

6040na  11650as  11660as  11750na
11795as  13590as  13645as  13650eu
13720as  17490eu

| 1100 | 1200 | mtwhf | Equatorial Guinea,  Radio Africa # 2 | 15190af |
| 1100 | 1200 | Sat/Sun | Equatorial Guinea,  Radio East Africa | 15190af |
| 1100 | 1200 | | Malaysia, RTM/Traxx FM | 7295do |
| 1100 | 1200 | | New Zealand, Radio NZ International | 9655pa |
| 1100 | 1200 | | Nigeria, Voice of Nigeria/External Service 9690af | |
| 1100 | 1200 | | Papua New Guinea, Radio Wantok Light 7325do | |
| 1100 | 1200 | | Saudi Arabia, BSKSA/Saudi Radio | 15250af |

15470af

| 1100 | 1200 | Sun | Slovakia, IRRS/Euro Gospel Radio | 9515va |
| 1100 | 1200 | | Taiwan, Radio Taiwan International | 7445as |

11715as

| 1100 | 1200 | | Uganda, UBC Radio | 7195do |
| 1100 | 1200 | | UK, BBC World Service | 6190af  6195as |

9545eu  9740as  9860af  11760me
15280as  15310as  15575as  17640af
17790as  17830af  21470af

| 1100 | 1200 | | USA, American Forces Network | 4319usb |

5446usb  5765usb  7812usb  12133usb
12759usb  13362usb

| 1100 | 1200 | | USA, WEWN Vandiver AL | 11520va |
| 1100 | 1200 | | USA, WINB Red Lion PA | 9265ca |
| 1100 | 1200 | | USA, WRMI Miami FL | 9955ca |
| 1100 | 1200 | | USA, WTJC Newport NC | 9370na |
| 1100 | 1200 | | USA, WTWW Lebanon TN | 5755na |
| 1100 | 1200 | | USA, WWCR Nashville TN | 4840na  5890na |

15825na

| 1100 | 1200 | | USA, WWRB Manchester TN | 3185na |

| Start | End | Days | Station | Frequencies |
|---|---|---|---|---|
| 1100 | 1200 | | USA, WYFR/Family Radio Worldwide | 5950na 5985na 7730sa 9625sa 15560as |
| 1100 | 1200 | | Zambia, 1 Africa-CVC Africa | 13590af |
| 1100 | 1200 | vl | Zambia, Radio Christian Voice/The Voice Africa | 6065af |
| 1130 | 1150 | f | Vatican City State, Vatican Radio | 15595as 17765as |
| 1130 | 1200 | Sat/Sun | Australia, HCJB Global Voice Australia | 15400as |
| 1130 | 1200 | f | Vatican City State, Vatican Radio/Mass | 15595me 17765me |
| 1130 | 1200 | | Vietnam, Voice of Vietnam | 9840as 12020as |
| 1145 | 1200 | Sat/Sun | UK, Bible Voice Broadcasting | 7245as |

## 1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

| Start | End | Days | Station | Frequencies |
|---|---|---|---|---|
| 1200 | 1215 | | Nepal, Radio Nepal | 5005as |
| 1200 | 1215 | Sat/Sun | UK, Bible Voice Broadcasting | 7245as |
| 1200 | 1230 | mtwhf | France, Radio France Internationale | 21620af |
| 1200 | 1230 | | Germany, AWR Europe | 15435as |
| 1200 | 1230 | | Japan, NHK World/ Radio Japan | 6120na 9625pa 9695as 9790eu |
| 1200 | 1230 | | Saudi Arabia, BSKSA/Saudi Radio | 15250af 15470af |
| 1200 | 1230 | mtwhfa | Vatican City State, Vatican Radio | 9830am |
| 1200 | 1245 | | USA, WYFR/Family Radio Worldwide | 5950na 5985na |
| 1200 | 1258 | | New Zealand, Radio NZ International | 9655pa |
| 1200 | 1259 | | Poland, Polskie Radio Warsaw | 11675eu 11980eu |
| 1200 | 1300 | | Anguilla, Worldwide Univ Network | 11775am |
| 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 | Sat/Sun | Australia, HCJB Global Voice Australia | 15400as |
| 1200 | 1300 | | Australia, Radio Australia | 6020pa 9475as 9580pa 9965as 11945pa |
| 1200 | 1300 | DRM | Australia, Radio Australia | 5995pa |
| 1200 | 1300 | | Bahrain, Radio Bahrain | 6010me |
| 1200 | 1300 | a/DRM | Belgium, TDP Radio | 6015eu |
| 1200 | 1300 | Sat/Sun | Canada, CBC NQ SW Service | 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 | 5955as 9460as 9660as 9730as 9760pa 11650as 11660as 11690me 11760pa 11980as 13645as 13650eu 13790eu 17490eu |
| 1200 | 1300 | Sat/Sun | Equatorial Guinea, Radio East Africa | 15190af |
| 1200 | 1300 | mtwhf | Ethiopia, Radio Ethiopia/National Service | 5990do 7110do 9704do |
| 1200 | 1300 | DRM | Germany, Deutsche Welle | 9545eu 13810eu |
| 1200 | 1300 | | Malaysia, RTM/Traxx FM | 7295do |
| 1200 | 1300 | | Nigeria, Voice of Nigeria/External Service | 9690af |
| 1200 | 1300 | | Papua New Guinea, Radio Wantok Light | 7325do |
| 1200 | 1300 | | Russia, Voice of Russia | 11500as |
| 1200 | 1300 | | South Korea, KBS World Radio | 9650na |
| 1200 | 1300 | | Uganda, UBC Radio | 7195do |
| 1200 | 1300 | | UK, BBC World Service | 5875as 6190af 6195as 9545eu 9740as 9860af 11750as 11760me 15310as 15575as 17640af 17790as 17830af |
| 1200 | 1300 | | USA, American Forces Network | 4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb |
| 1200 | 1300 | | USA, KNLS Anchor Point AK | 7355as 9680as |
| 1200 | 1300 | | USA, Voice of America | 7575va 9510va 9760va 12075va |
| 1200 | 1300 | | USA, WEWN Vandiver AL | 11520va |
| 1200 | 1300 | | USA, WHRI Cypress Creek SC | 7315na |
| 1200 | 1300 | Sun | USA, WHRI Cypress Creek SC | 9410na |
| 1200 | 1300 | | USA, WINB Red Lion PA | 9265ca |
| 1200 | 1300 | | USA, WRMI Miami FL | 9955ca |
| 1200 | 1300 | | USA, WTJC Newport NC | 9370na |
| 1200 | 1300 | | USA, WTWW Lebanon TN | 9479na |
| 1200 | 1300 | | USA, WWCR Nashville TN | 7490af 9980na 13845na 15825na |
| 1200 | 1300 | | USA, WWRB Manchester TN | 3185na |
| 1200 | 1300 | | USA, WYFR/Family Radio Worldwide | 17555sa 17795na |
| 1200 | 1300 | | Zambia, 1 Africa-CVC Africa | 13590af |
| 1200 | 1300 | vl | Zambia, Radio Christian Voice/The Voice Africa | 6065af |
| 1215 | 1300 | | Egypt, Radio Cairo | 17870as |
| 1215 | 1300 | mtwhyf | UK, BBC World Service | 9410ca 11860ca |

| Start | End | Days | Station | Frequencies |
|---|---|---|---|---|
| 1230 | 1300 | mtwhf | Australia, HCJB Global Voice Australia | 15400as |
| 1230 | 1300 | | Bangladesh, Bangladesh Betar | 7250as |
| 1230 | 1300 | | Saudi Arabia, BSKSA/Saudi Radio | 15470af |
| 1230 | 1300 | | Thailand, Radio Thailand World Service | 9890va |
| 1230 | 1300 | | Vietnam, Voice of Vietnam | 9840as 12020as |
| 1230 | 13000 | | Turkey, Voice of Turkey | 15450eu 15520as |

## 1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

| Start | End | Days | Station | Frequencies |
|---|---|---|---|---|
| 1300 | 1329 | | Czech Republic, Radio Prague | 11600eu |
| 1300 | 1330 | | Australia, HCJB Global Voice Australia | 15400as |
| 1300 | 1330 | | Egypt, Radio Cairo | 17870as |
| 1300 | 1330 | | Japan, NHK World/ Radio Japan | 11985as |
| 1300 | 1330 | | Turkey, Voice of Turkey | 15450eu 15520eu |
| 1300 | 1330 | Sat/Sun | USA, WHRI Cypress Creek SC | 9840na |
| 1300 | 1357 | | North Korea, Voice of Korea | 9335eu 11710na 13760as 15245eu |
| 1300 | 1400 | | Anguilla, Worldwide Univ Network | 11775am |
| 1300 | 1400 | | Australia, ABC NT Alice Springs | 2310do |
| 1300 | 1400 | | Australia, ABC NT Katherine | 2485do |
| 1300 | 1400 | | Australia, Radio Australia | 6020pa 9580pa 9590pa |
| 1300 | 1400 | DRM | Australia, Radio Australia | 5995pa |
| 1300 | 1400 | | Bahrain, Radio Bahrain | 6010me |
| 1300 | 1400 | s/DRM | Belgium, TDP Radio | 6015na |
| 1300 | 1400 | Sat/Sun | Canada, CBC NQ SW Service | 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 | 5995as 9570na 9650as 9730as 9765as 9870as 11660as 11760me 11980as 13610eu 13755as 15260na |
| 1300 | 1400 | Sat/Sun | Equatorial Guinea, Radio East Africa | 15190af |
| 1300 | 1400 | | Indonesia, Voice of Indonesia | 9526va 11785al |
| 1300 | 1400 | | Malaysia, RTM/Traxx FM | 7295do |
| 1300 | 1400 | | New Zealand, Radio NZ International | 6170pa |
| 1300 | 1400 | | Nigeria, Voice of Nigeria/External Service | 9690af |
| 1300 | 1400 | | Palau, T8WH/WHRI/Sound of Hope Radio | 9930as |
| 1300 | 1400 | | Papua New Guinea, Radio Wantok Light | 7325do |
| 1300 | 1400 | | South Korea, KBS World Radio | 9770as |
| 1300 | 1400 | | Tajikistan, Voice of Tajik/External Service | 7245va |
| 1300 | 1400 | | Uganda, UBC Radio | 4976do |
| 1300 | 1400 | | UK, BBC World Service | 5875as 6190af 6195as 9545eu 9740as 9860af 11760me 15310as 15420af 15575as 17640af 17790as 17830af 21470af |
| 1300 | 1400 | | United States, Overcomer Ministries | 6110eu |
| 1300 | 1400 | | USA, American Forces Network | 4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb |
| 1300 | 1400 | | USA, KJES Vado NM | 11715na |
| 1300 | 1400 | Sat/Sun | USA, Voice of America | 7575va 9510va 9760va |
| 1300 | 1400 | | USA, WBCQ Monticello ME | 9330am |
| 1300 | 1400 | | USA, WEWN Vandiver AL | 13835eu |
| 1300 | 1400 | | USA, WINB Red Lion PA | 9265ca |
| 1300 | 1400 | | USA, WRMI Miami FL | 9955ca |
| 1300 | 1400 | | USA, WTJC Newport NC | 9370na |
| 1300 | 1400 | | USA, WTWW Lebanon TN | 9479na |
| 1300 | 1400 | | USA, WWCR Nashville TN | 7490af 9980na 13845na 15825na |
| 1300 | 1400 | | USA, WWRB Manchester TN | 9385na |
| 1300 | 1400 | | USA, WYFR/Family Radio Worldwide | 11520as 11560na 11830na 11910na 12155as 13820as 17795na |
| 1300 | 1400 | | Zambia, 1 Africa-CVC Africa | 13590af |
| 1300 | 1400 | vl | Zambia, Radio Christian Voice/The Voice Africa | 6065af |
| 1305 | 1400 | Sun | Greece, Voice of Greece | 9420va 15630va |
| 1330 | 1400 | mta | Guam, KSDA/AWR | 11860as |
| 1330 | 1400 | | India, All India Radio | 9690as 11620as 13710as |
| 1330 | 1400 | | Laos, Lao National Radio | 7145as |
| 1330 | 1400 | | Sweden, Radio Sweden | 15735va |
| 1330 | 1400 | | Vietnam, Voice of Vietnam | 9840as 12020as |

## 1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

| Start | End | Days | Station | Frequencies |
|---|---|---|---|---|
| 1400 | 1425 | mh | Guam, KTWR/TWR | 9975as |
| 1400 | 1430 | | China, CNR-11/Holy Tibet | 6010do 7350do 9480do |
| 1400 | 1430 | Sun | Germany, Pan American Broadcasting | 15205as |

| Start | Stop | Days | Station | Frequencies |
|---|---|---|---|---|
| 1400 | 1430 | ` | Japan, NHK World/ Radio Japan | 11705as 11985as 21560va |
| 1400 | 1430 | | Thailand, Radio Thailand World Service | 9575va |
| 1400 | 1430 | Sun | United Arab Emirates, FEBA Radio | 12025as |
| 1400 | 1435 | twfas | Guam, KTWR/TWR | 9975as |
| 1400 | 1500 | | Anguilla, Worldwide Univ Network | 11775am |
| 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 | 6080pa 7240pa 9590pa |
| 1400 | 1500 | | Bahrain, Radio Bahrain | 6010me |
| 1400 | 1500 | DRM | Belgium, TDP Radio/Disco Palace | 6015eu |
| 1400 | 1500 | | Bhutan, Bhutan Broadcasting Service | 6035as |
| 1400 | 1500 | Sat/Sun | Canada, CBC NQ SW Service | 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 | 5955na 9765as 9870as 11665as 11675as 11765eu 13710as 13740na 13790eu 17630as |
| 1400 | 1500 | Sat/Sun | Equatorial Guinea, Radio East Africa | 15190af |
| 1400 | 1500 | | India, All India Radio | 9690as 11620as 13710as |
| 1400 | 1500 | | Malaysia, RTM/Traxx FM | 7295do |
| 1400 | 1500 | | Netherlands, R Netherlands Worldwide | 11835as 15745as |
| 1400 | 1500 | | New Zealand, Radio NZ International | 6170pa |
| 1400 | 1500 | | Nigeria, Voice of Nigeria/External Service | 9690af |
| 1400 | 1500 | | Palau, T8WH/WHRI/Sound of Hope Radio | 9930as |
| 1400 | 1500 | | Papua New Guinea, Radio Wantok Light | 7325do |
| 1400 | 1500 | | Russia, Voice of Russia | 4975va 9455as 11500as |
| 1400 | 1500 | DRM | Russia, Voice of Russia | 9750eu |
| 1400 | 1500 | | South Africa, Channel Africa | 9625af |
| 1400 | 1500 | | Uganda, UBC Radio | 4976do |
| 1400 | 1500 | | UK, BBC World Service | 5790eu 5875as 6190af 6195as 7230af 9740as 11920as 12095as 15310as 17640af 17830af 21470af |
| 1400 | 1500 | DRM | UK, BBC World Service | 9545eu 13590eu |
| 1400 | 1500 | Sat | UK, Bible Voice Broadcasting | 15265as |
| 1400 | 1500 | | United States, Overcomer Ministries | 13810eu |
| 1400 | 1500 | | USA, American Forces Network | 4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb |
| 1400 | 1500 | | USA, KJES Vado NM | 11715am |
| 1400 | 1500 | | USA, KNLS Anchor Point AK | 11765as |
| 1400 | 1500 | | USA, Voice of America | 6080af 12080af 15530af 15580af 17585af 17740af |
| 1400 | 1500 | mtwhf | USA, Voice of America | 7540va 7575va 9760va |
| 1400 | 1500 | | USA, WBCQ Monticello ME | 9330am |
| 1400 | 1500 | Sat | USA, WBCQ Monticello ME | 15420am |
| 1400 | 1500 | | USA, WEWN Vandiver AL | 13835as |
| 1400 | 1500 | Sat | USA, WHRI Cypress Creek SC | 9840na |
| 1400 | 1500 | | USA, WINB Red Lion PA | 9265ca |
| 1400 | 1500 | | USA, WJHR International Milton FL | 15550na |
| 1400 | 1500 | | USA, WRMI Miami FL | 9955ca |
| 1400 | 1500 | | USA, WTJC Newport NC | 9370na |
| 1400 | 1500 | | USA, WTWW Lebanon TN | 9479na |
| 1400 | 1500 | | USA, WWCR Nashville TN | 7490af 9980na 13845na 15825na |
| 1400 | 1500 | | USA, WWRB Manchester TN | 9385na |
| 1400 | 1500 | | USA, WYFR/Family Radio Worldwide | 9365as 9615as 9865as 11560as 11725as 11830na 11910na 13695na 17795na |
| 1400 | 1500 | | Zambia, 1 Africa-CVC Africa | 13590af |
| 1400 | 1500 | vl | Zambia, Radio Christian Voice/The Voice Africa | 6065af |
| 1415 | 1430 | mtwhfa | Germany, Pan American Broadcasting | 15205as |
| 1415 | 1430 | | Nepal, Radio Nepal | 5005as |
| 1415 | 1500 | Sun | UK, Bible Voice Broadcasting | 15265as |
| 1425 | 1455 | mtwhf | Swaziland, TWR Swaziland | 6065af |
| 1430 | 1445 | Sun | Germany, Pan American Broadcasting | 15205as |
| 1430 | 1459 | | China, CNR-2/Business Radio | 6055do 6155do 7245as 7315as 7335as 7375as 9820as |
| 1430 | 1500 | mtwhfa | Albania, Radio Tirana | 13625na |
| 1430 | 1500 | | Australia, Radio Australia | 9475as 11660as |
| 1430 | 1500 | | China, China Radio International | 7325as 11695as 12110as |
| 1430 | 1500 | | Sweden, Radio Sweden | 13820va |
| 1445 | 1500 | Sat/Sun | Australia, HCJB Global Voice Australia | 15340as |

## 1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

| Start | Stop | Days | Station | Frequencies |
|---|---|---|---|---|
| 1500 | 1510 | mtwhfa | Turkmenistan, Turkmen Radiosi | 5015eu |
| 1500 | 1515 | Sun | UK, Bible Voice Broadcasting | 13740as |
| 1500 | 1530 | | Australia, HCJB Global Voice Australia | 15340as |
| 1500 | 1530 | Sun | China, Voice of the Strait | 4940do 9505do |
| 1500 | 1530 | | Guam, KSDA/AWR | 11720as |
| 1500 | 1530 | | UK, BBC World Service | 7405af 11860af 15420af |
| 1500 | 1530 | | Vietnam, Voice of Vietnam | 7285as 9840as 12020as |
| 1500 | 1545 | | USA, WYFR/Family Radio Worldwide | 15770sa |
| 1500 | 1550 | | New Zealand, Radio NZ International | 6170pa |
| 1500 | 1557 | | Canada, Radio Canada International | 11675as 15125as |
| 1500 | 1557 | | Netherlands, R Netherlands Worldwide | 11835as 15745as |
| 1500 | 1557 | | North Korea, Voice of Korea | 9335eu 11710na 13760na 15245eu |
| 1500 | 1600 | | Anguilla, Worldwide Univ Network | 11775am |
| 1500 | 1600 | | Australia, ABC NT Alice Springs | 2310do |
| 1500 | 1600 | | Australia, ABC NT Katherine | 2485do |
| 1500 | 1600 | | Australia, Radio Australia | 5995pa 6080pa 7240pa 9475as 9590pa 11660as |
| 1500 | 1600 | | Bahrain, Radio Bahrain | 6010me |
| 1500 | 1600 | Sat/Sun | Canada, CBC NQ SW Service | 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 | 5955na 6095me 7325as 7410as 9720me 9870as 9800as 11965eu 13640eu 13740na 17630as |
| 1500 | 1600 | Sat/Sun | Equatorial Guinea, Radio East Africa | 15190af |
| 1500 | 1600 | | Malaysia, RTM/Traxx FM | 7295do |
| 1500 | 1600 | | Myanmar, Myanma Radio | 5985as |
| 1500 | 1600 | | Nigeria, Voice of Nigeria/External Service | 15120af |
| 1500 | 1600 | | Papua New Guinea, Radio Wantok Light | 7325do |
| 1500 | 1600 | | Russia, Voice of Russia | 4975va 9455as 9735me 11985va 12040eu 13855af 11985as |
| 1500 | 1600 | | South Africa, Channel Africa | 9625af |
| 1500 | 1600 | vl | Uganda, Dunamis Shortwave | 4750af |
| 1500 | 1600 | | Uganda, UBC Radio | 4976do |
| 1500 | 1600 | | UK, BBC World Service | 5790eu 5875as 6575as 6190af 6195as 9740as 11920as 12095eu 15310as 15400af 17640af 17830af 21470af |
| 1500 | 1600 | DRM | UK, BBC World Service | 5790eu 13590eu |
| 1500 | 1600 | | United States, Overcomer Ministries | 13810af 17485af |
| 1500 | 1600 | | USA, American Forces Network | 4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb |
| 1500 | 1600 | | USA, Voice of America | 4930af 7540va 7575va 12080af 12150va 13750va 15530va 15580af 17895af |
| 1500 | 1600 | | USA, Voice of America/Special English | 6140va 7520va 9485va 9760va |
| 1500 | 1600 | | USA, WBCQ Monticello ME | 9330am |
| 1500 | 1600 | Sat | USA, WBCQ Monticello ME | 15420am |
| 1500 | 1600 | | USA, WEWN Vandiver AL | 13835as |
| 1500 | 1600 | Sat | USA, WHRI Cypress Creek SC | 17510af |
| 1500 | 1600 | Sun | USA, WHRI Cypress Creek SC | 9840na 15195eu |
| 1500 | 1600 | smtwhf | USA, WINB Red Lion PA | 13570ca |
| 1500 | 1600 | Sat | USA, WINB Red Lion PA | 9265ca |
| 1500 | 1600 | | USA, WJHR International Milton FL | 15550na |
| 1500 | 1600 | | USA, WRMI Miami FL | 9955na |
| 1500 | 1600 | | USA, WTJC Newport NC | 9370na |
| 1500 | 1600 | | USA, WTWW Lebanon TN | 9479na |
| 1500 | 1600 | | USA, WWCR Nashville TN | 7490af 9980na 13845na 15825na |
| 1500 | 1600 | | USA, WWRB Manchester TN | 9385na |
| 1500 | 1600 | | USA, WYFR/Family Radio Worldwide | 6280as 11605as 11830na 11910na 15520na 17580af 17795na |
| 1500 | 1600 | | Zambia, 1 Africa-CVC Africa | 13590af |
| 1500 | 1600 | vl | Zambia, Radio Christian Voice/The Voice Africa | 6065af |
| 1505 | 1600 | DRM | Canada, Radio Canada International | 9800na |
| 1505 | 1600 | | Canada, Radio Canada International | 9515as |
| 1515 | 1530 | | Vatican City State, Vatican Radio | 11850as 13765as 15235as |
| 1515 | 1545 | Sat | UK, Bible Voice Broadcasting | 13740as |

| | | | | |
|---|---|---|---|---|
| 1525 | 1600 | Sat/Sun | Swaziland, TWR Swaziland | 6025af |
| 1530 | 1545 | | India, All India Radio | 7255do 9820do 9910do |
| 1530 | 1558 | Sat | Vatican City State, Vatican Radio | 13765as 15235as |
| 1530 | 1600 | | China, Xizang PBS/Holy Tibet | 4905do 4920do 5240do 6110do 6130do 6200do 7255do 7385do |
| 1530 | 1600 | | Germany, AWR Europe | 15255as |
| 1530 | 1600 | | Iran, VOIRI/IRIB | 7305as 9600as |
| 1530 | 1600 | | Mongolia, Voice of Mongolia | 9665as 12085as |
| 1530 | 1600 | | Sweden, Radio Sweden | 13870va 13600al |
| 1530 | 1600 | h | UK, Bible Voice Broadcasting | 13740as |
| 1530 | 1600 | Sun | UK, Bible Voice Broadcasting | 13590me |
| 1545 | 1600 | m | UK, Bible Voice Broadcasting | 13590me |
| 1545 | 1600 | twhfa | UK, Bible Voice Broadcasting | 13590me |
| 1551 | 1600 | | New Zealand, Radio NZ International | 7440pa |
| 1551 | 1600 | DRM | New Zealand, Radio NZ International | 6170pa |

## 1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

| | | | | |
|---|---|---|---|---|
| 1600 | 1605 | Sun | Croatia, Croatian Radio | 6165eu |
| 1600 | 1615 | mtwhfa | Croatia, Croatian Radio | 6165eu |
| 1600 | 1615 | | Pakistan, PBC/Radio Pakistan | 7530me 11585va |
| 1600 | 1615 | f | UK, Bible Voice Broadcasting | 13590me |
| 1600 | 1625 | Sat/Sun | Swaziland, TWR Swaziland | 6025af |
| 1600 | 1627 | | Czech Republic, Radio Prague | 9740eu |
| 1600 | 1627 | | Iran, VOIRI/IRIB | 7305as 9600as |
| 1600 | 1630 | Sun | Germany, Pan American Broadcasting | 13830me |
| 1600 | 1630 | | Guam, KSDA/AWR | 11720as 11805as |
| 1600 | 1630 | | Myanmar, Myanma Radio | 9730do |
| 1600 | 1630 | | Vietnam, Voice of Vietnam | 7220me 7280eu 9550me 9730eu |
| 1600 | 1645 | h | UK, Bible Voice Broadcasting | 13590me |
| 1600 | 1645 | | USA, WYFR/Family Radio Worldwide | 11830na 11865na |
| 1600 | 1657 | | North Korea, Voice of Korea | 9990na 11545va |
| 1600 | 1700 | | Anguilla, Worldwide Univ Network | 11775am |
| 1600 | 1700 | | Australia, ABC NT Alice Springs | 2310do |
| 1600 | 1700 | | Australia, ABC NT Katherine | 2485do |
| 1600 | 1700 | | Australia, Radio Australia | 5995pa 6080pa 7240pa 9465as 9710pa 11660as |
| 1600 | 1700 | | Bahrain, Radio Bahrain | 6010me |
| 1600 | 1700 | Sat | Canada, CBC NQ SW Service | 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 | | Canada, Radio Canada International | 9515as |
| 1600 | 1700 | DRM | Canada, Radio Canada International | 9800na |
| 1600 | 1700 | | China, China Radio International | 6060as 7235as 7420af 9570af 11900af 11940eu 11965eu 13760eu |
| 1600 | 1700 | | Egypt, Radio Cairo | 12170af |
| 1600 | 1700 | | Ethiopia, Radio Ethiopia/External Service | 7165va 9560af |
| 1600 | 1700 | mtwhf | France, Radio France Internationale | 15605af 17605af |
| 1600 | 1700 | | Germany, Deutsche Welle | 6170as 9485as 9540as 15410as |
| 1600 | 1700 | | Malaysia, RTM/Traxx FM | 7295do |
| 1600 | 1700 | | New Zealand, Radio NZ International | 7440pa |
| 1600 | 1700 | DRM | New Zealand, Radio NZ International | 6170pa |
| 1600 | 1700 | | Papua New Guinea, Radio Wantok Light | 7325do |
| 1600 | 1700 | | Russia, Voice of Russia | 4975va 11985va 11985af 12040eu 13855af |
| 1600 | 1700 | | South Korea, KBS World Radio | 9515eu |
| 1600 | 1700 | | Taiwan, Radio Taiwan International | 11550as 13840as |
| 1600 | 1700 | vl | Uganda, Dunamis Shortwave | 4750af |
| 1600 | 1700 | | Uganda, UBC Radio | 4976do |
| 1600 | 1700 | | UK, BBC World Service | 3255af 5790eu 5850as 5975as 6190af 9695as 12095eu 15400af 17640af 17795af 17830af 21470af |
| 1600 | 1700 | DRM | UK, BBC World Service | 3995eu 5790eu |
| 1600 | 1700 | Sat/Sun | UK, Bible Voice Broadcasting | 13590me |
| 1600 | 1700 | | USA, American Forces Network | 4319usb 5446usb 5765usb 7812usb 12133usb 12759usb 13362usb |
| 1600 | 1700 | | USA, Voice of America | 4930af 6080af 15580af |
| 1600 | 1700 | | USA, Voice of America/Special English | 11890va 12080va 13570va |
| 1600 | 1700 | | USA, WBCQ Monticello ME | 9330am |
| 1600 | 1700 | Sat | USA, WBCQ Monticello ME | 15420am |
| 1600 | 1700 | | USA, WEWN Vandiver AL | 15610va |
| 1600 | 1700 | Sun | USA, WHRI Cypress Creek SC | 9840na |
| 1600 | 1700 | has | USA, WHRI Cypress Creek SC | 17520af |
| 1600 | 1700 | smtwhf | USA, WINB Red Lion PA | 13570ca |
| 1600 | 1700 | Sat | USA, WINB Red Lion PA | 9265ca |
| 1600 | 1700 | | USA, WJHR International Milton FL | 15550na |
| 1600 | 1700 | | USA, WRMI Miami FL | 9955na |
| 1600 | 1700 | | USA, WTJC Newport NC | 9370na |
| 1600 | 1700 | | USA, WTWW Lebanon TN | 9479na |
| 1600 | 1700 | | USA, WWCR Nashville TN | 9980na 12160af 13845na 15825na |
| 1600 | 1700 | | USA, WWRB Manchester TN | 9385na |
| 1600 | 1700 | | USA, WYFR/Family Radio Worldwide | 6010af 6085ca 7270af 11850as 13695na 17545af 17795na 18980va 21485eu 21525af |
| 1600 | 1700 | | Zambia, 1 Africa-CVC Africa | 13590af |
| 1600 | 1700 | vl | Zambia, Radio Christian Voice/The Voice Africa | 6065af |
| 1615 | 1630 | mtwhf | Swaziland, TWR Swaziland | 6130af |
| 1615 | 1630 | | Vatican City State, Vatican Radio | 4005eu 5885eu 7250eu 15595eu |
| 1615 | 1700 | Sun | UK, BBC World Service | 7405af 11860af 15420af |
| 1630 | 1700 | | Guam, KSDA/AWR | 11740as |
| 1630 | 1700 | | Palau, T8WH/WHRI/Sound of Hope Radio | 9930va |
| 1630 | 1700 | | Slovakia, Radio Slovakia International | 5920eu 6055eu |
| 1630 | 1700 | Sat/Sun | Swaziland, TWR Swaziland | 6130af |
| 1630 | 1700 | Sat | UK, BBC World Service | 11860af |
| 1630 | 1700 | mtwhf | UK, BBC World Service | 15420af |
| 1640 | 1650 | mtwhfa | Turkmenistan, Turkmen Radiosi | 4930eu |

