

Scanning - Shortwave - Ham Radio
Equipment - Computers - Antique Radio



Monitoring Times

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HAPPY NEW YEAR
FROM AROUND THE WORLD



MT Reviews:
Alinco DJ-X7T Pocket Radio
BandMaster Software
iRiver MP3 recorder
AOR LA380 Active Loop Antenna

AOR, the Authority on Radio Makes MORE Than Great Radios!

Discover these Accessories & Add to your Capabilities.



DA3000

Antennas for the Great Outdoors

DA3000: a 16 element receive wideband discone antenna with useable frequency coverage from 25MHz to 2GHz. Using different length elements to ensure true wideband characteristics, the DA3000 also includes one 'loaded' element to enhance low frequency performance. Engineered and manufactured to AOR's exacting standards, the DA3000 comes with 50 feet of quality RG58/U coaxial cable terminated in a BNC plug for the radio connection and a low-loss TNC plug in the antenna base. Pole clamps are also standard.

Designed for areas where space is a problem or when an "unobtrusive" installation is essential, **SA7000** is a super wideband coverage receive antenna with useable frequency coverage of 30 KHz to 2 GHz. The SA7000 is a passive arrangement with two whip elements: a long element for short wave up to 30 MHz and a second shorter loaded whip antenna for frequencies up to 2 GHz. The loading coils are tuned around 150 & 800 MHz to enhance VHF & UHF performance.



SA7000

Antennas for Indoor Enjoyment

AOR has made performance even better with the new **LA380** indoor antenna as successor to the popular LA350. The LA380 features full frequency coverage (40KHz - 500MHz) using a single receiving element. Designed to provide reception when away from the main monitoring location or when large external antennas are not practical, the LA380 is a compact active (1 foot diameter) loop antenna which features an



LA380

internal high-gain amplifier (20dB for 40KHz-250MHz) and excellent overall strong signal handling (high IP3 +10dBm). The loop design allows directional control and nulling noise or interference. Perfect for listening in remote locations or in antenna-restricted areas.

Accessories for Added Monitoring Capability



P25-8600
APC025 Decoder

Now you can monitor APCO 25 signals using an AR8600MKII. The **P25-8600 APCO25 Decoder** can be installed in the AR8600MKII receiver to automatically decode the APCO25 signal. The decoded audio is then output from the receiver's speaker. (Installation is required.)



TVA-1 External
NTSC TV Converter

The **TVA-1 External NTSC TV Converter** is compact, lightweight and easy to install. Designed to be used with the AOR AR5000A series of communications receivers, its simple operation uses the 10.7 MHz IF input from your receiver. Audio and video outputs allow monitoring a variety of sources such as broadcast TV, public safety agencies, aircraft, Amateur Radio FSTV, news media video and more.

The **TV5000A NTSC TV Internal Converter** adds the ability to receive broadcast television signals (NTSC) and allow monitoring video feeds from a variety of sources including broadcast TV channels, public safety agencies, aircraft, Amateur Radio FSTV, news media video and more when used with AOR AR5000A series of communications receivers.



TV5000A NTSC
TV Internal
Converter

The **TV2000 External NTSC Video Decoder** is designed to be used with the AOR SR2000. Compact and lightweight, no external power supply is required (power is supplied from the SR2000). The video output is available from the rear panel of the TV2000 and audio is provided from the SR2000 through the external speaker jack.



TV2000 External
NTSC Video Decoder



Authority on Radio
Communications

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accessories, visit
the website at
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External or internal? Which one suits YOU best?

- Software-defined DSP demodulation
- Excellent sensitivity
- High dynamic range
- Continuously adjustable IF bandwidth
- Optional DRM demodulator
- Real-time spectrum analyzer
- Graphical IF shift, passband tuning and notch filter
- User definable audio filter
- Noise blanker
- Audio and IF recording and playback
- Test and measurement facilities



WiNRADiO G313 Series Software Panel

WiNRADiO G313 series

External or internal? With the WiNRADiO WR-G313 series the choice is yours. There is the PCI-based internal G313i (fits neatly inside your PC, no power supply necessary, no cables, no clutter on your desk). And there is also the USB-interfaced G313e which can work very well with your laptop if portability is important to you. Both are very high-performance software-defined HF receiver models, 9 kHz to 30 MHz, optionally extendable to 180 MHz.

The G313 software contains numerous advanced features, many tuning and scanning options, virtually unlimited memories and a rich on-line help facility. There are numerous demodulation modes, and a real-time spectrum analyzer. There is an integrated recorder (for both audio and IF recording) and a signal test and measurement facility, previously unavailable with receivers of this price.

The latest digital signal transmissions using the breakthrough DRM technology can be received with the DRM Demodulator/Decoder Option.

With so many advanced features at a great price, and our large range of software and hardware options, the G313 series models will surely continue to impress.



WR-G313e (external)



WR-G313i (internal)

Reviews

"Overall, the G313 remains, in both its forms, my receiver of choice when trying to extract weak signals out of noise and interference. The Synchronous AM mode is particularly effective and the IF filters manage to cut a very sharp line between passband and stopband."

"Sensitivity and stability are also excellent."

Short Wave Magazine

"The G313's lack of receiver spurious responses was quite astonishing given that the inside of a PC is hardly a hospitable electrical environment."

"The measured sensitivity was remarkably consistent over most of the frequency range at -119dBm for 10dB S+N/N."

"It is a pleasure to be able to say that the G313i and its software display an outstanding combination of performance, functionality, quality and value for money."

"Overall rating: 5 stars"

World Radio TV Handbook 2005

For more information about WiNRADiO G313 radio products and the extensive range of accessories and options available to choose from, please visit:

WiNRADiO®

www.winradio.com



Cover Story

Around the World in 24 Hours

By Fred Waterer

New Years Eve is a time of traditions. As one year comes to an end and a new one looms on the horizon, people have created a variety of rituals to mark the transition. One challenging tradition enjoyed by radio hobbyists is to tune in stations around the globe in an attempt to hear the midnight hour in as many time zones as possible.

Some stations will carry special programming for New Years Eve; others carry on business as usual. To fill in those gaps which cannot be heard due to propagation or broadcast schedules, our trip around the world is supplemented by broadcasting now available on the internet. This year why not avoid the bad weather or the crunks on the highway, and challenge yourself to a full day of broadcast listening from around the world?

This 24-hour challenge can also be enjoyed whenever you've got the time! Read the story on page 10.

On our Cover: Image courtesy NASA Goddard Space Flight Center

C O N T E N T S

Gerryrigging a Contact with Antarctica 14 By Richard Finkel

When Kerguelen, an unoccupied volcanic island in French Antarctica, hosted an amateur radio DXpedition, there was a lot of excitement in the amateur radio community. The author knew it would not be easy, but he hoped to make a contact using Morse code to fill in one of his few remaining DX "countries."

Almost immediately, things began going wrong – failing coax, a blown amplifier, antennas cobbled together from the junk box – was he going to miss his chance? Was it a futile effort to "never give up, even when the odds are stacked highly against you"?

Bandmaster - Presiding at the Perfect Marriage 17 By John Catalano

Bandmaster is a program that combines the capabilities of amateur radio, computers, and the internet to open up enormous real-time possibilities. You can immediately see propagation conditions, tune the radio at a click, join an instant online community, perform automatic station look-up, logging, QSLing, and on and on. Can all this monitoring power be extended to shortwave listeners as well? Absolutely, says the author. The companion **Computers & Radio** column shows how to configure the program to control Icom receivers.

Reviews:

A new offering among wide-band pocket-sized radios is the **Alinco DJ-X7T**. Popular among race-car fans, this little gem does it all – AM/FM/TV audio, shortwave and scanning. We check it out on page 70.

A good companion accessory for today's crop of wideband receivers is **AOR's LA380 Active Loop Antenna**, covering 10 kHz through 500 MHz – no

need to keep swapping out antennas to match each band of interest. (See page 71.)

If you want to take your scanning to the next level, try automatic recording with the **iRiver H300 series MP3 recorders** and store up to 40 gigabytes of audio files! See page 66 to find out how. Also on page 69, check out the strange world of "appliance radios!"

World's #1 Selling Shortwave Guide!

PASSPORT to World Band Radio

Edition 2006

If you need it, PASSPORT TO WORLD BAND RADIO has it within almost 600 pages.

PASSPORT'S frequency-by-frequency Blue Pages are nearly a book unto themselves, covering every station on the air. This quick-access guide shows schedules, often confirmed by global monitoring, for each transmitter—times and days, locations and powers, target zones, networks, languages and whether there's jamming.

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PASSPORT'S "What's On Tonight" builds on this with hour-by-hour summaries of news, music, sports and entertainment shows in English. Station contacts and Webcasts? PASSPORT'S "Addresses PLUS" chapter is the industry bible, crammed with juicy tips. There's also a separate section on The China Connection.

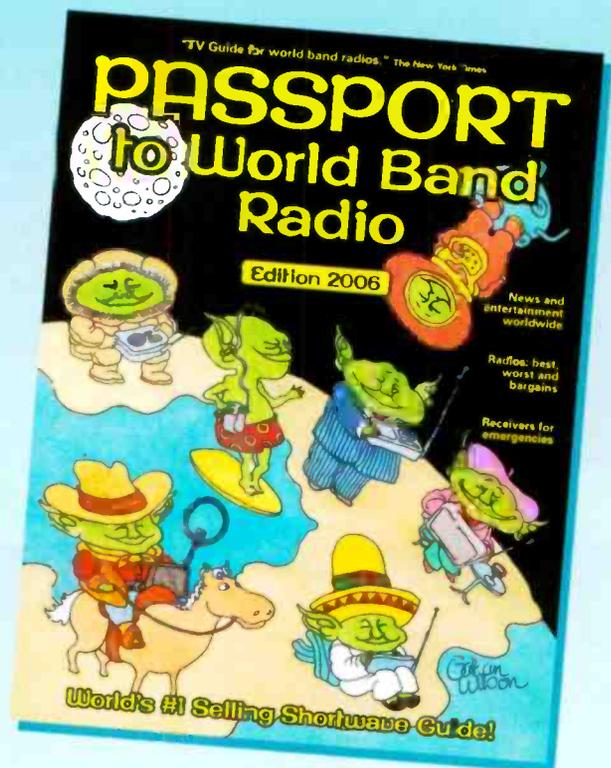
PASSPORT TO WORLD BAND RADIO is the world's favorite guide to shortwave listening
Available from major dealers and bookstores, or by Priority Mail direct from the publisher:

PASSPORT to World Band Radio Edition 2006

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mktg@passband.com
www.passband.com



PASSPORT REPORTS tests, evaluates and scores dozens of the latest portable, portatop, PC controlled, professional and tabletop receivers—outdoor and indoor antennas, too. *Outside* magazine minces no words, "The best. They tell you what's good about the good, bad about the bad, and advertisers be damned."