## 1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

| | | | | |
|---|---|---|---|---|
| 1700 | 1705 | | Canada, Radio Canada International | 9515as |
| 1700 | 1705 | DRM | Canada, Radio Canada International | 9800na |
| 1700 | 1715 | mtwhf | Moldova, (Transnistria) Radio PMR | 6240eu |
| 1700 | 1715 | | UK, Bible Voice Broadcasting | 13590me |
| 1700 | 1727 | | Czech Republic, Radio Prague | 9740eu |
| 1700 | 1730 | DRM | Romania, Radio Romania International | 7350eu |
| 1700 | 1730 | | Sweden, Radio Sweden | 13870va |
| 1700 | 1730 | | USA, Voice of America | 6080af 12015af 15580af 17895af |
| 1700 | 1730 | | Vietnam, Voice of Vietnam | 9725eu |
| 1700 | 1746 | | UK, BBC World Service | 6005af 9410af |
| 1700 | 1756 | DRM | Romania, Radio Romania International | 9535eu |
| 1700 | 1756 | | Romania, Radio Romania International | 11735eu |
| 1700 | 1759 | | Canada, Radio Canada International | 5850na |
| 1700 | 1759 | | Poland, Polskie Radio Warsaw | 9770eu |
| 1700 | 1800 | | Anguilla, Worldwide Univ Network | 11775am |
| 1700 | 1800 | | Australia, ABC NT Alice Springs | 2310do |
| 1700 | 1800 | | Australia, ABC NT Katherine | 2485do |
| 1700 | 1800 | | Australia, Radio Australia | 5995pa 6080pa 9475as 9510pa 9710pa 11880pa |
| 1700 | 1800 | | Bahrain, Radio Bahrain | 6010me |
| 1700 | 1800 | Sat | Canada, CBC NQ SW Service | 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 | 6090as 6140eu 6145eu 6165me 7235as 7265af 7410as 7420as 9570af 9695eu 11900af 13760eu |
| 1700 | 1800 | | Egypt, Radio Cairo | 12170af |
| 1700 | 1800 | | Equatorial Guinea, Radio Africa | 7190af 15190af |
| 1700 | 1800 | DRM | Germany, Deutsche Welle | 5790eu |
| 1700 | 1800 | | Malaysia, RTM/Traxx FM | 7295do |
| 1700 | 1800 | | New Zealand, Radio NZ International | 7440pa |
| 1700 | 1800 | DRM | New Zealand, Radio NZ International | 6170pa |
| 1700 | 1800 | | Nigeria, Voice of Nigeria/External Service | 15120af |
| 1700 | 1800 | | Palau, T8WH/WHRI/Sound of Hope Radio | 9930va |
| 1700 | 1800 | | Papua New Guinea, Radio Wantok Light | 7325do |
| 1700 | 1800 | DRM | Poland, Polskie Radio Warsaw | 7265eu |
| 1700 | 1800 | | Russia, Voice of Russia | 4975va 11985va 12040eu 13855af |
| 1700 | 1800 | | South Africa, Channel Africa | 9675af |
| 1700 | 1800 | | Swaziland, TWR Swaziland | 3200af 9500af |
| 1700 | 1800 | | Taiwan, Radio Taiwan International | 15690af |
| 1700 | 1800 | | Tajikistan, Voice of Tajik/External Service | 7245va |
| 1700 | 1800 | vl | Uganda, Dunamis Shortwave | 4750af |
| 1700 | 1800 | | Uganda, UBC Radio | 4976do |

| Start | Stop | Days | Station | Freq | Freq |
|---|---|---|---|---|---|
| 1700 | 1800 | | UK, BBC World Service | 3255af | 5790eu |
| | | | 5850as | 5875eu | 5975as | 6190af |
| | | | 7405af | 9810as | 12095af | 13675eu |
| | | | 15400af | 17795af | 17830eu |
| 1700 | 1800 | DRM | UK, BBC World Service | 3995eu | |
| 1700 | 1800 | Sat | UK, Bible Voice Broadcasting | 9645me | |
| 1700 | 1800 | Sat/Sun | UK, Bible Voice Broadcasting | 13590me | |
| 1700 | 1800 | | USA, American Forces Network | 4319usb | |
| | | | 5446usb | 5765usb | 7812usb | 12133usb |
| | | | 12759usb | 13362usb | |
| 1700 | 1800 | | USA, WBCQ Monticello ME | 9330am | 15420am |
| 1700 | 1800 | | USA, WEWN Vandiver AL | 15610va | |
| 1700 | 1800 | smtwhf | USA, WINB Red Lion PA | 13570ca | |
| 1700 | 1800 | Sat | USA, WINB Red Lion PA | 9265ca | |
| 1700 | 1800 | | USA, WJHR International Milton FL | 15550na | |
| 1700 | 1800 | | USA, WRMI Miami FL | 9955ca | |
| 1700 | 1800 | | USA, WTJC Newport NC | 9370na | |
| 1700 | 1800 | | USA, WTWW Lebanon TN | 9479na | |
| 1700 | 1800 | | USA, WWCR Nashville TN | 9980na | 12160af |
| | | | 13845na | 15825na | |
| 1700 | 1800 | | USA, WWRB Manchester TN | 9385na | |
| 1700 | 1800 | | USA, WYFR/Family Radio Worldwide | 7395af | |
| | | | 7560af | 11810af | 13690na | 17545af |
| | | | 17795na | 18980va | 21485eu |
| 1700 | 1800 | | Zambia, 1 Africa-CVC Africa | 13590af | |
| 1720 | 1740 | Sat/Sun | USA, Voice of America/Studio 7 | 4930af | |
| | | | 11605af | 15775af | |
| 1730 | 1740 | | USA, Voice of America | 4930af | 11605af |
| | | | 15775af | |
| 1730 | 1800 | | Bulgaria, Radio Bulgaria | 5900eu | 7400eu |
| 1730 | 1800 | DRM | Bulgaria, Radio Bulgaria | 9400eu | |
| 1730 | 1800 | | Clandestine, Sudan Radio Service/ SRS | 9590af | |
| 1730 | 1800 | | UK, Bible Voice Broadcasting | 13590me | |
| 1730 | 1800 | Sun | UK, Bible Voice Broadcasting | 9645me | |
| 1730 | 1800 | | USA, Voice of America | 12015af | 15580af |
| | | | 17895af | |
| 1730 | 1800 | mtwhf | USA, Voice of America/Studio 7 | 4930af | |
| | | | 11605af | 15775af | |
| 1730 | 1800 | | Vatican City State, Vatican Radio | 11625af | |
| | | | 13765af | 15570af | |
| 1745 | 1800 | | Bangladesh, Bangladesh Betar | 7250as | |
| 1745 | 1800 | DRM | India, All India Radio | 9950eu | |
| 1745 | 1800 | | India, All India Radio | 6120af | 6280eu |
| | | | 7400af | 7410af | 7550eu | 9415af |
| | | | 9445af | 9940eu | 11935af |
| 1745 | 1800 | mtwhf | Moldova, (Transnistria) Radio PMR | 6240na | |

## 1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

| Start | Stop | Days | Station | Freq | Freq |
|---|---|---|---|---|---|
| 1800 | 1800 | Sat | USA, WINB Red Lion PA | 9265ca | |
| 1800 | 1810 | Sun | UK, Bible Voice Broadcasting | 13590me | |
| 1800 | 1830 | w | Austria, AWR Europe | 9755af | |
| 1800 | 1830 | | South Africa, AWR3215af | 3345af | 9610af |
| 1800 | 1830 | | UK, BBC World Service | 5875eu | 5975as |
| 1800 | 1830 | Sun | UK, Bible Voice Broadcasting | 9430me | |
| 1800 | 1830 | | USA, Voice of America | 6080af | 9850af |
| | | | 12015af | 15580af | |
| 1800 | 1830 | Sat/Sun | USA, Voice of America | 4930af | |
| 1800 | 1835 | | New Zealand, Radio NZ International | 7440pa | |
| 1800 | 1835 | DRM | New Zealand, Radio NZ International | 6170pa | |
| 1800 | 1857 | | Netherlands, R Netherlands Worldwide | 6020af | |
| 1800 | 1857 | | North Korea, Voice of Korea | 13760af | 15245eu |
| 1800 | 1859 | | Canada, Radio Canada International | 9530af | |
| | | | 11765af | 17735af | 17810af |
| 1800 | 1900 | | Anguilla, Worldwide Univ Network | 11775am | |
| 1800 | 1900 | mtwhf | Argentina, Radio Nacional RAE | 9690eu | |
| | | | 15345eu | |
| 1800 | 1900 | | Australia, ABC NT Alice Springs | 2310do | |
| 1800 | 1900 | | Australia, ABC NT Katherine | 2485do | |
| 1800 | 1900 | | Australia, Radio Australia | 6080pa | 7240pa |
| | | | 9475as | 9510pa | 9710pa | 11880pa |
| 1800 | 1900 | | Bahrain, Radio Bahrain | 6010me | |
| 1800 | 1900 | | Bangladesh, Bangladesh Betar | 7250eu | |
| 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 | 9600eu | |
| | | | 13760eu | |
| 1800 | 1900 | | Equatorial Guinea, Radio Africa | 7190af | |
| | | | 15190af | |
| 1800 | 1900 | DRM | Germany, Deutsche Welle | 5790eu | |
| 1800 | 1900 | DRM | India, All India Radio | 9950eu | |
| 1800 | 1900 | | India, All India Radio | 6120af | 6280eu |
| | | | 7400af | 7410af | 7550eu | 9415af |
| | | | 9445af | 11935af | |
| 1800 | 1900 | | Kuwait, Radio Kuwait | 15540va | |

| Start | Stop | Days | Station | Freq | Freq |
|---|---|---|---|---|---|
| 1800 | 1900 | | Liberia, Star Radio | 3900do | 4025al |
| 1800 | 1900 | | Malaysia, RTM/Traxx FM | 7295do | |
| 1800 | 1900 | | Netherlands, R Netherlands Worldwide | 12045af | |
| | | | 15535af | |
| 1800 | 1900 | | Nigeria, Voice of Nigeria/External Service | 15120af | |
| 1800 | 1900 | | Palau, T8WH/WHRI/Sound of Hope Radio | 9930va | 9955as |
| 1800 | 1900 | | Papua New Guinea, Radio Wantok Light | 7325do | |
| 1800 | 1900 | | Russia, Voice of Russia | 4975va | 12040eu |
| 1800 | 1900 | | South Korea, KBS World Radio | 7275eu | |
| 1800 | 1900 | | Taiwan, Radio Taiwan International | 6155eu | |
| 1800 | 1900 | vl | Uganda, Dunamis Shortwave | 4750af | |
| 1800 | 1900 | | Uganda, UBC Radio | 4976do | |
| 1800 | 1900 | | UK, BBC World Service | 3255af | 5790eu |
| | | | 5875eu | 5950as | 6190af | 7405af |
| | | | 11810af | 12095af | 13675eu | 15400af |
| | | | 17795af | |
| 1800 | 1900 | Sat | UK, Bible Voice Broadcasting | 9430me | |
| 1800 | 1900 | Sun | UK, Bible Voice Broadcasting | 6130eu | |
| 1800 | 1900 | | USA, American Forces Network | 4319usb | |
| | | | 5446usb | 5765usb | 7812usb | 12133usb |
| | | | 12759usb | 13362usb | |
| 1800 | 1900 | | USA, KJES Vado NM | 15385pa | |
| 1800 | 1900 | | USA, WBCQ Monticello ME | 7415am | 9330am |
| | | | 15420am | |
| 1800 | 1900 | | USA, WEWN Vandiver AL | 15610va | |
| 1800 | 1900 | Sun | USA, WHRI Cypress Creek SC | | 17520af |
| 1800 | 1900 | hfas | USA, WHRI Cypress Creek SC | | 9840na |
| 1800 | 1900 | smtwhf | USA, WINB Red Lion PA | 13570ca | |
| 1800 | 1900 | | USA, WJHR International Milton FL | 15550na | |
| 1800 | 1900 | | USA, WRMI Miami FL | 9955ca | |
| 1800 | 1900 | | USA, WTJC Newport NC | 9370na | |
| 1800 | 1900 | | USA, WTWW Lebanon TN | 9479na | |
| 1800 | 1900 | | USA, WWCR Nashville TN | 9980na | 12160af |
| | | | 13845na | 15825na | |
| 1800 | 1900 | | USA, WWRB Manchester TN | 9385na | |
| 1800 | 1900 | | USA, WYFR/Family Radio Worldwide | | 6180af |
| | | | 7395af | 9770af | 9830me | 13615na |
| | | | 13690na | 13750af | 17795na | 17845af |
| | | | 18980va | |
| 1800 | 1900 | | Yemen, Republic of Yemen Radio/Radio Sana'a | 6005me | 9780me |
| 1800 | 1900 | | Zambia, 1 Africa-CVC Africa | 13590af | |
| 1805 | 1810 | Sat | Croatia, Croatian Radio | 6165eu | |
| 1805 | 1815 | mtwhf | Croatia, Croatian Radio | 6165eu | |
| 1810 | 1820 | f | USA, Voice of America | 4930af | 11605af |
| | | | 15775af | |
| 1830 | 1845 | | Rwanda, Radio Rwanda | 6055do | |
| 1830 | 1845 | Sat | UK, Bible Voice Broadcasting | 6130eu | |
| 1830 | 1900 | | Serbia, International Radio of Serbia | 6100eu | |
| 1830 | 1900 | | Slovakia, Radio Slovakia International | 5920eu | |
| | | | 6055eu | |
| 1830 | 1900 | | Turkey, Voice of Turkey | 9785eu | |
| 1830 | 1900 | | UK, BBC World Service | 5875as | 6005af |
| | | | 9410af | |
| 1830 | 1900 | f | UK, Bible Voice Broadcasting | 9430me | |
| 1830 | 1900 | | USA, Voice of America | 4930af | 6080af |
| | | | 9850af | 12015af | 15580af |
| 1836 | 1900 | | New Zealand, Radio NZ International | 9615pa | |
| 1836 | 1900 | DRM | New Zealand, Radio NZ International | 9890pa | |
| 1845 | 1900 | mtwhas | Albania, Radio Tirana | 7520eu | 13640na |
| 1845 | 1900 | Sun | UK, Bible Voice Broadcasting | 11830af | |
| 1859 | 1900 | | Netherlands, R Netherlands Worldwide | 7425af | |
| | | | 11610af | 11970af | |

## 1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

| Start | Stop | Days | Station | Freq | Freq |
|---|---|---|---|---|---|
| 1900 | 1915 | Sun | UK, Bible Voice Broadcasting | 11830af | |
| 1900 | 1930 | | Germany, Deutsche Welle | 6150af | 11795af |
| | | | 17865af | |
| 1900 | 1930 | | Turkey, Voice of Turkey | 9785eu | |
| 1900 | 1930 | | Vietnam, Voice of Vietnam | 7280eu | 9730eu |
| 1900 | 1935 | DRM | New Zealand, Radio NZ International | 9890pa | |
| 1900 | 1945 | DRM | India, All India Radio | 9950eu | |
| 1900 | 1945 | | India, All India Radio | 6120af | 6280eu |
| | | | 7400af | 7410af | 7550af | 9415af |
| | | | 9445af | 11935af | |
| 1900 | 1945 | mtwh | USA, WBCQ Monticello ME | 7415am | |
| 1900 | 1945 | | USA, WYFR/Family Radio Worldwide | 6085ca | |
| 1900 | 1950 | | New Zealand, Radio NZ International | 9615pa | |
| 1900 | 1957 | | Netherlands, R Netherlands Worldwide | 7425af | |
| | | | 12045af | 15535af | |
| 1900 | 1957 | | North Korea, Voice of Korea | 7100eu | 9975af |
| | | | 11535va | 11910af | |
| 1900 | 2000 | | Anguilla, Worldwide Univ Network | 11775am | |
| 1900 | 2000 | | Australia, ABC NT Alice Springs | 2310do | |

| Start | Stop | Notes | Station | Freq | Freq | Freq | Freq |
|---|---|---|---|---|---|---|---|
| 1900 | 2000 | | Australia, ABC NT Katherine | 2485do | | | |
| 1900 | 2000 | | Australia, Radio Australia | 6080pa | 7240pa | | |
| | | | | 9500as | 9510pa | 9710pa | 11880pa |
| 1900 | 2000 | | Bahrain, Radio Bahrain | 6010me | | | |
| 1900 | 2000 | DRM | Belgium, TDP Radio | 15755na | | | |
| 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 | | 7295af | | |
| | | | | 9435af | | | |
| 1900 | 2000 | | Egypt, Radio Cairo | 11510af | | | |
| 1900 | 2000 | | Equatorial Guinea, Radio Africa | | 7190af | | |
| | | | | 15190af | | | |
| 1900 | 2000 | DRM | Germany, Deutsche Welle | 3995eu | 5875eu | | |
| 1900 | 2000 | | Kuwait, Radio Kuwait | 15540va | 17550va | | |
| 1900 | 2000 | | Liberia, Star Radio | 3900do | 4025al | | |
| 1900 | 2000 | | Malaysia, RTM/Traxx FM | 7295do | | | |
| 1900 | 2000 | | Netherlands, R Netherlands Worldwide | 11610af | | | |
| | | | | 11970af | | | |
| 1900 | 2000 | | Nigeria, Voice of Nigeria/External Service | | | | |
| | | | | 9690af | 7255al | | |
| 1900 | 2000 | | Palau, T8WH/WHRI/Sound of Hope Radio | | | | |
| | | | | 9930va | | | |
| 1900 | 2000 | | Papua New Guinea, Radio Wantok Light | 7325do | | | |
| 1900 | 2000 | | Russia, Voice of Russia | 12040eu | | | |
| 1900 | 2000 | mtwhf | Spain, Radio Exterior de Espana | 9665af | | | |
| | | | | 11620eu | | | |
| 1900 | 2000 | | Thailand, Radio Thailand World Service | 7570eu | | | |
| 1900 | 2000 | | Uganda, UBC Radio | 4976do | | | |
| 1900 | 2000 | | UK, BBC World Service | 3255af | 3995eu | | |
| | | | | 5875eu | 5950as | 6005af | 6155as |
| | | | | 6190af | 9410af | 11810af | 12095af |
| | | | | 15400af | 17795af | | |
| 1900 | 2000 | | Ukraine, Radio Ukraine International | 7440na | | | |
| 1900 | 2000 | | United States, Overcomer Ministries | 6155eu | | | |
| | | | | 7425me | 9895me | | |
| 1900 | 2000 | | USA, American Forces Network | 4319usb | | | |
| | | | | 5446usb | 5765usb | 7812usb | 12133usb |
| | | | | 12759usb | 13362usb | | |
| 1900 | 2000 | | USA, Voice of America | 4930af | 4940af | | |
| | | | | 6080af | 9850af | 15580af | 17895af |
| 1900 | 2000 | | USA, Voice of America/Special English | 7485va | | | |
| | | | | 9630va | | | |
| 1900 | 2000 | fas | USA, WBCQ Monticello ME | 7415am | | | |
| 1900 | 2000 | | USA, WBCQ Monticello ME | 9330am | 15420am | | |
| 1900 | 2000 | | USA, WEWN Vandiver AL | 15610va | | | |
| 1900 | 2000 | mtwhfa | USA, WHRI Cypress Creek SC | 9840na | | | |
| 1900 | 2000 | Sun | USA, WHRI Cypress Creek SC | 15665af | | | |
| 1900 | 2000 | smtwhf | USA, WINB Red Lion PA | 13570ca | | | |
| 1900 | 2000 | Sat | USA, WINB Red Lion PA | 9265ca | | | |
| 1900 | 2000 | | USA, WJHR International Milton FL | 15550na | | | |
| 1900 | 2000 | | USA, WRMI Miami FL | 9955ca | | | |
| 1900 | 2000 | | USA, WTJC Newport NC | 9370na | | | |
| 1900 | 2000 | | USA, WTWW Lebanon TN | 9479na | | | |
| 1900 | 2000 | | USA, WWCR Nashville TN | 9980na | 12160af | | |
| | | | | 13845na | 15825na | | |
| 1900 | 2000 | | USA, WWRB Manchester TN | 9385na | | | |
| 1900 | 2000 | | USA, WYFR/Family Radio Worldwide | | | | |
| | | | | 6020af | 7270af | 7395af | 9610af |
| | | | | 9775af | 9830me | 13615af | 13690na |
| | | | | 17795na | 17845af | 18930va | 18980va |
| 1900 | 2000 | | Zambia, 1 Africa-CVC Africa | 9540af | | | |
| 1905 | 1920 | Sat | Mali, ORTM Du Mali | 5995do | | | |
| 1905 | 2000 | m | South Africa, Amateur Radio Mirror Intl | 3215af | | | |
| 1930 | 2000 | Sat/Sun | Germany, Pan American Broadcasting | 6175af | | | |
| 1930 | 2000 | | Iran, VOIRI/IRIB | 5940eu | 6205eu | 7205eu | |
| | | | | 7215af | 9800af | | |
| 1930 | 2000 | vl | South Africa, RTE Radio Worldwide | 6225af | | | |
| 1936 | 2000 | DRM | New Zealand, Radio NZ International | 11675pa | | | |
| 1945 | 2000 | DRM | Vatican City State, Vatican Radio | 9800am | | | |
| 1950 | 2000 | | Vatican City State, Vatican Radio | 4005eu | | | |
| | | | | 5885eu | 7250eu | 9645eu | |
| 1951 | 2000 | | New Zealand, Radio NZ International | 11725pa | | | |

## 2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

| Start | Stop | Notes | Station | Freq | Freq | Freq |
|---|---|---|---|---|---|---|
| 2000 | 2005 | m | South Africa, Amateur Radio Mirror Intl | 3215af | | |
| 2000 | 2015 | Sun | Germany, Pan American Broadcasting | 6175af | | |
| 2000 | 2020 | | Vatican City State, Vatican Radio | 4005eu | | |
| | | | | 5885eu | 7250eu | 9645eu |
| 2000 | 2027 | | Czech Republic, Radio Prague | 5930eu | | |
| 2000 | 2027 | | Iran, VOIRI/IRIB | 5940eu | 6205eu | 7205eu |
| | | | | 7215af | 9800af | |
| 2000 | 2030 | mtwhfa | Albania, Radio Tirana | 7465eu | 13640na | |
| 2000 | 2030 | | Egypt, Radio Cairo | 11510af | | |
| 2000 | 2030 | Sat | Germany, Pan American Broadcasting | 6175af | | |

| Start | Stop | Notes | Station | Freq | Freq | Freq | Freq |
|---|---|---|---|---|---|---|---|
| 2000 | 2030 | vl | South Africa, RTE Radio Worldwide | 6225af | | | |
| 2000 | 2030 | | Swaziland, TWR Swaziland | 3200af | | | |
| 2000 | 2030 | | USA, Voice of America | 4930af | 4940af | | |
| | | | | 6080af | 15580af | | |
| 2000 | 2030 | | Vatican City State, Vatican Radio | 7365af | | | |
| | | | | 9755af | 11625af | | |
| 2000 | 2030 | DRM | Vatican City State, Vatican Radio | 9800am | | | |
| 2000 | 2045 | | USA, WYFR/Family Radio Worldwide | 17750eu | | | |
| 2000 | 2050 | DRM | New Zealand, Radio NZ International | 11675pa | | | |
| 2000 | 2056 | | Romania, Radio Romania International | 9690na | | | |
| | | | | 11880eu | 11940na | | |
| 2000 | 2057 | | Germany, Deutsche Welle | 6150af | 11795af | | |
| | | | | 11865af | | | |
| 2000 | 2057 | | Netherlands, R Netherlands Worldwide | 7425af | | | |
| | | | | 11610af | 11970af | | |
| 2000 | 2059 | | Canada, Radio Canada International | 15235af | | | |
| | | | | 17735af | | | |
| 2000 | 2100 | | Anguilla, Worldwide Univ Network | 11775am | | | |
| 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 | 11650pa | | |
| | | | | 11660pa | 11880pa | | |
| 2000 | 2100 | Sat/Sun | Australia, Radio Australia | 6080pa | 7240pa | | |
| | | | | 12080pa | | | |
| 2000 | 2100 | | Bahrain, Radio Bahrain | 6010me | | | |
| 2000 | 2100 | | Belarus, Radio Belarus | 7255eu | 7360eu | | |
| | | | | 7390eu | | | |
| 2000 | 2100 | DRM | Belgium, TDP Radio/Disco Palace | 15755na | | | |
| 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 | 7295af | 7415eu |
| | | | | 9440af | 9600eu | | |
| 2000 | 2100 | | Cuba, Radio Havana Cuba | 11760ca | | | |
| 2000 | 2100 | | Equatorial Guinea, Radio Africa | | 7190af | | |
| | | | | 15190af | | | |
| 2000 | 2100 | | Indonesia, Voice of Indonesia | 9526va | 11785al | | |
| 2000 | 2100 | | Kuwait, Radio Kuwait | 15540va | 17550va | | |
| 2000 | 2100 | | Liberia, Star Radio | 3900do | 4025al | | |
| 2000 | 2100 | | Malaysia, RTM/Traxx FM | 7295do | | | |
| 2000 | 2100 | | New Zealand, Radio NZ International | 11725pa | | | |
| 2000 | 2100 | | Nigeria, Voice of Nigeria/External Service | | | | |
| | | | | 15120af | | | |
| 2000 | 2100 | | Palau, T8WH/WHRI/Sound of Hope Radio | | | | |
| | | | | 9930va | | | |
| 2000 | 2100 | | Syria, Radio Damascus | 9330eu | 12085as | | |
| 2000 | 2100 | | Uganda, UBC Radio | 4976do | | | |
| 2000 | 2100 | | Uganda, UBC Radio | 4976do | | | |
| 2000 | 2100 | | UK, BBC World Service | 3255af | 5875eu | | |
| | | | | 6005af | 6190af | 9410af | 11810af |
| | | | | 12095af | 13820af | 15400af | |
| 2000 | 2100 | | United States, Overcomer Ministries | 6155eu | | | |
| 2000 | 2100 | | USA, American Forces Network | 4319usb | | | |
| | | | | 5446usb | 5765usb | 7812usb | 12133usb |
| | | | | 12759usb | 13362usb | | |
| 2000 | 2100 | | USA, WBCQ Monticello ME | 7415am | 9330am | | |
| | | | | 15420am | | | |
| 2000 | 2100 | | USA, WEWN Vandiver AL | 15610va | | | |
| 2000 | 2100 | Sat | USA, WHRI Cypress Creek SC | 15665af | | | |
| 2000 | 2100 | Sun | USA, WHRI Cypress Creek SC | 13660af | | | |
| 2000 | 2100 | smtwhf | USA, WINB Red Lion PA | 13570ca | | | |
| 2000 | 2100 | Sat | USA, WINB Red Lion PA | 9265ca | | | |
| 2000 | 2100 | | USA, WJHR International Milton FL | 15550na | | | |
| 2000 | 2100 | | USA, WRMI Miami FL | 9955ca | | | |
| 2000 | 2100 | | USA, WTJC Newport NC | 9370na | | | |
| 2000 | 2100 | | USA, WTWW Lebanon TN | 9479na | | | |
| 2000 | 2100 | | USA, WWCR Nashville TN | 9980na | 12160af | | |
| | | | | 13845na | 15825na | | |
| 2000 | 2100 | | USA, WWRB Manchester TN | 9385na | | | |
| 2000 | 2100 | | USA, WYFR/Family Radio Worldwide | | | | |
| | | | | 7430eu | 9450af | 9510af | 9610af |
| | | | | 9740af | 11690af | 12055af | 13615sa |
| | | | | 17725af | 17795va | 17845va | 18980va |
| 2000 | 2100 | | Zambia, 1 Africa-CVC Africa | 9540af | | | |
| 2030 | 2045 | | Thailand, Radio Thailand World Service | 9680eu | | | |
| 2030 | 2056 | DRM | Romania, Radio Romania International | 9765eu | | | |
| 2030 | 2100 | | Sweden, Radio Sweden | 9495va | | | |
| 2030 | 2100 | | Turkey, Voice of Turkey | 7205va | | | |
| 2030 | 2100 | | USA, Voice of America | 4930af | 6080af | | |
| | | | | 7355af | 7555af | 15580af | |
| 2030 | 2100 | Sat/Sun | USA, Voice of America | 4940af | | | |
| 2030 | 2100 | | Vietnam, Voice of Vietnam | 7280eu | 9550me | | |
| 2045 | 2100 | | India, All India Radio | 6280eu | 7550eu | | |
| | | | | 9445eu | 9910eu | 11620pa | 11715pa |
| 2045 | 2100 | DRM | India, All India Radio | 9950eu | | | |

## 2100 UTC - 5PM EDT / 4PM CDT / 2PM PDT

| | | | | |
|---|---|---|---|---|
| 2100 | 2105 | | Uganda, UBC Radio | 4976do |
| 2100 | 2130 | | Australia, ABC NT Alice Springs | 2310do |
| 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 | 11955af |
| 2100 | 2130 | Sat | Canada, CBC NQ SW Service | 9625na |
| 2100 | 2130 | | Serbia, International Radio of Serbia | 6100eu |
| 2100 | 2130 | | South Korea, KBS World Radio | 3955eu |
| 2100 | 2130 | | Turkey, Voice of Turkey | 7205va |
| 2100 | 2145 | | USA, WYFR/Family Radio Worldwide | 13615na |
| | | | 13690na      17795na      18980va | |
| 2100 | 2150 | | New Zealand, Radio NZ International | 11725pa |
| 2100 | 2150 | DRM | New Zealand, Radio NZ International | 11675pa |
| 2100 | 2157 | | Germany, Deutsche Welle      9735as | 11865af |
| | | | 15640af | |
| 2100 | 2157 | | North Korea, Voice of Korea  13760va | 15245eu |
| 2100 | 2200 | | Anguilla, Worldwide Univ Network | 11775am |
| 2100 | 2200 | | Australia, Radio Australia      9500pa | 9660pa |
| | | | 11650pa      11660pa      11695as      12080pa | |
| | | | 13630pa      15515pa | |
| 2100 | 2200 | | Bahrain, Radio Bahrain | 6010me |
| 2100 | 2200 | | Belarus, Radio Belarus      7255eu | 7360as |
| | | | 7390eu | |
| 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 |
| 2100 | 2200 | DRM | Canada, Radio Canada International | 9800na |
| 2100 | 2200 | | China, China Radio International | |
| | | | 7205af      7285eu      7325af      7415eu | |
| | | | 9600eu | |
| 2100 | 2200 | | Equatorial Guinea, Radio Africa      7190af | |
| | | | 15190af | |
| 2100 | 2200 | | India, All India Radio      6280eu | 7550eu |
| | | | 9445eu      9910pa      11620pa      11715pa | |
| 2100 | 2200 | DRM | India, All India Radio      9950eu | |
| 2100 | 2200 | | Malaysia, RTM/Traxx FM      7295do | |
| 2100 | 2200 | | Palau, T8WH/WHRI/Sound of Hope Radio | |
| | | | 9930va | |
| 2100 | 2200 | Sat/Sun | Spain, Radio Exterior de Espana | 9650eu |
| 2100 | 2200 | | Syria, Radio Damascus      9330va | 12085va |
| 2100 | 2200 | DRM | UK, BBC World Service      3995eu | |
| 2100 | 2200 | | UK, BBC World Service      3255af | 3915as |
| | | | 5790eu      5875as      5905as      6005af | |
| | | | 6190af      6195as      7405af      9915af | |
| | | | 12095af | |
| 2100 | 2200 | | Ukraine, Radio Ukraine International | 6145na |
| 2100 | 2200 | | USA, American Forces Network | 4319usb |
| | | | 5446usb      5765usb      7812usb      12133usb | |
| | | | 12759usb      13362usb | |
| 2100 | 2200 | | USA, Voice of America      6080af | 7555af |
| | | | 15580af | |
| 2100 | 2200 | | USA, WBCQ Monticello ME      7415am | 9330am |
| 2100 | 2200 | | USA, WEWN Vandiver AL      15610va | |
| 2100 | 2200 | Sun | USA, WHRI Cypress Creek SC | 9690na |
| 2100 | 2200 | Sat | USA, WHRI Cypress Creek SC | 13660af |
| 2100 | 2200 | | USA, WINB Red Lion PA      9265ca | |
| 2100 | 2200 | | USA, WJHR International  Milton FL | 15550na |
| 2100 | 2200 | | USA, WRMI Miami FL      9955ca | |
| 2100 | 2200 | | USA, WTJC Newport NC      9370na | |
| 2100 | 2200 | | USA, WTWW Lebanon TN      9479na | |
| 2100 | 2200 | | USA, WWCR Nashville TN      7465na | 9350na |
| | | | 9980na      13845na | |
| 2100 | 2200 | | USA, WWRB Manchester TN  3215na | 6890va |
| 2100 | 2200 | | USA, WYFR/Family Radio Worldwide | 5975af |
| | | | 7425af      9450eu      9715af      9740af | |
| | | | 12055af      17845af | |
| 2100 | 2200 | | Zambia, 1 Africa-CVC Africa  9540af | |
| 2115 | 2145 | | Egypt, Radio Cairo | 6270eu |
| 2130 | 2157 | | Czech Republic, Radio Prague | 9410af |
| 2130 | 2200 | | Australia, ABC NT Alice Springs | 4835do |
| 2130 | 2200 | | Australia, ABC NT Katherine  5025do | |
| 2130 | 2200 | mtwhfa | Canada, CBC NQ SW Service | 9625na |
| 2130 | 2200 | | China, China Radio International | 7365eu |
| 2130 | 2200 | | Guam, KSDA/AWR | 11850as |
| 2130 | 2200 | | Netherlands, R Netherlands Worldwide | 7460af |
| 2130 | 2200 | | Sweden, Radio Sweden | 7460va |

## 2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

| | | | | |
|---|---|---|---|---|
| 2200 | 2230 | | India, All India Radio      6280eu | 7550eu |
| | | | 9445eu      9910pa      11620pa      11715pa | |
| 2200 | 2230 | DRM | India, All India Radio      9950eu | |
| 2200 | 2245 | | Egypt, Radio Cairo      6270eu | |
| 2200 | 2245 | | USA, WYFR/Family Radio Worldwide | 15770af |
| 2200 | 2256 | | Romania, Radio Romania International | 5960as |
| | | | 7435va      9790eu      11940as | |
| 2200 | 2300 | | Anguilla, Worldwide Univ Network | 6090am |
| 2200 | 2300 | | Australia, ABC NT Alice Springs | 4835do |
| 2200 | 2300 | | Australia, ABC NT Katherine | 5025do |
| 2200 | 2300 | | Australia, Radio Australia      9660pa | 11695as |
| | | | 11875pa      12080pa      13630as      15230pa | |
| | | | 15240as      15415as      15515as      15560as | |
| 2200 | 2300 | smtwhf | Canada, CBC NQ SW Service | 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 | 9590as |
| 2200 | 2300 | | Equatorial Guinea, Radio Africa | 7190af |
| | | | 15190af | |
| 2200 | 2300 | | Malaysia, RTM/Traxx FM      7295do | |
| 2200 | 2300 | | New Zealand, Radio NZ International | 13730pa |
| 2200 | 2300 | DRM | New Zealand, Radio NZ International | 15720pa |
| 2200 | 2300 | | Russia, Voice of Russia      9890na | |
| 2200 | 2300 | | Syria, Radio Damascus      9330va | 12085va |
| 2200 | 2300 | | Turkey, Voice of Turkey      9830va | |
| 2200 | 2300 | | UK, BBC World Service      3915as | 5905as |
| | | | 5935af      6195as      7490as      9440as | |
| | | | 9740as      9915af      12095af | |
| 2200 | 2300 | DRM | UK, BBC World Service      3995eu | |
| 2200 | 2300 | | USA, American Forces Network | 4319usb |
| | | | 5446usb      5765usb      7812usb      12133usb | |
| | | | 12759usb      13362usb | |
| 2200 | 2300 | mtwhf | USA, Voice of America      5895va | 5915va |
| | | | 7460va      7575va      11955va | |
| 2200 | 2300 | | USA, Voice of America      7555af | |
| 2200 | 2300 | Sat/Sun | USA, WBCQ Monticello ME      5110am | |
| 2200 | 2300 | | USA, WBCQ Monticello ME      7415am | 9330am |
| 2200 | 2300 | | USA, WEWN Vandiver AL      11520va | |
| 2200 | 2300 | f | USA, WHRI Cypress Creek SC | 11785na |
| 2200 | 2300 | Sun | USA, WHRI Cypress Creek SC | 9785af |
| 2200 | 2300 | | USA, WINB Red Lion PA      9265ca | |
| 2200 | 2300 | | USA, WJHR International  Milton FL | 15550na |
| 2200 | 2300 | | USA, WRMI Miami FL      9955ca | |
| 2200 | 2300 | | USA, WTJC Newport NC      9370na | |
| 2200 | 2300 | | USA, WTWW Lebanon TN      9479na | |
| 2200 | 2300 | | USA, WWCR Nashville TN      7465na | 9350na |
| | | | 9980na      13845na | |
| 2200 | 2300 | | USA, WWRB Manchester TN  3215na | 6890va |
| 2200 | 2300 | | USA, WYFR/Family Radio Worldwide | 5950na |
| | | | 11740na      15440na | |
| 2215 | 2230 | | Croatia, Croatian Radio      3985eu | 9925ca |
| 2230 | 2257 | | Czech Republic, Radio Prague | 9440va |
| 2230 | 2300 | | China, Xizang PBS/Holy Tibet 4905do | 4920do |
| | | | 5240do      6110do      6130do      6200do | |
| | | | 7255do      7385do | |
| 2230 | 2300 | | Guam, KSDA/AWR | 15320as |
| 2230 | 2300 | | USA, Voice of America | 11840as |
| 2230 | 2300 | | USA, Voice of America/Special English | 9570va |
| | | | 11840va      15145va | |
| 2245 | 2300 | | India, All India Radio      6055as | 7305as |
| | | | 9705as      9950as      11645as      13605as | |

## 2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

| | | | | |
|---|---|---|---|---|
| 2300 | 0000 | | Anguilla, Worldwide Univ Network | 6090am |
| 2300 | 0000 | | Australia, ABC NT Alice Springs | 4835do |
| 2300 | 0000 | | Australia, ABC NT Katherine | 5025do |
| 2300 | 0000 | | Australia, Radio Australia      9660pa | 11875as |
| | | | 12080pa      13690pa      15560pa      17750as | |
| 2300 | 0000 | | Bahrain, Radio Bahrain | 6010me |
| 2300 | 0000 | | Bulgaria, Radio Bulgaria      9700na | 11700na |
| 2300 | 0000 | smtwhf | Canada, CBC NQ SW Service | 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 | 5915as |
| | | | 5990ca      6145na      7350eu      7410as | |
| | | | 9610as      11690pa      11790na      11840na | |

| | | | | |
|---|---|---|---|---|
| 2300 | 0000 | | Cuba, Radio Havana Cuba | 5040na |
| 2300 | 0000 | | Egypt, Radio Cairo | 11590na |
| 2300 | 0000 | vl | Guyana, Voice of Guyana | 3290va |
| 2300 | 0000 | | India, All India Radio | 6055as 7305as |
| | | | 9705as 9950as 11645as 13605as | |
| 2300 | 0000 | | Malaysia, RTM/Traxx FM | 7295do |
| 2300 | 0000 | | New Zealand, Radio NZ International | 13730pa |
| 2300 | 0000 | DRM | New Zealand, Radio NZ International | 15720pa |
| 2300 | 0000 | | Russia, Voice of Russia | 9890na |
| 2300 | 0000 | | UK, BBC World Service | 3915as 6195as |
| | | | 7490as 9740as 9890as 11850as | |
| | | | 12010as | |
| 2300 | 0000 | | USA, American Forces Network | 4319usb |
| | | | 5446usb 5765usb 7812usb 12133usb | |
| | | | 12759usb 13362usb | |
| 2300 | 0000 | | USA, Voice of America | 5895va 5915va |
| | | | 7575va 11955va 13805as | |
| 2300 | 0000 | Sat/Sun | USA, WBCQ Monticello ME | 5110am |
| 2300 | 0000 | | USA, WBCQ Monticello ME | 7415am 9330am |
| 2300 | 0000 | | USA, WEWN Vandiver AL | 11520va |
| 2300 | 0000 | smtwhf | USA, WHRI Cypress Creek SC | 5920ca |
| 2300 | 0000 | Sat | USA, WHRI Cypress Creek SC | 9690na |
| 2300 | 0000 | | USA, WINB Red Lion PA | 9265ca |
| 2300 | 0000 | | USA, WRMI Miami FL | 9955ca |
| 2300 | 0000 | | USA, WTJC Newport NC | 9370na |
| 2300 | 0000 | | USA, WTWW Lebanon TN | 9479na |
| 2300 | 0000 | | USA, WWCR Nashville TN | 7465na 9350na |
| | | | 9980na 13845na | |
| 2300 | 0000 | | USA, WWRB Manchester TN | 3215na 6890va |
| 2300 | 0000 | | USA, WYFR/Family Radio Worldwide | 5950na |
| | | | 11580sa 15655sa 15440na | |
| 2300 | 2330 | | Australia, Radio Australia | 11695as 15240as |
| | | | 17795pa | |
| 2300 | 2330 | | USA, Voice of America/Special English | 9570as |
| | | | 13805va 15145va | |
| 2300 | 2330 | DRM | Vatican City State, Vatican Radio | 9755am |
| 2300 | 2345 | | USA, WYFR/Family Radio Worldwide | 11740na |
| 2305 | 0000 | | Canada, Radio Canada International | 6100na |
| 2330 | 0000 | | UK, BBC World Service | 9580as |
| 2330 | 0000 | | USA, Voice of America/Special English | 7460as |
| | | | 9570va 13805va 15145va 15340va | |
| 2330 | 0000 | | Vietnam, Voice of Vietnam | 9840as 12020as |

## MT SHORTWAVE STATION RESOURCE GUIDE

Albania, Radio Tirana ............................**http://rtsh.sil.at/**
Anguilla, Worldwide Univ Network .........**www.worldwideuniversity network.com/**
Argentina, Radio Nacional RAE...............**www.radionacional.com.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 Voice Australia.....**www.hcjb.org/**
Australia, Radio Australia .......................**www.abc.net.au/ra/**
Austria, AWR Europe ............................**www.awr2.org/**
Bahrain, Radio Bahrain ..........................**www.radiobahrain.fm/**
Bangladesh, Bangladesh Betar ...............**www.betar.org.bd/**
Belarus, Radio 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 Service .....**www.bbs.com.bt/**
Bulgaria, Radio Bulgaria ........................**www.bnr.bg/**
Canada, CBC NQ SW Service ................**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/**
China, Voice of the Strait .......................**www.vos.com.cn**
Clandestine, Cotton Tree News...............**www.cottontreenews.org/**
Clandestine, Sudan Radio Service/ SRS ....**www.sudanradio.org/**
Croatia, Croatian Radio ......................**www.hrt.hr/**
Cuba, Radio Havana Cuba ....................**www.radiohc.cu/**
Czech Republic, Radio Prague ...............**www.radio.cz/**
Egypt, Radio Cairo................................**www.sis.gov.eg/**
Ethiopia, Radio Ethiopia/External Service...**www.erta.gov.et**
France, Radio France Internationale........**http://rfienglish.com**
Germany, AWR Europe...........................**www.awr2.org/**
Germany, Blue Star Radio .....................**www.mvbalticradio.de**
Germany, Deutsche Welle .....................**www.dw-world.de/**
Germany, European Music Radio............**www.emr.org.uk/**
Germany, Pan American Broadcasting ....**www.radiopanam.com/**
Germany, Radio Gloria International ......**www.radiopanam.com/**
Germany, TWR Europe...........................**www.twr.org**
Greece, Voice of Greece ........................**www.voiceofgreece.gr/**
Greece, Voice of Greece/Radio Filia........**www.voiceofgreece.gr/**
Guam, KSDA/AWR ...............................**www.awr2.org/**
Guam, KTWR/TWR................................**www.twr.org/**
Guyana, Voice of Guyana .....................**www.voiceofguyana.com/**
India, All India Radio ...........................**www.allindiaradio.org/**
Indonesia, Voice of Indonesia ................**www.voi.co.id**
Iran, VOIRI/IRIB ....................................**www.irib.ir/English/**
Japan, NHK World/ Radio Japan............**www.nhk.or.jp/english/**
Kuwait, Radio Kuwait.............................**www.media.gov.kw/**
Laos, Lao National Radio ......................**www.lnr.org.la**
Liberia, Star Radio .................................**www.starradio.org.lr/**
Libya, LJB/Voice of Africa ......................**www.voiceofafrica.com.ly**
Malaysia, RTM/Traxx FM........................**www.traxxfm.net/index.php**
Malaysia, RTM/Voice of Malaysia............**www.rtm.gov.my**
Mali, ORTM Du Mali .............................**www.ortm.ml**
Monaco, TWR Europe ...........................**www.twr.org/**
Mongolia, Voice of Mongolia..................**www.mnb.mn**
Nepal, Radio Nepal ..............................**www.radionepal.org/**
Netherlands, R Netherlands Worldwide ....**www.radionepal.org/**
New Zealand, Radio NZ International ......**www.rnzi.com**
Nigeria, Voice of Nigeria/External Service **www.voiceofnigeria.org**

Oman, Radio Sultanate of Oman ............**www.oman-tv.gov.om**
Pakistan, PBC/Radio Pakistan...................**www.radio.gov.pk**
Palau, T8WH/WHRI/Sound of Hope Radio **www.whr.org/**
Philippines, FEBC ...................................**www.febc.ph**
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 ...........................**www.ruvr.ru/**
Rwanda, Radio Rwanda ........................**www.orinfor.gov.rw/radiorwanda. eng.html**
Saudi Arabia, BSKSA/Saudi Radio...........**www.saudiradio.net/**
Serbia, International Radio of Serbia........**www.glassrbije.org**
Slovakia, IRRS/Euro Gospel Radio...........**www.nexus.org**
Slovakia, IRRS/Radio City ......................**www.nexus.org**
Slovakia, IRRS/Radio Joystick ..................**www.nexus.org**
Slovakia, Radio Slovakia International......**www.rsi.sk**
South Africa, Amateur Radio Mirror Intl ...**www.sarl.org.za**
South Africa, AWR..................................**www.awr2.org/**
South Africa, Channel Africa...................**www.channelafrica.org**
South Africa, RTE Radio Worldwide .........**www.rte.ie/radio1/**
South Africa, TWR Africa.........................**www.twr.org/**
South Korea, KBS World Radio ...............**http://rki.kbs.co.kr/english/**
Spain, Radio Exterior de Espana .............**www.ree.rne.es/**
Sri Lanka, SLBC .....................................**www.slbc.lk**
Swaziland, TWR Swaziland .....................**www.twrafrica.org**
Sweden, Radio Sweden ..........................**www.sr.se/rs/english/**
Syria, Radio Damascus...........................**www.rtv.gov.sy/**
Taiwan, Radio Taiwan International .........**http://english.rti.org.tw/**
Thailand, Radio Thailand World Service ...**www.hsk9.com/**
Turkey, Voice of Turkey...........................**www.trt.net.tr**
Uganda, Dunamis Shortwave .................**www.biblevoice.org/stations/ east-africa**
Uganda, UBC Radio ..............................**www.ubconline.co.ug**
UK, BBC World Service ...........................**www.bbc.co.uk/worldservice/**
UK, Bible Voice Broadcasting..................**www.biblevoice.org/**
Ukraine, Radio Ukraine International .......**www.nrcu.gov.ua/**
United Arab Emirates, FEBA Radio ...........**www.febaradio.info**
United States, Overcomer Ministries.........**www.overcomerministry.org/**
USA, American Forces Network ..............**http://myafn.dodmedia.osd.mil/**
USA, EWTN/WEWN Vandiver AL ............**www.ewtn.com**
USA, KNLS Anchor Point AK....................**www.knls.org/**
USA, Voice of America ...........................**www.voanews.com/**
USA, Voice of America/Special English.....**www.voanews.com/**
USA, Voice of America/Studio 7..............**www.voanews.com/**
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 Miami FL..............................**www.wrmi.net/**
USA, WRNO New Orleans LA ................**www.wrnoworldwide.org/**
USA, WTJC Newport NC .........................**www.fbnradio.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**
Vatican City State, Vatican Radio/Mass.....**www.vaticanradio.org**
Vietnam, Voice of Vietnam......................**www.vov.org.vn**
Yemen, Republic of Yemen Radio/Radio Sana'a **www.yemenradio.net**
Zambia, 1 Africa-CVC Africa...................**www.1africa.tv**
Zambia, Radio Christian Voice/The Voice Africa **www.1africa.tv**

# THE QSL REPORT

**VERIFICATIONS RECEIVED BY OUR READERS**

*Gayle Van Horn, W4GVH*
gaylevanhorn@monitoringtimes.com

# QSLing the Unpredictable and Unlicensed

Urban legends and things that go bump in the night: Even in shortwave radio, one night a year brings out the bizarre and unpredictable.

Radio Bob, one of my favorite former pirate broadcasters, once graced the airwaves on Halloween with an unforgettable radio voyage through the bizarre world of ghostly goings-on from Shake Rag, Georgia. What became of Bob is anyone's guess, but last year's Pumpkin Patch Radio reminded us that *The Devil Went Down to Georgia* – and perhaps you'd like to QSL "if you dare." Satan Radio made its appearance with a mixture of backwards talk and death metal music, followed by Rig-O-Mortis' multimedia special from the Voice of Doom.

Historically, Halloween produces more pirate radio broadcasts than any other holiday. This year's weekend holiday on Sunday, October 31, will likely find more pirates haunting the airwaves, so begin checking on October 29-30 around 6925 (AM or USB), plus or minus 30 to 40 kHz. The majority of U.S. pirates operate between 2000-0400 UTC; however, some may opt for an earlier broadcast.

If the station QSLs, most operators will announce their email address or postal maildrop address during the broadcast. Others may announce "QSL via FRN," a reference to the logs posted at Free Radio Weekly website at **www.frn.net.** Some operators prefer to verify by scanning those logs, so be sure to include *"please QSL"* in your FRN Grapevines post.

To find out more about Free Radio Weekly, or to contribute, send an email to *freeradio@gmail.com*.

Ragnar Daneskjold keeps the pirate community up to date on pirate news through his *Pirates Week Podcast* on the Shortwave Pirate Info website at **www.piratesweek.info/**

European pirate stations may offer a Halloween special, though most appear to be a scaled down version of North American stations. European activity is best heard in North America from 2100-0200, around 3900-4025 and 5800-7490 kHz upper or lower sideband. Check, too, between 1300-1900 UTC on 15055-15080 kHz.

If you hear Mystery Radio, you can use that station as a propagation indicator for other European pirate stations. Programming is modern dance music and they broadcast daily on 6220 kHz. The best time to log Dutch pirate, Cupid Radio, is during their frequent DX frequency test, usually on 15070 kHz anytime from 1200-1600 UTC. Send your details to *cupidradio@hotmail.com* or to the Oldebroek address below.

Does the bizarre appeal to you? Maybe you're just curious and that first pirate has eluded your log book so far. Don't be surprised if you hear the likes of *Ghostbusters* from Pumpkin Patch Radio gracing the airwaves for Halloween 2010.

## PIRATE STATIONS

### EUROPE

**Atlantic Radio**, 3910 kHz. Full data personal letter and post card from Stephen Prendergast. Received in 31 days for a pirate report to: *atlanticradio12152@gmail.com* or postal: Ballyvary, Castlebar, Co. Mayo, Ireland. (Silveri Gomez, Italy/playdx2003)

**Borderhunter Radio**, 6205 kHz. Full data e-QSL showing Frans at the mic and mixing board. Received in one day for pirate report to:*borderhunterradio@hotmail.com* (Andrew Yoder, PA/Cumbre DX)

**Radio East Coast Holland**, 6220 kHz. Full data e-QSL from Ronald, received in four days for pirate report to: *eastcoastholland@hotmail.com* (Gomez).

**Radio Playback International**, 6870 kHz. E-QSL received in 90 days for pirate report to: *playbackinternational@gmail.com* (Norbert Reiner, Germany/playdx2003)

**Radio Skyline**, 3980 kHz. E-QSL received in 14 days for pirate report to: *skyline-horizon@hotmail.com* (Reiner).

**Radio Spaceman**, 3900 kHz. E-QSL received in two days for pirate report to: *3927am@rock.com* (Reiner).

### UNITED STATES

**Outhouse Radio**, 6925USB. Date/frequency with Radio Caroline logo e-QSL. Received in a few hours for pirate report to: *outhouseradio@gmail.com* (Yoder)

**Radio Ronin SW**, 6950 kHz. Large full data color samurai card. Received in two weeks for email report to: *radioroninshortwave@gmail.com* (Yoder).

### PIRATE MAIL DROPS

U.S. addresses require three mint stamps. European drops recommend at least two IRCs.

Basel
Box 510
CH-4010 Basel
Switzerland

Belfast
P.O. Box 1
Belfast, NY 14711
USA

BRS/ Blue Ridge
Summit
P.O. Box 109
Blue Ridge Summit,
PA 17214
USA

Eisenach
SRS Deutscheland
(station name)
Postfach 10 11 45
DE-99801 Eisenach
Germany

Merlin
Box 293
Merlin, Ontario
NOP 1W0
Canada

Neede
P.O. Box 73
7160AB Neede
Netherlands

Oldebroek
P.O. Box 9
8096 ZG
Oldebroek
Netherlands

Santiago
Casilla 159
Santiago 14
Chile

Ytterby
c/o SRS News
Ostra Porten 29
S-442 54 Ytterby
Sweden

## US EMAIL CONTACT LIST

*Though not a complete list of all U.S. pirates, the following stations have been monitored within the past year.*

All Aboard - allaboardradio@gmail.com
Ann Hoffer (post on FRN)
Barnyard Radio - barnyardradio@gmail.com
Blue Rhino Radio - bluerhinoradio@gmail.com
Blue Ridge Radio - blueridgeradio@gmail.com
Brando Radio - MarlonBrandoRadio@gmail.com
Calling Marco Radio - callingmarcoradio@gmail.com
Captain Morgan - captainradioshortwave@gmail.com
CE3K - radioce3k@gmail.com
Channel Z (Blue Ridge) - channelzradio@gmail.com
Dead Cat Radio (post on FRN)
Derby Shortwave - derbyshortwave@yahoo.com
Eccentric Shortwave - eccentricsw@yahoo.com
Grasscutter Radio (Merlin)
Grey Rhino Radio - greyrhinoradio@gmail.com
Iron Man Radio (Belfast) - ironmanradio@hotmail.com
KBOX - kboxradio@gmail.com
KUSA North America - kusanorthamerica@gmail.com
Liquid Radio - wwrbfm@gmail.com
MAC Shortwave - macshortwave@yahoo.com
Mack Truck Radio - macktruckradio@gmail.com
Maple Leaf Radio (Belfast) - radio.mapleleaf@gmail.com
Northwoods Radio - northwoodsradio@gmail.com
OTH Radio (post on FRN)
Pirate Radio Boston - pirateradioboston@gmail.com
Polka Dot Rhino Radio - polkadotrhinoradio@gmail.com
Pumpkin Patch Radio - pumpkinjpatchradio@gmail.com
Punxsutawney Pothead Radio (Belfast) - puxradio@gmail.com
Radio Bronco - radiobronco@gmail.com
Radio Casablanca - radiocasablanca1@gmail.com
Radio Cinco de Mayo-  radiocincodemay@gmail.com
Radio Free Speech (Belfast) - radiofreespeech@gmail.com
Radio Free Whatever - radiofreewhatever@yahoo.com
Radio Ga-Ga - radiogaga6925@gmail.com
Radio Is My Friend - cherokeemental@yahoo.com
Radio Jamba International - krackerradio@pnlol.com
Radio Josephine - radiojosephine@gmail.com
Radio Lunchbox - piratelunchbox@gmail.com
Radio Marlene - radiomarlene@gmail.com
Radio Paisano - radiopaisano@gmail.com
Radio Pigmeat International - pigmeat_voab@yahoo.com
Radio SRV - radiosrv@gmail.com
Radio XXP - radiostationxxp@gmail.com
Red Rhino Radio - redrhinoradio@gmail.com
Satan Radio - satanradio@gmail.com
Somebody's Gotta Say It Radio - somebodyradio@gmail.com
Sycko Radio - syckoradio@gmail.com
The Crystal Ship - tcsshortwave@gmail.com
Thinking Man Radio - thinkingmanradio@gmail.com
Undercover Radio (Merlin) - undercoverradio@gmail.com
VUDU - vudu11@hotmail.com
Voice of the Beast (post on FRN)
Voice of Doom (post on FRN)
Voice of Honor thevoiceofhonor@gmail.com
Voice of KAOS voiceofkaos@gmail.com
Voice of Next Thursday voiceofnextthursday@gmail.com
Voice of the Robots voiceoftherobots@gmail.com
Voice of Spike voiceofspike@gmail.com
WBNY (Belfast) wbnyradiobunny@gmail.com
WDDR World Wide ericblair@wddr1027.com
WEAK Radio weakradio@gmail.com
WFUQ dj_jack_hammer@rocketmail.com
WHJR heyjoe6925@gmail.com
WHYP whypradio@gmail.com
WNKR relay wnkr@rock.com
WTCR 20th Century Radio (Belfast) morbius@nyms.net
Weather Radio (post on FRN)
Wind Up Radio (post on FRN)
X-Ray Radio broadcastrecption@hotmail.com
Yellow Rhino Radio yellowrhinoradio@gmail.com

# MTXTRA
## Shortwave Broadcast Guide

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.

**SHORTWAVE GUIDE**

### 0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

| | | | | |
|---|---|---|---|---|
| 0000 | 0045 | | Ecuador, HCJB Global | 11920sa |
| 0000 | 0045 | | USA, WYFR/Family Radio Worldwide | 15190sa |
| 0000 | 0100 | | Angola, Radio Nacional de Angola | 4950do |
| 0000 | 0100 | | Angola, Radio N'gola Yetu 7217do | |
| 0000 | 0100 | mtwhf | Argentina, Radio Nacional RAE | 11710am |
| 0000 | 0100 | | Brazil, Jornal A Critica 5055do | |
| 0000 | 0100 | | Brazil, Novas de Paz 6080do | 9515do |
| | | | 11725do | |
| 0000 | 0100 | | Brazil, Radio Alvorada/Londrina | 4865do |
| 0000 | 0100 | | Brazil, Radio Alvorada/Parintins | 4965do |
| 0000 | 0100 | | Brazil, Radio Aparecida 5035do | 6135al |
| | | | 9630al 11855al | |
| 0000 | 0100 | | Brazil, Radio Bandeirantes 6090do | 9645do |
| | | | 11925do | |
| 0000 | 0100 | | Brazil, Radio Boa Vontade 6160do | 9550do |
| | | | 11895do | |
| 0000 | 0100 | | Brazil, Radio Brasil 4785do | |
| 0000 | 0100 | | Brazil, Radio Brasil Central 4985do | 11815do |
| 0000 | 0100 | | Brazil, Radio Cancao Nova 4825do | 6105do |
| | | | 9675do | |
| 0000 | 0100 | | Brazil, Radio Capixaba 4935do | |
| 0000 | 0100 | | Brazil, Radio Clube do Para 4885do | |
| 0000 | 0100 | | Brazil, Radio Cultura do Para 5045do | |
| 0000 | 0100 | | Brazil, Radio Cultura Ondas Tropicais | 4845do |
| 0000 | 0100 | | Brazil, Radio Cultura Sao Paulo | 9615do |
| | | | 17815do | |
| 0000 | 0100 | | Brazil, Radio Cultura/Araraquara | 3365do |
| 0000 | 0100 | | Brazil, Radio Daqui 4905do | |
| 0000 | 0100 | | Brazil, Radio Difusora Acerana | 4885do |
| 0000 | 0100 | | Brazil, Radio Difusora Caceres | 5055do |
| 0000 | 0100 | | Brazil, Radio Difusora de Macapa | 4915do |
| 0000 | 0100 | | Brazil, Radio Difusora do Amazonas | 4805do |
| 0000 | 0100 | | Brazil, Radio Difusora Roraima | 4875do |
| 0000 | 0100 | | Brazil, Radio Difusora/Londrina | 4815do |
| 0000 | 0100 | Sun | Brazil, Radio Educacao Rural de Tefe | 4925do |
| 0000 | 0100 | | Brazil, Radio Educadora 2380do | |
| 0000 | 0100 | | Brazil, Radio Educadora 6 de Agosto | 3255do |
| 0000 | 0100 | | Brazil, Radio Gaucha 6020do | 11915do |
| 0000 | 0100 | | Brazil, Radio Gazeta Universitaria | 5955do |
| | | | 9685do 15325al | |
| 0000 | 0100 | | Brazil, Radio Globo 6120do | 9585do |
| | | | 11804do | |
| 0000 | 0100 | | Brazil, Radio Guaiba 6000do | 11785do |
| 0000 | 0100 | | Brazil, Radio Imaculada Conceicao | 4755do |
| 0000 | 0100 | | Brazil, Radio Inconfidencia 6010do | 15190do |
| 0000 | 0100 | | Brazil, Radio Itatiaia 5969do | |
| 0000 | 0100 | | Brazil, Radio Marumby 9665do | 11750do |
| 0000 | 0100 | | Brazil, Radio Minicipal 3375do | |
| 0000 | 0100 | | Brazil, Radio Missoes da Amazonia | 4865do |
| 0000 | 0100 | | Brazil, Radio Mundial 3325do | |
| 0000 | 0100 | | Brazil, Radio Nacional da Amazonia | 6185do |
| | | | 11780do | |
| 0000 | 0100 | | Brazil, Radio Nossa Voz 4975do | |
| 0000 | 0100 | | Brazil, Radio Nove de Julho 9820do | |
| 0000 | 0100 | | Brazil, Radio Novo Tempo 4895do | |
| 0000 | 0100 | | Brazil, Radio Record 6150do | 9505do |
| 0000 | 0100 | | Brazil, Radio Rural 4765do | |
| 0000 | 0100 | | Brazil, Radio Verdas Florestas 4865do | |
| 0000 | 0100 | | Brazil, Radio Voz Missionaria 5940do | |
| 0000 | 0100 | | Brazil, Super Radio Deus e Amour | 6060do |
| | | | 9565do 11765do | |
| 0000 | 0100 | | Brazil, Super Rede Boa Vontade | 4860do |
| 0000 | 0100 | | Brazil, Voz Missionaria 5940do | |
| 0000 | 0100 | | China, China Radio International | 9560eu |
| | | | 9710eu | |
| 0000 | 0100 | mtwhf | Portugal, RDP Internacional 9715am | 11630sa |
| | | | 11940sa | |
| 0000 | 0100 | | USA, WYFR/Family Radio Worldwide | 11580sa |
| | | | 17725sa | |
| 0030 | 0100 | | Vatican City State, Vatican Radio | 7305sa |
| | | | 9610sa | |

### 0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

| | | | | |
|---|---|---|---|---|
| 0100 | 0145 | | USA, WYFR/Family Radio Worldwide | 7520sa |
| 0100 | 0200 | | Angola, Radio Nacional de Angola | 4950do |
| 0100 | 0200 | | Angola, Radio N'gola Yetu 7217do | |
| 0100 | 0200 | | Brazil, Jornal A Critica 5055do | |
| 0100 | 0200 | | Brazil, Novas de Paz 6080do | 9515do |
| | | | 11725do | |
| 0100 | 0200 | | Brazil, Radio Alvorada/Londrina | 4865do |
| 0100 | 0200 | | Brazil, Radio Alvorada/Parintins | 4865do |
| 0100 | 0200 | | Brazil, Radio Aparecida 5035do | 6135al |
| | | | 9630al 11855al | |
| 0100 | 0200 | | Brazil, Radio Bandeirantes 6090do | 9645do |
| | | | 11925do | |
| 0100 | 0200 | | Brazil, Radio Boa Vontade 6160do | 9550do |
| | | | 11895do | |
| 0100 | 0200 | | Brazil, Radio Brasil 4785do | |
| 0100 | 0200 | | Brazil, Radio Brasil Central 4985do | 11815do |
| 0100 | 0200 | | Brazil, Radio Cancao Nova 4825do | 6105do |
| | | | 9675do | |
| 0100 | 0200 | | Brazil, Radio Capixaba 4935do | |
| 0100 | 0200 | | Brazil, Radio Clube do Para 4885do | |
| 0100 | 0200 | | Brazil, Radio Cultura do Para 5045do | |
| 0100 | 0200 | | Brazil, Radio Cultura Ondas Tropicais | 4845do |
| 0100 | 0200 | | Brazil, Radio Cultura Sao Paulo | 9615do |
| | | | 17815do | |
| 0100 | 0200 | | Brazil, Radio Cultura/Araraquara | 3365do |
| 0100 | 0200 | | Brazil, Radio Daqui 4905do | |
| 0100 | 0200 | | Brazil, Radio Difusora Acerana | 4885do |
| 0100 | 0200 | | Brazil, Radio Difusora Caceres | 5055do |
| 0100 | 0200 | | Brazil, Radio Difusora de Macapa | 4915do |
| 0100 | 0200 | | Brazil, Radio Difusora Roraima | 4875do |
| 0100 | 0200 | | Brazil, Radio Difusora/Londrina | 4815do |
| 0100 | 0200 | | Brazil, Radio Educacao Rural de Tefe | 4925do |
| 0100 | 0200 | | Brazil, Radio Educadora 2380do | |
| 0100 | 0200 | | Brazil, Radio Gaucha 6020do | 11915do |
| 0100 | 0200 | | Brazil, Radio Gazeta Universitaria | 5955do |
| | | | 9685do 15325al | |
| 0100 | 0200 | | Brazil, Radio Globo 6120do | 9585do |
| | | | 11804do | |
| 0100 | 0200 | | Brazil, Radio Guaiba 6000do | 11785do |
| 0100 | 0200 | | Brazil, Radio Imaculada Conceicao | 4755do |
| 0100 | 0200 | | Brazil, Radio Inconfidencia 6010do | 15190do |
| 0100 | 0200 | | Brazil, Radio Missoes da Amazonia | 4865do |
| 0100 | 0200 | | Brazil, Radio Mundial 3325do | |
| 0100 | 0200 | Sun | Brazil, Radio Nacional da Amazonia | 6185do |
| | | | 11780do | |
| 0100 | 0200 | | Brazil, Radio Nossa Voz 4975do | |
| 0100 | 0200 | | Brazil, Radio Nove de Julho 9820do | |
| 0100 | 0200 | | Brazil, Radio Novo Tempo 4895do | |
| 0100 | 0200 | | Brazil, Radio Record 6150do | 9505do |
| 0100 | 0200 | | Brazil, Radio Rural 4765do | |
| 0100 | 0200 | t | Brazil, Radio Verdas Florestas 4865do | |
| 0100 | 0200 | | Brazil, Radio Voz Missionaria 5940do | |
| 0100 | 0200 | | Brazil, Super Radio Deus e Amour | 6060do |
| | | | 9565do 11765do | |
| 0100 | 0200 | | Brazil, Super Rede Boa Vontade | 4860do |
| 0100 | 0200 | | Brazil, Voz Missionaria 5940do | |
| 0100 | 0200 | mtwhf | Portugal, RDP Internacional 9715am | 11630sa |
| | | | 11940sa | |
| 0100 | 0200 | | USA, WYFR/Family Radio Worldwide | 11530sa |
| | | | 11550sa | |

### 0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

| | | | | |
|---|---|---|---|---|
| 0200 | 0230 | | Brazil, Radio Educadora 2380do | |
| 0200 | 0300 | | Angola, Radio Nacional de Angola | 4950do |
| 0200 | 0300 | | Angola, Radio N'gola Yetu 7217do | |
| 0200 | 0300 | | Brazil, Jornal A Critica 5055do | |
| 0200 | 0300 | | Brazil, Novas de Paz 6080do | 9515do |

| | | | | | |
|---|---|---|---|---|---|
| | | | 11725do | | |
| 0200 | 0300 | | Brazil, Radio Alvorada/Londrina | | 4865do |
| 0200 | 0300 | | Brazil, Radio Aparecida | 5035do | 6135al |
| | | | 9630al | 11855al | |
| 0200 | 0300 | | Brazil, Radio Bandeirantes | 6090do | 9645do |
| | | | 11925do | | |
| 0200 | 0300 | | Brazil, Radio Boa Vontade | 6160do | 9550do |
| | | | 11895do | | |
| 0200 | 0300 | | Brazil, Radio Brasil | 4785do | |
| 0200 | 0300 | | Brazil, Radio Brasil Central | 4985do | 11815do |
| 0200 | 0300 | | Brazil, Radio Cancao Nova | 4825do | 6105do |
| | | | 9675do | | |
| 0200 | 0300 | | Brazil, Radio Capixaba | 4935do | |
| 0200 | 0300 | | Brazil, Radio Clube do Para | 4885do | |
| 0200 | 0300 | | Brazil, Radio Cultura do Para | 5045do | |
| 0200 | 0300 | | Brazil, Radio Cultura Ondas Tropicais | | 4845do |
| 0200 | 0300 | | Brazil, Radio Cultura Sao Paulo | | 9615do |
| | | | 17815do | | |
| 0200 | 0300 | | Brazil, Radio Cultura/Araraquara | | 3365do |
| 0200 | 0300 | | Brazil, Radio Daqui | 4905do | |
| 0200 | 0300 | | Brazil, Radio Difusora Acerana | | 4885do |
| 0200 | 0300 | | Brazil, Radio Difusora Caceres | | 5055do |
| 0200 | 0300 | | Brazil, Radio Difusora de Macapa | | 4915do |
| 0200 | 0300 | | Brazil, Radio Difusora Roraima | | 4875do |
| 0200 | 0300 | | Brazil, Radio Difusora/Londrina | | 4815do |
| 0200 | 0300 | | Brazil, Radio Gaucha | 6020do | 11915do |
| 0200 | 0300 | | Brazil, Radio Gazeta Universitaria | | 5955do |
| | | | 9685do | 15325al | |
| 0200 | 0300 | | Brazil, Radio Globo | 6120do | 9585do |
| | | | 11804do | | |
| 0200 | 0300 | | Brazil, Radio Guaiba | 6000do | 11785do |
| 0200 | 0300 | | Brazil, Radio Imaculada Conceicao | | 4755do |
| 0200 | 0300 | | Brazil, Radio Inconfidencia | 6010do | 15190do |
| 0200 | 0300 | | Brazil, Radio Mundial | | 3325do |
| 0200 | 0300 | Sun | Brazil, Radio Nacional da Amazonia | | 6185do |
| | | | 11780do | | |
| 0200 | 0300 | | Brazil, Radio Nossa Voz | 4975do | |
| 0200 | 0300 | | Brazil, Radio Nove de Julho | 9820do | |
| 0200 | 0300 | | Brazil, Radio Novo Tempo | 4895do | |
| 0200 | 0300 | | Brazil, Radio Record | 6150do | 9505do |
| 0200 | 0300 | | Brazil, Radio Rural | 4765do | |
| 0200 | 0300 | | Brazil, Radio Voz Missionaria | 5940do | |
| 0200 | 0300 | | Brazil, Super Radio Deus e Amour | | 6060do |
| | | | 9565do | 11765do | |
| 0200 | 0300 | | Brazil, Super Rede Boa Vontade | | 4860do |
| 0200 | 0300 | | Brazil, Voz Missionaria | 5940do | |
| 0200 | 0300 | | USA, WYFR/Family Radio Worldwide | | 11550sa |
| 0230 | 0300 | | Japan, NHK World/ Radio Japan | | 6195sa |
| | | | 9485sa | 9510sa | |