Re_Inventing Radio through Design and Necessity



FR250 \$50* Multi-Purpose

Stay informed and prepared for emergencies with this self-powered 3-in-1 radio, flashlight and cell-phone charger — no batteries required.

- _ AM/FM/Shortwave Radio Reception
- _ Built-in power generator recharges the internal rechargeable Ni-MH battery (Included)

- _ Cell-phone charger output jack 3.5mm (various cell phone plug tips included)
- _ Built-in 2 white LED light source and one flashing red LED
- _ Dimensions: 6-1/2"W x 6"H x 2-1/2"D
- _ Weight: 1 lb. 3 oz.
- _ Power Source: Built-In Rechargeable Ni-MH Battery Pack; 3 AA Batteries (not included); Crank power alone; AC Adapter (not included); AC Adapter recharges built-in Ni-MH battery pack



FR200 \$40* Crank it Up

Without the need for batteries, this self-powered 2-in-1 radio and flashlight helps you stay informed and prepared for emergencies.

- _ AM/FM/Shortwave Radio Reception
- _ Built-in power generator recharges the internal rechargeable Ni-MH battery (Included)

- _ Built-in white LED light source
- _ 12 international bands
- _ Dimensions: 6-1/2"W x 5-3/4"H x 2-1/4"D
- _ Weight: 1 lb. 2 oz.
- _ Power Source: Built-In Rechargeable Ni-MH Battery Pack; 3 AA Batteries (not included); Crank power alone; AC Adapter (not included); AC Adapter recharges built-in Ni-MH battery pack
- _ Available colors: Metallic Blue, Metallic Red, Sand



FR300 \$50*

All-In-One



This all-in-one unit offers functionality and versatility that makes it ideal for emergencies.

- _ AM/FM/TV-VHF/NOAA Radio Reception
- _ Built-in power generator recharges the internal rechargeable Ni-MH battery (Included)
- _ Can be powered from four different sources:
 1. The built-in rechargeable Ni-MH battery that takes charge from the dynamo crank and from an AC adapter (AC adapter not included)
 2. 3 AA Batteries (Not included)
 3. The AC adapter alone (AC adapter not included)
 4. The dynamo crank alone, even with no battery pack installed
- _ Cell-phone charger output jack 3.5mm (various cell phone plug tips included)
- _ Built-in 2 white LED light source and one flashing red LED
- _ Weather alert
- _ Dimensions: 6-1/2"W x 6"H x 2-1/2"D
- _ Weight: 1 lb. 3 oz.



S350 Deluxe \$150*

High-Performance Field Radio with Stereo Headphones

For S350 devotees the deluxe model combines a sporty new exterior with the same unrivalled functionality.

- _ Highly sensitive analog tuner with digital display
- _ Large, full range speaker with bass & treble control
- _ Clock, alarm, and sleep timer
- _ Built-in antennas and connections for external antennas
- _ Headphones included
- _ Dimensions: 12-1/2"W x 7"H x 3-1/2"D
- _ Weight: 3 lb. 4 oz.
- _ Power Source: 4 D or AA Batteries (not included) or AC Adapter (included)
- _ Available colors: Metallic Red, Black ■ ■

Improvements over S350:

- _ FM- stereo via headphones
- _ AM/SW Frequency Lock
- _ Set clock and alarm while radio plays
- _ Operates on 4D or 4AA batteries



S350 \$100*

Ruggedly Retro

With the look of a retro field radio sporting a rugged body and military-style controls – the S350 also features today's innovation for excellent AM, FM, and Shortwave reception and a large, full-range speaker for clear sound.

- _ AM/FM/Shortwave Radio reception
- _ Highly sensitive and selective analog tuner circuitry
- _ Liquid Crystal Display (LCD), for frequency and clock display.
- _ Digital clock with selectable 12/24 hour format
- _ Dimensions: 10-3/4"W x 7"H x 3-18-1/2"D
- _ Weight: 3 lb. 2 oz.
- _ Power Source: 4 D Batteries (not included) or AC Adapter (included)



YB550PE \$100*

Digital expertise

Offering high-tech digital performance and portability, the YB550PE packs performance into a small radio. Palm-sized and only 11oz, the YB550PE can receive AM, FM, and continuous Shortwave across all 14 international bands.

- _ Shortwave range of 1711 – 29,995 KHz
- _ Autoscan, direct keypad, and scroll wheel tuning
- _ 200 customizable station presets
- _ Alarm and sleep timer functions
- _ AC adaptor and supplementary antenna inputs
- _ Dimensions: 3-1/2"W x 5-3/4"H x 1-1/2"D
- _ Weight: 10.5 oz.
- _ Power Source: 3 AA Batteries (included) or AC Adapter (not included)



Please visit us at CES in Las Vegas, booth #36212, South Hall

*Prices do not include Shipping/Handling and applicable taxes.
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WRTH 2006



This year is the 60th anniversary of the bestselling directory of world broadcasting on LW, MW, SW & FM

An extended Features section includes special anniversary articles on *The History of WRTH*, *60 Years of Reception*, *50 years DXing*, *60 Years of Technology*, and *The Future of Radio*

The remaining pages are, as usual, full of information on:

- National and International broadcasts and broadcasters by country with frequencies, powers, languages, station addresses, email, web, phone and fax, leading personnel, QSL policy, and more
- Clandestine and other target broadcasters
- MW frequency listings by region
- International and domestic SW frequency listings
- International SW broadcasts in English, French, German, Portuguese & Spanish, listed by UTC

- Equipment reviews, *Digital update* and more
- TV by country
- Reference section with Transmitter Site Location Table, Standard Time & Frequency Transmissions, DX clubs, Internet Resources, and much more

SOME COMMENTS ON WRTH 2005:

"World Radio TV Handbook 2005, bible of SW broadcasting community, is as complete as it can possibly be" Glenn Hauser, *WORLD OF RADIO #1256*

"WRTH is the one and only authoritative source of information for everyone involved in international broadcasting" Prof. Wolf Harranth, *ORF/Austrian Broadcasting Corporation*

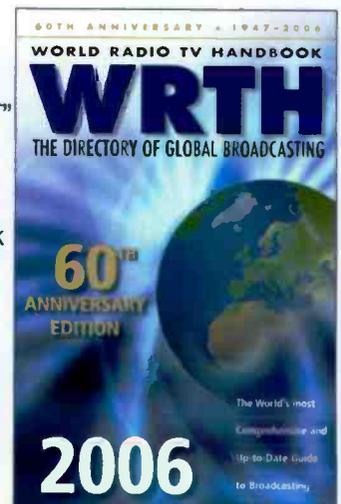
"Thanks for a stunning document – still the best value for money" Ed van den Heever, *South Africa*

"This edition is the best one yet (I have been buying the book, off and on, since the 1960s) It really is indispensable" Joe Analssandrini, *USA*

"Again this year, I can recommend serious DX-ers to buy this 'DX-ers Bible'! It really is a MUST" Anker Petersen, *Danish SW Club International*

"WRTH is now at its peak again" E Wyman, *UK*

"WRTH has been THE authority for my SWL for 20 years. Thanks for the most concise and informative radio reference" R Larkin, *USA*



**Available December 2005
for more information visit www.wrth.com**



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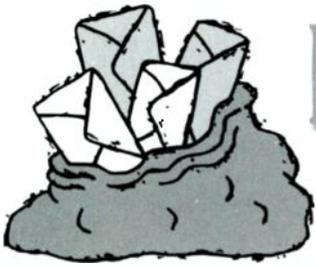
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LETTERS TO THE EDITOR

Second MT Internet Excellence Award

Monitoring Times is proud to give its second "Internet Excellence" award to the Worldwide Utility Club (<http://www.wunclub.com>) for its dedication and excellence in the field of shortwave utilities. This is a challenging area of the hobby which requires a lot of original work and analysis to uncover users, modes, locations, etc. WUN's club president, Ary Boender, and webmaster Jason Berri shared a bit about where WUN has come from and where it is headed:

"The Worldwide Utility News (WUN) club web site was started as part of the creation of WUN back in 1995. WUN was created to provide an electronic medium (mailing list and web) for utility DXers to exchange information. The site was put together in the early days of the internet, when web browsing was still in its infancy.

"The WUN club site has evolved over the years from a simple design that was basically an archive of monthly club newsletters, to the more sophisticated, comprehensive design you see today. The site is constantly being updated, and undergoes regular reviews of design and content. In the future the site will continue to be a mainstay on the internet to provide information for utility DXers around the world."

While the site appears simple and utilitarian, there is a wealth of information available via menus or the search button. One of our favorite tools for the beginner is the library of audio files for about 30 different digital modes. Other comprehensive lists of ships, aircraft, callsigns, etc. help in the identification of intercepted signals. The WUN listserver is an excellent tool for sharing real-time intercepts for propagation and direction-finding purposes.

As always, a club or publication is only as good as its members and contributors, and in this, too, WUN is a winner. We hope you'll visit them soon.

Correction Corner

Two errors slipped through in the November article on Hurricane Katrina. Mac McCormick III wrote author Larry Van Horn, "You have the callsign DAWG listed as USAF C-130H 165 AW/158 as Dobbins AFB. The DAWGs are 165 AW/158 AS, but they are GA ANG out of Savannah IAP." Larry says his database agrees - he doesn't know where he picked up the Dobbins ID!

However, don't fault Larry with identifying the ARRL as the Amateur Radio Relay League! That was his editor's fault and I certainly know better - It's the AMERICAN Radio Relay League!

We also owe *Passport to World Band Radio* an apology for running the wrong ad in November and December, due to a file name confusion. You no doubt realized the *Passport* ad meant the new edition was ready, but we are running the correct ad another two months anyway, and we regret the error.

In Glenn Hauser's December column, we picked up a website link for the condig list he referred to, but it was completely incorrect. It should have been <http://groups.yahoo.com/group/condiglist/>

While we're talking of corrections, some folks don't realize we post corrections on our website as quickly as we learn about them. There is a button at the top of <http://www.monitoringtimes.com> entitled "Corrections Corner" where we have corrections to issues going back to January 2002. Even dead internet links (not strictly an "error") are often listed there if we know their new site address. (Such as a URL correction in this month's *Computer & Radio* column.)

Eavesdropping on Mt St Helens

"As a LONG time subscriber to *MT*, I have never had anything of value to share in regards to my scanning hobby, until now.