## 0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

| | | | | | |
|---|---|---|---|---|---|
| 0300 | 0345 | | USA, WYFR/Family Radio Worldwide | | 11550sa |
| 0300 | 0400 | | Angola, Radio Nacional de Angola | | 4950do |
| 0300 | 0400 | | Angola, Radio N'gola Yetu | 7217do | |
| 0300 | 0400 | | Brazil, Jornal A Critica | 5055do | |
| 0300 | 0400 | | Brazil, Radio Alvorada/Londrina | | 4865do |
| 0300 | 0400 | | Brazil, Radio Bandeirantes | 6090do | 9645do |
| | | | 11925do | | |
| 0300 | 0400 | | Brazil, Radio Boa Vontade | 6160do | 9550do |
| | | | 11895do | | |
| 0300 | 0400 | | Brazil, Radio Brasil | 4785do | |
| 0300 | 0400 | Sat/Sun | Brazil, Radio Brasil Central | 4985do | 11815do |
| 0300 | 0400 | | Brazil, Radio Cancao Nova | 4825do | 6105do |
| | | | 9675do | | |
| 0300 | 0400 | | Brazil, Radio Capixaba | 4935do | |
| 0300 | 0400 | | Brazil, Radio Clube do Para | 4885do | |
| 0300 | 0400 | | Brazil, Radio Daqui | 4905do | |
| 0300 | 0400 | | Brazil, Radio Difusora Acerana | | 4885do |
| 0300 | 0400 | | Brazil, Radio Difusora Caceres | | 5055do |
| 0300 | 0400 | | Brazil, Radio Difusora de Macapa | | 4915do |
| 0300 | 0400 | | Brazil, Radio Difusora Roraima | | 4875do |
| 0300 | 0400 | | Brazil, Radio Gaucha | 6020do | 11915do |
| 0300 | 0400 | | Brazil, Radio Gazeta Universitaria | | 5955do |
| | | | 9685do | 15325al | |
| 0300 | 0400 | | Brazil, Radio Globo | 6120do | 9585do |
| | | | 11804do | | |
| 0300 | 0400 | | Brazil, Radio Guaiba | 6000do | 11785do |
| 0300 | 0400 | | Brazil, Radio Imaculada Conceicao | | 4755do |
| 0300 | 0400 | | Brazil, Radio Inconfidencia | 6010do | 15190do |
| 0300 | 0400 | | Brazil, Radio Mundial | | 3325do |
| 0300 | 0400 | Sun | Brazil, Radio Nacional da Amazonia | | 6185do |
| | | | 11780do | | |
| 0300 | 0400 | | Brazil, Radio Nossa Voz | 4975do | |
| 0300 | 0400 | | Brazil, Radio Nove de Julho | 9820do | |
| 0300 | 0400 | | Brazil, Radio Novo Tempo | 4895do | |
| 0300 | 0400 | | Brazil, Radio Record | 6150do | 9505do |

| | | | | | |
|---|---|---|---|---|---|
| 0300 | 0400 | | Brazil, Radio Rural | 4765do | |
| 0300 | 0400 | | Brazil, Super Radio Deus e Amour | | 6060do |
| | | | 9565do | 11765do | |
| 0300 | 0400 | | Brazil, Super Rede Boa Vontade | | 4860do |
| 0300 | 0400 | | Brazil, Voz Missionaria | 5940do | |
| 0300 | 0400 | | USA, WYFR/Family Radio Worldwide | | 7730sa |

## 0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

| | | | | | |
|---|---|---|---|---|---|
| 0400 | 0445 | | USA, WYFR/Family Radio Worldwide | | 11530af |
| 0400 | 0500 | | Angola, Radio Nacional de Angola | | 4950do |
| 0400 | 0500 | | Angola, Radio N'gola Yetu | 7217do | |
| 0400 | 0500 | | Brazil, Jornal A Critica | 5055do | |
| 0400 | 0500 | | Brazil, Radio Alvorada/Londrina | | 4865do |
| 0400 | 0500 | | Brazil, Radio Bandeirantes | 6090do | 9645do |
| | | | 11925do | | |
| 0400 | 0500 | | Brazil, Radio Boa Vontade | 6160do | 9550do |
| | | | 11895do | | |
| 0400 | 0500 | | Brazil, Radio Brasil | 4785do | |
| 0400 | 0500 | | Brazil, Radio Cancao Nova | 4825do | 6105do |
| | | | 9675do | | |
| 0400 | 0500 | | Brazil, Radio Capixaba | 4935do | |
| 0400 | 0500 | | Brazil, Radio Clube do Para | 4885do | |
| 0400 | 0500 | | Brazil, Radio Cultura/Araraquara | | 3365do |
| 0400 | 0500 | | Brazil, Radio Daqui | 4905do | |
| 0400 | 0500 | | Brazil, Radio Difusora Caceres | | 5055do |
| 0400 | 0500 | | Brazil, Radio Difusora de Macapa | | 4915do |
| 0400 | 0500 | | Brazil, Radio Gazeta Universitaria | | 5955do |
| | | | 9685do | 15325al | |
| 0400 | 0500 | | Brazil, Radio Globo | 6120do | 9585do |
| | | | 11804do | | |
| 0400 | 0500 | | Brazil, Radio Imaculada Conceicao | | 4755do |
| 0400 | 0500 | | Brazil, Radio Inconfidencia | 6010do | 15190do |
| 0400 | 0500 | | Brazil, Radio Maria | 4885do | |
| 0400 | 0500 | | Brazil, Radio Mundial | | 3325do |
| 0400 | 0500 | Sun | Brazil, Radio Nacional da Amazonia | | 6185do |
| | | | 11780do | | |
| 0400 | 0500 | | Brazil, Radio Nossa Voz | 4975do | |
| 0400 | 0500 | | Brazil, Radio Nove de Julho | 9820do | |
| 0400 | 0500 | | Brazil, Radio Novo Tempo | 4895do | |
| 0400 | 0500 | | Brazil, Super Radio Deus e Amour | | 6060do |
| | | | 9565do | 11765do | |
| 0400 | 0500 | | Brazil, Super Rede Boa Vontade | | 4860do |
| 0400 | 0500 | | Brazil, Voz Missionaria | 5940do | |
| 0430 | 0500 | mtwhf | UK, BBC World Service | 3380af | 6100af |
| | | | 6145af | | |

## 0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

| | | | | | |
|---|---|---|---|---|---|
| 0500 | 0530 | mtwhf | UK, BBC World Service | 3380af | 6100af |
| | | | 6145af | | |
| 0500 | 0600 | | Angola, Radio Nacional de Angola | | 4950do |
| 0500 | 0600 | | Angola, Radio N'gola Yetu | 7217do | |
| 0500 | 0600 | | Brazil, Jornal A Critica | 5055do | |
| 0500 | 0600 | | Brazil, Radio Alvorada/Londrina | | 4865do |
| 0500 | 0600 | | Brazil, Radio Bandeirantes | 6090do | 9645do |
| | | | 11925do | | |
| 0500 | 0600 | | Brazil, Radio Boa Vontade | 6160do | 9550do |
| | | | 11895do | | |
| 0500 | 0600 | | Brazil, Radio Brasil | 4785do | |
| 0500 | 0600 | | Brazil, Radio Cancao Nova | 4825do | 6105do |
| | | | 9675do | | |
| 0500 | 0600 | | Brazil, Radio Capixaba | 4935do | |
| 0500 | 0600 | | Brazil, Radio Clube do Para | 4885do | |
| 0500 | 0600 | | Brazil, Radio Cultura/Araraquara | | 3365do |
| 0500 | 0600 | | Brazil, Radio Daqui | 4905do | |
| 0500 | 0600 | | Brazil, Radio Difusora Caceres | | 5055do |
| 0500 | 0600 | | Brazil, Radio Difusora de Macapa | | 4915do |
| 0500 | 0600 | | Brazil, Radio Gazeta Universitaria | | 5955do |
| | | | 9685do | 15325al | |
| 0500 | 0600 | | Brazil, Radio Globo | 6120do | 9585do |
| | | | 11804do | | |
| 0500 | 0600 | | Brazil, Radio Imaculada Conceicao | | 4755do |
| 0500 | 0600 | | Brazil, Radio Inconfidencia | 6010do | 15190do |
| 0500 | 0600 | | Brazil, Radio Maria | 4885do | |
| 0500 | 0600 | | Brazil, Radio Mundial | | 3325do |
| 0500 | 0600 | Sun | Brazil, Radio Nacional da Amazonia | | 6185do |
| | | | 11780do | | |
| 0500 | 0600 | | Brazil, Radio Nossa Voz | 4975do | |
| 0500 | 0600 | | Brazil, Radio Nove de Julho | 9820do | |
| 0500 | 0600 | | Brazil, Radio Novo Tempo | 4895do | |
| 0500 | 0600 | | Brazil, Super Radio Deus e Amour | | 6060do |
| | | | 9565do | 11765do | |
| 0500 | 0600 | | Brazil, Super Rede Boa Vontade | | 4860do |
| 0500 | 0600 | | Brazil, Voz Missionaria | 5940do | |
| 0500 | 0600 | mtwhf | Portugal, RDP Internacional | 7240eu | |

| | | | | |
|---|---|---|---|---|
| 0530 | 0559 | Germany, Deutsche Welle | 17800af | |
| 0530 | 0600 | Germany, Deutsche Welle | 9700af | 21780af |
| 0530 | 0600 | Vatican City State, Vatican Radio | 11625af | |
| | | 13765af | 15570af | |

## 0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

| | | | | |
|---|---|---|---|---|
| 0600 | 0700 | Angola, Radio Nacional de Angola | 4950do | |
| 0600 | 0700 | Angola, Radio N'gola Yetu | 7217do | |
| 0600 | 0700 | Brazil, Jornal A Critica | 5055do | |
| 0600 | 0700 | Brazil, Radio Alvorada/Londrina | 4865do | |
| 0600 | 0700 | Brazil, Radio Bandeirantes | 6090do | 9645do |
| | | 11925do | | |
| 0600 | 0700 | Brazil, Radio Boa Vontade | 6160do | 9550do |
| | | 11895do | | |
| 0600 | 0700 | Brazil, Radio Brasil | 4785do | |
| 0600 | 0700 | Brazil, Radio Cancao Nova | 4825do | 6105do |
| | | 9675do | | |
| 0600 | 0700 | Brazil, Radio Capixaba | 4935do | |
| 0600 | 0700 | Brazil, Radio Clube do Para | 4885do | |
| 0600 | 0700 | Brazil, Radio Cultura/Araraquara | 3365do | |
| 0600 | 0700 | Brazil, Radio Daqui | 4905do | |
| 0600 | 0700 | Brazil, Radio Difusora Caceres | 5055do | |
| 0600 | 0700 | Brazil, Radio Difusora de Macapa | 4915do | |
| 0600 | 0700 | Brazil, Radio Gazeta Universitaria | 5955do | |
| | | 9685do | 15325al | |
| 0600 | 0700 | Brazil, Radio Globo | 6120do | 9585do |
| | | 11804do | | |
| 0600 | 0700 | Brazil, Radio Imaculada Conceicao | 4755do | |
| 0600 | 0700 | Brazil, Radio Inconfidencia | 6010do | 15190do |
| 0600 | 0700 | Brazil, Radio Maria | 4885do | |
| 0600 | 0700 | Brazil, Radio Mundial | 3325do | |
| 0600 | 0700 Sun | Brazil, Radio Nacional da Amazonia | 6185do | |
| | | 11780do | | |
| 0600 | 0700 | Brazil, Radio Nossa Voz | 4975do | |
| 0600 | 0700 | Brazil, Radio Nove de Julho | 9820do | |
| 0600 | 0700 | Brazil, Radio Novo Tempo | 4895do | |
| 0600 | 0700 | Brazil, Super Radio Deus e Amour | 6060do | |
| | | 9565do | 11765do | |
| 0600 | 0700 | Brazil, Super Rede Boa Vontade | 4860do | |
| 0600 | 0700 | Brazil, Voz Missionaria | 5940do | |
| 0600 | 0700 | France, Radio France Internationale | 11830af | |
| 0600 | 0700 mtwhf | Portugal, RDP Internacional | 7240eu | |
| 0645 | 0700 | Brazil, Radio Itatiaia | 5969do | |
| 0645 | 0700 mtwhf | Portugal, RDP Internacional | 11850eu | |

## 0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

| | | | | |
|---|---|---|---|---|
| 0700 | 0745 | USA, WYFR/Family Radio Worldwide | 9985eu | |
| 0700 | 0800 | Angola, Radio Nacional de Angola | 4950do | |
| 0700 | 0800 | Angola, Radio N'gola Yetu | 7217do | |
| 0700 | 0800 | Brazil, Jornal A Critica | 5055do | |
| 0700 | 0800 | Brazil, Radio Alvorada/Londrina | 4865do | |
| 0700 | 0800 | Brazil, Radio Aparecida | 5035do | 6135al |
| | | 9630al | 11855al | |
| 0700 | 0800 | Brazil, Radio Bandeirantes | 6090do | 9645do |
| | | 11925do | | |
| 0700 | 0800 | Brazil, Radio Boa Vontade | 6160do | 9550do |
| | | 11895do | | |
| 0700 | 0800 | Brazil, Radio Brasil | 4785do | |
| 0700 | 0800 | Brazil, Radio Brasil Central | 4985do | 11815do |
| 0700 | 0800 | Brazil, Radio Cancao Nova | 4825do | 6105do |
| | | 9675do | | |
| 0700 | 0800 | Brazil, Radio Capixaba | 4935do | |
| 0700 | 0800 | Brazil, Radio Clube do Para | 4885do | |
| 0700 | 0800 mtwhfa | Brazil, Radio Congonhas | 4775do | |
| 0700 | 0800 | Brazil, Radio Daqui | 4905do | |
| 0700 | 0800 | Brazil, Radio Difusora Caceres | 5055do | |
| 0700 | 0800 | Brazil, Radio Difusora de Macapa | 4915do | |
| 0700 | 0800 | Brazil, Radio Gazeta Universitaria | 5955do | |
| | | 9685do | 15325al | |
| 0700 | 0800 | Brazil, Radio Globo | 6120do | 9585do |
| | | 11804do | | |
| 0700 | 0800 | Brazil, Radio Guaiba | 6000do | 11785do |
| 0700 | 0800 | Brazil, Radio Imaculada Conceicao | 4755do | |
| 0700 | 0800 | Brazil, Radio Inconfidencia | 6010do | 15190do |
| 0700 | 0800 | Brazil, Radio Itatiaia | 5969do | |
| 0700 | 0800 | Brazil, Radio Maria | 4885do | |
| 0700 | 0800 | Brazil, Radio Mundial | 3325do | |
| 0700 | 0800 Sun | Brazil, Radio Nacional da Amazonia | 6185do | |
| | | 11780do | | |
| 0700 | 0800 | Brazil, Radio Nossa Voz | 4975do | |
| 0700 | 0800 | Brazil, Radio Nove de Julho | 9820do | |
| 0700 | 0800 | Brazil, Super Radio Deus e Amour | 6060do | |
| | | 9565do | 11765do | |
| 0700 | 0800 | Brazil, Super Rede Boa Vontade | 4860do | |

| | | | | |
|---|---|---|---|---|
| 0700 | 0800 | Brazil, Voz Missionaria | 5940do | |
| 0700 | 0800 mtwhf | Portugal, RDP Internacional | 7240eu | 11850eu |
| 0700 | 0800 Sat/Sun | Portugal, RDP Internacional | 12020eu | 15160af |
| | | 12000va | | |

## 0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

| | | | | |
|---|---|---|---|---|
| 0800 | 0900 | Angola, Radio Nacional de Angola | 4950do | |
| 0800 | 0900 | Angola, Radio N'gola Yetu | 7217do | |
| 0800 | 0900 | Brazil, Jornal A Critica | 5055do | |
| 0800 | 0900 | Brazil, Novas de Paz | 6080do | 9515do |
| | | 11725do | | |
| 0800 | 0900 | Brazil, Radio Alvorada/Londrina | 4865do | |
| 0800 | 0900 | Brazil, Radio Aparecida | 5035do | 6135al |
| | | 9630al | 11855al | |
| 0800 | 0900 | Brazil, Radio Bandeirantes | 6090do | 9645do |
| | | 11925do | | |
| 0800 | 0900 | Brazil, Radio Boa Vontade | 6160do | 9550do |
| | | 11895do | | |
| 0800 | 0900 | Brazil, Radio Brasil | 4785do | |
| 0800 | 0900 | Brazil, Radio Brasil Central | 4985do | 11815do |
| 0800 | 0900 | Brazil, Radio Cancao Nova | 4825do | 6105do |
| | | 9675do | | |
| 0800 | 0900 | Brazil, Radio Capixaba | 4935do | |
| 0800 | 0900 | Brazil, Radio Congonhas | 4775do | |
| 0800 | 0900 | Brazil, Radio Cultura do Para | 5045do | |
| 0800 | 0900 | Brazil, Radio Cultura Ondas Tropicais | 4845do | |
| 0800 | 0900 | Brazil, Radio Cultura Sao Paulo | 9615do | |
| | | 17815do | | |
| 0800 | 0900 | Brazil, Radio Cultura/Araraquara | 3365do | |
| 0800 | 0900 | Brazil, Radio Daqui | 4905do | |
| 0800 | 0900 | Brazil, Radio Difusora Caceres | 5055do | |
| 0800 | 0900 | Brazil, Radio Difusora de Macapa | 4915do | |
| 0800 | 0900 | Brazil, Radio Difusora Roraima | 4875do | |
| 0800 | 0900 | Brazil, Radio Difusora/Londrina | 4815do | |
| 0800 | 0900 | Brazil, Radio Educadora | 2380do | |
| 0800 | 0900 | Brazil, Radio Gazeta Universitaria | 5955do | |
| | | 9685do | 15325al | |
| 0800 | 0900 | Brazil, Radio Globo | 6120do | 9585do |
| | | 11804do | | |
| 0800 | 0900 | Brazil, Radio Guaiba | 6000do | 11785do |
| 0800 | 0900 | Brazil, Radio Imaculada Conceicao | 4755do | |
| 0800 | 0900 | Brazil, Radio Inconfidencia | 6010do | 15190do |
| 0800 | 0900 | Brazil, Radio Itatiaia | 5969do | |
| 0800 | 0900 | Brazil, Radio Maria | 4885do | |
| 0800 | 0900 | Brazil, Radio Mundial | 3325do | |
| 0800 | 0900 | Brazil, Radio Nacional da Amazonia | 6185do | |
| | | 11780do | | |
| 0800 | 0900 | Brazil, Radio Nossa Voz | 4975do | |
| 0800 | 0900 | Brazil, Radio Nove de Julho | 9820do | |
| 0800 | 0900 | Brazil, Radio Novo Tempo | 4895do | |
| 0800 | 0900 | Brazil, Radio Record | 6150do | 9505do |
| 0800 | 0900 | Brazil, Radio Rural | 4765do | |
| 0800 | 0900 | Brazil, Radio Voz Missionaria | 5940do | |
| 0800 | 0900 | Brazil, Super Radio Deus e Amour | 6060do | |
| | | 9565do | 11765do | |
| 0800 | 0900 | Brazil, Super Rede Boa Vontade | 4860do | |
| 0800 | 0900 | Brazil, Voz Missionaria | 5940do | |
| 0800 | 0900 | Portugal, RDP Internacional | 12020eu | |
| 0800 | 0900 Sat/Sun | Portugal, RDP Internacional | 12000va | 15160af |
| 0800 | 0900 | USA, WYFR/Family Radio Worldwide | 9605sa | |
| | | 9625sa | 11770sa | |
| 0830 | 0900 Sat/Sun/DRM | Portugal, RDP Internacional | 11995eu | |

## 0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

| | | | | |
|---|---|---|---|---|
| 0900 | 1000 | Angola, Radio Nacional de Angola | 4950do | |
| 0900 | 1000 | Angola, Radio N'gola Yetu | 7217do | |
| 0900 | 1000 | Brazil, Novas de Paz | 6080do | 9515do |
| | | 11725do | | |
| 0900 | 1000 | Brazil, Radio Alvorada/Londrina | 4865do | |
| 0900 | 1000 | Brazil, Radio Aparecida | 5035do | 6135al |
| | | 9630al | 11855al | |
| 0900 | 1000 | Brazil, Radio Bandeirantes | 6090do | 9645do |
| | | 11925do | | |
| 0900 | 1000 | Brazil, Radio Boa Vontade | 6160do | 9550do |
| | | 11895do | | |
| 0900 | 1000 | Brazil, Radio Brasil | 4785do | |
| 0900 | 1000 | Brazil, Radio Brasil Central | 4985do | 11815do |
| 0900 | 1000 | Brazil, Radio Cancao Nova | 4825do | 6105do |
| | | 9675do | | |
| 0900 | 1000 | Brazil, Radio Capixaba | 4935do | |
| 0900 | 1000 | Brazil, Radio Clube do Para | 4885do | |
| 0900 | 1000 | Brazil, Radio Congonhas | 4775do | |
| 0900 | 1000 | Brazil, Radio Cultura do Para | 5045do | |
| 0900 | 1000 | Brazil, Radio Cultura Ondas Tropicais | 4845do | |

| Start | Stop | Days | Station | Frequencies |
|---|---|---|---|---|
| 0900 | 1000 | | Brazil, Radio Cultura Sao Paulo | 9615do 17815do |
| 0900 | 1000 | | Brazil, Radio Cultura/Araraquara | 3365do |
| 0900 | 1000 | | Brazil, Radio Daqui | 4905do |
| 0900 | 1000 | | Brazil, Radio Difusora Acerana | 4885do |
| 0900 | 1000 | | Brazil, Radio Difusora Caceres | 5055do |
| 0900 | 1000 | | Brazil, Radio Difusora Caceres | 5055do |
| 0900 | 1000 | | Brazil, Radio Difusora de Macapa | 4915do |
| 0900 | 1000 | | Brazil, Radio Difusora Roraima | 4875do |
| 0900 | 1000 | | Brazil, Radio Difusora/Londrina | 4815do |
| 0900 | 1000 | | Brazil, Radio Educadora | 2380do |
| 0900 | 1000 | | Brazil, Radio Gaucha | 6020do 11915do |
| 0900 | 1000 | | Brazil, Radio Gazeta Universitaria | 5955do 9685do 15325al |
| 0900 | 1000 | | Brazil, Radio Globo | 6120do 9585do 11804do |
| 0900 | 1000 | | Brazil, Radio Guaiba | 6000do 11785do |
| 0900 | 1000 | | Brazil, Radio Imaculada Conceicao | 4755do |
| 0900 | 1000 | | Brazil, Radio Inconfidencia | 6010do 15190do |
| 0900 | 1000 | | Brazil, Radio Itatiaia | 5969do |
| 0900 | 1000 | | Brazil, Radio Maria | 4885do |
| 0900 | 1000 | | Brazil, Radio Marumby | 9665do 11750do |
| 0900 | 1000 | | Brazil, Radio Minicipal | 3375do |
| 0900 | 1000 | | Brazil, Radio Missoes da Amazonia | 4865do |
| 0900 | 1000 | | Brazil, Radio Mundial | 3325do |
| 0900 | 1000 | | Brazil, Radio Nacional da Amazonia | 6185do 11780do |
| 0900 | 1000 | | Brazil, Radio Nossa Voz | 4975do |
| 0900 | 1000 | | Brazil, Radio Nove de Julho | 9820do |
| 0900 | 1000 | | Brazil, Radio Novo Tempo | 4895do |
| 0900 | 1000 | | Brazil, Radio Record | 6150do 9505do |
| 0900 | 1000 | | Brazil, Radio Rural | 4765do |
| 0900 | 1000 | | Brazil, Radio Trans Mundial | 5964do 9530al 11735do |
| 0900 | 1000 | | Brazil, Radio Voz Missionaria | 5940do |
| 0900 | 1000 | | Brazil, Super Radio Deus e Amour | 6060do 9565do 11765do |
| 0900 | 1000 | | Brazil, Super Rede Boa Vontade | 4860do |
| 0900 | 1000 | | Brazil, Voz Missionaria | 5940do |
| 0900 | 1000 | | Portugal, RDP Internacional | 12020eu |
| 0900 | 1000 | Sat/Sun | Portugal, RDP Internacional | 12000va 15160af |
| 0900 | 1000 | Sat/Sun/DRM | Portugal, RDP Internacional | 11995eu |
| 0900 | 1000 | | USA, WYFR/Family Radio Worldwide | 6175sa 9605sa 9625sa 11770sa |
| 0927 | 1000 | | Brazil, Radio Alvorada/Parintins | 4865do |
| 0930 | 1000 | | Brazil, Radio Difusora do Amazonas | 4805do |
| 0930 | 1000 | | Japan, NHK World/ Radio Japan | 6195sa 9485sa 9510sa |

## 1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

| Start | Stop | Days | Station | Frequencies |
|---|---|---|---|---|
| 1000 | 1030 | | USA, Voice of America | 17740af 21590af |
| 1000 | 1045 | | USA, WYFR/Family Radio Worldwide | 6175sa 9605sa 11770sa |
| 1000 | 1100 | | Angola, Radio Nacional de Angola | 4950do |
| 1000 | 1100 | | Angola, Radio N'gola Yetu | 7217do |
| 1000 | 1100 | | Brazil, Novas de Paz | 6080do 9515do 11725do |
| 1000 | 1100 | | Brazil, Radio Alvorada/Londrina | 4865do |
| 1000 | 1100 | | Brazil, Radio Aparecida | 5035do 6135al 9630al 11855al |
| 1000 | 1100 | | Brazil, Radio Bandeirantes | 6090do 9645do 11925do |
| 1000 | 1100 | | Brazil, Radio Boa Vontade | 6160do 9550do 11895do |
| 1000 | 1100 | | Brazil, Radio Brasil | 4785do |
| 1000 | 1100 | | Brazil, Radio Brasil Central | 4985do 11815do |
| 1000 | 1100 | | Brazil, Radio Cancao Nova | 4825do 6105do 9675do |
| 1000 | 1100 | | Brazil, Radio Capixaba | 4935do |
| 1000 | 1100 | | Brazil, Radio Clube do Para | 4885do |
| 1000 | 1100 | | Brazil, Radio Congonhas | 4775do |
| 1000 | 1100 | | Brazil, Radio Cultura do Para | 5045do |
| 1000 | 1100 | | Brazil, Radio Cultura Ondas Tropicais | 4845do |
| 1000 | 1100 | | Brazil, Radio Cultura Sao Paulo | 9615do 17815do |
| 1000 | 1100 | | Brazil, Radio Cultura/Araraquara | 3365do |
| 1000 | 1100 | | Brazil, Radio Daqui | 4905do |
| 1000 | 1100 | | Brazil, Radio Difusora Acerana | 4885do |
| 1000 | 1100 | | Brazil, Radio Difusora Caceres | 5055do |
| 1000 | 1100 | | Brazil, Radio Difusora de Macapa | 4915do |
| 1000 | 1100 | | Brazil, Radio Difusora do Amazonas | 4805do |
| 1000 | 1100 | | Brazil, Radio Difusora Roraima | 4875do |
| 1000 | 1100 | | Brazil, Radio Difusora/Londrina | 4815do |
| 1000 | 1100 | | Brazil, Radio Educacao Rural de Tefe | 4925do |
| 1000 | 1100 | | Brazil, Radio Educadora | 2380do |
| 1000 | 1100 | | Brazil, Radio Educadora 6 de Agosto | 3255do |
| 1000 | 1100 | | Brazil, Radio Gaucha | 6020do 11915do |
| 1000 | 1100 | | Brazil, Radio Gazeta Universitaria | 5955do 9685do 15325al |
| 1000 | 1100 | | Brazil, Radio Globo | 6120do 9585do 11804do |
| 1000 | 1100 | | Brazil, Radio Guaiba | 6000do 11785do |
| 1000 | 1100 | | Brazil, Radio Inconfidencia | 6010do 15190do |
| 1000 | 1100 | | Brazil, Radio Itatiaia | 5969do |
| 1000 | 1100 | | Brazil, Radio Maria | 4885do |
| 1000 | 1100 | | Brazil, Radio Marumby | 9665do 11750do |
| 1000 | 1100 | Sun | Brazil, Radio Minicipal | 3375do |
| 1000 | 1100 | | Brazil, Radio Missoes da Amazonia | 4865do |
| 1000 | 1100 | | Brazil, Radio Mundial | 3325do |
| 1000 | 1100 | | Brazil, Radio Nacional da Amazonia | 6185do 11780do |
| 1000 | 1100 | | Brazil, Radio Nossa Voz | 4975do |
| 1000 | 1100 | | Brazil, Radio Nove de Julho | 9820do |
| 1000 | 1100 | | Brazil, Radio Novo Tempo | 4895do |
| 1000 | 1100 | | Brazil, Radio Record | 6150do 9505do |
| 1000 | 1100 | | Brazil, Radio Rio Mar | 6160do 9695do |
| 1000 | 1100 | | Brazil, Radio Rural | 4765do |
| 1000 | 1100 | | Brazil, Radio Senado | 5990do |
| 1000 | 1100 | | Brazil, Radio Trans Mundial | 5964do 9530al 11735do |
| 1000 | 1100 | | Brazil, Radio Voz Missionaria | 5940do |
| 1000 | 1100 | | Brazil, Super Radio Deus e Amour | 6060do 9565do 11765do |
| 1000 | 1100 | | Brazil, Super Rede Boa Vontade | 4860do |
| 1000 | 1100 | | Brazil, Voz Missionaria | 5940do |
| 1000 | 1100 | mtwhf | Portugal, RDP Internacional | 12020eu 15575va |
| 1000 | 1200 | Sat/Sun | Portugal, RDP Internacional | 12000va 15180af |
| 1030 | 1100 | | Brazil, Radio Verdas Florestas | 4865do |

## 1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

| Start | Stop | Days | Station | Frequencies |
|---|---|---|---|---|
| 1100 | 1130 | mtwhfa | Vatican City State, Vatican Radio | 21680sa |
| 1100 | 1200 | | Angola, Radio Nacional de Angola | 4950do |
| 1100 | 1200 | | Angola, Radio N'gola Yetu | 7217do |
| 1100 | 1200 | mtwhf | Argentina, Radio Nacional RAE | 6060am 11710am |
| 1100 | 1200 | | Brazil, Novas de Paz | 6080do 9515do 11725do |
| 1100 | 1200 | | Brazil, Radio Alvorada/Londrina | 4865do |
| 1100 | 1200 | | Brazil, Radio Aparecida | 5035do 6135al 9630al 11855al |
| 1100 | 1200 | | Brazil, Radio Bandeirantes | 6090do 9645do 11925do |
| 1100 | 1200 | | Brazil, Radio Boa Vontade | 6160do 9550do 11895do |
| 1100 | 1200 | | Brazil, Radio Brasil | 4785do |
| 1100 | 1200 | | Brazil, Radio Brasil Central | 4985do 11815do |
| 1100 | 1200 | | Brazil, Radio Cancao Nova | 4825do 6105do 9675do |
| 1100 | 1200 | | Brazil, Radio Capixaba | 4935do |
| 1100 | 1200 | | Brazil, Radio Clube do Para | 4885do |
| 1100 | 1200 | | Brazil, Radio Congonhas | 4775do |
| 1100 | 1200 | | Brazil, Radio Cultura do Para | 5045do |
| 1100 | 1200 | | Brazil, Radio Cultura Ondas Tropicais | 4845do |
| 1100 | 1200 | | Brazil, Radio Cultura Sao Paulo | 9615do 17815do |
| 1100 | 1200 | | Brazil, Radio Cultura/Araraquara | 3365do |
| 1100 | 1200 | | Brazil, Radio Daqui | 4905do |
| 1100 | 1200 | | Brazil, Radio Difusora Acerana | 4885do |
| 1100 | 1200 | | Brazil, Radio Difusora Caceres | 5055do |
| 1100 | 1200 | | Brazil, Radio Difusora de Macapa | 4915do |
| 1100 | 1200 | | Brazil, Radio Difusora do Amazonas | 4805do |
| 1100 | 1200 | | Brazil, Radio Difusora Roraima | 4875do |
| 1100 | 1200 | | Brazil, Radio Difusora/Londrina | 4815do |
| 1100 | 1200 | | Brazil, Radio Educacao Rural de Tefe | 4925do |
| 1100 | 1200 | | Brazil, Radio Educadora | 2380do |
| 1100 | 1200 | | Brazil, Radio Educadora 6 de Agosto | 3255do |
| 1100 | 1200 | | Brazil, Radio Gaucha | 6020do 11915do |
| 1100 | 1200 | | Brazil, Radio Gazeta Universitaria | 5955do 9685do 15325al |
| 1100 | 1200 | | Brazil, Radio Globo | 6120do 9585do 11804do |

# Monitoring the Chinese Navy

In recent weeks, tensions in the Far East have flared up and some monitors are turning their attention toward the region. Several incidents in and around the Korean Peninsula have added to tensions. Any time the region goes on high alert, most military monitors think about China, since they are one of the major military players in this portion of the world.

The People's Liberation Army Navy (PLAN or PLA Navy) is the naval branch of the People's Liberation Army (PLA), the military arm of the People's Republic of China. Until the early 1990s, the navy performed a subordinate role to the PLA Land Forces. Since the 1990s, it has undergone rapid modernization.

The PLA Navy is currently the second largest naval service in the world after the United States Navy. With personnel more than 250,000 strong, the PLAN also includes 35,000 coastal defense forces, 56,000 naval infantry/marines, in addition to a 56,000 PLAN naval air arm operating several hundred land-based aircraft and ship-based helicopters. As part of its overall program of naval modernization, the service also plans to develop a blue-water navy.

The People's Liberation Army Navy has become more prominent in recent years due to a change in Chinese strategic priorities. The new strategic threats include possible conflict with the United States and/or a resurgent Japan in areas such as the Taiwan Strait or the South China Sea. Robert D. Kaplan, an American journalist and military forces expert, has been quoted as saying that it was "the collapse of the Soviet Union that allowed China to transfer resources from its army to its navy and other force projection assets."

The PLAN force consists of more than a hundred major combat vessels, organized into three fleets: the North Sea Fleet, the East Sea Fleet, and the South Sea Fleet.

- The North Sea Fleet, headquartered in Qingdao, Shandong Province, patrols the Bohai Bay and the Yellow Sea. Its flagship is DDG *Harbin*.
- The East Sea Fleet, headquartered in Ningbo, Zhejiang Province, patrols the East China Sea, which is called the Eastern Sea in Chinese. Its flagship is J302 *Chongmingdao*.
- The South Sea Fleet, headquartered in Zhanjiang, Guangdong Province, patrols the South China Sea, or the South Sea in Chinese. Its flagship is AOR/AK *Nanchang*.

## ❖ Bases

Military bases associated with the Chinese PLAN forces include the following:

### North Sea Fleet
Major bases:
   Qingdao (HQ), Huludao, Jianggezhuang, Guzhen Bay, Lushun, Xiaopingdao.
Minor bases:
   Weihai Wei, Qingshan, Luda, Lianyungang, Ling Shan, Ta Ku Shan, Changshandao, Liuzhuang, Dayuanjiadun, Dalian

### East Sea Fleet
Major bases:
   Ningbo (HQ), Zhoushan, Shanghai, Daxie, Fujian.
Minor bases:
   Zhenjiangguan, Wusong, Xinxiang, Wenzhou, Sanduao, Xiamen, Xingxiang, Quandou, Wen Zhou SE, Wuhan, Dinghai, Jiaotou

### South Sea Fleet
Major bases:
   Zhanjiang (HQ), Yulin, Huangfu, Hong Kong, Guangzhou (Canton).
Minor bases:
   Haikou, Shantou, Humen, Kuanchuang, Tsun, Kuan Chung, Mawai, Beihai, Ping Tan, San Chou Shih, Tang-Chiah Huan, Longmen, Bailong, Dongcun, Baimajing, Xiachuandao, Yuchi

### PLANAF air bases include:

### North Sea Fleet:
   Dalian, Qingdao, Jinxi, Jiyuan, Laiyang, Jiaoxian, Xingtai, Laishan, Anyang, Changzhi, Liangxiang and Shan Hai Guan
### East Sea Fleet:
   Danyang, Daishan, Shanghai (Dachang), Ningbo, Luqiao, Feidong and Shitangqiao
### South Sea Fleet:
   Foluo, Haikou, Lingshui, Sanya, Guiping, Jialaishi and Lingling

*The Royal Navy's Flag Ship HMS Ark Royal in the company of the Chinese Frigate Saigon, off the coast of the Isle of Wight. (Photo courtesy of the UK Royal Navy)*

## ❖ Chinese Military Comms – Enigma M89

Most military organizations such as the Chinese Navy rely heavily on HF radio communications, and we believe that the PLAN is no exception.

One of the major numbers station broadcasters in the HF spectrum – the Enigma M89 Morse code transmissions – have been attributed to the Chinese military. Extensive direction finding activities have pinpointed M89 transmitter sites near Guangzhou, Qingdao and the Dalian / Lushan areas. The network has various other locations throughout the country, such as Lanzhou and Xi'an.

Qingdao is the headquarters of China's North Sea Fleet, while Lushan is another major base of the North Sea Fleet and Dalian is one of the largest training facilities of the navy. Guangzhou is one of the largest bases associated with the South Sea Fleet.

L9CC and 2SLC seem to originate from the Dalian/Lushan area; 4XML from Qingdao; L4FC from Guanghzou; and NH8T from near Dandong (41.25º N, 124.27º E). Recently some new bearings were taken during a 4XML transmission on 10822.0 kHz. This transmission appeared to be coming from central China (38º 36' N, 107º 00' E), likely from either Lanzhou or Xi'an. That would place the 10 MHz transmission originating from a different location than the one used for the 8-MHz transmissions. It is, however, quite possible that all callsigns are being transmitted via all stations.

Long term monitoring of the M89 family of CW transmissions indicates that there are no fixed schedules or frequencies. Most of the M89 CW activity can be found in the 3- to 10-MHz portion of the HF spectrum and we have a complete list of recently reported M89 frequencies in Table 1.

For many years L9CC was the most widely heard callsign associated with the M89 transmissions, but it is now seldom copied. Station L9CC should be familiar to amateur radio operators who operate in the CW segment of the 40-meter amateur band. For years, L9CC had been a fixture in various IARU Intruder reports from all three ITU regions in the 7-7.1 MHz segment of the band.

The most common traffic that you will monitor is a continuous V marker tape.
V CP17 CP17 CP17 de L9CC L9CC
V MW3D MW3D MW3D de 2SLC 2SLC
Besides the channel markers that I have listed above, the network does transmit coded

messages like the ones below (courtesy of the N&O bulletin published by Ary Boender).

v mw3d mw3d mw3d de 2slc 2slc (endless string)
v mw3d mw3d de 2slc 2slc hr cq msg nr
msg nr 226 ck 3t1 16 1t27 162t =
msg nr 226 ck 3t1 16 1t27 162t =
d3n5 tdn5 at64 43a6 7un3 a463 u57t 4t75 tt55
ttaa 73ta 65ua un34 a46t 6dan dun3 ud5n
nad6 4a6u 6535 5u6t 76un u64d 5a3u u547
a6tn 5d3n d4a5 d53a dua3 a6n5 6and 3t3n
un67 4uad dtnt 4ndu u3da 4td3 5n7u 6437
5tdu dau7 745a d6t5 576u dt45 7u6t 4n5d
un6t 37t4 a67t a6du nu6d u4an 47nu u4t5
dta3 3475 4t7n nadn 4na3 d74t d537 u36u
t75n 3a4d 7t65 3a7n 4au6 7u56 64da 435a
73t6 5da3 nunt 5dt4 53a7 6347 ud7u 63d3
74tn 35dt 543n 3675 a64n 7a5n at65 d4u7
467t 3nu4 7tdu a6t6 3n34 d67t 6at7 nd7u
7u4t 57ta 73an
iii = n67n au3a 3t73 an4t 4na5 td65 6n7a 5tau
tt55 ttau 7453 4a36 atdt a364 ada4 adat 53nt
n547 6dau 73du u634 ua37 n536 at~3 n7d4
tn66 dt76 u644 75u7 3ta4 uda5 ud53 ta5a
4d47 64a7 743t 6u37 733n 3aad n3at d463
ta34 t76t utu4 54t4 3t5t 67d7 6a6u 5~u3
u365 u4nd a5u4 57d4 5n47 3a34 5t3n ud54
4ana 5u6d 5na3 6td6 3d65 n6an 5376 t373
tdt6 6d73 t46t a6u5 n~65 a763 7nun 76du
tn76 3t5a u7a4 6tn7 dund ud53 n7td nu74
7nu5 7467 n7nu t53n 5d57 6tda d456 7atu
5ua5 a3d7 d35u n6n5 n4d5 53d5 4tu6 nut3
5u74 64nn ddtu
iii = 4tn3 tdaa t4u6 ut7u 53nt 6u35 u6d5 6dna
tt55 tta3 dta7 7u63 67dt 3ud7 47t7 nan5
4u64 734t nt47 4dud 45d7 n3u3 tt4u 7653
4n6u 4a56 a3tn an63 d73u 636u nat7 duat
tn73 43d7 5t3t 4563 5au6 74ua 6au6 634t
d55t nd56 6d57 td4u nuau 45a5 dna4 4ant
567u d4n4 7n7d 7367 43at 76du t5d5 tan6
73ad ntn6 uau5 7n74 d6n6 4n4t dad7 5n37
u5tu t75n tnt4 a7d4 a63a n474 7a45 udad
dt5n ataa 3d37 a4d5 u53t 5n64 53a3 3d5u
7a67 347t utd6 adn7 u5u3 nant 5a4a au4n
u7n4 3n56
6un5 73d n35d t356 56tn 744a 65t6 ud53
u57n u436
iii = 774a ar
msg nr 226 ck 3t1 16 1t27 162t =
v mw3d mw3d mw3d de 2slc 2slc (endless string)

Another traffic string variant:

v la5s la5s la5s de nh8t nh8t (endless string)
ugt comm = 361/5952/5885/58/53/8288/5/
   558/a ar
ugt comm = 361/5952/5885/58/53/8288/5/
   558/a ar
ugt comm = 361/5952/5885/58/53/8288/5/
   558/a ar
v la5s la5s la5s de nh8t nh8t (continue)

Of course, no one outside the Chinese military knows what is contained within these messages, but regular monitors use the quantity of traffic being passed as an indicator of possible important events involving the stations being monitored.

These stations are also useful as propagation markers for possible radio paths into China and the Far East, since they transmit their channel markers almost continuously. As the Cycle 24 sunspot count continues to rise, we may catch more openings into China to monitor the Enigma M89 transmitters.

So, as things heat up in the Far East, keep our list of M89 frequencies handy and let us know what you are hearing. Until next month, 73 and good hunting.

*(Mode CW and frequencies kHz)*

| Call | Frequencies |
|---|---|
| 2DKI de 9CNV | 3645.0 |
| 5J4I de YI4K | 4770.0 |
| 7NPE de QV5B | 4225.0 4227.0 5500.0 |
| 9UQW de 5ZBD | 7414.0 7416.0 |
| ABYZ de 6PXJ | 3340.0 3440.0 4567.0 4575.0 5600.0 6780.0 6785.0 |
| AU34 de 567D | 8120.0 8301.0 |
| B7TZ de 8PNX | 3846.0 4727.0 4927.0 4928.0 4929.0 4938.0 4988.0 7153.0 8038.0 8046.0 |
| BFR7 de 4XML | 3378.5 3380.0 5588.0 5645.0 5756.0 8189.5 8257.0 8303.0 8308.0 8455.0 8457.0 8457.1 10820.0 10822.0 |
| CP17 de L9CC | 3456.0 3507.0 3527.0 3529.0 3533.0 3536.1 3536.5 3540.0 3542.0 3542.2 3543.1 3543.5 3544.5 3545.0 3547.5 3549.0 3550.0 3551.7 3552.0 3553.0 3554.0 3555.0 3556.0 3556.4 3561.0 3564.0 3646.0 3673.5 5018.0 5032.0 5051.3 5402.0 5416.5 5418.0 5423.0 5428.0 5439.0 7000.0 7025.0 7026.0 7030.0 7031.2 7031.8 7034.0 7036.0 7036.3 7036.4 7038.8 7039.0 7041.0 7041.7 7043.7 7044.0 7045.5 7047.0 7047.9 7049.0 7049.9 7050.0 7050.5 7050.7 7050.8 7051.0 7052.0 7052.2 7052.4 7053.0 7053.2 7053.7 7054.0 7054.5 7054.9 7055.0 7055.4 7055.5 7056.0 7056.4 7056.7 7057.3 7057.6 7057.8 7058.0 7058.5 7058.6 7059.0 7059.1 7059.2 7059.5 7059.6 7059.7 7059.8 7060.0 7060.1 7060.2 7060.4 7060.5 7060.6 7060.7 7061.0 7061.1 7061.4 7061.5 7061.7 7061.8 7062.0 7062.1 7062.3 7062.4 7062.5 7062.7 7063.0 7063.3 7063.4 7063.7 7063.8 7063.9 7064.0 7064.5 7064.7 7065.0 7065.1 7065.2 7065.6 7065.8 7066.0 7066.5 7067.0 7067.3 7067.4 7067.7 7067.8 7068.0 7068.5 7068.9 7069.0 7069.1 7069.3 7069.9 7070.1 7071.5 7072.0 7072.8 7073.0 7074.0 7074.5 7074.7 7076.0 7079.0 7079.2 7079.4 7080.0 7080.7 7081.5 7082.0 7082.1 7083.2 7083.6 7084.2 7086.7 7087.7 7088.0 7088.4 7092.6 7100.0 7103.2 9266.5 9267.0 9422.0 9435.0 9436.9 9437.0 |
| DKG6 de 3A7D | 3641.5 5696.7 7596.6 7597.0 7598.5 7600.0 7601.4 7602.0 7602.9 7604.0 |
| DKLO de SDKL | 6458.0 |
| FXP4 de YZL6 | 5795.0 9185.0 10566.0 10711.0 |
| GKVZ de Q7NW | 3297.0 3298.0 4670.0 4673.0 4982.0 5278.0 6667.0 6995.0 |
| GM1W de B7UA | 4415.0 |
| GM2Z de PNW9 | 4824.0 4831.0 5628.0 5628.5 5629.3 5631.0 5633.5 6981.5 6992.0 7623.0 |
| GM3Z de PNM9 | 4824.5 4825.6 4831.9 5625.0 5628.0 5636.0 5636.1 5636.5 6982.5 6992.0 12585.0 (PNW9 is probably the correct callsign and the PNM9 callsign could air due to a faulty tape) |
| GUGM de Z702 | 8808.0 |
| HJ4I de YI4K | 4770.0 |
| HNR2 de CN9R | 9071.0 |
| HPBQ de V2KG | 7718.0 |
| IBEH de L4FC | 4762.0 4769.0 4771.5 6501.0 6505.5 6508.2 7620.0 9343.5 9349.7 |
| JAH3 de CI4W | 5237.6 5240.0 5243.5 |
| JS4X de 6DUO | 5241.0 5520.0 6982.0 9071.5 |
| KG? de F9SY | 9220.0 |
| KS8Q de 51JU | 5875.0 |
| LA5H de NH8T | 4832.0 4874.0 5382.0 5386.0 5410.5 5412.0 5756.0 5874.0 6507.0 7300.0 7310.0 7313.0 8038.0 8042.0 |
| LA5S de NH8T | 4874.0 5381.9 5383.0 7300.0 7307.0 7310.0 8042.0 (LA5H is probably the correct callsign and the LA5S callsign could air due to a faulty tape) |
| MB3B de YA6X | 8378.0 8385.0 |
| MW3D de 2SLC | 3330.0//4440.0 4435.4 5580.0 5588.0//7074.0 7076.0 |
| ONMT de B9VW | 5719.0 |
| QPZM de WOXN | 3327.0 4523.0 7568.0 7570.0 7833.0 10643.0 |
| RXP7 de CZT2 | 5086.0 7778.0 7779.0 7816.0 8050.0 8650.0 8727.0 8826.0 10475.0 10860.0 10864.0 11083.0 11084.0 20589.0 |
| TA6EU de MB3R | 4365.0 |
| T3AP de QF3K | 3397.0 3399.0 4727.0 5227.0 5643.0 5643.8 5644.0 5725.0 5727.0 8318.0 8321.0 8436.0 8437.0 8438.3 10830.0 |
| TLU1 de SSC5 | 3562.0 5767.0 5770.0 |
| TW9C de A2NK | 5795.0 |
| U8OV de 1RMK | 3568.0 3570.0 |
| XY5V de 4PPW | 3846.0 4928.0 7145.0 8044.0 |
| YAV8 de OTUV | 5302.0 7737.0 8121.0 |
| ZKT5 DE UWM2 | 8045.0 |

Other transmissions reported, but no current frequencies available: 6DNG de 2NX2, HRT6 de U4NP, IQDW de IZJT, J9RZ de 8NMQ, NQ3J de PLDR, and YELM de FC1T.

Variant transmissions:

| Call | Frequencies |
|---|---|
| BJCC de 3SA | 16664.0 |
| BJCQ de 3SW | 10588.0 |
| XSV86 de 3SY | 8802.0 |
| Q2M de NYZ | 4860.0 6840.0 10640.0 |

(Note: The only variant with a different appearance 3 x 3 callsign. The messages and traffic behavior is similar to the other M89 stations. NYZ always uses parallel frequencies 4860 and 6840 kHz.)

| Call | Frequencies |
|---|---|
| CQMSG DE CQMSG | 3639.0 4146.0 |

Other reported M89 frequencies (kHz):
3197.0 3398.0 3546.4 3549.4 3551.0 3552.8
3553.2 3557.5 3558.4 3561.5 3565.6
3847.0 4224.0 4439.0 4602.0 4770.4
4778.0 4870.0 4873.0 5237.0 5304.0
5376.0 5384.0 5432.0 5436.5 5498.0
5634.0 5635.0 5636.6 5636.7 5728.0
5873.0 6506.5 6508.0 6509.0 6509.6
6510.0 6668.0 6788.0 6789.0 6925.5
6982.6 6985.0 7032.9 7039.8 7042.6
7042.7 7042.9 7045.0 7051.3 7051.5
7056.7 7056.8 7057.1 7057.5 7057.7
7057.9 7058.7 7059.3 7059.4 7061.6
7061.9 7062.2 7062.6 7062.9 7063.1
7063.4 7063.5 7064.1 7064.3 7064.8
7065.3 7065.4 7065.7 7066.1 7066.2
7066.3 7066.6 7066.7 7066.9 7067.2
7067.5 7067.6 7067.9 7068.0 7068.3
7068.6 7068.7 7068.8 7069.5 7069.6
7070.0 7070.5 7072.8 7072.9 7073.1
7073.3 7073.4 7073.7 7075.5 7076.6
7076.7 7077.0 7077.8 7078.0 7078.4
7081.7 7320.0 7568.1 7582.0 7597.8
7599.0 7600.8 7601.1 7601.5 7603.0
7741.0 8060.6 8437.8 8442.0 8727.9
8876.0 10831.0 16663.0

# What is the Future for AM?

It seems that in every issue I'm writing about another AM station permanently gone. The total number of AM stations in the U.S. peaked in the 1990s at around 5,000 and it has been declining ever since. At the same time, there's been plenty of growth elsewhere in the broadcasting industry. But, even on the AM dial, we've got a long way to go before we run out of DX targets!

1970 found the United States with 6,751 radio stations, total. There were 691 commercial TV stations and 184 educational stations, for a total of 875. Forty years later, the total number of radio stations has more than doubled to 14,503. However, the number of AM stations has increased only 12%. The greatest growth has been in FM, where the number of commercial stations has tripled from just over 2,000 to about 6,500.

Growth among non-commercial FM stations has been even greater. There are *eight times* as many non-commercial FM stations today as there were forty years ago. Many of these are religious outlets. In 1970, most commercial stations carried some religious programming. Today, religious programming is rare on commercial radio.

Television has also grown since 1970. The number of TV stations has roughly doubled in the last forty years. (Of course, that only counts over-the-air stations. Channels delivered only by cable were rare in 1970, and almost nobody watched them. Satellite TV simply didn't exist.) Growth has been approximately equal among commercial and non-commercial stations. In the last six months, *after* the digital TV transition, two more commercial TV stations and one additional non-commercial station have hit the airwaves.

There are also the services that didn't exist at all in 1970. FM translators had first been authorized that year. By 1991, 1,875 of these low-powered relay stations made it on the air – and then there was the "Great Translator Invasion." Changes in the rules – first, allowing translators hundreds if not thousands of miles from the station they relay, and then allowing FM translators to relay AM stations – resulted in the number of these stations tripling between 1991 and 2009.

Low-power TV and Class A TV didn't exist in 1970, either. The LPTV service has grown to 2,451 stations, and the Class A service to 523.

The broadcast service which has seen the greatest decline is *not* AM radio. TV translators were first authorized in 1956. By 1991, there were about 5,000 on the air; this number has declined by about 9%. On the other hand, there is a recent upward trend; today there are about 5% *more* TV translators than there were in December 2009. Much of this recent increase is probably temporary, as separate licenses are taken out for digital translators serving the same areas as existing analog translators. Chances are, many of these will go away when the FCC requires the shutdown of analog TV translators.

Some of the "disappearing translators" haven't actually disappeared – they've converted to LPTV or Class A TV service.

## ❖ Disappearing Stations

Regarding AM stations going away for good, much of the bad news is from Canada this month. The big news is probably from Montreal. As you remember, the city's two biggest AM stations, CINF-690 and CINW-940, went off the air earlier this year. These stations have now surrendered their licences for cancellation.

There's been quite a bit of speculation among hobbyists that other Montreal stations will take over these prime frequencies. I haven't seen anything on this from the Canadian government, though.

In a second Canadian case, an AM station is going off the air involuntarily. Barring a successful appeal, CHSC-1220 will be disappearing. The station was licensed to broadcast in English, serving St. Catharines, Ontario, roughly 50km south of Toronto. The Canadian Radio-Television and Telecommunications Commission found that the station was actually broadcasting in Italian to an audience in Toronto. It also found that CHSC had no operational studio in St. Catharines. Lesser offenses included inadequate English-language news content and failure to file required paperwork. The CHSC licene is scheduled to expire at the end of August. It will not be renewed.

In the U.S., such program-related com-



*CHSC-1220 will be gone by the time you read this. (chsc.ca)*

plaints – failure to carry adequate news content, failure to carry programming of interest to St. Catharines, broadcasting in the "wrong" language – would not be regulated. Content regulation in Canada is a lot looser than it used to be, but it's not completely deregulated. In the U.S. I would also expect the "non-renewal" of a station license would be fought in the courts. From what I'm hearing, the CHSC decision is likely final.

Recently, in a similar situation involving an FM station in Quebec City, a new owner took over the frequency and launched a new station with the same call letters and essentially the same programming. I suppose many listeners didn't even notice. However, a standalone AM station in St. Catharines is a lot less valuable than a Quebec City FM station, so I suspect you can count CHSC as dead.

A much less dramatic example of the vanishing AM band in Canada is the application by CFXG-1230 Grande Cache, Alberta, to move to 93.3 *FM*. Such applications are almost always granted. CFXG is a low-power relay of FM station CFXE-FM Edson (which in turn recently moved from 970 AM).

In the U.S., we have one AM station to report permanently gone, and one off briefly (and probably back by the time you read this).

KTON-940 was located in Belton, central Texas between Waco and Austin. The station had filed an application to move to Kaufman, near Dallas. This application also involved a frequency change to 950 kHz, made possible by the cancellation of a station on that frequency in nearby Denison. In early June, the KTON license was cancelled.

The station had been off the air since December 2008. The station's Wikipedia page says the towers were dismantled when the station failed to pay rent on the transmitter site. When the 940 Belton license was cancelled, there was no license to change to move to Kaufman – so that move is off as well.

A much larger station went dark on August 4th. Severe storms took down all three towers at WWVA-1170 Wheeling, West Virginia. The station has promised to rebuild; given the size of this operation, I think you can assume they will indeed do so. At this writing, WWVA programming has been moved to sister station WBBD-1400. I would expect temporary restoration of the WWVA signal in a week or so. It will probably take a few months to rebuild the original antenna system.

*(Last-minute note: at deadline, WWVA is reported back on the air on a temporary antenna and at 5,000 watts, vs. their normal 50,000 watts of power.)*

*AM radio towers are supposed to be vertical! WWVA-1170 was off briefly after storms collapsed their towers. (wwva.com)*



*The growth (or decline, in the case of AM...) of broadcasting in the U.S. since 1990.*

Finally, a publication *about* radio is going dark. Since 1935, *Broadcasting Magazine* (later *Broadcasting and Cable*) has published an annual *Yearbook*. The *Yearbook* was a reference for advertisers, station executives, equipment suppliers, and other broadcasting professionals. It listed U.S., Canadian, and some foreign stations, providing technical details, lists of leading personnel, contact addresses and phone numbers, and station formats. Many a hobbyist has pursued a copy as well. (The price, on the order of $400, tended to drive hobbyists away. However, quite a few of us have acquired used copies for much lower figures!)

I would imagine it comes as no surprise to most readers that the *Yearbook* was having a hard time competing with the Internet. Accurate technical data is available for free from the FCC. (The *Yearbook*, I'm afraid, had frequent inaccuracies.) Contact, personnel, and programming information is on Google, Wikipedia, and the stations' own websites. Internet information is continuously updated, whereas a print directory is obsolete almost instantly, especially given how often radio stations change programming format these days!

The 2010 edition of the *Broadcasting and Cable Yearbook* will be the last one published.

### ❖ The Good News

Most of this month's column seems to be bad news. The AM service is in decline; 50,000-watt stations are being deleted; 75-year-old publications are going by the wayside. The news isn't all bad, though.

Some years ago, the licensee of two Terre Haute, Indiana AM stations was convicted in state court of serious felonies. The FCC stripped him of his licenses, leaving Terre Haute with only one operating AM station. (A 50,000-watt FM station was also silenced!) In late July, the FCC held an auction of thirteen broadcast permits. One of them was the permit for AM 640 in Terre Haute. Birach Broadcasting Corp. bid $53,000 for the permit. The auction of the other Terre Haute AM frequency, 1230, has not yet been settled.

FM permits sold for figures between $15,000 (105.3 Durango, Colorado) and $324,350 (98.9 Rosendale, New York). An FM permit in Shawsville, Virginia sold to a George S. Flinn Jr. of Memphis. Flinn is owner of a number of other broadcast stations (both radio and TV), mostly in the South. He's also a Republican candidate for the U.S. House of Representatives. One of his primary election opponents brought up the format of one of his West Tennessee stations as a campaign issue.

*(Last-minute note: at deadline, Dr. Flinn came in third in the Republican primary. He'll have plenty of time to run his radio stations while the Congressional campaign continues without him.)*

Permits have been granted for two new AM stations in central California. One station will broadcast from Bakersfield on the 1310 frequency abandoned by a Taft, California, station. The other will operate on 1330 from Porterville. Both stations will face an uphill battle, trying to make a profit on the AM dial.

### ❖ 'Til Next Month

How was your FM/TV DX season? I landed my second digital TV sporadic-E logging this summer: KOTA-TV channel 3 (RF channel 2) Rapid City, South Dakota. Have any of you experienced digital sporadic-E? 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.fcc.gov/mb/audio/totals/index.html
   **Broadcast** Station Totals. (FCC)
www.wwva.com/cc-common/gallery/display.
   html?album_id=244870     **P h o t o**
   gallery of WWVA-1170 tower collapse
www.rbr.com/media-news/26083.html
   Radio Business Report article on the end of
   the Broadcasting and Cable Yearbook
www.crtc.gc.ca/eng/archive/2010/2010-533.
   htm CHSC-1220 licence "unrenewed"

### OCTOBER BANDSCAN STATION REPORT

**NEW:**
**Permits granted for new stations:**

| | | |
|---|---|---|
| Bakersfield, California | 1310 | |
| 1,400/2,500 DA-2 | | |
| Porterville, California | 1330 | |
| 1,500/500 DA-2 | | |
| Terre Haute, Indiana | 640 | |
| 250/250 DA-2 (auction winner, permit not issued yet) | | |

**Stations deleted:**

| | | |
|---|---|---|
| St. Catharines, Ontario | 1220 | CHSC |
| Montreal, Quebec | 690 | CINF |
| Montreal, Quebec | 940 | CINW |
| Belton, Texas | 940 | KTON |

**CHANGES:**
**Frequency & location changes on the air:**

| | | |
|---|---|---|
| Lumberton, Texas | 1300 | KSET |
| from Silsbee; power to 2,000/270 DA-2. | | |

**Frequency & location changes denied:**

| | | |
|---|---|---|
| Arden-Arcade, California | 1210 | KEBR |
| from Rocklin, California. | | |
| Kaufman, Texas | 950 | KTON |
| from 940 at Belton, Texas. The KTON licence has been cancelled for remaining off the air for over a year. | | |

**Frequency & location changes requested:**

| | | |
|---|---|---|
| Grande Cache, Alberta | 93.3 | CFXG |
| from AM 1230 | | |

**Callsign changes:**

| | | |
|---|---|---|
| Black Canyon City, Ariz. | 710 | KBMB |
| from KMIA | | |
| Santa Barbara, California | 1490 | KSPE |
| from KIST | | |
| Colorado Springs, Colo. | 1580 | KREL |
| from KKKK | | |
| Augusta, Georgia | 1340 | WYNF |
| from WSGF | | |
| Silver Spring, Maryland | 1050 | WBQH |
| from WTOP | | |
| Natick, Massachusetts | 1060 | WQOM |
| from WBIX | | |
| Burns, Oregon | 1230 | KBNH |
| from KZZR | | |
| Mexia, Texas | 1590 | KLRK |
| from KRQX | | |
| Claremont, Virginia | 670 | WRJR |
| (back) from WPMH | | |
| Portsmouth, Virginia | 1010 | WPMH |
| from WRJR | | |

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

# Southern Cross DX

On a recent visit to a local marine store, I noticed that their radio catalog contained some interesting new radios. The Standard Horizon GX2100 VHF radio had a built-in Automatic Identification System (AIS) unit. Their HX851 handheld had a built-in GPS. I guess we are heading for the VHF Digital Selective Calling (DSC) era quite quickly. I have not heard a date for mandatory operation in the Canadian Great Lakes, but rumors say it is not too far in the future. Many people have asked me for DSC upgrades to their VHF marine radio license.

I rarely watch the new reality television shows, but I have caught some episodes of *The Deadliest Catch*. These Bering Sea crab fishermen sure battle the wind and waves. I felt a true loss when Captain Phil Harris of the *Cornelia Marie* died. That show lost a genuine character.

I also watch for what radio information I can capture from the program. I noticed VHF channels 16, 14 and, of course, the US Coast Guard's 22A showing on their radios. HF radios showed the 4125 kHz emergency frequency, along with 4417 and 2088.4 kHz USB. I guess radio enthusiasts are always on the lookout for frequency data.

Kodiak Alaska's weather broadcasts on 6501 kHz USB have been heard here at times. I have also seen 7527 kHz listed as a US Coast Guard frequency.

Although it is October, the Atlantic hurricane season is not over. Be sure to monitor 14,325 kHz USB for storm information. The amateur radio hurricane net meets there whenever there is a tropical storm. They give the latest hurricane bulletins soon after they are issued. The reports they collect from affected areas are valuable to the National Hurricane Center in Miami, which is also often heard on the net. The center's amateur radio station, WX4NHC, is often on frequency as well.

On a local basis, be sure to monitor the local amateur 2 meter VHF repeaters during a storm or weather alert. Many amateurs collect weather observations and give out valuable information about power outages, etc. We have had several severe storm warnings this past summer and one tornado warning for our area. A weather radio with the weather alert code feature is a good item to have: My weather radio alarm has sounded many times this past summer.

## ❖ What You May be Hearing

I often look at other publications, columns and internet sites to see what frequencies I have researched are actually heard in North America. 12365 kHz from VMC in Australia, 12362 from VMW in Australia, and 5680 for Kinloss Rescue in the UK have been mentioned a few times. The US Coast Guard has been noted with ALE and voice on 5250, 5320, 7527, 15287 and 25350 kHz. 11494 kHz for US Coast Guard air from Point Reyes, California has also been heard. Coast Guard cutters have been heard on 6215 and 8337.6 kHz. (A real catch would be the maritime broadcast from the Netherlands on 18890 kHz at 2150 Z.) 5717 kHz for rescue traffic from Halifax has been noted. The Russian Navy has had CW on 8330 and 9075 kHz.

I also saw a listing for 8297 kHz for ZLM Taupo, New Zealand. That led me to research this station further.

## ❖ Under the Southern Cross

One of the astronomical formations visible only in the South Pacific is the Southern Cross. In hopes of some winter season DX, I began to research some of the radio frequencies used there.

ZLM Taupo Radio is the main marine radio center for New Zealand. They also issue Coastal Navigation warnings, Radio Navigational Warnings for Navarea XIV and Meteorological warnings. They work on the HF frequencies as well as having a system of 30 remote VHF marine stations all around the main islands of New Zealand. Besides 2182 kHz USB, they have supplemental calling on 2045 and 2068 kHz. They have inter-ship frequencies at 2456, 2638 and 2012 kHz. Private coastal stations use 2480 and 2444 kHz.