"On a recent trip to Mount St. Helens I visited the viewing center across the valley from the crater itself. I was showing the display of the quick deployment seismometer to my kids as I began pointing out the various parts, GPS, seismic sensor, data package, radio and antenna, when one of the rangers took notice of my identification of each part and the fact that many other visitors started to ask ME questions

about its functions!

"The ranger asked me how I knew so much about the equipment and I explained that I liked to monitor the analog seismo sensors in Southern California and that I was an amateur radio operator. We talked for a few minutes and I asked her if she would provide me with a few frequencies for the sensors on St. Helens.

"Here are three of the frequencies she shared with me. Typically these temporary type sensors send out an analog FM signal that sounds like a steady tone when the ground is stable and a warble tone when the ground shakes. The pitch of the audio tone (up and down) is in direct correlation to the amplitude of the quake.

"The ranger gave me the frequencies listed in Hz, however after careful investigation of the radio antennas on the roof I figured that she didn't know Hz from MHz. (See photo attached)

679 MHz STD - Studebaker Ridge - in front of mountain.
2380 MHz YEL - Yellow Rock - inside crater
2720 MHz ELK - Elk Rock - 20 mi from mtn.

"I didn't go to the mountain with all of my receiving gear; all that I had was my HT. I tried to pick up the 679 MHz signal but it was impossible on a rubber duck."

- Scott Tokar N6ZHV

Used Equipment

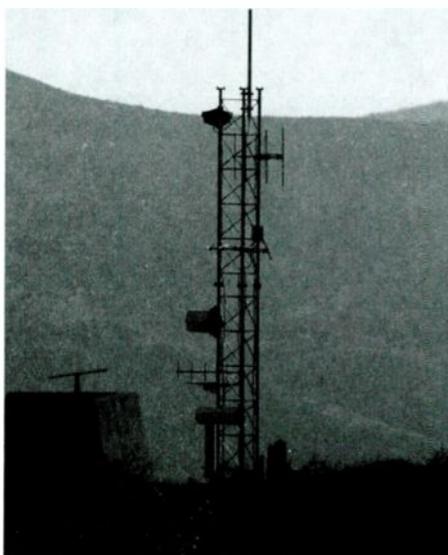
Ed Yeary passed along the following business where he found one of the better lists of used equipment he'd seen - "Some good rigs at good prices." Of course, stock always changes, but check them out: R&L Electronics, 1315 Maple Ave, Hamilton, Oh 45011; (800)221-7735 Order line; (513)868-6574 Fax; <http://www.randl.com>

Happy New Year!

We hope you are enjoying the redesign of the shortwave guide section for larger print. Several of you had let us know it was becoming difficult for you to use the frequency section. When we saw a way to remedy it, we didn't wait until the new year, but put the new design into effect immediately.

We always appreciate your feedback and suggestions; even if nothing happens right away in response to your suggestion, we do listen and weigh your requests with those of others.

I hope you enjoy the feature by Fred Waterer in our New Year's issue. But, even if your magazine arrives after December 31st, you can still take the challenge to monitor the world in 24 hours. We offer the story as another way to make all your *monitoring times* in 2006 happy ones!





COMMUNICATIONS

AMATEUR RADIO

.... - . - - - -

My New Year's Resolution is to go straight – straight to the ARRL Straight Key Night, that is! Every New Year's Eve, operators bring the past to the present and enjoy some good old-fashioned QSO fun using straight keys. The emphasis is on rag-chewing rather than fast contest-type exchanges. *SKN 2005* begins at 7:00 p.m. EST December 31 and runs for 24 hours through 7:00 p.m. EST January 1. You will hear as many vintage radios on the air during *SKN* as you will a variety of keys. Suggested areas of operation of 80, 40, and 20 meters are 60 to 80 kHz from the lower band edges and 10 kHz from the lower Novice-band edges.

AVIATION

Restricted Air Space

The Federal Aviation Administration posted a Notice of Proposed Rulemaking to create a "National Defense Airspace" over the greater Washington, D.C., metropolitan area, affecting approximately 150 area airports. The FAA contends this new type of restricted airspace is needed to protect our nation's capitol from terrorist attack using general aviation aircraft.

After more than 18,000 comments were received, the FAA extended the Nov 2 deadline for an additional 90 days and has promised a public hearing on the issue.

Malfunction or Interference?

Boston's Logan International Airport spent two frustrating days of delays in mid-October trying to trouble-shoot a malfunctioning radar system. A problem antenna was suspected, but interference from a new building, cellphone tower, or ship at sea, or even sabotage could have been at fault.

After similar systems in St Louis and Kansas City also crashed or were shut down after displaying thousands of non-aircraft blips, suspicion is turning toward migratory birds as the cause. All three airports were using the new Airport Surveillance Radar model 9.

Here Today, Gone Tomorrow

This is probably not aeronautical, but it does have to do with interference: The first weekend in November, many automatic garage doors in a 25-mile radius around Ottawa, Canada, (including the gates of the Angolan Embassy), stopped working due to a powerful radio signal.

The signal is transmitted on the 390-megahertz band, which is used by virtually all garage door openers on the continent. That's the same frequency used by the U.S. military's new state-of-the-art Land Mobile Radio System which has caused similar problems in the U.S., but the frequency band 225-399.9 MHz is also allocated

for Government of Canada usage.

It's interesting, however, that the signal disappeared on Monday, about the time CBC News called the US embassy to ask if they knew anything about it.

BROADCASTING

"Hard Date" for Digital TV

The Senate set April 7, 2009, as a firm date for television broadcasters to switch to all-digital transmissions (after basketball play-offs are over), and provided \$3 billion to help consumers buy digital-to-analog converter boxes for analog sets. However, legislation approved by the House Energy and Commerce Committee calls for a Dec. 31, 2008, deadline and provides only \$1 billion for the converter boxes. Differences will have to be worked out in a House-Senate conference.

The Senate measure also sets aside \$1 billion for public safety to buy new radio equipment which will utilize the 700 MHz frequencies released by the broadcasters. The House measure would fund the new radio equipment and set-top boxes with revenue garnered from auctioning remaining spectrum not allocated to public safety.

Meanwhile, the Federal Communications Commission has ruled that small TV sets must be digital-ready by March 1, 2006, and mid-sized sets by March 1, 2007.

Low Power AM?

The Federal Communications Commission is considering proposals to establish a low-power service for AM similar to the service already established for FM. The deadline to submit comments to Docket RM-11287 was the end of November.

Football Won't Play this Call

The FCC has granted the NFL permission to ignore the callsign identification rules for stations KNNF411 and KNNF412. These licenses cover 90 2-watt mobile units on UHF frequencies between 451 and 470 MHz, used by coaches to call plays in to their quarterbacks. The League told the Commission the transmission of callsigns in noisy stadiums confuses the quarterbacks and interferes with the orderly calling of plays. The frequencies can be found at: <http://wireless2.fcc.gov/UlsApp/UlsSearch/licenseFreqSum.jsp?licKey=1775688> <http://wireless2.fcc.gov/UlsApp/UlsSearch/licenseFreqSum.jsp?licKey=1775689>

Don't Mess with Homeland Security

The U.S. Supreme Court has refused to consider an appeal from Rajib Mitra who was sentenced to eight years in prison for jamming Madison, Wis., police radio frequencies. (See *MT* Jul 2004) Mitra's attorney said people have done similar crimes and the Federal Communications Commission usually only gave out a civil violation. Instead, the judge ruled that the police

communication system qualified as critical infrastructure under the new federal anti-terrorist guidelines that took effect in November 2003. "It's a long time to spend in a federal prison for a prank," said Mitra's lawyer.

Ain't It The Truth!

As first responders and congressmen bewail the lack of sufficient spectrum as the primary obstacle to effective communications, we appreciate the candor and frustration voiced by David Boyd, director of Safecom, the communications program of the Office of Interoperability and Compatibility at the Homeland Security Department.

Boyd told members of a congressional sub-committee that *people, not technology*, are the greatest obstacle to achieving interoperable communications. Public safety organizations that build *cooperative agreements around tools and procedures* can solve most emergency communications problems, he said. (Emphasis ours; see our November editorial.)



Some of you may remember the International Mission Radio Association (IMRA), a Ham Radio network founded in 1963. Most of its members were missionaries in many parts of the world. IMRA dissolved the organization September 2005, as missionaries now use more widely-available alternatives for global communication.

In late September, hacking and disruption of the Long Island and Northeast Scanning Forum caused owner Jim Fordyce to take down his website, www.fordyce.org. Charles Hargrove, N2NOV, invites those looking for New York City information to participate in the NYDXA SWL & Scanner Listeners Net which has been running since March 1992 and in their online forums at <http://www.n2nov.net/phppbb/>. The NYC-ARECS/RACES Net meets Mon. @ 8:30p.m. 147.360/107.2 PL <http://www.nyc-arecs.org>; NYDXA SWL & Scanner Net meets Wed. @ 9p.m. 147.360/107.2 PL <http://www.n2nov.net>

"Communications" is compiled by editor Rachel Baughn KE4OPD from newscippings and emails sent in by our readers. Many thanks to the fine folks who contributed during the last two or three months, when we had no column in which to give them credit: Anonymous, Azizul Al-Amin, Harry Baughn, Alan Bosch, Kevin Carey, Richard Cuff, Mark Cobbeldick, Bob Grove, David Guretzki, Charles Hargrove, Wayne Heinen, Norman Hill, Sterling Marcher, John Mayson, Jerry None, Ken Reitz, Michael Reynolds, Doug Robertson, Brian Rogers, Iden Rogers, Doug Smith, Robert Thomas, Gayle Van Horn, Larry Van Horn, Robert Wyman, and Ed Yeary.

Happy New Year Around the World in 24 Hours

By Fred Waterer

New Years Eve is a time of traditions. As one year comes to an end and a new one looms on the horizon, it's a time to look back – and to look forward, to what we hope will be better times. It's also a time of some very ancient traditions and some more recent ones. For instance, shouting and cheering at midnight is a very ancient practice, designed to frighten away any evil spirits. Being surrounded by friends and loved ones at midnight, toasting the New Year, and singing *Auld Lang Syne* are also long-standing traditions.

My personal tradition is to try to listen to radio stations all around the world, as the planet celebrates the arrival of the New Year. And with the advent of the internet, one can now get an even more local flavor to the worldwide celebration.

Early New Year Broadcasting

Special programming for the holidays is nothing new. In fact, the first ever radio broadcasts were reportedly transmitted on Christmas Day and repeated on New Years Day, 1906, by Canadian inventor Reginald Fessenden. One could perhaps argue that these two broadcasts represented both the birth of radio programming and of the DX hobby. The programs consisted of some phonograph music, Fessenden both speaking and singing (with violin accompaniment), and general wishes for a Merry Christmas and Happy New Year. They subsequently received reports of reception from as far away as the West Indies.

Fast-forward to 1929 and the inauguration of what was to become a broadcast tradition for parts of six decades, initially on radio and then on television. Guy Lombardo and his Royal Canadians began a New Year's Eve staple, playing the Ballroom of the Waldorf-Astoria in New York. Thanks to the broadcast of this performance across Canada and the United States, listeners across the continent could share in the celebrations vicariously. So popular was this broadcast that one year, his New Year's Eve show was on two networks, switching from CBS to NBC at midnight.

The Lombardo broadcast is an example of the power of the relatively new medium of radio. During that first 1929 performance, Lombardo chose to play his arrangement of a song he had often heard sung by Scottish immigrants during his youth near London, Ontario.

That song was of course, *Auld Lang Syne*. So many people heard it and accepted it as a New Year's "tradition," that it became one of the largest selling records of the time; even today over 75 years later, radio stations that would normally never think of playing Lombardo's style of music (billed as "the sweetest music this side of heaven") will play his version of *Auld Lang Syne* at midnight. You are also just as likely to hear it from Australia or South Africa, as you are to hear it in New York!

A Worldwide Celebration

The celebration of New Years Eve and New Years Day is certainly not just a North American phenomenon. Virtually every country in the world that uses the Gregorian calendar has some sort of celebration as the old year comes to an end and a new one begins.

It's always been a fun exercise to follow the progress of the celebrations around the world, as each country and region rings in the New Year. As world band radio listeners, we have always had the ability to do this, and with the arrival of the internet, we can enhance the experience by having access to any number of local and regional radio stations throughout the world.

CNN did a visual version of this on Dec 31, 1999, as they celebrated the arrival of the new millennium (which wasn't actually the turn of the millennium, but that's a whole other story). It was fun to watch.

How to Get Started

So what does one have to do to follow the events around the globe? Rising early on December 31st (from a North American perspective) one can easily begin the journey around the world as the New Year arrives in each time zone.

The first method is to listen to the BBC World Service. As each time zone begins its own celebration, the BBC announcer will wish their listeners in that particular region a Happy New Year.

What follows is a brief rundown of suggestions as to where to tune and when, in order to hear the New Year celebrations in different regions of the world. May I recommend

that you consult your favorite guidebooks, DX programs, and websites in advance, in search of last minute program information, and try to tune in your preferred station well before the stroke of midnight. Also, keep an eye on <http://www.timeanddate.com>, which was consulted for this article.

Asia-Pacific

Beginning west of the International Date Line in the Pacific, the New Year arrives in New Zealand at 1100 UTC Dec 31. One can try for Radio New Zealand International or one of the local radio stations in New Zealand via the internet.

The New Year next arrives in the Melbourne studios of Radio Australia at 1300 UTC. Try 3AW in Melbourne via the internet for the local perspective <http://www.3aw.com.au>. Australia is obviously a large country spread across three time zones; therefore, it takes three more hours for the New Year to arrive in Western Australia. In the meantime, try for local programming in Brisbane at 1400 and Darwin at 1430. Perth in Western Australia parties at 1600. For local flavor, try <http://www.6pr.com.au> for New Year celebrations in Perth.

Midnight in Tokyo is at 1500 UTC. NHK Radio Japan joins in with special programming taken from the NHK Tokyo service in Japan. Check regular NHK Radio Japan services in the 1100-1530 UTC time span. Reception of this has reportedly been spotty over the years, at least in North America.

Taipei, Beijing, Manila, Hong Kong, and Singapore all celebrate midnight at 1600 UTC. Your best bet for hearing any special programming from these countries in North America may be local programming via the internet.



Voice of Vietnam circa 1986





С Новим роком!

Radio Kiev circa 1984 "Happy New Year"

South Asia, the Middle East and Russia

Moving eastward, the New Year arrives in Pakistan at 1800, in New Delhi at 1830, and in Kabul at 1930 UTC.

Now we are arriving at one of the busiest time periods. Many countries in Europe, the Middle East, and Africa all join the New Year in the next few hours.

First up at 2000 UTC are Abu Dhabi and Iran. Then at 2100 UTC, Kuwait, Saudi Arabia, Iraq, and Nigeria all greet the New Year. 2100 is also, as the song says, *Midnight in Moscow*. While you would be wasting your time looking for anything special on the Voice of Russia at midnight, Moscow time, perhaps one could try for something domestically, such as Radio Rossi, or one of the on-line private stations. I often listen to one or other of the feeds at <http://www.101.ru> out of Moscow. Perhaps something could be heard there.

Europe and Africa

At 2200 UTC, midnight arrives in a large number of countries, including Israel, Egypt, Turkey, Ukraine, South Africa, Belarus, Romania, Finland, Greece, and Bulgaria. You might hear something via shortwave from Israel or Greece. Many Israeli networks are online. Once again, if you live outside of Europe, look for something online from the other mentioned countries.

One annual New Years Eve tradition, which is long gone, was the annual phone-in from Radio RSA in Johannesburg, South Africa (now known as Channel Africa). Heard in the early eighties, this may in fact have been the first example of what is now a common type of program, the international call-in show. During the apartheid era, it was a

typical attempt to foster goodwill. Hosted by the self-proclaimed "Two Mail Bags," Shirley Veal and Kathy Fitch, it was a unique opportunity to talk directly on the air, and was widely listened to for several years. In 2006 this type of program can be heard on any number of stations, for example BBC's "World Have Your Say," or VoA's "Talk to America."

At 2300 UTC, much of the rest of Europe joins the party, including Poland, Serbia, Croatia, Austria, Sweden, the Czech Republic, Germany, Italy, Denmark, Norway, Switzerland, Holland, Belgium, France, and Spain. Austrian (ORF), German (Deutsche Welle), and Spanish (RFE) programs should have live broadcasts. Italian (RAI), Croatian (HRT), French (RFI) may be available live. HRT Radio in Zagreb, Croatia is certainly available 24/7 via the internet <http://www.hrt.hr/hr/>

At 0000 UTC Jan 1, 2006, as the time suggests, it is midnight at the BBC, and also in Dublin, Iceland, and Portugal.

New Years Eve is perhaps the only time of the year that one can hear the world's most famous bell chime. Located in St Stephen's Tower, "Big Ben" is the nickname of the largest bell in the tower, the bell that marks the hours. A few minutes before midnight UT, tune in to BBC World Service and hear "Big Ben" in London ring 12 times as January 1st arrives. Occasionally, you can hear the crowd cheer as the 12th chime sounds and before the BBC cuts back to the studio.

Don't forget that you can listen to any number of BBC broadcasts online. It might be interesting to check out some of the domestic networks and regional stations such as BBC Radio Scotland or BBC Radio London. Just go to the BBC website <http://www.bbc.co.uk/radio> and browse for your station of choice. Or if you prefer Ireland, try RTE Radio 1 online, <http://www.rte.ie/radio1/index.html>

Portugal should be audible on both shortwave and the internet. There is an impossibly long URL for the live audio, so just log on to <http://www.rdp.pt> and navigate to radio and RDP International.

The Americas

Staying with a Portuguese theme, there is now a two-hour wait as one crosses the Atlantic to Brazil at 0200 UTC. Try the tropical and shortwave bands for Brazilian stations.

Next, at 0300, much of the rest of South America comes into play, with Argentina and Chile reaching midnight local time, followed at 0330 by the Canadian province of Newfoundland as the New Year finally arrives in North America. The Canadian Broadcasting Corporation website may be quite useful. I am not really sure that CBC stations across the country do anything special at midnight (the TV network has been known to show films that begin before midnight and run right through into the New Year without even acknowledging it). However, you can try accessing the stations across the country. For links go to <http://www.cbc.ca/local/>



Shirley Veal and Kathy Fitch hosted the now defunct New Year's Call-In Show on Radio RSA in the 1980s.

At 0400, the areas in the Atlantic Time Zone ring in the festivities (Nova Scotia, New Brunswick, Cuba, Venezuela, and Puerto Rico). Powerhouse CBC station CBA in Moncton, NB (1070) is a good bet to be heard in Eastern North America. Venezuela is a more difficult catch than it used to be. Perhaps try for Cuban stations as well, such as Radio Rebelde.

At 0500 the Eastern Time Zone arrives at midnight, including major areas of North America such as Quebec, Ontario, New York, Boston, Detroit, Philadelphia, Atlanta, Washington; and outside North America, Colombia and Peru. Any number of clear channel AM radio stations will be on the air, including CKAC 730 Montreal; CFRB CFRX (1010/6070), CHOW 740, and CHUM 1050 in Toronto; WABC 770, WNBC 660 and WCBS 880 in New York; WBZ 1030 in Boston, WSB 750 in Atlanta and many others, many of which will be streaming on the internet as well.

Since most of the American shortwave stations are Christian in orientation or platforms for paid programming, don't expect too much live programming, if any, from most of them. Possible exceptions may be WBCQ and WRMI.

Next up at 0600 is the Central Time Zone (Winnipeg, Chicago, Minneapolis-St Paul, New Orleans, Houston, Dallas, Nicaragua, Mexico, and much of Central America). 0600 is probably a good time to cruise the tropical bands looking for Central American signals. Also, I have noted

Feliz Año
1988

RADIO HABANA CUBA



Inside and outside of a New Years Card from Radio Tashkent, circa 1986. The slogan in gold on the cover reads "Happy New Year" in Russian

a number of Mexican stations stream online. WRNO, also sadly gone, was heard one year virtually simulcasting with WWL.

Garrison Keillor's weekly radio show will broadcast twice on Dec 31, 2005. "A Prairie Home Companion" can be heard during its regular Saturday timeslot from 5-7 pm CT. Later in the evening Keillor will present a special live broadcast from 10pm-1am CT. The program originates in The Fitzgerald Theatre in St Paul, Minnesota.

The New Year finally arrives at 0700 in the Mountain Time Zone (Edmonton, Calgary, Denver, and Phoenix) and at 0800 on the West Coast (British Columbia, Washington, Oregon, and California). As with the East Coast, look for programming from the big cities, Vancouver, LA, Seattle, and so forth.

0900 is midnight in Alaska. I have no idea if it has any special programming, but I do occasionally listen to a radio station online in Anchorage, KNBA 90.3 FM. Despite the call letters, it has nothing to do with basketball, but is operated by the Koahnic Broadcast Corporation (KBC), a nonprofit, Alaska Native governed and operated media center located in Anchorage, Alaska. "'Koahnic' is an Athabascan word in the Ahtna dialect meaning 'live air'." <http://www.knba.org/> Since Alaska is rarely heard here in the south, you may have to peruse the internet.