If you call on 4125 kHz, use 4146 or 4417 kHz for traffic. If you call on 6215 kHz, use 6224 or 6227 for traffic. ZLM also handles DSC and SITOR traffic

ZLM's broadcast schedule is as follows: **Coastal Navigation** warnings, synopsis and forecasts are given at 0133, 0533, 1333, and 1733 on 2207, 4146 and 6224 kHz. **Coastal reports for shipping** are given at 0803, 1203 and 2003 on the same frequencies. **Warnings for Navarea XIV** and high seas forecasts with synopsis are given at 0303, 0903, 1503 and 2103 local time on 6224 and 12356 kHz. The broadcast is repeated at 0333, 0933, 1533 and 2133 local time on 8297 and 16531 kHz

Another listing gave the frequency assignment for ZLM Taupo Radio as:

```
2183.4, 2208.4
4126.4, 4147.4, 4150.4
6216.4, 6225.4, 6228.4, 6231.4
8292.4, 8295.4, 8298.4
12291.4, 12354.4, 12357.4, 12360.4, 12363.4,
    12366.4
16421.4, 16529.4, 16532.4, 16535.4, 16538.4,
    16541.4, 16544.4, 16547.4
22160.4, 22166.4, 22172.4, 22178.4
```

All are in kHz and are USB. The frequency is 1.4 kHz above the carrier because of the use of sideband. This will be a great catch here in North America. I now have a winter target for monitoring. I would surely love to visit this station. A Google search for ZLM gives great results.

## ❖ South Pacific Dreaming

A very good list of South Pacific frequencies is available at **www.islandcruising.co.nz**.

I came across a listing for V8V222 Brunei Bay Radio in NW Borneo. Their main simplex channels are 4042 and 8170 kHz. They have supplementary simplex frequencies at: 6227, 8294, 12359, 18840, and 22168 kHz. 4483 and 6516 kHz can be used for yachting events. They

*MV Birchglen, downbound with a cargo of grain, entering and actually lowering in Lock 7 of the Welland Canal.*

*The* Pinta, *a replica of Columbus's ship, upbound in the Welland Canal. This picture was possible because I listened to radio traffic and got to the canal before dark.*

are assigned the following ITU channels:

| Channel | Shore Transmit | Ship transmit (kHz) |
|---------|----------------|---------------------|
| 428 | 4351 | 4351 |
| 608 | 6522 | 6221 |
| 835 | 8710 | 8710 |
| 1239 | 13191 | 12344 |
| 1804 | 19764 | 18789 |
| 2229 | 22780 2 | 2084 |

Broadcasts of various weather forecasts and marine information are made at the following times: Channels 428 and 608 are used at 2335 and 23245 UTC. Channels 835 and 1239 are used at 0035, 0045, 0055, 0135, 0145, 0155, 0205 and 0215 UTC. Channels 608 and 1239 are used at 0735 and 0745 UTC. Channel 1239 and simplex 16354 kHz are used at 0835, 0845, 0935 and 0945 UTC. Let me know if you hear this station – I hope I can!

Radio "Peri-Peri" broadcasts from East Africa. They give information for the Indian Ocean and South Atlantic as 8101 kHz at 0500 UTC and after the net they go to 12353 kHz. This is repeated at 1500 UTC.

ZSC Capetown South Africa monitors channel 16 VHF at their station and 12 remote stations which feed ZSC. They use 4417, 8779, 13137 and 17302 kHz to contact vessels. Weather forecasts are broadcast in FEC, SITOR mode at 0930 and 1730 on 4214, 6322, 8428.5, 12698 and 17164 kHz. Voice broadcasts follow at 0918 and 1718 on 4435 and 8719 kHz as well as VHF. ZSC monitors all international distress frequencies, both voice and DSC channels.

Last but not least, Russell Radio at the Bay of Islands is a private station in New Zealand. This is a voluntary radio system with the call ZMH310. They monitor VHF channels 16, 63 for working vessels and 03 for commercial traffic. Weather broadcasts are given at 0800, 09030, 1330 and 1730 on channel 63. They also monitor 2182 kHz emergency frequency.

Their HF schedule is to monitor 4417 kHz from 1900 to 1930, 4445 kHz from 1830 to 1900, 6516 kHz from 1800 to 1830 and 13101 kHz from 1630 to 1730 UTC. I consider this as a superb DX catch.

### ❖ Loran–C

I have now heard the Notice to Mariners on VBR Prescott radio's continuous broadcast, advising that the Canadian chain of Loran-C stations has been decommissioned. The USCG terminated their stations for domestic areas including the Great Lakes on Feb.8, 2010. As of August 3, 2010 the Canadian and US Coast Guards have terminated the Loran-C service for the east and west coasts. The system can no longer be used for navigation. Time does march on and 100 kHz should be very quiet indeed. This will be welcome news to amateurs who wish to experiment with their VLF allocations.

Another notice to mariners asked ships to keep their radar sets at a range of three miles or less while transiting the Welland Canal. It seems that stronger signals have been causing problems with the remote controls to raise and lower several bridges. Just another example of the RF environment we live in now.

Look around your home and see how many items you have that emit RF signals. Cell phones, cordless phones, remote weather stations and baby room monitors are just a few. Don't forget the accidental radio emitters like computers, monitors and flat screen television sets. There is a plasma TV near my home that emits broad band interference three houses away and much further if you have an antenna connected to your receiver. I am working to have this cleared up before the winter DX season. Hopefully, RF chokes on the power line may eliminate the problem.

### ❖ Fall/Winter VHF Listening

If you live in an area where there is winter freeze-up on the waterways, the traffic in November and December can be very interesting. Along the Seaway, ocean ships are beating a hasty retreat before the December closure of the system due to ice. The Seaway broadcasts bulletins through various coast stations as to the water temperature at Montreal, ice conditions in the canals, and the number of ocean vessels still in the system.

This is also the season of our famous November gales. Weather reports, broadcasts and warnings can all be heard. The Canadian Coast Guard Radio stations use channels 23B 161.65 MHz and 83B 161,775 MHz for their continuous marine broadcasts. The frequencies alternate between the remote towers connected to the main station to prevent overlap of signals.

Be sure to scan all the marine channels, as there may be some private use of the service in your area. For example, a local boat line uses channel 64A as they load passengers on and off the vessels.

I always scan the 450 to 470 MHz band when around any ships or harbors where you can hear a lot of internal communications and shore side chatter. The cruise ships use this band for communications between the various officers and departments. Also be sure to put the local fire department frequencies in your scanner if you have a fireboat or fire rescue marine unit in the area.

### ❖ Canadian Empress

Although I did not expect to be sailing on the *Canadian Empress* again, I got a call to help out when another mate got a chance to serve on HMS *Bounty*. The plan is for me to be on board for three trips: One trip from Kingston to Quebec City, one cruise around the Thousand Islands, and one trip from Kingston to Ottawa. I had to do a quick brush-up on the radio channels in use: The Seaway uses channels 11, 12, 13 and 14 for traffic control. Channels 17 and 13 are used to talk to each individual lock.

Channel 13 is maintained for bridge to bridge communications for commercial vessels. This is one frequency you should also monitor.

We carry a maximum of 64 passengers, and I enjoy meeting people from all over the world when aboard. Unfortunately, we do not carry marine HF radio equipment. Of course, I plan to get some photographs for my collection and the column.

### ❖ KSM in Danger

I received an email from Richard Dillman of the Marine radio Historical Society (MRHS) advising that historic radio stations like KSM are in danger of being forced off the air. He stated that the World Radio Conference 2012 proposals from the FCC would make digital communications so dominant that KSM and other historical radio stations would be forced off the air.

Although public comment was requested by Aug.13, 2010, if you are interested in this service, go to the MRHS website, **www.radiomarine.org**, and get the full story.

I hope you all have the best of DX, no interference and great propagation. Perhaps at Christmas time, you might find some new gear as well.



*The* Canadian Provider *approaching Iroquois Lock of the Seaway. This classic "laker" with its forward cabins is a dying breed. These vessels, built in the early 1960's, are reaching the end of their useful life. All new lakers have their cabins aft.*

# Connecting the World with EchoLink

As an amateur radio operator, I haven't had the best of luck with regard to my equipment. In the summer of 2005, my entire collection of HF equipment was taken out by a direct lightning strike to my house. The only thing I hadn't unplugged during the storm was the surge protector that all of the equipment was plugged into. With a brilliant flash of light, more than $1,000 worth of equipment went up in smoke.

Last year, during a particularly nasty winter ice storm in the Carolinas, my mobile 2-meter rig's antenna suffered a fatal decapitation at the hands of about a half of inch of ice.

These two bouts with Mother Nature left me scrambling to get back on the air, but meanwhile I was down for the count for a brief time. Mother Nature 2, Loyd 0.

Ah, but technology is always evolving and creating new opportunities for amateurs to participate in their hobby, no matter the state of their equipment (or the size of their wallet). I touched briefly on EchoLink last month. This program has evolved into a bridge between computer and transmitter that has opened the doors for thousands of hams to get on the air, no matter the state of their equipment.

EchoLink is a Windows computer program that allows communication between hams from across the globe through Internet-streaming. Local hams set up a stream of their repeater through EchoLink, and with that simple interface, the entire world has access to talk through the repeater.

Recently, EchoLink even added an app to the Apple App Store so that users of iOS-based devices could access EchoLink-streamed repeaters.

The first part of the process is to download the software from the EchoLink Web site. The software is free and the latest version runs about 2.8MB. Once downloaded and installed on your machine, the next step to complete, before you can transmit to the world, is to verify your callsign.

For me, this was a hang up. I had moved to a new apartment in the last year, and hadn't yet updated my FCC license to reflect this change. So, after submitting the proper forms and receiving a new copy of my license, I proceeded with the callsign verification step.

There are several means at your disposal for verifying your callsign. Perhaps the easiest is to verify using your debit/credit card. This method matches the billing address on the card with the address on file with the FCC. To do this, you will be charged $1 to your account. This step took me just a few minutes to complete and my callsign was verified.

Other options include sending a photocopy of your station license to EchoLink, or calling a phone number to verify, but in my experience the credit/debit card method was very quick and painless.

Once you have validated your callsign, you are free to begin exploring the world of Internet Amateur Radio!

Opening EchoLink for the first time, you will notice a long list of stations with location information, status, and the local time of the station. This is the index view. You can also operate in the Explorer view. This allows you to sort through stations that are organized by location, rather than an index of all stations. Most hams will probably operate with the Explorer view, just for ease in finding potential repeaters to work. If you are wondering where the local time went, just hover your mouse pointer over a repeater and you will see the local time and other station information.

Once you find a repeater you want to talk on, simply double-click on the repeater name. Once connected, you will be receiving audio from the repeater!



To transmit, your spacebar is the default hot-key to use. Simply tap the spacebar to begin transmitting, tap it again to end your transmission. That's it, really!

A tip for users: if you are connected to a repeater, you must first disconnect from that repeater before you connect to a new one.

If you can operate a traditional amateur radio transmitter, you can operate on EchoLink with ease! Of course, in order to operate and transmit
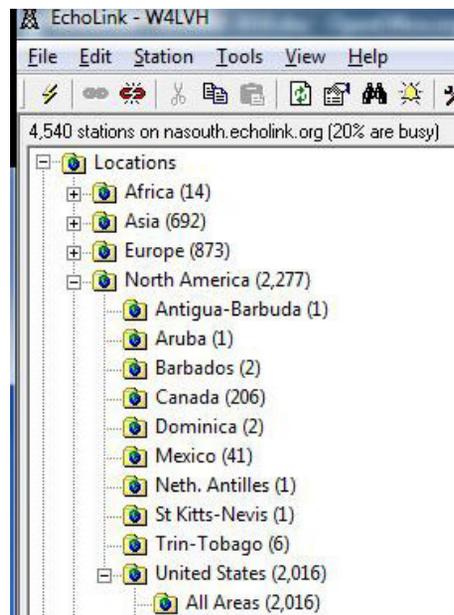


on EchoLink, your computer must have a sound card with either external speakers or headphones, and a microphone.

As mentioned earlier, there is also an app for iOS devices that allows you to operate EchoLink in a mobile environment. The EchoLink app has been an enjoyable way for me to show my friends the fun one can have through the magic of Amateur Radio!

The interface is very similar to the Explorer view of the EchoLink program. In my experience, if you are connected to a repeater through your computer, you cannot connect to that same repeater with your iOS device.

To test to make sure my EchoLink was working, I broke out my ICOM IC-T90A multiband transceiver and tuned in my local repeater that streams on EchoLink. I then transmitted through my computer, while listening to the audio on my ICOM. The audio quality was crisp and clear and very readable.
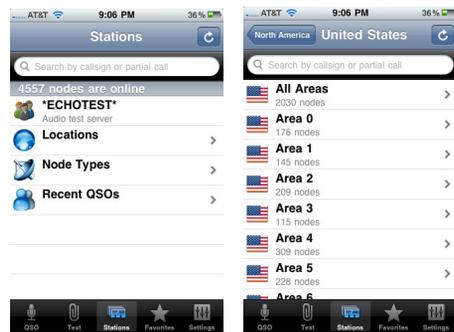
I then reversed my test and used the ICOM to transmit while receiving audio through EchoLink. Once again, the audio was crystal clear, no apparent buffering issues or net congestion problems. The EchoLink servers appear to be very capable of handling high-traffic; their Web site claims to often handle as many as 5,000 users at a time!
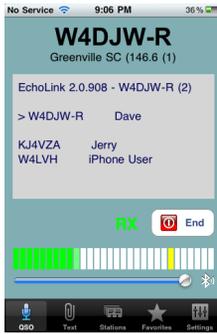
But who wants to stick with local repeaters, when the entire world is just a few mouse-clicks away? I first tuned in AL7YK-R repeater in Bethel, Alaska. It was really cool to hear the conversations about people going on camping trips to the Denali National Park, and then join in a chat with a few local people!

Deciding to take my exploration of the world even further, I was soon connected to repeaters in Australia, England, Bulgaria, Japan and India.

It was a thrill to have conversations with people in different countries again, something I had greatly missed since my HF rig took that nasty lightning strike more than five years ago. In my conversations, I learned that quite a few people even QSL their EchoLink conversations! It's a whole new frontier for amateur radio, and if the hobby is going to survive in the long-term, it is undoubtedly through technology like EchoLink that it will happen.

So, if you are a licensed amateur radio operator (and if you are not, it really has never been easier to do, so check into it!), I highly advise taking a look at EchoLink to expand your overall hobby experience. No matter how crummy the conditions might be, you can still communicate with the world any time you choose with Echo-Link!

### ❖ A new ISP for me!

After months of research and twice as many months of hand-wringing over the quality of service from my previous Internet Service Provider (Charter Communications), I finally made the switch to AT&T's U-Verse service. All I can say is wow!

Now, I am not going to jump on my soapbox and turn this into an opportunity to bash Charter as a service provider (although the temptation is strong). What I will tell you is how wonderful an experience I have had thus far with U-Verse.

U-Verse is a fiber-optic-based service that combines not only telephone and broadband Internet, but also Internet Protocol Television (IPTV). Without getting too bogged down into the technical aspects of what U-Verse is, it basically is a two-wire service that provides online content directly to your home (no more sharing cable bandwidth with the neighbors) with at least a large portion of the connection coming through fiber-optic cable.

As an ISP, U-Verse has been flawless. The hub of all U-Verse service in the home is the Residential Gateway (RG). Essentially, this is a large router that sends signals to the proper devices (television, wireless Internet, Ethernet connected devices, and telephones). This provides a very stable, encrypted Wireless-G network connection throughout your home.

As a comparison, my own personal Linksys Wireless-G router was constantly having issues with devices recognizing it or maintaining a connection, among others. The U-Verse RG has been stable with no issues at all since installation.

To test how reliable it was, I decided to push the RG a bit. I simultaneously tuned my television to an HD movie channel (with Dolby Digital 5.1 audio stream embedded), my bedroom television to an HD sports channel (also in 5.1), I downloaded music from iTunes on my PC, I turned all three of my WiFi radios on to different high-bit-rate streams, I played a game on my Xbox Live account, and I streamed a television station on my iPhone (using WiFi)! The RG didn't even blink, nor did I notice any significant decline in television picture quality, audio quality or Internet speed. I was blown away!

Not only are my Internet speeds faster due to not sharing bandwidth with my neighbors (I was paying for 25mbps download speed with Charter but averaging 12-14 mbps in actual speed tests), but the U-Verse servers themselves seem to be faster as well. This means there is less congestion at the ISP itself, which leads to a faster Internet connection.

If you are looking for a new alternative to your current ISP, at least check into U-Verse. It isn't available in all areas, so you will need to see if your address is covered by U-Verse service. If it is, I can highly recommend giving it a shot; packages are actually very cost-effective for what you get, and the customer service I have received thus far is head and shoulders above what I was getting with cable.

### ❖ Royalty Compromise on the Horizon?

Long-time readers of this column have probably been following, as I have, the spirited debate between musicians and radio stations over performance royalties. Radio stations have long paid royalties to song publishing companies such as BMI and ASCAP, but not to the artists themselves. So, if U2 decides to cover a Beatles song and it gets significant airplay, U2 doesn't see a dime but the Beatles make a healthy amount of cash.

In the last year or so, the music industry decided the solution to their recent financial woes was to ask Congress to force radio stations to pay performance royalties to the artists. If passed, the Congressional legislation would allow the Copyright Royalty Board (CRB) to dictate to radio stations what the royalties they would pay would be.

The broadcast industry has been screaming from the rooftops that such a move would be financially crippling to an industry already bleeding from the economic downturn. But now, it appears the broadcasters have decided that a compromise might be more cost-effective than fighting the extra royalties.

The National Association of Broadcasters has made moves to come to an agreement that would kill the Congressional bill and settle the royalty debate directly, through talks between broadcasters and the music industry. The thinking is that any deal made between the two parties would likely save broadcasters money in the long run.

Though no deal has been agreed to yet, this situation bears watching. Whatever performance royalties are set for broadcasters will likely have a large impact on online streaming as well – not just the terrestrial broadcasters that also stream online, but also the royalties that Internet-only streaming stations pay.

Should broadcasters get stuck with a hefty bill to the artists, broadcasters would likely lean more heavily on their streaming content to save costs from traditional broadcasting. In addition, Internet-only stations that just recently came to an agreement with the music industry over royalties they pay, would likely be taking a hard look at the numbers to see if they can re-negotiate their rates, too.

Either way, online streaming products are likely to be directly impacted by the results of a pre-emptive agreement from both sides, or by Congressional legislation.

Until next month!

# Longwave Timeline

**F**or those of you following our broadband loop project (**http://tinyurl.com/ygt39z7**), a quick update is in order regarding my efforts to get the preamp board working. I should say "working properly," because I believe the basic amplifying circuitry is functioning just fine. I know this because when I touch certain areas of the board, signals come booming in, yet I am not getting strong pickup from the loop itself, and there is little or no directivity on the few signals I do receive.

To resolve the problem, I've been in discussion with the loop designer, Steve McDonald, VE7SL. Steve kindly gave me several things to check, but I did not have the time to investigate them prior to the column deadline, so the project remains on my bench, awaiting further attention. Steve's ideas include the following checks that I will be making:

• Proper transformer connections to the loop and preamp circuit
• Gap at the top of the loop free of metallic debris (which would short out the loop)
• Proper connection between coaxial shield and the circuit board's ground bus
• Proper component values and polarity/pin orientation
• Proper voltage at the transistors – specifically the Drain of the J310 FET, and the Base of the 2N3904

Stay tuned, and I'll have an update next month (and hopefully a conclusion) to my circuit board saga.

## ❖ LW Timeline

Now, on to this month's main topic. I've been writing this column since July of 1991, and it has been a very rewarding experience. Right from the start, I began receiving encouraging letters from readers, lists of LF loggings, and questions on how to improve one's reception. Interaction with readers has always been the best part of the job for me.

Nineteen years is a long time to focus on a particular portion of the radio spectrum, and I've seen some changes in the band during that time, but the changes actually go back decades earlier and include events of just the past few years. The story of how the LF band evolved from the dawn of radio to today's situation makes for an interesting study, indeed.

There isn't enough room to cover all of longwave history in a monthly column, or even a year's worth of columns, but we can take a timeline approach. I thought it might be interesting to mark some of the key events in longwave history, as a way of putting things in perspective for monitors like ourselves.

This will be a work-in-progress, so if you have things to add, feel free to send them along and we will update our timeline for a future issue. Nothing is out of bounds, as long as it's longwave related. Products, manufacturers, people, prominent stations, books, distance records, etc., are all welcome, so let's hear from you. The following is an attempt to get the effort started, but it is just that, a start. There is much more to add.

**Longwave Timeline (Version 1.0)**

**1899** First wireless distress signal (CQD) sent on longwave from East Goodwin Lightship.
**1903** First **2-way** wireless communication between North America and Great Britain takes place from a longwave spark transmitter.
**1906** Distress call "SOS" approved by convention for use on ships. (CQD continued to be used for a number of years.)
**1912** **Titanic** ship sinks. CQD and SOS calls are used. Longwave wireless plays key role in rescue of over 700 survivors.
**1914** ARRL formed by H.P. Maxim W1AW, after a relay of his signals results in successful contact with a fellow amateur 30 miles away.
**1921** The U.S. Maritime Radiobeacon System becomes operational with three spark gap transmitter sites, under jurisdiction of the Lighthouse Service.
**1926** Rugby, England station GBR begins operation on 16 kHz. Active until 2003.
**1934** The Communications act of 1934 creates the Federal Communications Commission (FCC).
**1939** U.S. Coast Guard assumes responsibility Maritime Radiobeacon System. By the 1980s, more than 200 such stations are operating.
**1957** Ground-based LORAN-C navigation service begins on 100 kHz, providing impressive 1/4 mile or better positioning accuracy, and repeatability of 600 feet or better.
**1963** WWVB becomes operational, broadcasting a 7 kW signal on 60 kHz.
**1963** Time station WWVL (20 kHz) begins operation. Decommissioned 1972.
**1967** Arthur D. Watt's **VLF Radio Engineering** published by Pergamon Press. Considered the authoritative text on LW engineering practices to this day.
**1968** Crystal controlled LOWFER transmitter article appears in **CQ** Magazine. Believed to be first such article highlighting the 160-190 kHz license-free band.
**1972** First **Low and Medium Frequency Radio Scrapbook** published by Ken Cornell, W2IMB. Considered to be the end-all book of longwave experimentation. Lasts until the 10ᵗʰ edition in 1996.
**1974** Longwave Club of America (LWCA) formed.

**1983** Ralph W Burhans, famed engineer/longwave experimenter publishes classic series on LF/VLF active antennas.
**1987** U.S. Coast Guard begins "modernization program" for radiobeacons, resulting in the eventual shutdown of sequenced beacon chains on the Great Lakes.
**1987** Ground Wave Emergency Network (GWEN) active from 150-175 kHz. System ended in 2000.
**1989** U.S. Navy Project ELF system becomes active on 76 Hz, with two transmitters; one in Wisconsin, and one in Michigan. Antenna length: 56 miles.
**1990** U.S. Coast Guard makes plans to establish DGPS stations using old radiobeacon sites operating in the 285-325 kHz band.
**1993** NAVTEX required for large vessels by 1993 Safety of Life at Sea (SOLAS) Convention.
**1993** U.S. Air Force announces bid of contract for High Frequency Active Auroral Research Program (HAARP) in Alaska
**1997** Ken Cornell, "Longwave Wizard" becomes a silent key after decades of contributions to the longwave experimenter community.
**1997** OMEGA Navigation System (10-14 kHz) terminated.
**1999** Ships no longer required to maintain a watch on 500 kHz, the International Distress and Calling frequency.
**2006** FCC grants Part 5 experimental license WD2XSH to the ARRL, on behalf of amateurs investigating spectrum near 500 kHz.



## ❖ Mailbag

We are pleased to hear once again from **Robert Homuth KB7AQD** from Arizona, who writes, "Thank you for including my longwave loggings recently in *MT*. Sheldon Remington was kind enough to include my NDB loggings

in his *West Coast NDB Checklist* since I was the only Arizona contributor back in 1986. The *Checklist* was hand written and photocopied, not typed nor word processed.

"Now, if I'm lucky, I can only copy local NDBs around Phoenix, and GLS-206 Galveston, TX under intense noise. But, back then, I could hear signals from the USA East Coast, up through Canada, and out to Hawaii, Hao Atoll, Sakhalin Island and Rarotonga using just an off-the-shelf Radio Shack DX-400 (Uniden CR2021) receiver and a wood frame loop antenna."

Robert also asks about submitting historic loggings for this column, and the possibility of having a "featured beacon" for listeners to try for. Robert, both of these are excellent ideas. As you can see from this month's column, history and longwave are closely aligned, and I always enjoy seeing notable catches made years ago, even if those stations are no longer active.

As for featured beacons, you made some suggestions, including **GLS-206 kHz, Galveston, TX**. That seems as good a place to start as

any, so how about it, *MT* readers? Can you hear GLS? How strong is it at your location, and what do you use for receiving gear? Let's see who can hear it from the farthest distance away.

To verify proper reception, please state the number of *complete* IDs from GLS in a 1-minute period. (This serves as a beacon's "fingerprint," because the number of IDs is unique to each station.) I look forward to hearing from our readers! By the way, loggings of any other stations you hear are always welcome; we are simply highlighting GLS with this challenge.

**Rowland Hamly (MN)** also wrote to *Below 500 kHz* with some loggings (see Table 1) and a question regarding availability of my CD and books on Longwave Radio. Rowland, I have produced three items related to longwave: A beacon directory called the *BeaconFinder II*, a narrated audio recording (CD or cassette) titled *The Sounds of Longwave*, and a published book (softcover) under the title of *Listening to Longwave*.

The first two items are available directly from me, and an advertisement for them appears at the back of this magazine. *Listening to Longwave* may be ordered from Universal Radio, Inc., 6830 Americana Parkway, Reynoldsburg, OH 43068-4113 (Tel. 1-800-431-3939). An online link to this book is available at (**http://tinyurl.com/LW-Radio**).

*Listening to Longwave* was a long-term project completed with Fred Osterman, President of Universal Radio, Inc. It had been a long time

since a new book on hobby monitoring of longwave was available, so the time was right for a new release. The book is actually an update of an earlier tome called *The World Below 500 kHz* by L. Peter Carron. It contains dozens of new pages, charts, pictures and diagrams, as well as information on new operating modes.

## ❖ Loggings

Our loggings this month are courtesy of Robbie Spain (WY) and Rowland Hamly (MN). Each of these contributors is identified by their initials and state in Table 1 below. If you have loggings to share, please e-mail them to the address shown in the masthead, and try to follow the same general format shown below. Logs are printed as space allows, and they may be cross-posted to the LWCA journal *DX Downstairs* column, which I also edit.

### TABLE 1. SELECTED BEACON LOGGINGS

| FREQ | ID | LOCATION | BY |
|---|---|---|---|
| 350 | NYO | British Columbia | R.S. (WY) |
| 358 | BO | Boise, ID | R.S. (WY) |
| 362 | RPX | Roundup, MT | R.S. (WY) |
| 340 | ORB | Orr, MN | R.H. (MN) |
| 346 | YXL | Sioux Lookout, ON | R.H. (MN) |
| 353 | IN | International Falls, MN | R.H. (MN) |
| 376 | YAG | Ft. Francis, ON | R.H. (MN) |
| 360 | SW | Warroad/Swede, MN | R.H. (MN) |
| 413 | YHD | Dryden, ON | R.H. (MN) |
| 209 | IB | Atikokan, ON | R.H. (MN) |
| 248 | WG | Winnipeg, MB | R.H. (MN) |

# Digital Signal Processing Solutions

This month, we'll explore the differences between software that does digital signal processing (DSP) at audio frequencies and hardware implementation of DSP at intermediate or radio frequencies (IF or RF). We'll also review a commercially available and inexpensive software program for audio DSP.

Radios with digital signal processing generally offer you these features:
• Variable bandwidth filtering
• Noise reduction
• Auto-notch (for SSB)

Although DSP can clean up signals to the point that you can barely hear some types of noise, there are several things that can make it unpleasant to listen to:
• A perceptible delay between real-time audio and processed audio
• A feeling that you are listening to a signal at the end of a barrel that causes signals to sound somewhat muffled
• A "watery" sound

Some modern rigs have DSP that is always on, which means that even if you wanted to, you could not turn it off. A better choice is a radio that allows you to decide if you like the sound of DSP and then enable it only if it truly seems to help.

## ❖ Dynamic Range

Many radio manufacturers have chosen to develop custom algorithms implemented in hardware DSP chips. One commonly used family of parts is the Analog Devices "Sharc" processors. The ADSP-2100 family used 16-bit processing, while the newer ADSP-21160 family has 32-bit processing and instruction execution speed of 100MHz (with a sustained speed of 380 million floating point operations per second [MFLOPs]).

The number of bits is important, because there are many mathematical algorithms being executed, and roundoff errors can accumulate if there are not enough digits of internal resolution. The speed is important because there is only a short time between incoming samples to perform the complex math functions needed to create filters and do noise reduction.

Internal data handling resolution should not be confused with the number of bits of digital data being fed into the processor. Typically, the analog information is sampled with an analog to digital (A/D) converter that is generally only 16-bits, and this translates directly into dynamic range.

Dynamic range is the range of signal strength that can be handled by a device, from weakest to strongest. For example, if you had a signal that ranged from zero to 5 volts, and you sampled it with an 8-bit A/D converter, you would have 5V/256 = 19.5 mV per bit of signal detection capability, or 20 log (1/256) = 68dB of dynamic range. If you used a 16 bit A/D, you would have 5V/65536 = 76 microvolts per bit, or 20 log (1/65536) = 96dB of dynamic range.

So, the more bits, the better. But there is a point of diminishing returns. Suppose you sampled that same 5V signal with a 32-bit A/D. This would give you a theoretical 5V/4,294,967,296 = 1.2 nanovolt sensitivity, resulting in 192dB of dynamic range. In practice, this is impossible to achieve with real parts on a real circuit board. Noise from digital circuits, ground loops and externally induced noise would quickly render most of those extra bits meaningless. And even if you could actually build a board that quiet, the cost of a 32-bit A/D would be prohibitive. Besides, at IF frequencies, 96 dB of dynamic range is more than adequate.

## ❖ Where to put the DSP?

There are three places one can put digital signal processing in a radio receiver:

• Audio (0 to 20 kHz)
• IF (10 kHz to 10 MHz)
• RF (0 to 30 MHz for HF receivers)

Until recently, audio was the only place one could do DSP, because the microprocessors simply could not execute fast enough to perform the required math on incoming data. Audio processing has two drawbacks – 1) interfering signals and internally generated noise have already had a chance to be mixed and amplified, so there's more to clean up, and 2) such processing by nature has to occur outside the receiver's AGC loop, so any improvement in the signal cannot be used to attenuate or amplify the overall receiver gain.

Processor speeds have increased dramatically in recent years, allowing signals to be processed at any of the receiver's IF stages. Thus, a purely analog receiver can still apply DSP to signals once they have been converted to a fixed frequency that is low enough to allow math operations to be completed between samples of the signal.

A Software-Defined-Radio (SDR) does the ultimate – it samples the RF directly and performs not only DSP, but *all* receiver functions via software or firmware. However, to get the desired dynamic range of over 120 dB with sensitivity around –140dBm, these radios must feed more bits into the processor – usually 24. This is why such radios generally cost more – the parts to get this kind of resolution are still expensive.

## ❖ Hardware Versus Software DSP

If a receiver implements hardware DSP, it is using custom firmware in chips that will certainly become obsolete and possibly even unavailable in the not-too-distant future. This is one reason many people are reluctant to buy such a radio. It's a little silly, though. When a radio is in active production, the manufacturer is obligated to provide support. Many years later, when it is no longer possible for a manufacturer to get parts necessary to support the radio, a malfunctioning unit is simply disposed of or used for spare parts.

This has always been the case. For example, while it is still possible to repair boatanchor radios made in the 1950s, many of the parts are getting harder and harder to find. Eventually, these old radios will simply be museum pieces, just as many radios of the '30s are today. In fact, as digital technology progresses to the point where radio broadcasts no longer use AM, CW or SSB, the old sets will not be usable at all, kind of like analog TV sets.

One solution preferred by many is software based DSP, which allows the desired signal to be processed in software running on a PC instead of in custom algorithms running on a microprocessor. There are two methods in common use for this. Some Software Defined Radios digitize the RF spectrum with a fast A/D and send the data to a PC via a high-speed bus where software routines using open source algorithms perform DSP and other receiver functions.

Another solution is Audio DSP. Although the problems mentioned above for Audio DSP solutions are still true, the radio itself may be serviceable longer, since it uses no custom parts that may become obsolete quickly, and you can turn off the DSP if you don't like the way it sounds.

## ❖ ChromaSound

A very inexpensive solution using Audio DSP is made by Silicon Pixels. Their product is called ChromaSound. For $50, you can simply feed your receiver audio into your PC's sound card, run this software, and then hear and see the effects of DSP. In fact, running your rig's audio through a PC and then out to amplified speakers can sound pretty good even without DSP enhancement! It hearkens back to the days when everyone had big loudspeakers and the rich sound of wideband AM came booming through.