And 23 hours after we began the journey, we reach the end of the line at 1000 UTC when the New Year arrives in Hawaii, just east of the International Date Line. There is nothing much here on shortwave, beyond KWHR and WWVH. Your best bet in North America may be the internet.

More to Hear Than Just Auld Lang Syne

Don't think that all you will hear is 15 or 20 versions of *Auld Lang Syne*. In the days and nights between Christmas and New Years Eve, and later on New Year's Day, most international broadcasters present programs looking back at the current year as it comes to an end and looking forward

to the year to come. Since this period is often a holiday period for staff, most programs were prepared well in advance. Regularly scheduled programs may have "special editions" or may be dropped in this period and replaced with special end of the year programming. So you are likely to hear reports on the year in sports, the year in politics, economic reviews and previews, and so forth.

There is much light-hearted fare as well. Some stations exhibit a real sense of humor. For instance, Radio Moscow (as it was then known) had a very enjoyable program one year featuring members of the staff sending greetings and singing songs (*Auld Lang Syne*) sadly yet good-naturedly, quite off key.

Another radio station exhibiting quite a sense of humor is Radio Prague. Over the years, Radio Prague has become notorious for being able to laugh at themselves and their countries' politicians. For instance, in 2003 on New Years Eve, Radio Prague aired a program in which they parodied many of their regular programs. One Christmas, Radio Prague also poked fun at the Czech Prime Minister, with Santa Claus being accidentally confused with (then) Czech Prime Minister Vaclav Klaus, leading to some very funny misadventures, which were set right in time to save Christmas. It's impossible to imagine the Cold War Radio Prague making light of Communist boss Gustav Husak. More evidence the times have changed indeed.

New Year's Eve was a big celebration in Soviet times; to some extent this lingers today. Look for some entertaining programs from the Voice of Russia and other former Soviet states.

The Canadian Broadcasting Corporation has a history of dropping their regular schedule on Christmas Day and New Years Eve/Day (and all statutory holidays, for that matter). You never know what you might hear. For a number of years one of the highlights of the season for me was a program called "Snap, Crackle and Pop." Roy Forbes seems to "pop" up on Canadian holidays on a regular basis. The CBC describes the show thus: "Ring out the old year and ring in the new with two hours of great music on 'Snap, Crackle, Pop.' Singer, songwriter and record producer Roy Forbes draws on his huge collection of vintage recordings for music by Jack Teagarden, Brent

Titcomb, Clyde McPhatter and the Drifters and yes, even Guy Lombardo and his Royal Canadians. So make a date with Roy Forbes and co-host Paul Grant for New Year's Eve." (CBC HotSheet Dec 31 2001) I've heard these shows for many years. Forbes has an amazing collection and an encyclopaedic knowledge of the music he plays. Just an example of what you can hear.

Another New Year tradition originates in Vienna. The annual Vienna Philharmonic New Year concert is seen or heard by an audience estimated at 1 billion persons. With audience participation reminiscent of the BBC Proms, the lively Strauss music is an annual treat. It can be heard via shortwave on ORF and can usually be seen on television in North America. Check out the Vienna Philharmonic website closer to the time.

So, there is a brief retrospective of some of the programs one can hear at New Years. It's always an interesting time to listen, and I wish you luck in your listening efforts.

As a final observation, just after midnight arrives in your time zone, it's interesting to surf up and down your local dial. It's amazing how many stations will be playing either *Auld Lang Syne* or *New Years Day* (or both) as by performed by U2. At one time you might have heard 1999 by Prince, but that is fairly passé now.

Orthodox Christmas

And finally...if you are not too tired of Christmas yet, don't forget that Orthodox Christmas is celebrated in a number of countries, including Armenia, Belarus, Bulgaria, Georgia, Greece, Moldova, Romania, Russia, Serbia (and many of the former republics of Yugoslavia), on January 6. Try some of these around this time of year, as each country has for all intents and purposes a "state" church.

About the Author:

Fred Waterer has been a shortwave listener for close to thirty years, with an interest in radio history. He's also been editor of the "Programming Matters" column in the Ontario DX Association's publication "Listening In" for 20 years. Fred resides in St Catharines, Ontario.

Best Bets on Shortwave

UTC	Country, Station	Freqs kHz
1100	New Zealand, RNZI	9885 (0800-1059 UTC) 15530 (1100-1259 UTC)
1300	Radio Australia	9580 11660
1500	Radio Japan	9750 11815 (Japanese; 11705 via Canada) 7200 9875 (English; most frequencies beamed to Asia)
2200	Greece, Voice of	9420 7475 (15485 to North America, ends at 2200)
2300	Spain, REE	9535
	Germany, DW	6075
	Austria, ROI	6155 5945
	Croatia, HRT	9925
	Italy, RAI	11800
0000	United Kingdom, BBC	5975
	Portugal, RDP	15540 9715 at 0000 UTC
0330	St John's NF, CKZN	6160 (not an easy catch)
0400	Cuba, Radio Habana	6000 9820 (English)
0500	US, WBCQ	5110 7415 9330
	US, WRMI	7385 9955
0800	Anguilla, Caribbean Beacon	6090 (Is the late Gene Scott's ministry live on New Years Eve?)
1000	Hawaii, WWVH	2500 5000 10000 15000 (time standard station)

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Gerryrigging a Contact with French Antarctica

By Dr Richard Finkel, W1TSP

For the amateur radio operator interested in DX, the French Antarctic territory is one of the more elusive areas of the world. It consists of two groups of islands in the South Indian Ocean, Iles Kerguelen (FT-X), and Iles Crozet (FT-W). Other rare DX entities in this part of the world are Heard (VKOH), Macquarie (VKOM), and the Campbell and

Auckland Islands (ZL9). (fig. 1) Further to the West are Bouvet, as well as South Georgia, Sandwich, Shetland, and Orkney.

Kerguelen is a volcanic island which has no permanent inhabitants. Access to it is limited, but there are visits by scientists who are studying the natural fauna. So, when it was announced that a large radio expedition would

take place beginning 19 March 2005, there was great excitement among DXers.

The Difficulty of Contacting Kerguelen

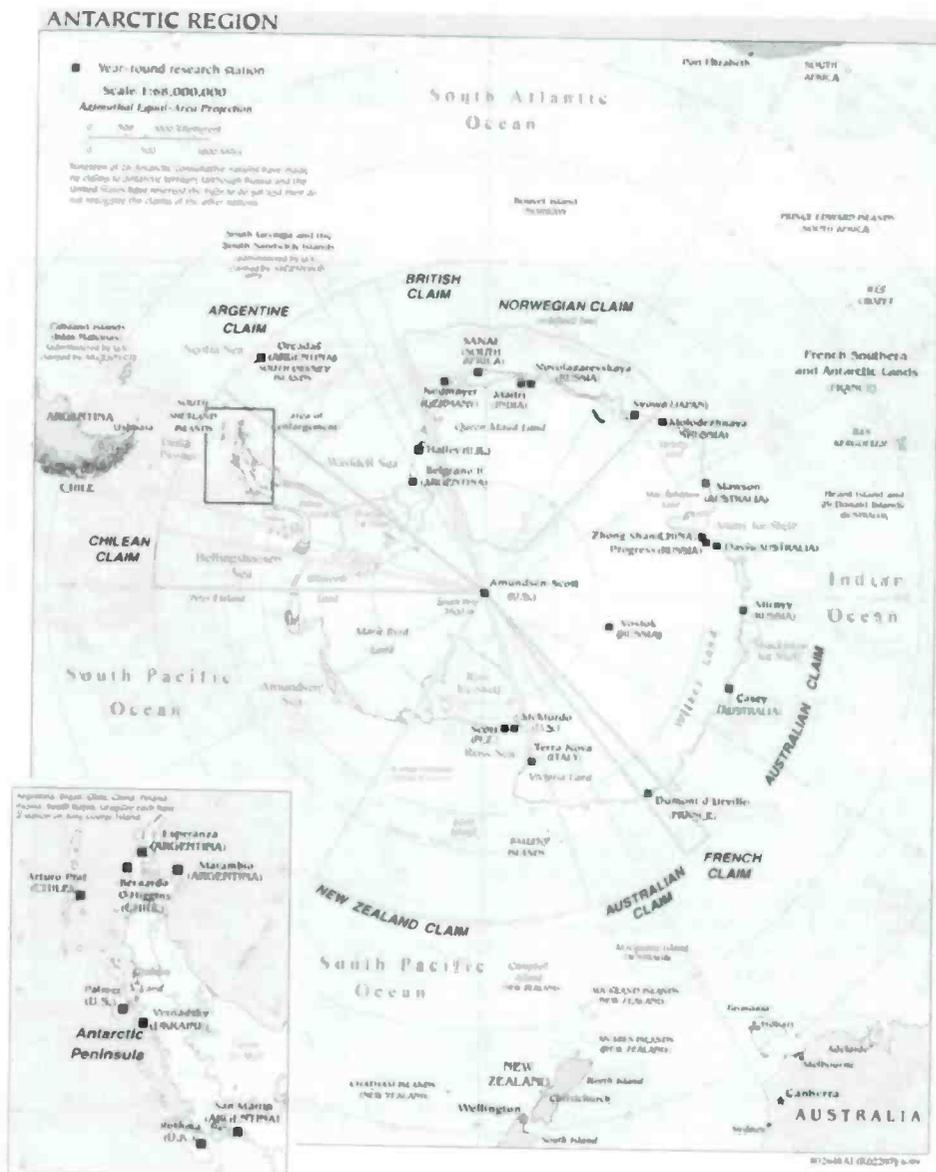
Kerguelen is of particular interest to me because it is one of the last five amateur radio "countries" that I've not contacted on CW (Morse code). I realized that getting a QSO (a contact between radio amateurs) would not be an easy task. The island is located 10,500 miles from my QTH (location) near Boston, and my antennas are modest. Another problem is that the decline in sun spot numbers at this point in the sun spot cycle limits propagation of radio signals on the higher frequency bands. Under these conditions, a contact on 10, 12, or 15 meters seemed highly unlikely, if not impossible.

As I prepared myself by studying when paths to Kerguelen were likely to be open, unexpected problems developed. I began to notice atypical SWR (standing wave ratio) readings when using my Carolina Windom, an antenna that I rely on for 12, 17, 30, 40, and 80 meters. Unwisely, I ignored the problem, hoping it would go away. When the situation worsened, I began to suspect that the antenna, which was quite old and had survived many New England winters, might require a new matching transformer and/or line isolator.

The Half-Square Antenna

Although hams are known for their resourcefulness and ingenuity, I wasn't at all confident that I possessed those attributes. Nevertheless, after rummaging around in my basement storage room, I found a 40 meter half square, an antenna consisting of two vertical 1/4 wavelength elements joined by a 1/2 wavelength horizontal element and fed at an upper corner with 50 ohm coaxial line (figure 2). I hadn't been using it because adequate height to support it was not available.

The half-square is a very effective DX antenna, because it radiates a bi-directional signal at a low take-off angle, essential for very long distance DX. For example, when the angle is at 40 degrees, one skip off of the ionosphere would be less than 1000 miles, but when the angle is 15 degrees, skip distances of over 2000 miles are possible (fig.3). In addition, the half-square has more gain than a dipole. (See



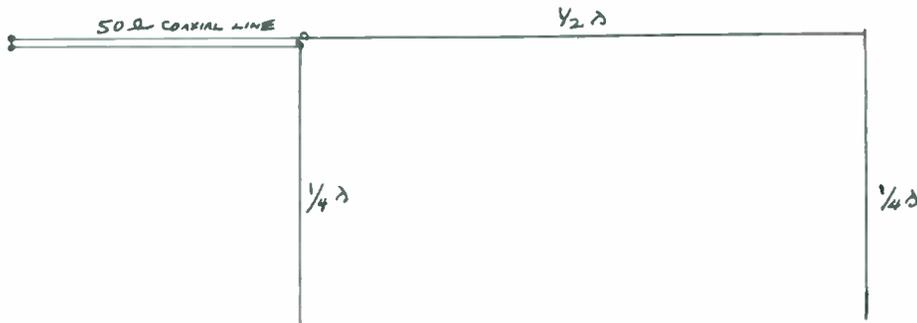


FIGURE 2 HALP-SQUARE antenna. Ideally the 50 ohm line is extended for at least 1/4 wavelength along the axis of the horizontal element.

Antenna Topics for more on radiation angles.)

In the manual for the antenna I found a response from the manufacturer to an inquiry I had made 10 years before, which explained how to adapt the antenna for 30 meters. Since I had made many DX contacts in the Antarctic on that band and had room for a 30 meter half-square, I went ahead with the modification. I shortened the half wavelength horizontal element and folded back the vertical elements until they were 1/4 wavelength for 30 meters, attached the 50 ohm coaxial transmission line which had previously fed the Carolina Windom, and hung it between my 40 foot tower and a tree. As I attempted to trim the elements for resonance, I found that no matter what the length of the elements, I couldn't achieve a standing wave ratio (SWR) lower than 20.

It was then that I realized that I had misdiagnosed what was wrong with the Windom, and that the problem was likely in the transmission line itself. Although the line was high quality, low loss coaxial cable, I had forgotten how old it was. The following day I checked it out and found that there was indeed a short between the conductor and the braid. I didn't think this would be a big problem to replace, but all three suppliers that I contacted could not deliver new coax until the expedition was nearly over.

From Bad to Worse

Then, about a week before Kerguelen was to get on the air, something blew in my Alpha 91b amplifier. I replaced a 2 amp fuse, turned it back on, and after several seconds of warm-up, the fuse blew again. I disconnected the 220 volt line and on the following day I inspected the inside but saw nothing amiss.

I called a repairman who does excellent

work and found that his phone had been disconnected! An internet search revealed that he was still in business but that he had relocated to Florida. I called the manufacturer and was told that they couldn't possibly get the amplifier back to me in time. Although I'm not paranoid, at this point I began to feel as though I were a victim of a conspiracy!

The FT5XO operation began and was greeted by monstrous pileups of stations attempting to make a contact. At that point I had only a small, three-element rotatable array for 10, 15, and 20 meters and no amplifier. As expected, I never even heard the FT5 on 10 or 15 meters. On 20, where I might have had a chance, I was very disappointed in that I heard them only infrequently and when I did, they were barely above the noise level.

Try, Try Again

It was unacceptable to sit back and do nothing under these frustrating circumstances. I did have some short segments of recent vintage coaxial cable, so I went to my antenna library to see if I could find a suitable system which required a very short transmission line. A "corner-fed," apex up, triangular configuration (delta loop) seemed to fit the bill, but I knew that the feedpoint impedance of delta loops might be as high as 100 ohms and that the mismatch created by feeding it with 50 ohm coax would likely

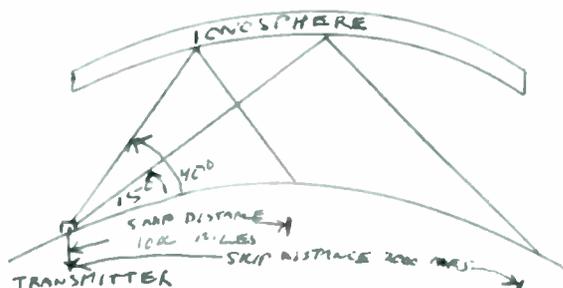


Figure 3 Relation of take-off angle to skip distance.

be a problem.

Whenever I read L B Cebik's (W4RNL) antenna articles, I always learn something new. In his description of various types of self-contained vertical antennas (<http://www.cebik.com/scv/scv0.html>), he points out that if the apex angle of a delta loop is 90 degrees, the feedpoint impedance drops to close to 50 ohms. This antenna is called a right angle delta. I also learned that my concept of "corner feed" was incorrect. The optimal feedpoint for vertical polarization should be located 1/4 wavelength down from the apex, not at the corner (fig. 4).

The right angle delta seemed to be a very good choice, because, like the half-square, it puts out a signal with a low take-off angle and some gain. In addition, if I were careful in locating the support point for the apex, I could position the feedpoint to be very close to the shack and orient the antenna so that one of its main lobes, perpendicular to the axis of the antenna, would be close to 120 degrees, which is the bearing for Kerguelen. In addition, it is a bidirectional antenna, so it would provide an opportunity to contact the FT5 by long path propagation as well.

Design of a Right Angle Delta Loop

For the length of the loop, it's advisable to use a length slightly greater than one wavelength and then to trim it until it is resonant in the center of the band.

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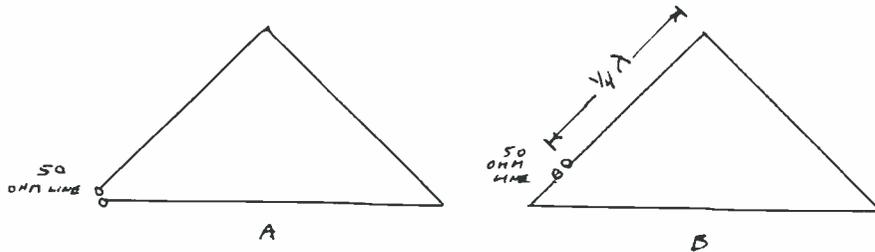


FIG. 4 Vertically polarized right angle delta loops showing proper (B) and improper feed points (A).

L in feet = $1.05 \times 983.59/f$
 $f = 10.110 \text{ MHz}$
 $L = 102 \text{ feet}$
 Feedpoint: $102/4 = 25\text{-}1/2 \text{ feet}$ down from the apex

As for the length of the base, one can use some simple geometric principles:

$$L = b + 2s = 102 \text{ ft}$$

(b = base, s = side)

In accord with the Pythagorean theorem:

$$(b)^2 = (s)^2 + (s)^2$$

$$(b)^2 = 2(s)^2$$

$$b = 1.414s$$

$$1.414s + 2s = 102$$

$$3.414s = 102$$

$$s = 29.88 \text{ ft}$$

$$b + 29.88 + 29.88 = 102$$

$$b = 42.24 \text{ ft}$$

You can use these formulas for constructing loops for 40 and 80 meters as well.

I put the loop together, measured the feed point impedance, and was pleasantly surprised to find that it was very close to what W4RNL had predicted, 60 ohms. I trimmed off a few inches from each corner by folding the wire back on itself, in order to bring the resonant point to ~10.110. The SWR was 1.8 across the band. But there was still a problem. After attaching a 1/1 balun (for optimal performance when feeding a balanced antenna with an unbalanced line) and the short segments of coax that I had found, I was still about six feet short of what I needed to reach the shack.

In addition, I had run out of double female connectors (PL-258s).

So, it was back to the basement. There I located a coaxial switch and 10 feet of coax of unknown age. I attached it to the line via the switch and found that the SWR was still 1.8. With this additional segment of coax and the interposed switch I had enough length to reach my transmatch (for optimal matching of transmission line impedance to antenna impedance).

Putting it to the Test

By this time, FT5XO had been on for a few days, so the pileups on 30 meters, though still very large, were not horrendous. That night their signal into the East Coast was good. Using the new delta loop, I began calling him with the commonly employed technique of calling about 0.5 kHz above the person he had just worked. On the third call he came back to me. What a feeling of exhilaration!

It is best, however, not to rest on one's laurels, but to consider how best to go about getting an "insurance" contact. The operating skills of the FT5 operators were very impressive, but in any operation there can be glitches. Sometimes after a QSO with a rare entity, one receives in response to a QSL card request, "Sorry, not in the log." That is a very painful experience, so it's best not to rely on one contact. However, I like to avoid duplicate QSOs on the same band using the same mode, since these make it more difficult for others to make their first contact. So I needed a contact on another band.

I noticed that the 30 meter delta loop also listened well on 40 meters, and I often heard the FT5 with a reasonably good signal on that band, so putting together a 40 meter antenna seemed to be a good approach. I knew that I wouldn't be able to place a delta loop for 40 meters high enough to avoid having its base drag on the ground, but I thought I might be able to fit in a quad loop. Since vertical polarization worked so well on 30 meters, I decided to go with that again.

Design of a Quad Loop

I constructed a loop of $1.05 \times 983.59/7.100 = 145.46 \text{ ft}$. Each side was 36 ft 4 inches. I fed the antenna at the center of the vertical side closest to the shack. Although it didn't drag on the ground, there was only 2 feet of clearance. So, I moved the lower corners forward and tilted the loop towards the southeast. This raised the corners to 6 feet off the ground. I hoped that the tilt might provide some additional gain in that direction.

I again needed to do some trimming, but it is far better to have an antenna that is too long than one that is too short. The feedpoint impedance was 120 ohms. I thought I might feed it with the segments of coax if I used a 4/1 balun, but I couldn't find one. I did, however, discover a long-forgotten multiband dipole fed with ladder line. Since it had never performed that well for DX, I didn't hesitate to cannibalize it. I removed the ladder line, attached it to the quad loop, and found that there was sufficient length to reach the shack.