ChromaSound uses 64-bit floating point math internally, an advantage of using the PC architecture to best advantage.
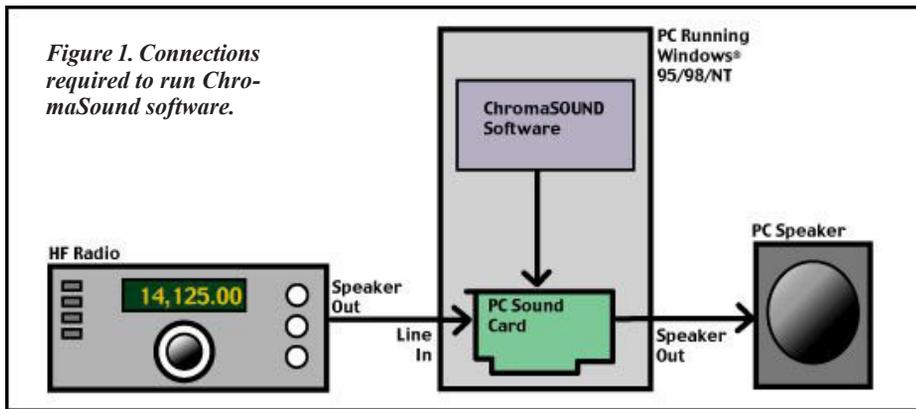
*Figure 1. Connections required to run ChromaSound software.*

Figure 1 shows how it works.

ChromaSound is specifically designed for HF communications use. Like many other PC applications these days, it uses your PC sound card or onboard sound chip to capture, process and output the processed audio.

As a specialized application, ChromaSound offers a wide variety of standard DSP filters, namely, high-pass, low-pass, band-pass and band-reject. It also supports three different levels of SSB noise reduction, as well as an automatic notch filter and Automatic Gain Control, or AGC.

One of the features that separates ChromaSound from other DSP systems is the Filter Designer. By moving the various sliders on the screen, you can visually track changes you make in the low frequency cutoff, high frequency cut-off, filter skirt "width" and the desired rejection. Figure 2 shows how several of these sliders are displayed in the program, as well as their associated values.
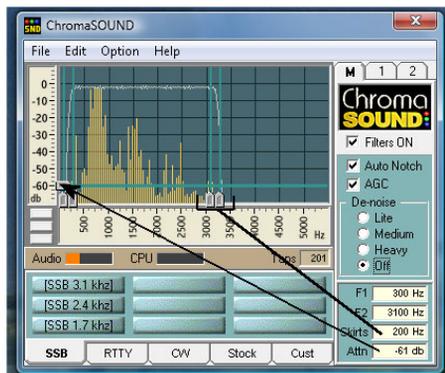


*Figure 2. ChromaSound screen showing location of sliders to adjust filter parameters.*

Once you've designed a filter (or modified one of the "stock" filters), you can save it by clicking down and holding the left mouse button inside the "gridded" part of the window, dragging the mouse to an empty or unlabeled filter selector button, then releasing the mouse. A window will appear asking you to name the filter. Once done, the filter is saved and available for future use. To erase or delete a custom filter, simply right-click on the desired filter selector button then answer "Yes" when prompted if you want to erase the file.

ChromaSound was originally designed by Jim Barber, N7CXI and William Montgomery,

VE3EC in 1999 as part of an early series of experiments into using Windows PCs for radio signal processing uses. Although it's been around a while, it installs and runs on all current versions of Windows. Unregistered "shareware" versions will run for thirty minutes at a time and then close. The author's address provided in the program and documentation is no longer accurate, but is available at Jim's Silicon Pixels website at **www.barberdsp.com**.

## ❖ HD Sound Cards

When I first heard that HD sound cards were coming out, I thought perhaps that applications like ChromaSound would get even better. But alas, it is not really true. High Def sound cards have supplanted the former industry standard "AC97" spec. These are cards and computer motherboards using chips that claim to have faster sampling speeds (192 kHz versus the older 48 kHz), more bits (32 versus the older 16-20 bits), and more output channels (8 versus the older 6) that can handle the common multi-channel surround sound systems.

However, reality is different from marketing hype. Truth be told, no AC97 soundcard ever shipped that actually supported more than 16-bit sampling, and no high-def soundcard has ever shipped that supports more than 24-bit sampling. Most just run at either 44 kHz or 48 kHz at 16 bits. Unfortunately, poorly designed motherboards and soundcards can introduce enough noise that the system still has only about 96 dB of dynamic range, and sometimes much less (as low as 60 dB on the recording inputs and 86 dB on playback).

Current sound cards in the $50-$100 USD range have signal to noise ratios that reach (and

in some cases exceed) 100db, allowing full use of the 96db dynamic range equated with 16-bit audio applications like ChromaSound.

Sound cards in the $20-$49 USD range vary widely in quality, both in audio terms and in the quality of the supplied device driver software.

## ❖ Impressions

As with most DSP implementations, ChromaSound has some artifacts that can be annoying at times. It is perhaps most noticeable when using the "De-noise" functions. If the signal level is too loud, you need to use the volume control in your soundcard to lower the line input level.

You can also use the Automatic Gain Control (AGC) setting, but remember that if the signal is distorted coming into the soundcard, the AGC will not be able to "fix" it. This AGC is outside your radio's internal AGC loop, so any gain reduction applied will not be reflected back to the front end of your receiver. This dual AGC (one from your rig and one in ChromaSound) can result in signals getting suddenly louder or softer. I found that it was usually necessary to keep the volume control on the screen along with ChromaSound and adjust them both for best audio.

The Auto Notch function works very well to eliminate heterodynes – both receiver-generated (birdies), and those on the bands (people tuning up nearby). Just be sure not to use it when listening to CW. The first time I did that, I wondered why the CW signals would appear to start and then get severely attenuated. It sounds very strange!

Since ChromaSound takes the audio output of your rig and processes it, there is a perceptible delay between the "real-time" audio coming from the rig's speakers and the processed audio coming out of your PC. If you have the PC's line out feeding into your rig for digital mode transmission and you have enabled it to go to your rig's speakers, you can get the system into a feedback loop that sounds like an echo chamber, so be sure to disable the line-out to your rig when using ChromaSound.

On rigs that have hardware DSP, adjusting the filter response is not something you can do to the extent offered by ChromaSound. It's a neat program. If you've been wondering what all the fuss is about DSP, this program would be a great way to learn.

# FUN WITH LOOPS
## *Low-Frequency Listening Made Easy*

I've noticed that my column is revealing an unmistakable bias for ham operation between 160 and 6 meters. In the excitement of chasing rare DX, catching the odd bits of weird propagation on 10 and 6 meters, and ragchewing with all my friends on every band, I sometimes forget that most of us also enjoy the passive, "listener-only" aspects of our hobby.

I've been a shortwave listener even longer than I've been a ham – I can still recall the incredible thrill of listening to Radio Havana, HCJB in Ecuador, and Radio Nederland on a one-tube regenerative receiver I built on an old chassis when I was ten years old. And as we go along, I'm sure we'll look at more antennas for the SWL. To a large extent, though, I've provided a bunch of good shortwave antenna ideas already, by default, since all the ham antennas I've talked about making great SWL antennas, too, especially with a good tuner.

So, my friends, this month I'd like to talk about an antenna for an under-appreciated part of the listening spectrum – everything under 1.8 MHz (the bottom of the lowest ham band, 160 meters). As we go down the dial, this encompasses the AM broadcast band, 550 to 1700 kHz, which I'll call hereafter "BCB"; longwave, usually construed as about 100 to 500 kHz or so, "LW"; and everything below LW, which can be thought of as "VLF" or very low frequency.

BCB is the easiest to access – surely everyone has the AM band on home stereo, car stereo, clock radio, or somewhere around the house. LW is likely to be present on most "general coverage" receivers and transceivers nowadays, and even many older radios cover some or all of this band. VLF is the tough one here; there's not much in the way of commercial equipment for listening down this low, though I've seen numerous kits and circuits for VLF receivers or converters over the years.

### ❖ Long Waves = Long Antennas

The conventional antennas we've looked at over the months become impractical at these low frequencies, due to their immense size: for example, a halfwave dipole for 1080 kHz, in the middle of BCB, is 433 feet long! Even a quarterwave vertical would be 217 feet tall. Down in LW it gets even sillier. A dipole for 200 kHz would be 2340 feet long – almost half a mile.

Fortunately, someone figured out many years ago that a length of wire can be wound in an open loop to serve as an antenna at these low frequencies. Older AM "table radios" had this loop wound on the inside of the back cover of the radio. When pocket transistor radios came along, the loop was wound on a short stick of ferrite rod, which increased its inductance and allowed the coil to serve as both antenna and as the inductive part of the tuning circuit.

This loop wound on a stick of ferrite rod, by the way, was commonly called a "loopstick." It was installed inside the pocket radio and gave these little rigs a neat, antenna-less appearance. Even now, a loop antenna for AM listening comes with the purchase of a home stereo system, for connection to antenna terminals on the rear of the stereo. (*See photo.*)

This small loop – about five inches in diameter



*The AM loop that came with the author's home stereo system. (Photo by author)*

ameter – is adequate for local BCB stations. At night, you can even hear stations from greater distances under the right conditions. But to do any real DXing on BCB and to sample the world of LW, we need something a little more robust. So I took stock of what scrap lumber and leftover wire I had around the house, and came up with this month's antenna: a homemade loop of tabletop size. (*See photo.*)

### ❖ Tabletop Loop Construction

I made the "X" brace from two 24" lengths of 1"x2" lumber screwed together at their centers. Then I cut the four arms that the loop is wound on – two 4" pieces and two 4-3/4" pieces, since the brace lengths are offset by the thickness of a 1"x2". I pre-drilled the holes to screw these arms onto the brace to prevent splitting the wood.

On the arm that became the base of the loop, I drilled a hole in the center of its joint with the brace, large enough to fit over a deck screw. I then ran a 3" deck screw through the center of a square piece of 2"x10" to form the base, and set the hole drilled in the "bottom" foot on this screw. This gives us a frame that can be pivoted on its base, an important feature, as we'll see later.

Next, it was time to wind the loop of wire onto the frame. I found a good-sized spool of *bell wire* in my stash of odds and ends and decided to use it. Bell wire is a pair of #20 solid wires, one covered with red insulation and one covered with white, that has been used for many years to run doorbell wiring inside the home. I wrapped the free end of the pair a few times around the base arm to secure it, leaving eight inches or so hanging free to connect to, and commenced winding the paired wires around the frame, on the arms. I wound twenty turns, and the tape measure showed that the frame circumference was 74", so I had wound a total of 123 feet of the paired wire onto the loop. I wrapped this end around the base arm a few times to secure it, cut off the wire, leaving about eight inches again to connect to, and the loop was done!

Oops, not quite. I hadn't allowed for the need to space the loop off of the base to allow for the wire now wrapped around the frame. A hole drilled in a plastic bottle cap to form a spacer on the deck screw between the base and the frame, and a second plastic bottle cap glued to the front of the bottom arm to level the assembly, completed the antenna.

Now it was time to do some test driving. I connected a short length (about two feet) of ladder line to the loop with wire nuts, and the other end to the BALANCED input of my MFJ 969 tuner. Then I realized that the tuning function would not be much help at these low frequencies, since the bottom of the tuner's range is rated as 1.8 MHz. So I switched the tuner's selector to "balanced line – bypass," which meant I was really just using the tuner's 4:1 balun and coax connection to my radio. As we'll see, though, it all worked out just fine.

### ❖ Tuning Around…and Down

On my Yaesu FT-897D transceiver, I've got one band always set to 5 MHz in AM mode to monitor WWV. It would be simple to tune down from here to BCB and LW, so I turned on that band setting. WWV came roaring in, strong and clear. Down at 2.5 MHz, WWV was even louder, easily reaching S9. And this was with the loop in the basement, where my ham shack is.

When I reached BCB, pandemonium broke loose. It was 2 am local time, and AM stations
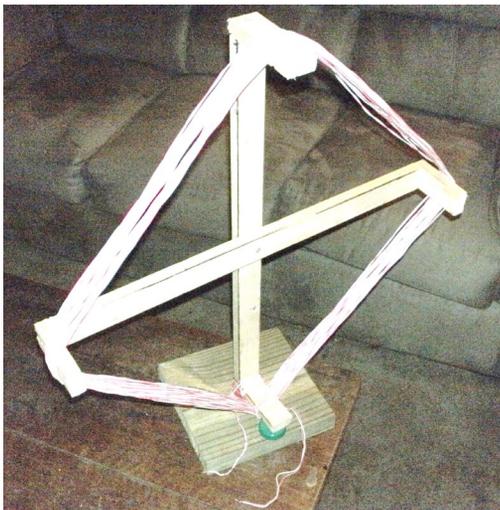
*The homemade loop antenna, ready to pull in long-wave DX. (Photo by author)*

from all over the nation came rolling in, every 5 kHz, all the way down the dial. I experimented with swiveling the loop on its pivot and found that the antenna has definite directional properties. I couldn't hear much on LW, though, so I toted radio, power supply and loop upstairs to the dining room table, to put the loop some feet above ground.

Let me tell you that there are *all sorts* of cool things to listen to on LW. I had never explored this band before and am quickly becoming a huge fan. There are odd-sounding military data transmissions, another AM broadcast band

used by other countries (in Europe and Asia), frequencies for hams and experimenters, and beacon stations, to name just a few. Check out Kevin Carey's excellent monthly column here in *Monitoring Times*, called "Below 500 kHz", for everything you need to know to get you started (and hooked on) listening to LW. You can also find some info by Googling "longwave"; there are several sites devoted to this very interesting band.

Be aware that on LW the loop will pick up a lot of power line and other "loud hum" interference, and rotating the loop to null these interferences becomes an art in itself. Also, as is true on BCB and the lower end of the shortwave spectrum, nighttime and the fall and winter seasons will provide the most productive times to listen. Propagation falls to absolutely nothing during the day, and at night, atmospheric and other noise is overwhelming during the spring and summer. You can still listen profitably during these times – it's just not nearly as easy.

Also, don't overlook the fun of DXing on BCB. It's a blast trying to log an AM broadcaster in as many states as you can, or from the greatest distances possible. And feel free to experiment with loop construction – the size of the loop, the amount of wire, etc. If you Google "loop antennas" you'll find many interesting loop construction projects.

That's all for this month, friends. Next time we'll delve ever deeper into the world of antennas. Happy operating!

## *The Revolution Has Begun:*
# The Uniden HomePatrol-1™

### By Larry Van Horn, N5FPW, MT Review Editor

"**W**e left a lot of people behind in today's scanner market and we know it," said Paul Opitz, Uniden America's Product Manager, during a recent interview with *Monitoring Times* magazine.

Opitz was referring to all the people who would like to own and listen to scanners, but who have been locked out due to the complexity of the current crop of scanning radios. "These are people who hear the sirens going off in their neighborhood and they want to find out right now what is happening," Opitz said. The convoluted procedures required for modern scanner operation are a direct cause of diminishing scanner sales over the past several years.

For Uniden, while the lower scanner sales figures were easy to compile, fixing the problem was not so easy. As Bill Dorr, a Senior Vice President at Uniden America, recently said, "Simplicity is hard to achieve."

"That is why we have taken a hard look at how we could get them [the hobbyists left behind] back, and our answer was the HomePatrol-1," Opitz said.

### ❖ Why are scanners so complex to program?

Many years ago, with the advent of trunking radio systems, P25 digital voice, and other technological advances, communications crossed a technological threshold beyond which many scanner hobbyists never dared venture, not even to continue listening to their local public safety agencies. Gone from the vocabulary of the radio hobbyist were terms such as channels, banks, and "enter" key; nor could they just punch in a frequency, hit the ENTER button and listen to local public safety communications.

Because the communications had gone high tech, the radio monitoring hobby unfortunately had to go high tech as well. In order to stay in the game, we've had to wrestle with programming concepts such as GRE's Object Oriented programming and Uniden's Dynamic Memory Allocation (DMA) scanners. We've had to learn about Motorola, EDACS and LTR trunk radio systems (3600 baud/9600 baud/ESK, etc.), P25 digital modulation, talk groups, NAC/DCS and PL tones, and all sorts of things that confuse and discourage many radio hobby-

ists.

But, the most common complaint that radio hobbyists voice about modern scanner technology is that "They are 'way too complicated to program and operate for the average Joe," and, "You darn near need a college degree just to hear the local dog catcher!"

This dilemma has been borne out in *MT* as well. I know many readers have lamented the difficulty of operating scanner equipment and have felt left behind in the wake. In review after review of scanners in *MT,* we have documented that setting them up and operating these radios isn't easy. We always recommend that you spent a lot of time with the owner's manual, and that you practice programming the examples from the manuals to become familiar with using these technological marvels.

### ❖ So why is the HomePatrol-1 a revolution?

What is so revolutionary about this new scanner? To take a page from Bill Dorr's play book, Uniden has finally achieved simplicity in programming with this scanner. There has never been a scanner like it before. Saying that it will be easy to program by the user is actually an understatement.

While there are several ways you can program a HomePatrol-1, the easiest way is by just punching in five numbers and pressing Enter on the touch screen (well, actually the ACCEPT button). That ought to make a few of you old timers a little more comfortable already.

At its most basic level, the only thing you will need to know to program a HomePatrol scanner is – the *ZIP code* where you are currently located! Yes, punch in your five digit ZIP code on the LCD touch screen, press ACCEPT, and the scanner loads your local frequencies from a database stored within the unit. After that is done, you should hear your local scan-

ner communications (conventional and trunked, analog and digital). No other operator interface is needed and it is truly just that simple.

If you don't know the ZIP code of the location you want to monitor, you can also punch in the city and state on the touch screen. In addition to these two methods, there are currently two more ways to program the HomePatrol-1: more on that below.

### ❖ Where do the frequencies come from?

The engine that drives this little scanning marvel is the **RadioReference.com** website. Unless you have been living on another planet for the last few years, most scanner enthusiasts with Internet access are familiar with RadioReference. They are the world's largest radio communications data provider, featuring a complete frequency database, trunked radio system information, and FCC license data.

A couple of years ago, the administrators at RadioReference embarked on a project to assign specific location information (known as a geotag) to all radio systems/frequencies in their online database. A geotag consists of latitude, longitude, and range. This tag describes a circle centered at the latitude/longitude that fully encompasses the political entity (i.e. city, town, state, etc.) served by that radio system. Each of these circles in the RadioRef database also includes all the radio system information (frequencies, descriptions, tags indicating how each channel is used, etc).

By punching in your ZIP code HomePatrol-1 sets your location somewhere within 10 miles of the center of that ZIP code. While that is not very precise, it will be good enough to catch local communications. HomePatrol-1 will then select channels from its online database stored on a 2 GB micro SD card for all of the radio systems that overlap your approximate location.

But, using the ZIP code is not the only method of getting information loaded into HomePatrol-1. Each method for selecting your location uses a different sized circle. In addition to the 10-mile Zip Code radius, HomePatrol-1 is able to use the following circle sizes:
- 20-miles radius from the center of a city when using city selection.
- 30-miles radius from the location of the dis-

covered radio tower when using Auto Locate.
- Zero mile radius if you connect a GPS or manually enter your latitude or longitude.

Right now you are probably scratching your head: zero miles? Yes, that means that the scanner knows your precise location. So, in order for a radio system to be selected, that system would have to provide coverage/service to the precise location you have entered into the scanner.

For instance, if you are traveling and you use a GPS to feed precise location information into the unit, HomePatrol-1 will automatically select and deselect systems as you drive through each system's coverage zone. There's nothing extra to scan, program in advance, or deselect as you travel down the highway.

If you want to hear more (or less) than what the HomePatrol-1 selected, you can manually change the range setting to be bigger (to include more systems) or smaller (to include fewer systems). This is done from the main screen by tapping RANGE and adjusting the range up or down. Just keep in mind that if you are not using GPS, the range will be from the center of the ZIP code or city you have entered, or your closest radio tower location, not your precise location.

Because there are so many different kinds of communications going on, you can turn on specific types of agencies you want to hear and turn off those you don't. Maybe you don't want to monitor civilian or military air communications, just police, fire and EMS. No problem: touch the screen to set up what you want to hear and it is done. Table One has a list of the various service types that can be selected or deselected using this unit.

In a nutshell, there are no banks, no systems, no groups, no programming of frequencies to fiddle with; your location is all you need to get you started.

## ❖ It's what's under the hood that counts.

HomePatrol-1 operation centers around its touch "main screen." From this screen you can select and manage the transmissions you listen to, as well as set the framework for how HomePatrol-1 operates (volume, backlighting, squelch levels, etc.).

There are four databases that are stored within the HomePatrol-1 unit and each can be updated by the user at no cost.

- Radio System Database – provided by **www.radioreference.com**. This database contains radio system information including frequencies, trunked talk groups, and geographic locations for radio systems across most of North America. This database is stored on the card inside the unit and is updated regularly via a computer connected to the Internet.
- ZIP code Geographic Database – provides geographic coordinates for every ZIP code in the U.S. and every postal code in Canada.
- RadioReference SysID Database – contains system ID and geographic location information for trunked radio systems across North America, used with the Auto Locate feature.
- City Location Database – includes the center point of most named cities and counties.

Some of the other tools in HomePatrol-1's feature set include:

- Radio systems: APCO 25 Digital Trunked and Conventional, Motorola Analog and Mixed Digital, EDACS Narrow and Wide, LTR, and conventional frequencies.
- 2 GB micro SD for storing favorites lists and recording transmissions. It is factory programmed for all known radio systems in the United States and Canada.
- Auto-locate that can quickly find local systems even if you don't know where you are.
- USB connection to PC for database and firmware updates through HomePatrol-1 Sentinel software.
- Weather Alert Standby (SAME).
- Optional car mounting kit.

As you listen to HomePatrol, you'll find that there are certain channels you want to listen to more frequently. You can create a specialized list and save these channels to it. For example, you can create a list entirely



### TABLE ONE: HOMEPATROL-1 SERVICES TYPES

*Note: Not all service types are available in all areas and this list may change from time to time by Uniden and RadioReference.*

| Service Type | Description |
| --- | --- |
| · Aircraft: | For civilian aircraft and air traffic control operations most typically in the 118-136 MHZ and 225-380 MHZ bands in AM mode. |
| · Business: | Most business related entities not covered by other tags. |
| · Corrections: | Jail/prison operations and other corrections activities, including federal prisons. |
| · Emergency Ops: | Emergency Operation Centers and similar emergency management or disaster related operations. |
| · EMS Dispatch: | Ambulance dispatch, including rescue squads. |
| · EMS-Tac: | Ambulance on-scene communications, tactical operations and secondary channels. |
| · EMS-Talk: | Ambulance talk-around, car-to-car and supervisor operations. |
| · Federal: | All federal government operations (except corrections, traditional law enforcement patrol and fire/EMS operations). |
| · Fire Dispatch: | Fire dispatch, including combined fire/ambulance dispatch. |
| · Fire-Tac: | Fire ground, tactical and on-scene communications, including combined fire/ambulance operations. |
| · Fire-Talk: | Fire talk-around and car-to-car operations, chiefs, supervisors, etc., including combined fire/ambulance operations. |
| · Ham: | Any amateur radio assignment. |
| · Hospital: | Ambulance-to-Hospital communications and patient reports. |
| · Interop: | Interoperability communications, cross-agency communications, mutual aid, etc. |
| · Law Dispatch | Law enforcement dispatch. |
| · Law-Tac: | Law enforcement tactical, SWAT, on-scene, surveillance and specific sub-agency communications. |
| · Law Talk: | Law enforcement talk-around, car-to-car and supervisor operations. |
| · Media: | Newspapers, television and broadcast radio operations. |
| · Military: | Military operations, e.g., range control, air-to-air combat, etc. |
| · Multi-Dispatch: | Combined law enforcement and fire/ambulance dispatch. |
| · Multi-Tac: | Combined law enforcement and fire/ambulance tactical and on-scene communications. |
| · Multi-Talk: | Combined law enforcement and fire/ambulance tactical talk-around and car-to-car operations. |
| · Public Works: | Public agency non-public safety communications. This includes any non-public safety government services, such as trash, streets, roads, sewer, zoos, administration, maintenance, animal control, community initiatives, code compliance, etc. |
| · Railroad: | All common carrier railroad communications. |
| · Security: | Non-law enforcement security operations, including private security companies, noncommissioned government agency security, school security, etc. |
| · Schools: | School-related communications (schools, school buses, football games, etc.). |
| · Transportation: | Public and private bus, taxi, and public passenger rail communications. |
| · Utilities: | Private electric, water, natural gas, phone, cable TV, etc. operations. |

of police department dispatchers, emergency operations, or a specific city's transmissions. If there is a special event coming up, like an air show or car race, you could create a list just for that event.

As you find transmissions you like and would like to monitor again, you can save them to a favorites list. When you opt to listen to a favorites list, HomePatrol-1 will monitor only the transmissions on that list.

You can also select transmissions for HomePatrol-1 to avoid (ignore). This is the

## TABLE TWO: HOMEPATROL-1 SPECIFICATIONS

| | |
|---|---|
| Display: | Standard 3.5-inch Hi Color LCD (65K) with backlight QVGA 320 X 240 (3.5 inch) |
| Touch Panel: | LCD with Touch Panel |
| Controls/Switches: | Power On/Off, Volume Control, Reset Switch |
| External Jacks/Slots: | ANT. Jack - SMA Type |
| | Phone Jack - 3.5 mm (Stereo Type) - 32 ohm (Stereo headphone) - 64 ohm (Earphone) |
| | Line Out Jack - 2.5 mm (Stereo Type) - 600 ohm for Audio Output |
| | DC Power Jack - EIAJ Type-3 (Center Positive) |
| | GPS Interface Jack - 4-pin Mini Type (RS232C) |
| | USB Jack - 5-pin Mini USB Type |
| | Memory card Slot - MicroSD Type |
| Internal Speaker: | 8 ohm. 2.0 W Max |
| Power Requirements: | 4 x AA size Rechargeable NiMH Batteries (2300mAh) (included) |
| | 4 x AA size Alkaline Batteries (not included) or |
| | AC Adapter (AC 120V 60Hz 9V 800mA Regulated) (included) |
| | DC Adapter (DC 12V to DC 9V 800mA Regulated) (included) |
| Operating Temperature: | +14° F (-10° C) ~ +140° F (+ 60° C) |
| Storage Temperature: | -22° F (- 30° C) ~ +140° F (+ 60° C) |
| Size (mm): | 3.3 in (84.5) H x 5.9 in (149) W x 1.5 in (38.4) D (Without antenna) |
| Weight: | 15.9 ounces with battery and antenna, 10.8 ounces without |
| Accessories: | AC Adapter (9V 800mA DC Out) |
| | DC Adapter (9V 800mA DC Out – Cigarette Lighter type) |
| | AA size NiMH Rechargeable Battery (2300mAh x 4) |
| | Rubber antenna (SMA type) |
| | USB cable (USB A to USB Mini B Type) |
| | MicroSD Card (2GB) |
| | Desk Use Bracket (Stand Type) |
| Scanning Speed: | 100 Channels/Second (maximum) |
| Trunk Tracking: | Motorola Type I 800 |
| | Motorola Type II 800, 900, UHF, VHF |
| | EDACS Wide, Narrow |
| | LTR |
| | APCO P25 |

same thing as lockout for the old timers.

HomePatrol-1 also has a feature that acts as an instant replay of the transmissions you've just heard. You can set how long a period replay will record for instant playback, ranging from 30 seconds to 240 seconds (four minutes). While you can replay that recording immediately and continue replaying it, you cannot save it for future listening.

On the other hand, with HomePatrol-1 you can tap a button and begin recording the transmission you're listening to. When you begin recording, HomePatrol-1 will add the replay recording buffer to the recording and stores the whole thing on the micro SD card inside the unit. You can record up to 1,000 sessions, but HomePatrol-1 stops recording when SD card memory is down to 512MB.

### ❖ What's in the box?

There is a lot of bang for the buck in this box. In addition to the unit itself, there is an antenna, AC Adapter, DC cigarette lighter car adapter, plastic desk stand, USB computer interface cable, a printed quick reference guide, and four NiMH (AA) batteries.

Once the scanner is powered up and interfaced to a computer using the USB cable, the user can download a full operator's manual (pdf format) and install the HomePatrol Sentinel software. This software will ensure you are using the latest software and database. HomePatrol will appear to be an additional drive on your system.

For more information and customer support, you should also visit Uniden's exclusive address for everything HomePatrol at **www.homepatrol.com/**.

### ❖ Overall rating and final thoughts

No *First Look*, review would be complete without some complaint on my part, so let's get that out of the way first.

I would like the ability to customize the main frequency list in this scanner and not have to rely solely on RadioReference. In its current configuration, HomePatrol-1 and its Sentinel software will not let me

do that. My discussions with Uniden indicate that could be an option sometime after the initial release of the unit, probably early next year.

I have really been sold on the Uniden Close Call technology over the last few years and would like to have seen it included with this unit, but since I own several other scanners with that feature, I can live without it – not that we have a choice.

The biggest issue with this radio is the battery drain. In our test we got about four to five hours of battery life, depending on how much radio traffic was received. I'm glad to see that they did include a cigarette lighter adapter for the car and an AC adapter. The former will help during long trips.

It is not often that I have seen a radio approach the level of perfection, but this one is certainly close. Sensitivity was excellent, and was even better than my BC-246 and BC-396D scanners as measured on the bench. It scans fast, is well engineered, and it is a great all around scanner for both home and vehicle.

For years, scanner hobbyists around the world have wanted to have their cake and eat it too. We wanted to be able to monitor complex trunk systems, but we didn't want to have to have to learn about them to hear them. We just wanted something simple to use that would let us listen to the complex world of communications that surrounds us. Unfortunately, simple just wasn't easy any more in the world of scanner radios.

But that has all changed. Uniden's new HomePatrol-1 scanner has fundamentally changed the face of scanning forever. Not many things in this world can be called true game changers, but the new HomePatrol-1 is the exception and has indeed made scanning simple again.

*The Uniden HomePatrol-1 (SCN 55) is available from Grove Enterprises (1-800-438-8155 or http://www.grove-enterprises.com) for $499.95 plus shipping and handling.*

### MT FIRST LOOK RATING (0-10 SCALE)

| | |
|---|---|
| Audio Quality | 10 |
| Audio Levels | 10 |
| Backlight/Display | 9 |
| Battery Life | 6 |
| Ease of Use | 10 |
| Feature Set | 8 |
| Keyboard/Button/Control Layout | 9 |
| Overall Construction | 10 |
| Overall Reception | 8 |
| Owner's Manual | 9 |
| Sensitivity | 9 |
| Selectivity | 9 |

**Overall rating: 4 and 3/4 stars**

★ ★ ★ ★ ★

### TABLE THREE: HOMEPATROL-1 FREQUENCY COVERAGE

| Frequency (MHz) | Modulation | Step (kHz) | Remarks |
|---|---|---|---|
| 25.0000-26.9600 | AM | 5.0 | Petroleum Products & Broadcast Pickup |
| 26.9650-27.4050 | AM | 5.0 | CB Class D Channel |
| 27.4100-27.9950 | AM | 5.0 | Business & Forest Products |
| 28.0000-29.6950 | NFM | 20.0 | 10 Meter Amateur Band |
| 29.7000-49.9950 | NFM | 10.0 | VHF Low Band |
| 50.0000-53.9950 | NFM | 20.0 | 6 Meter Amateur Band |
| 108.0000-136.9950 | AM | 8.33 | Aircraft Band |
| 137.0000-143.9950 | NFM | 12.5 | Military Land Mobile |
| 144.0000-147.9950 | NFM | 5.0 2 | Meter Amateur Band |
| 148.0000-150.7950 | NFM | 12.5 | Military Land Mobile |
| 150.8000-161.9950 | NFM | 5.0 | VHF High Band |
| 162.0000-173.9950 | NFM | 12.5 | Federal Government |
| 174.0000-215.9950 | FM | 5.0 | TV Broadcast 7 – 13 |
| 216.0000-224.9950 | NFM | 20.0 | 1.25 Meter Amateur Band |
| 225.0000-379.9950 | AM | 25.0 | UHF Aircraft Band |
| 380.0000-399.9950 | NFM | 12.5 | Military Band |
| 400.0000-405.9950 | NFM | 12.5 | Miscellaneous |
| 406.0000-419.9950 | NFM | 12.5 | Federal Government Land Mobile |
| 420.0000-449.9950 | NFM | 12.5 | 70 cm Amateur Band |
| 450.0000-469.9950 | NFM | 12.5 | UHF Standard Band |
| 470.0000-512.0000 | NFM | 12.5 | UHF TV |
| 758.0000-787.9950 | NFM | 6.25 | Public Service Band |
| 788.0000-805.9950 | NFM | 6.25 | Public Service Band |
| 806.0000-823.9875 | NFM | 12.5 | Public Service Band |
| 849.0125-868.9875 | NFM | 12.5 | Public Service Band |
| 894.0125-960.0000 | NFM | 12.5 | Public Service Band |

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Manufacturers suggested list price $799.95
**CEI Special Price $519.95**
**1,000 Channels • 10 banks • CTCSS/DCS • S Meter**
**Size: 6¹⁵/₁₆˝ Wide x 6⁹/₁₆˝ Deep x 2³/₈˝ High**

*Frequency Coverage:* 25.000-512.000 MHz., 806.000-956.000 MHz. (excluding the cellular & UHF TV band), 1,240.000-1,300.000 MHz.