Listening on 40 meters with this antenna at 2100 UTC about 2 hours before darkness was a revelation! I noticed the high noise level that is

characteristic of vertically polarized antennas, but I was astounded to hear the FT5 coming in. He was weak but easily readable above the noise. I've used many kinds of 40 meter antennas, but never had one that "listened" this well. Usually during daylight hours I hear almost no DX except an occasional weak European station.

What made this even more remarkable was that the FT5 was running only about 100 watts. A few hours later, after darkness, his strength was building and I worked him without much difficulty. So now the insurance contact was in the log.

Almost as pleasurable as contacting a rare station is the receiving of confirmation of the contact, the QSL card. Within a few months I received the card bearing the call letters FT5XO and the location of the station, Iles Kerguelen (fig.5). On the reverse were listed confirmations of the 30 and 40 meter QSOs.

Lessons Learned

At this point I said to myself, "With antennas like these, who needs amplifiers?" However, before you run out and erect one of them, it's important to realize that performance is dependent on ground conductivity, not only under the antenna but for a few wavelengths distant from it. I assume that the good results that I experienced indicate that there was rich soil in my area. In fact, 100 years ago it had been farmland. If you are lucky enough to have a coastal location or live adjacent to a salt marsh, you can expect even better results from vertically polarized loops. But, if your terrain is mostly clay, sand, rocks, or asphalt and concrete, you are likely to be disappointed and would be better off with horizontally polarized antennas.

What I learned from this experience is to never give up, even when the odds are stacked highly against you. I also learned not to take my coaxial lines for granted. Even when connections are carefully weather-proofed, deterioration occurs.

Now that I know that my ground conductivity is good, I'm going to rely more on vertically polarized antennas. I can't imagine what kind of signal I will put out once my amplifier is repaired! Maybe someday I'll even be able to contact the last two amateur radio entities that I need - Scarborough Reef and North Korea.

FT5XO

ILES KERGUELEN

49°30' SOUTH 69°50' EAST
 CO ZONE 19 ITU ZONE 68 IOTA AF-048

OPERATORS:
 AGGA, GURAWG, HEPATZ, MBOXR, NGAIZ, NHTT,
 IPSXVY, VEHL, VKGDXI, WFMJ, WTEW & 9VTK
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"NO MORE MR. KILOWATT"

Band Master – Presiding at the Perfect Marriage

By Dr John Catalano

The marriage of radio monitoring and the Internet has long been a topic of the *Computers & Radio* column in *Monitoring Times*. Useful websites seem to be growing exponentially, and searching these sites can easily occupy an entire day or evening. Many of our hard drives are also filled with radio programs we have downloaded from such sites.

However, I recently came across one program, Band Master, that adds a whole new dimension to radio. Like the infamous wedding director, this program presides over several programs performing different functions and coordinates them into the perfect marriage of computer, internet, and radio.

Dreamin' Big

Assume that you could see, in real time, exactly what other stations around the world were monitoring across the entire shortwave spectrum. Further assume that you could sort the reporting stations by relative distance to your monitoring location. This would allow you quickly "see" what frequencies are hot and at the same time, indicate current propagation conditions to various locations around the world.

That's a lot of heavy technical "assuming." But, as long as we are dreaming up a wish list, why not add auto tuning of your radio, real-time propagation conditions and forecasts, and station look-up with identification and location mapping?

Stop Dreaming

Believe it or not, all of this is here today in Band Master and its sister programs. Interested? Let's dig into Band Master.

Our entire wish list of features, plus azimuth/distance calculations and geographical mapping, are contained in a suite of programs controlled from Band Master. The suite – Band Master, DX Atlas, Ham Cap, IonoProbe, and OmniRig – all work together under the control of Band Master. They are aimed at ham operators working in the 1.8 to 50 MHz range of frequencies. However, this real-time information is also invaluable to DX-seeking SWLers.

Required Hardware

The system requirements, as outlined by the programs, are modest by today's standards:

- * 600 MHz Pentium II CPU
- * 64 Mb RAM
- * 16-bit or 32-bit color video card and Windows 95/98/ME/NT4/2000/XP

I ran them on a Pentium II 400 MHz laptop with 128 Mb of RAM running Windows 98 without a problem.

An Internet connection (I used dial-up) is essential. If you want the full Band Master experience, a supported, computer-controlled transceiver is needed. Band Master, via OmniRig, currently supports 19 or more Icom, Kenwood, Ten-Tec and Elecraft transceivers. See the current list at <http://www.dxatlas.com/OmniRig/>

See this month's *Computers & Radio* column on page 72 for details concerning using Band Master with the ICOM IC-R75 and other ICOM receivers.

Download and Install

The necessary files are available for downloading from <http://www.dxatlas.com/BandMaster/>. Time limited programs are free. After that period it will cost \$25 to continue using Band Master. The entire suite of programs described here (DX Atlas, IonoProbe and Band Master) can be ordered as a bundle for \$60. OmniRig and Ham Cap are also available from the website. All of the files, which are in a Zip format, are quickly and easily downloadable even with a dial-up connection. Once downloaded, use a program such as WinZip to unzip and install the programs.

An additional program – VOACAP – is required for propagation calculations with Ham Cap. VOACAP can be downloaded free of charge from: http://elbert.its.blrdoc.gov/pc_hf/hfwin32.html

Because there are a number of different programs working together, it is a good idea to use the most current versions.

Band Master Overview

As you can imagine, there is a lot to this program! Just take a look at Figure 1, which shows some of the screens of the program suite – DX Atlas, IonoProbe, Propagation Forecast, and Band Master's Band Map for the 14 MHz, 20 meter ham band.

Clearly, the screens are too small to use in

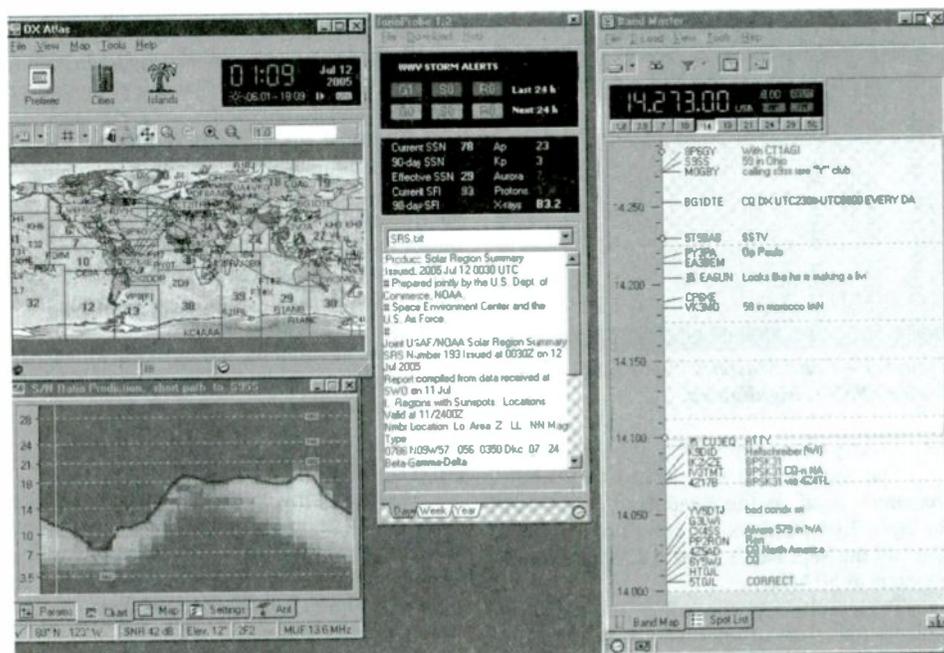


Figure 1 – This is a composite of all the programs comprising the Band Master suite.

this format, and Figure 1 is just for illustration of some of the capabilities of Band Master. In actual use, each program screen can be viewed as a full screen. We will cover each of these screens in more detail in a minute. But first we must set each one up to suit our station.

Setup and Customization

Using their setup or settings menus, we must give the mapping and propagation programs (DX Atlas and Ham Cap) our longitude, latitude and time zone. For exactness we can also choose our antenna type from a list in Ham Cap. Although the antenna parameters can be highly customized, the default is a classic dipole. Our ham call sign and transmitter power round out the basic data required. (Non-hams can borrow or make up a call from the correct region so propagation information will display properly.)

Since we have the IonoProbe program, we can download real-time sun and propagation details into Ham Cap by selecting IonoProbe in the settings menu. Checking the DX Atlas tab allows area prediction data to be superimposed over the DX Atlas map. The separate programs are very well integrated together and operate smoothly under Band Master.

Band Master Setup

Figure 2 shows the Band Map, one of the two Band Master screens. We have clicked on the "Setting" menu in the Command line at top. In the center of Figure 2 is the resulting "Settings" box. Here we have chosen the Miscellaneous in order to define which radio we will be using.

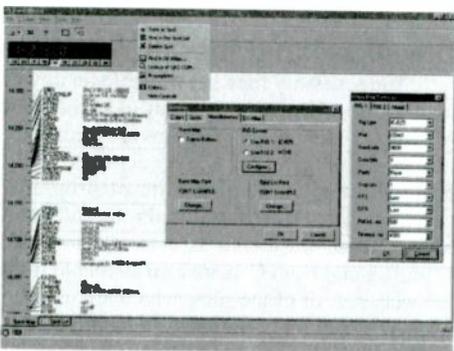


Figure 2 – Band Master's "Band Map" displaying a list of monitored station (along left side) setup, rig control and right-click-on-station menus.

Clicking "Configure" under Rig Control displays the Omni-Rig display at the right of Figure 2. Here, via a drop down menu, we can choose the radio we wish to control. The Icom IC-R75 is shown as our choice. Although it is not currently available from the OmniRig website, read this month's *Computers & Radio* for details on creating this control file.

We can leave all other parameters in the Omni-Rig menu as-is and choose "OK" to close each menu screen. We'll come back to the "Settings" menu later. Now that we have the basic setting in place, let's see what Band Master can do.

Band Mapping

Look back at the Band Map in the right column of Figure 2. Here we can see the stations that have been monitored in the 14 MHz ham band within the past hour. The vertical left side of the screen is measured off in frequencies. For example, the S9SS at the top of the list was monitored at 14.273 MHz (see left side of screen for frequency).

Stations monitored less than five minutes ago are highlighted in green. The automatic download update rate of the list can be set to between 1 to 10 minutes using the D-Load menu at top left of Figure 2.

If we "hover" the cursor over a callsign, the station's country will appear. Also the distance and direction to the station from our location will be displayed at the bottom left of the screen. "Hovering" works on many items and brings up a lot more details without the need to switch screens. This is just one of the well-implemented and very useful features found in Band Master.