When you buy your Bearcat 796DGV Trunktracker package deal from Communications Electronics, you get more. The GV means "Great Value." With your BC796DGV scanner purchase, you also get a **free deluxe scanner headphone** designed for home or race track use. Headset features independent volume controls and 3.5 mm gold right angle plug. The 1,000 channel Bearcat 796DGV is packed with features to track Motorola Type I/II/IIi Hybrid, EDACS, LTR Analog Trunk Systems and Motorola APCO 25 Phase I digital scanner including 9,600 Baud C4FM and CQPSK. Also features control channel only mode to allow you to automatically trunk many systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display and backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control and programming with RS232C 9 pin port (cable not supplied), Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMMBNC for $29.95. For complete details, download the owners manual from the **www.usascan.com** web site. For fastest delivery, order on-line at www.usascan.com.

### Bearcat® BCT8 Trunk Tracker III

Manufacturer suggested list price $299.95
**CEI Special Price $169.95**
**250 Channels • 5 banks • PC Programmable**
**Size: 7.06˝ Wide x 6.10˝ Deep x 2.44˝ High**
*Frequency Coverage:* 25.0000-54.0000 MHz., 108.0000-174,.0000 MHz., 400.0000-512.0000 MHz., 806.0000-823.9950 MHz., 849.0125-868.9950 MHz., 894.0125-956.0000 MHz.

The Bearcat BCT8 scanner, licensed by NASCAR, is a superb preprogrammed 800 MHz trunked highway patrol system scanner. Featuring TrunkTracker III, PC Programming, 250 Channels with unique BearTracker warning system to alert you to activity on highway patrol link frequencies. Preprogrammed service searches makes finding interesting active frequencies even easier and include preprogrammed police, fire and emergency medical, news agency, weather, CB band, air band, railroad, marine band and department of transportation service searches. The BCT8 also has preprogrammed highway patrol alert frequencies by state to help you quickly find frequencies likely to be active when you are driving. The BCT8 includes AC adapter, DC power cable, cigarette lighter adapter plug, telescopic antenna, window mount antenna, owner's manual, one year limited Uniden warranty, frequency guide and free mobile mounting bracket. For maximum scanning enjoyment, also order the following optional accessories: External speaker **ESP20** with mounting bracket & 10 feet of cable with plug attached $19.95. Magnetic Mount mobile antenna **ANTMMBNC** for $29.95.



## SCANNERS

### Bearcat® BCD396T Trunk Tracker IV

Suggested list price $799.95/**CEI price $519.95**
**APCO 25 9,600 baud compact digital ready handheld TrunkTracker IV scanner featuring Fire Tone Out Paging, Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging.**
**Size: 2.40˝ Wide x 1.22˝ Deep x 5.35˝ High**

*Frequency Coverage:*
25.0000-512.0000 MHz., 764.0000-775.9875 MHz., 794.0000-823.9875 MHz., 849.0125-868.8765 MHz., 894.0125-956.000 MHz., 1240.0000 MHz.-1300.0000 MHz.

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as **Fire Tone Out Decoder**. This feature lets you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning. **Close Call Radio Frequency Capture** – Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Useful for intelligence agencies for use at events where you don't have advance notice or knowledge of the radio communications systems and assets you need to intercept. The BCD396T scanner is designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS, LTR and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. **Dynamically Allocated Channel Memory** - The BCD396T scanner's memory is organized so that it more closely matches how radio systems actually work. Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 3,000 channels are typical but **over 6,000 channels are possible** depending on the scanner features used. You can also easily determine how much memory you have used and how much you have left. **Preprogrammed Systems** - The BCD396T is preprogrammed with over 400 channels covering police, fire and ambulance operations in the 25 most populated counties in the United States, plus the most popular digital systems. **3 AA NiMH or Alkaline battery operation and Charger** – 3 AA battery operation - The BCD396T includes 3 premium 2,300 mAH Nickel Metal Hydride AA batteries to give you the most economical power option available. You may also operate the BCD396D using 3 AA alkaline batteries. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in the BCD396T scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - A blue LCD light remains on when the back light key is pressed. Autolight - Automatically turns the blue LCD backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BCD396T automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BCD396T also works as a conventional scanner to continuously monitor many radio conversations even though the message is switching frequencies. The BCD396T comes with AC adapter, 3 AA nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, SMA/BNC adapter, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. Order on-line at www.usascan.com or call 1-800-USA-SCAN.

## More Radio Products

### Bearcat® BC246T Trunk Tracker III

Suggested list price $399.95/**CEI price $214.95**
**Compact professional handheld TrunkTracker III scanner featuring Close Call and Dynamically Allocated Channel Memory (up to 2,500 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging.**
**Size: 2.72˝ Wide x 1.26˝ Deep x 4.6˝ High**

*Frequency Coverage:*
25.0000-54.0000 MHz., 108.0000-174.0000 MHz., 216.0000-224.9800 MHz., 400.0000-512.0000 MHz., 806.0000-823.9875 MHz., 849.0125-868.9875 MHz., 894.0125-956.000 MHz., 1240.0000 MHz.-1300.0000 MHz.



The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at www.usascan.com and download the free owner's manual. Popular features include **Close Call Radio Frequency Capture** – Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. **Dynamically Allocated Channel Memory** - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but **over 2,500 channels are possible** depending on the scanner features used. You can also easily determine how much memory is used. **Preprogrammed Service Search (10)** - Makes it easy to find interesting frequencies used by public safety, news media TV broadcast audio, Amateur (ham) radio, CB radio, Family Radio Service, special low power, railroad, aircraft, marine, racing and weather frequencies. **Quick Keys** - allow you to select systems and groups by pressing a single key. **Text Tagging** - Name each system, group, channel, talk group ID, custom search range, and S.A.M.E. group using 16 characters per name. **Memory Backup** - When power is lost or disconnected, your BC246T retains the frequencies that were programmed in memory. **Unique Data Skip** - Allows the BC246T to skip over unwanted data transmissions and birdies. **Attenuator** - You can set the BC246T attenuator to reduce the input strength of strong signals by about 18 dB. **Duplicate Frequency Alert** - Alerts you if you try to enter a duplicate name or frequency already stored in the scanner. **22 Bands** - with aircraft and 800 MHz. The BC246T comes with AC adapter, 2 AA 1,800 mAH nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. For more fun, order our optional deluxe racing headset part **#HF24RS** for $29.95. Order now at www.usascan.com or call 1-800-USA-SCAN.

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# Starting up a Vintage Radio

Last week I sent in the September column introducing the Philco table model broadcast set that is to be our next restoration project. Under normal conditions, the October column you now have in your hands would report on the first steps in the restoration of that radio. However, it turns out I'll be away from home for most of the month of August, when I would ordinarily be putting together this column.

Instead, I'll have to submit a column before I go – or there will *be* no October "Radio Restorations!" Since I haven't had time to do enough on the Philco to discuss with you, I'll need to take another approach. This will be a special column dealing with the first steps to take in bringing an old radio back to life after years – often decades – of storage.

Most of the techniques I'll be mentioning have been practiced and discussed in connection with the various specific radios we have restored. But I don't recall ever pulling together such material in one generic column. And so – here it is!

## ❖ A.C.-D.C.s Can Be Lethal!

After you blow the dust off your relic and take your first peek inside, determine if it has a power transformer. If not, you have an a.c.-d.c. set, which can be dangerous to work on – if not lethal. The problem with those is that one side of the a.c. line is generally connected to the chassis ground (though it may be connected to a ground bus separate from the chassis).

If the side of the line connected to chassis ground is the "hot side," you could easily receive a powerful shock by touching a metal part of the radio while you are in contact with a house ground (such as a damp basement floor or perhaps the case of a test instrument whose chassis is grounded via a 3-prong a.c. plug).

Of course, the idea of connecting a ground lead from the grounded test instrument to the hot chassis of an a.c.-d.c. radio is not to be contemplated! One way of avoiding this problem is to use a polarized power plug, connected so that the ground side of the line is always connected to the radio chassis.

But this technique is effective only if the outlet you are plugging into has been correctly wired. My recommendation is that you *never* take this chance, but instead equip yourself with an isolation transformer. This is simply a transformer that does not step up or step down, but outputs at the secondary the same voltage fed into the primary. You plug the primary into the line and connect the radio's power plug to the secondary, and you now have a radio isolated from the line by the insulation in the transformer.

One source for isolation transformers is Radio Daze (**www.radiodaze.com**). They show a 100 VA unit with plug and receptacle already wired in for $60.36. Alternatively, a "hard wired" 90 VA unit (has wires sticking out; you add your own plug and receptacle) is listed at $36.17.

Another possibility would be to purchase two Radio shack 25.2 volt at 2 amp transformers (stock # 273-162) at $10.49 each. Wire the two secondaries together; attach a plug to one primary and a receptacle to the other; and you're in business with a capacity of maybe 40 VA. That's enough to handle any "All-American Five" a.c.-d.c. set that you might run across.

## ❖ The Power Transformer: A Crucial Component

I did mention this last month in connection with the Philco Restoration. But if your set has a power transformer, no discussion of a vintage radio startup strategy would be complete without stressing the need to test it early on. If it's no good, it might be wise to delay the restoration until you can get a replacement – maybe from a junker set. Finding replacement transformers that match an original both physically and electrically can be difficult.

Make sure that the rectifier tube is removed from its socket so that the power supply will not be making any d.c., then plug in the set and turn it on. Connect your d.c. voltmeter between one of the rectifier plates and ground, and you should get a reading in the neighborhood of 350



*A small isolation transformer suitable for 5- or 6-tube a.c.-d.c. sets.*

volts. You should get a matching reading from the other plate.

If you've left the other tubes in their sockets, see if at least some of them are lit. That would verify that the 6.3-volt winding of the transformer is ok. If the tubes have been removed or don't seem to be lit, check across one of the tube's heater connections to see if 6.3 volts (more with no tubes in place) is present.
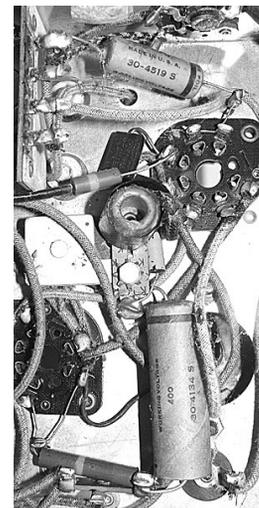
Finally, measure across the rectifier tube's filament connections to verify that filament voltage (usually 5 volts) is present. If everything looks good, then proceed to your next decision point – which will be how you want to handle the set's complement of capacitors.

## ❖ To Recap or not to Recap

Here we embark upon an area that is very controversial among radio restorers. A large percentage of the problems in a vintage receiver is caused by failure of the perhaps 75-year-old paper and electrolytic capacitors. Capacitors that short out can easily destroy other, difficult-to-replace components, such as power transformers and i.f. transformers. Many of these components were manufactured very cheaply and were certainly never intended to last for decades.

Since replacements for the old electrolytic and paper capacitors are readily available, inexpensive, and a fraction of the size of the originals (very helpful on occasion), the choice seems obvious. Change out all of the old caps for dependable, modern versions.



*Some restorers melt out the insides of original cardboard covered tubular capacitors like these and mount modern units within.*

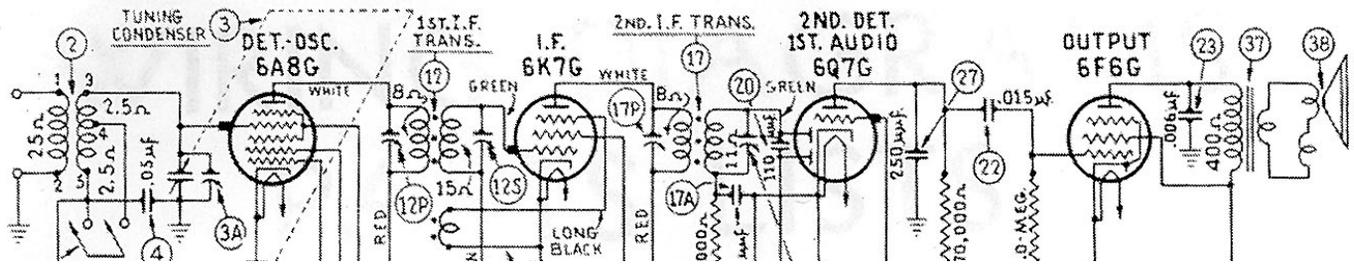That's the side of the fence I'm on.

However, there are others who look at it differently, and they also have a valid point of view. These folks are purists and would like their restored radios to look just as they did when they

*This schematic, carried over from last month's Philco article, illustrates the various stages through which signals can be injected or traced (see text).*

came from the factory – wax-coated, cardboard-cased capacitors and all.

These restorers may melt the wax from the old paper caps, remove the guts, and slip a diminutive modern replacement into the tube. I understand that even aluminum-cased electrolytics can be opened with a fine saw or cutting wheel, recapped inside, and somehow closed up again.

Such purists may completely recap a set, installing new units inside the old housings, or they may rebuild only those caps that are definitely bad, cross their fingers, and hope for the best. Obviously, the recap philosophy that you follow in a restoration with affect the startup procedure, and we'll get to that shortly.

Those who would like information on how to select modern capacitors to replace the old ones can find it in the February 2010 *Radio Restorations* article "Capacitors and Their Replacement." And last May, I devoted about a third of a page to respond to a reader who had seen the February article, but wanted me to address the *physical* problems associated with replacing capacitors.

## ❖ Applying Power – i.e. The Smoke Test

Before turning the set on for the first time, go ahead and test the tubes if you haven't already done so, and be sure to reinstall the rectifier tube. It's a good idea to spray the pins of each tube and the contacts in its socket with contact cleaner, then remove and insert the tube in the socket several times. This will break up any corrosion that may have formed over the decades.

If a radio has been completely recapped, as all of my restorations have, only minimal care is required on startup. I simply take the precaution of monitoring the output of the power supply to make sure that d.c. of the expected voltage really does appear and that it remains steady after rising to the expected value. I also use my eyes and nose to make sure there is no telltale plume of smoke. Of course, if the set fails to operate, I do shut it off very quickly so I can regroup.

If the radio hasn't been recapped, use a Variac to raise the startup voltage slowly. The B plus line should be disconnected from the power supply so that the latter can be powered up independently. The focus must be on the power supply at first, because the electrolytic capacitors it contains must be brought up to full voltage very slowly, under constant monitoring, to see if they can be brought back to life.

The insulating material (electrolyte paste) in a long disused electrolytic capacitor would almost certainly fail (short out) if full voltage were

to be applied suddenly. However, if the voltage is brought up very slowly, there is a chance that the paste will rejuvenate and regain its insulating value. This process is called "re-forming."

Should it be possible to reach the full rated voltage of the electrolytic capacitors without a breakdown and hold it there for a time, the re-forming process might tentatively be considered successful. If not, it's time to bite the bullet and install new electrolytics either inside the original can or under the chassis. If the latter is done, many people like to leave the original chassis-mounted can in place, disconnected of course, for show.

With re-formed or new electrolytics in place, turn down the Variac all the way, re-connect the B plus line to the power supply and begin a new slow start-up, monitoring the B plus voltage with your multimeter. Now you're looking for possible shorts caused by failure of paper capacitors or other components.

Watch your meter for abrupt voltage decline, keep your eyes and nose vigilant for smoke, and be ready to cut the power at the first sign of trouble! I really don't recommend a startup without changing the caps, but I realize that a lot of people think differently and I respect their position even if I don't agree with it!

## ❖ What to do if it Doesn't Play

I've found that if a careful job is done re-capping a radio and any obviously failed parts are replaced, nine times out of ten the set will reward the restorer by playing as soon as power is applied. But what if it doesn't? Here are some of the diagnostic tools available to the restorer.

**Resistance Tests** - Of course if the problem is caused by a short somewhere, you'll have to find and clear that before turning the radio on again. A good tool for this is a resistance chart if your service manual has one. Such charts give the resistance to be expected at various points (such as the tube pins) to ground. A measured resistance value that is significantly off may point to your circuit problem.

**Dynamic Tests** - If you are able to power up safely, you might try to identify the stage of the radio where the problem is located with a *dynamic test* such as signal tracing or signal substitution.

Signal substitution requires a standard service-type signal generator and possibly an output indicator such as an a.c. voltmeter connected across the speaker voice coil. Here's a simplified outline of the process.

The test begins by injecting the audio output of the signal generator into the grid of

the audio output stage. If a tone is heard in the speaker, the audio connection is moved to the grid of the first audio/second detector tube. If this stage is functioning, the tone will be heard again, but louder because of the extra amplification.

Now the signal generator is set to produce a modulated signal at the intermediate frequency. This is injected into the detector plate of the first audio/second detector tube. Once again, the tone should be heard in the loudspeaker. Moving the injection point to the grid of the i.f. stage, or stages should result in a further amplified tone.

Injecting the signal into the signal grid of the mixer (first detector) stage should add additional amplification to the tone. To test the oscillator stage, tune the radio to a quiet frequency and adjust the signal generator to provide a modulated signal at that frequency to see if an amplified tone is heard. Finally, if there is an r.f. stage, the injection point is moved to the grid of that stage. Once again, the tone should be heard at greater amplification.

Should the tone not appear – or appear only weakly – at any of these test points, you have found the location of the problem.

Signal tracing essentially reverses the signal substitution procedure. A test signal is injected into the antenna end of the radio, and then followed through the set to the audio output stage. If the signal disappears at any point, that is the malfunctioning stage.

While signal tracing follows the signal through the set in a more natural manner, it does require special high-impedance circuitry to detect and demodulate the signal in the r.f., converter and i.f. stages.

**Voltage Tests** - Once the malfunctioning stage is located, resistance tests, as described above, can assist with the troubleshooting. However, as long as the radio can be powered up safely, you can also make use of the voltage charts supplied in most service notes. Like the resistance charts, they provide typical readings to be found from various circuit points, such as tube socket pins, to ground.

But there's just one caveat. Voltage notes for vintage radios usually specify that a 1000 ohms per volt meter be used. Today's radio workbenches usually are equipped with a 20,000 ohms per volt multimeter, or a VTVM or DVM.

The sensitivity of the latter two is probably measured in megohms per volt. These instruments don't load down the radio circuitry enough to give values consistent with the charts. So if you don't have a 1000 ohms per volt instrument, look for a vintage multimeter at the next radio meet. The ohms per volt rating is usually given in small print on the meter face.

*Larry Van Horn, New Products Editor*

## FM Atlas, 21st Edition

The 21st edition of Bruce Elving's *FM Atlas* has been published. The book contains maps and directories, listings of some 10,000 FM radio stations, translators, boosters, and low power FM stations.

Included are specific listings of stations broadcasting HD Radio signals; stations having RDS data subcarriers, and other programming available to specially modified FM radios. The latter includes stations carrying reading services for the blind, and those stations broadcasting ethnic programming.
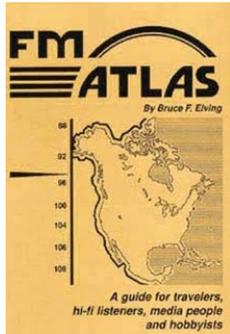
Covering the U.S., Canada and Mexico, the *FM Atlas* is 288 pages of FM information, the first such book to be published in five years. "It's all here: antenna height, power, SCA subcarrier info, and promotional catch phrases," writes Karl Zuk, ABC-TV retired, Katonah NY.

Editorial essays in the book explore the possibility of low power FM expanding into more metro areas, the encroachment of digital (HD) radio, and the virtual elimination of classical music from commercial FM.

Formats, too, are included, as are listings showing stations broadcasting in stereo and those suffering from the disease of being monophonic. All of North America is covered by the FMaps, with station listings by geography and frequency. Elving has a Ph.D. in communications from Syracuse University and published his first FM station directory in 1971. He published *FMedia!,* a newsletter, for some 20 years; it was discontinued earlier in 2010.

This book has been a mainstay in my radio shack for years. There is no other reference in the same class as the *FM Atlas*. I find the station directory, sorted by geography and frequency, particularly useful when I am DXing an FM band opening.

Among the major improvements to this edition are the station maps. While the maps are much cleaner, the callsigns for the stations on the map are a bit smaller. So, if you have vision issues, you might need some magnification help. Still, the smaller type does help keep the cost down.

The book is priced at $22 postpaid (checks, charge cards, money orders) from "FM Atlas," PO Box 336, Esko MN 55733-0336, by calling 1-800-605-2219, or PayPal at **FmAtlas@aol. com**.

## New Milcom Log Periodic Now Available

Signal Design Labs Antennas in Georgia, has released a new log periodic antenna for 225-400 MHz military air band reception. The antenna is constructed of T6061 aluminum with all stainless hardware. Each of the 20 tubular T6061 aluminum elements are attached to one of the 1-inch dual T6061 booms. This installation makes for an antenna that is incredibly well built, no flimsy, whippy elements that can be easily broken as with many other hobbyist-type antennas.

The antenna is rear mounted to eliminate mast interaction with the antenna pattern. This log periodic is vertically polarized and the antenna exhibits 9.4 dBi of gain. The longest element is 26 inches and the antenna has an overall turning radius of 49 inches. Wind area is 1.4 square feet so the antenna can be turned using inexpensive TVFM antenna type rotors. This antenna comes standard with an N female RG213 pigtail connection. The boom length is 48 inches and weighs 7 pounds, so attic or limited space mounting is possible.

This new 225-400 MHz LP antenna retails for $279.99. You can get more information on the company website at **http://kg4fvg.weebly. com//-sdl-log-periodic-antennas.html**.

## SSB LAN-SDR

A new top-class receiver is now available from SSB for use on a home network. The SSB LAN-SDR from SSB-Electronics combines first class technology with modern networking components, making this new Software Defined Radio (SDR) a natural fit for remote operation. Regardless of where you are located, you can now operate this new SDR from any location with access to the LAN (Local Area Network).

This new receiver has some interesting specifications. For instance, the software package that operates the radio has a free, scalable user interface and zoom function for spectrum and sonogram displays. These can be either one large format display or both images can be visible at the same time, using a minimum screen resolution of 1152 x 864 pixels.

Recordings can be made as a narrow-band audio file; as a broad-band IF recording, or both at the same time. Two antenna inputs are select-

able by software and can be user defined in setups (memories).

A graphically scalable, double notch filter, and an API interface, for taking advantage of freeware or other available standard software, make this product applicable for a wide variety of monitoring tasks.

**Technical Data** (from the manufacturer)
Frequency range: 0.100 kHz to 30 MHz
Dynamic range SSB: USB, 2400 Hz BW > 110 dB
Dynamic range CW:  CW, 500 Hz BW > 110 dB
ADC: 16 Bit @ 66.66 MHz
IF Bandwidth: 8 kHz – 500 kHz (USB: 8 kHz – 150 kHz)
Low noise figure:  9 dB
High input sensitivity: - 121 dBm @ 2.7 kHz BW 10 dB /SNR
IP3: > 35 dBm - 40 dBm typical
Operating Systems: Windows XP to Windows 7, 32 and 64 bit systems
Interfaces: Ethernet-LAN10/100, USB 2.0

According to Willi Passmann DJ6JZ at SSB SDR-Support, this product is FCC certified and available for sale in the United States. The retail price listed on the SSB website was 2.198,00 Euros ($2,789 U.S.), including a 19% tax. You can learn more about this product on the company website at **www.ssb.de**.

## NRC AM Radio Log

As this issue hits the newsstand, we start the beginning of the fall/winter AM broadcast band DX season, and that band is one of my favorite places in the radio spectrum to DX. This time of year also means that one of my favorite annual radio publications will again be available for purchase – *The NRC AM Radio Log*.

Formerly known as the *National Radio Club Domestic Log*, the first edition of this annual favorite was published by mimeograph with the
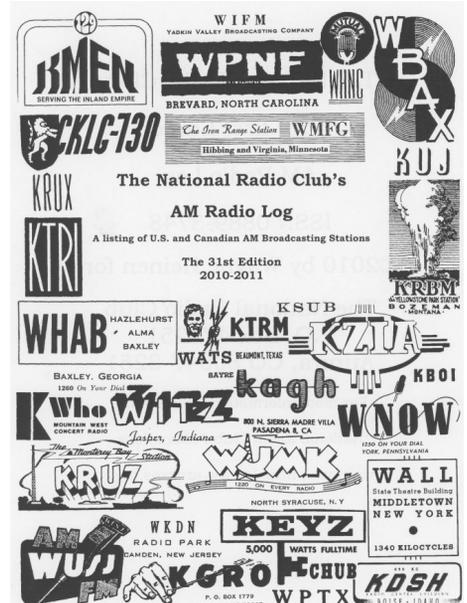
stencils hand-typed in Boston by the legendary AM radio hobbyist John Callarman. Since that first edition (which I still have), the *Log* has gone from its early, crude roots to today's sleek professional publication produced by Wayne and Joan Heinen.

This 2010-2011 31st annual edition of the National Radio Club's *AM Radio Log* contains 278 pages in 8-1/2-inch by 11-inch size, 3-hole punched, loose leaf format, so that you can put it neatly into a 1-inch three ring notebook.

AM band radio stations from the United States and Canada are listed including the expanded (X-band) stations from 1610-1700 kHz. Each station entry consists of its operating frequency, callsign, location (city and state of license), time zone, antenna and transmission power, mailing address daytime telephone number, hours of operation, and broadcast format, including network affiliation. There are also cross reference listings by city and callsign, as well as a list of stations conducting AM stereo operations.

Recent additions to the log include call letters of FM simulcasts, regional groups of stations, and a cross reference of those stations that are licensed to use IBOC (In Band On Channel) digital audio, known as HD-Radio. There are nearly 10,000 new updates in this edition since the 30th edition was released in the fall of 2010.

The *NRC AM Radio Log* is available from several radio dealers as well as directly from the club website at **www.nrcdxas.org** for $25.95 (non-NRC members) and $19.95 (for members). New York residents will have to add 4% sales tax. Orders are shipped postpaid Media Rate. USA and Canada add $3.50 for priority shipping. Canadian and overseas rates are as follows:

| | |
|---|---|
| Canada: Member | $24.00 |
| Canada Non-Member | $29.00 |
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You can also get additional information or send orders via mail to: National Radio Club Publications, P.O. Box 473251, Aurora, CO 80047-3251.

The *AM Radio Log* is the most accurate source on AM radio stations in the United States and Canada. If you tune the AM broadcast band, you need the *AM Radio Log*. Quite frankly, no self respecting AM DXer or listener should be without this superb publication on their radio room bookshelf.

## New Narrowband Mode Released – CMSK

Con Wassilieff, ZL2AFP, has recently released a new narrowband digital mode – Correlated, Convolved Minimum Shift Keying or CMSK. The new mode is designed specifically for the LF and MF ham radio bands (2200, 600 and 160 meter bands).

According to his web site, "MSK (Minimum Shift Keying) is very similar to PSK, but instead of changing the phase to signal the data bits, the frequency is advanced or retarded a very small amount (exactly half the symbol rate), sufficient to exactly achieve a 180° phase shift in one bit period. Because the resulting phase change is produced smoothly without any sudden changes in phase, the signal does not require raised cosine (amplitude) modulation or other means of spectrum management.

"For PSK modes, such modulation must be employed to drop the output to zero at the phase change, in order to reduce the keying sidebands. The MSK spectrum is very similar to PSK, but the phase relationship between the carrier and the data is different. MSK is little used on HF, but has been widely used on LF, notably (at 100 baud and 200 baud) for DGPS beacons, and (at 50 baud and 100 baud) for VLF submarine communications.

"The huge advantage of MSK over PSK is that, because there is no amplitude information on the signal, the transmitting amplifier need not be linear. The transmitter duty cycle is always 100%, not reduced by the AM modulation. In other respects the mode is similar to PSK, and, in fact, the same receiver demodulator can be used, although a different means of recovering symbol sync is required."

CMSK uses a full-time NASA standard convolutional coder with a generous interleaver to provide impressive QRN resistance. Synchronism is assured, even on very weak signals, by a transmitted PN-sequence frame marker and cross-correlator at the receiver.

Four modes have been provided, from 125 baud (<200Hz bandwidth, 60 WPM) down to 7.8 baud (12.5Hz bandwidth, 4WPM). The narrowest and slowest mode is intended for beacon applications, and can be received 100% at -21dB S/N in 3-kHz bandwidth. The default mode, CMSK63, has been reliably copied at a range of 2200 km on 600 meters using a power well under 1-watt EIRP.

Software for this new mode is available now from **www.qsl.net/zl1bpu/CMSK/cmsk.htm**

# LETTERS

*Rachel Baughn*
*rachelbaughn@monitoringtimes.com*

## Feedback and Quickies

"Mr. Hangster" says, "Your magazine is the best and having it online is great. I really look forward to your new product reviews. You guys are #1."

Tom Buyea of Miami, Florida, wrote, "I am a radio and TV station engineer and aircraft avionics technician. I have spent many years on CB radio and Ham radio, shortwave listening and scanner listening (including being a police dispatcher for two years).

"I just discovered your magazine four months / 4 issues ago (although I may have seen it many years ago?) Your magazine is very good, I spend the whole month reading it.

"You manage to present a more complicated but explained version of the subjects you cover than most magazines on electronic devices, without going completely into an area that only PHDs can understand. "

Thanks, Tom – You just summed up our mission statement nicely. It's good to know *MT* measures up to it!

Carole Perry had a request: "I've gotten a wonderful response to my August article about the "History of RCA." So much so, that the RCA webmaster would like to put it on our web page. "

We were gratified to hear folks enjoyed Carole's excellent article and were happy to give our permission. If you didn't see it, look for the article at **www.radioclubofamerica. org/**



*City police look about the same, the world around. Harry Baughn caught this photo while he and your editor were watching a parade in Pattaya, Thailand, in June!*

Kevin Asato KC6POB amended the critique from the July "Communications" column which suggests that all boats should "have an HF transceiver on board and someone in the crew with a ham license who knows how to use it."

Kevin says, "I think the point would have been better served had it said that at least one person in the crew know how to operate the radio. Using an HF transceiver for the marine bands does not require a licensed radio amateur to operate it, as it is in a different radio service. There are actually two licenses involved – a ship station license for the shipboard station (radio) and a Restricted Radio Operators Permit or better for the radio operator (www.offshore store.com/services/selfhelp/communications/radio%20licensing%20Q+A.htm).

"Having an amateur license (General Class or better) would be a plus as there would be more bands to try and establish a call for help. I do not mind the promotion of amateur radio, but there is an established radio service in place that needs to be used properly, with amateur radio considerations being secondary in this case."

Irv Sanders K3IUY also wrote, tongue in cheek, regarding a news item in "Communications": "Just received my August issue of *M/T*. In your Communications article on page 7, left column, bottom, 'Philly Councilman Tired of Looking at Dishes.' I wish you would ask the councilman if he owns /or uses a Cell Phone, and if he doesn't find those thousands of cell antennas unsightly? Just wondering."

Bob Grove sent this note: "In part 5 of my antenna series in August, at the end of page 15, an error was spotted by communications engineer David Hindin. The last paragraph should have said 'Since a typical two-way splitter is a power divider *[not a voltage divider]*…'

"Thanks, David, and I've corrected that same error in *Ask Bob* as well!"

## Ready-Made for 160M?

Dick Robbins WB9AIS asked: "Ken: I enjoyed your recent article on ready-made loops in *Monitoring Times*. Is there available such an antenna for 160 meters by any manufacturing company? "

"I have done a pretty thorough search of all the ham-related antenna manufacturers and I haven't found anything like a 160 meter receiving loop. My search did come up with a number of plans for constructing such a loop from dozens of hams who seemed also to be looking for the product. Just Google '160 meter receive-only loop' and you'll see what I mean.

"There doesn't seem to be anyone selling

such a product and it looks like a good opening for a ham/entrepreneur. One reason that it's not possible to build a small, effective loop for 160 similar to those used for the AM broadcast band is that most commercial stations operate at tens of thousands of watts, as opposed to hams who can only go as high as 1,500 watts but may be operating with just 100 watts or even less. The broadcast stations are just that much easier to hear!

"If any of our readers know of such a commercially made loop or have had experiences building their own receive-only loop for 160, let us know!"

*Ken Reitz KS4ZR, MT Staff*

## Pick-Up Antenna Solution

JA Moran volunteered this simple solution to mounting antennas on the prized pick-up truck without damaging the body or the paint:

"I have a 2004 F-150 longbed pickup. I had been using magnetic mount antennas; however, when I repainted the truck, I decided to build a dedicated area for the antennas. I have a 2/440 (150/450 MHz) antenna, a 27-32MHz (CB) a 6/2/440 and a 150/450/850 antenna. All are from Larsen Telley distributing and are NMO mounts.

"I bought two 8-foot 2x4's and a 1-foot section of metal channel stud (the header piece without any holes in it...)

"I built a rectangle that is 63 inches long (width of truck bed) and 24 inches tall (so as not to obstruct the rear window. The rectangle mounts behind the rear window. I threaded the coax from each antenna through an existing grommet behind the passenger seat. A ground wire is also attached to the metal channel and attached to the truck's frame

"Cost to build this was minimal."

*JA Moran*

Thanks, JA – Maybe this will inspire another reader to discover his own simple solution. When you build it, send us a picture and a description of how you did it!

Happy Halloween! In this month which celebrates spooks and all things weird and whacky, be sure to fully enjoy our slightly oddball hobby of radio monitoring!

*Rachel Baughn*

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*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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### Columnist Blogs and Web Sites

*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

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**

### Books by Ernest H. Robl:

• *The Basic Railfan Book*

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Detailed descriptions at:

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### Looking for Writers

*MT* is soliciting feature articles, reviews, and how-to articles covering shortwave broadcasting, utilities, scanning, frequency profiles, construction projects or whatever excites you! Contact Feature Editor Ken Reitz at *kenreitz@ monitoringtimes.com* or write c/o Monitoring Times, 7540 Hwy 64 West, Brasstown, NC 28902.

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