The top left portion of the screen (Figure 2) displays the radio data. You can see that the "14" button under the frequency display has been selected, which means that the 20 meter ham band, 14 MHz, is displayed on the Band Map. We can see from the display that we are tuned to 14.273 MHz in the USB mode.

The Spot List

Right clicking on a station brings up a key operational menu, the top left menu box in Figure 2. If we select "Tune at Spot," our radio will be tuned to that frequency and mode, and if propagation is right we should hear that station.

Clicking "Find in Spot List" brings up the Spot List as seen in Figure 3. As you can see, this list is in chronological order with the most recent intercept at the top. Unlike the Band Map, the Spot List is a true list with columns of data pertaining to the station being heard, such as exact frequency, time, spotter station and comments. Your system clock and time zone must be

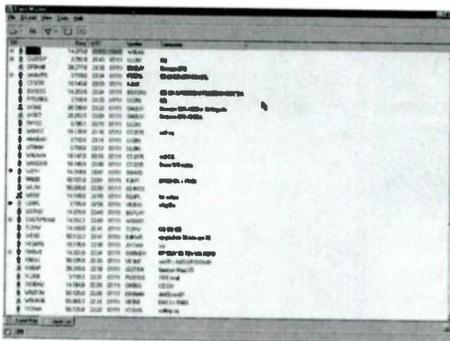


Figure 3 – Band Master's "Spot List" screen. Notice S9SS is highlighted.

set correctly or the spots will not be displayed.

The Spot List is not limited to a single frequency band, as the Band Map is. Instead, the Spot List displays all monitored stations from all the ham bands from 1.8 MHz through 6 meters at 50 MHz.

The symbols to the left of the callsigns indicate the mode of operation of that station. The detail that this program stores and presents

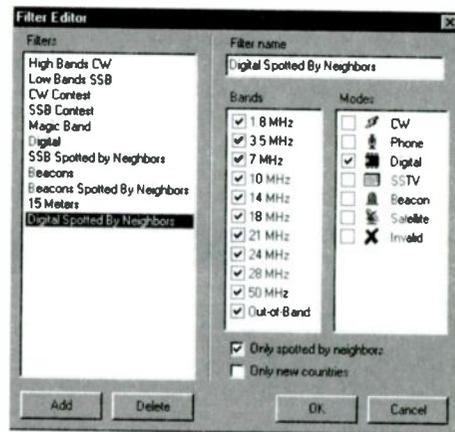


Figure 4 – Using the spot "filter editor" to customize the Spot List. Here we have Filter Out All But Beacons Received by "Neighbors"

is staggering, yet it is displayed in a very easy to use manner.

Again, "hovering" over these entries brings up more useful information, such as the distance and bearing to the spotter station from your location.

Bold is Beautiful

Notice that some of the call signs in the list are bolded, for example, W6ZL. If we go back to the "Settings" menu and then choose "Spots," we can enter a mileage distance. When the station that *monitored* or *spotted* the listed station is within the chosen distance from your location, the listing appears in bold. Note that this is *not* the station being received, but instead the receiving station. This can immediately clue you in on what you can hear from your specific geographical location – a very nice feature.

Filtering the Data

As we have seen, the Spot List covers all stations in a wide range of ham frequencies. We can *filter* this down to stations that meet our specific interests. For example, let's say we are interested in only monitoring stations using a digital transmission mode such as RTTY or PACTOR. The "Filter Editor" dropdown menu, which is under the "Tools" menu at the top of Figure 3, will do the trick.

Figure 4 displays the combination of station parameters that can be implemented to show us only stations of interest. Here we have created a filter which just displays digital transmissions (RTTY, PACTOR, etc.) across all bands that have been received by our "neighbor" stations (as defined in our measured mileage setting).

These are only the basics of the Filter feature. It can prove to be indispensable in contest environments.

More Right Clicking

Right clicking on a callsign such as S9SS in the Spot List brings up the same list of commands that we saw in the Band Map screen. Looking back at the "right click menu" at the top left of Figure 2, three more important commands are accessible.

Selecting "Find in DX Atlas" displays a map and the location of the station that was



Figure 5 – DX Atlas Mapping – a right-clicked call sign

right clicked. In Figure 5 we see the result. We have also chosen to display the solar terminator on the map.

S9SS is highlighted and displayed at the lower right on the West Coast of Africa. The bottom of the screen displays the distance and bearing to S9SS from my monitoring location. On the extreme left of Figure 5 is the call sign/country list. At the bottom of the list, the S9 call prefix is highlighted and identified as Sao Tome & Principe.

Who is this Station?

The next command, "Lookup at QRZ.com," will go to the Internet and connect to the QRZ.com website. Here, the call sign that you right clicked on will be automatically looked up and the details displayed. Very slick.

All Kinds of Propagation!

The last command that we will look at in the right-click menu, Propagation, has lots of different options. The one that I think is most unique uses "live" real-time solar data, which Ham Cap downloads from the Internet at regular intervals. Figure 6 shows the "F2 layer critical frequency" superimposed on the DX Atlas map.

This is just one of many, many representations of current propagation conditions. Notice that the location of S9SS is visible and highlighted at the lower right of Figure 6.

A Little Help Here!

The latest version of Band Master includes a comprehensive Help file. It covers all of the extensive features and command of Band Master. In addition, it has a nice Quick Reference feature that displays a simplified command sheet.

What's Missing?

As we have seen, the Band Master suite of programs performs many amazing and useful things. And they do them very well. But what about a logging function? Currently only AALog by DX Soft Group integrates with Band Master to provide logging capabilities. We did not try this program with Band Master. AALog is available at <http://www.dxsoft.com/>.

Still Impressed?

The more I use the Band Master suite, the more I appreciate its capabilities. Although sepa-

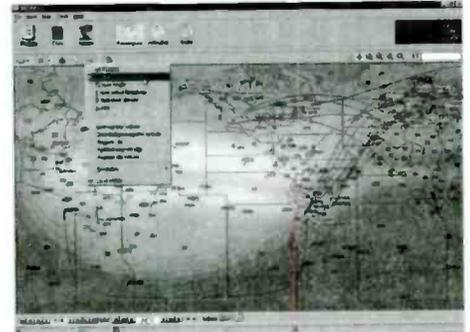


Figure 6 – One of many propagation displays using "live" real-time solar data.

rate programs, Band Master knits the programs together without a problem. For ham operators, Band Master is a no-brainer. Everyday, and especially during contests, Band Master will provide valuable features which can enhance the enjoyment of the hobby. It has truly married the Internet to the radio hobby.

Although primarily for the ham community, the methods used in Band Master can be very useful to the shortwave listening community. Knowing what the ham bands are doing can direct SWLers to "hot" shortwave broadcast and utility frequencies.

We started by "dreaming" about what could be. Let's expand on that dream – Wouldn't it be great if a similar "live" sharing infrastructure in a Band Master-like program suite were available for monitoring intercepts? Now we have gone full circle – back to dreaming again.

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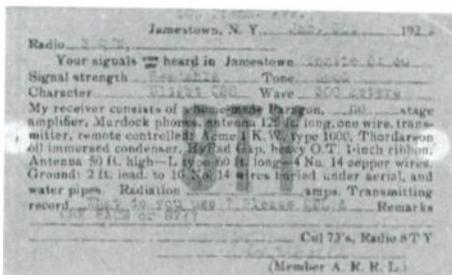
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QSL Mania: The Radio Hobbyist's Obsession

Many of us came to the radio hobby as kids listening to AM radios and enjoying the peculiarities of that band: for instance, that the ionosphere changes after sundown and allows us to listen to distant signals. You knew you were hooked when you asked: "What's the furthest station I can receive?" and "Can I pick up other countries?" It's no good just telling yourself of your achievement. You've got to have some sort of tangible evidence, a small token to put on your wall next to your receiver: a QSL card.

❖ QSL History

The term QSL was adopted internationally in 1912 as part of the "Q Code," a system of reducing common expressions sent via Morse Code to a series of three letters all starting with the letter Q. The code made it possible to relay vital information without any language barriers. QSL simply means "can you verify reception?" The first QSLs ever sent were most likely between early amateurs and it's possible that those cards have long been lost. But, there are cards dating from 1921 which indicate that by then such exchanges were common. Since then there has been a long and colorful tradition of the QSL card which includes not just hams but international broadcasters, AM, and even utility stations.



Ham QSL card from 8TY dates from 1921 and could be among the earliest to survive. (Courtesy: International Foundation QSL Collection)

At the peak of the Cold War in the 1960s, when low cost shortwave receivers were becoming widely available and the solar cycle was hot, there was no end of action on the bands. Government supported radio flooded the airwaves on both sides of the Iron Curtain with high powered shortwave giants, jamming stations, clandestines, and relay stations. The few remain-

ing popular radio dramas were relayed overseas via the American Forces Radio and Television Service (AFRTS). International press agencies sent their news feeds via shortwave. There was even one full time American commercial shortwave broadcaster: WNYW (Radio New York Worldwide). The first wave of Citizen's Band (CB) operators, legally licensed and proud to be on their 23 channels, also issued QSL cards.

It was considered by some to be the golden age of the QSL, when postage rates were low, printing costs cheap, and budgets were big. Broadcasters worldwide were happy to send QSL cards and many other items in return for reception reports. Communist countries were the most obliging. Reports to Radio Peking, as China Radio International was known then, not only earned a QSL but a subscription to *China Today*, a slick, four color glossy magazine showcasing the triumphs of Chinese Communism*. Likewise, Radio Habana QSLs came with a subscription to *Granma*, the official organ of the Central Communist Party of Cuba. Not nearly so slick, *Granma* was printed on newsprint with black and white photos and often carried text of recent speeches made by Fidel Castro.

❖ A Home for Old QSLs

After decades of collecting QSL cards, you would think that someone somewhere would have started a depository to save the best of



Thousands of amateur radio QSL cards in the storage room at International Foundation QSL Collection will be sorted and made available in the archive room. (Courtesy International Foundation QSL Collection)



QSL card from 1930 issued by G5RV, R. Louis Varney, famed for his antenna design which is still one of the most widely used on the air. (Courtesy: International Foundation QSL Collection)

these cards from the landfill. A few small efforts have been made by various collectors and radio museums, but until a few years ago a serious, permanent location for a massive accumulation of QSLs and associated ephemera was not found.

Then came the International Foundation QSL Collection – a nonprofit, all volunteer organization located in the center of Vienna, Austria, in a building directly across from ORF Funkhaus (Austria Radio's Broadcast House). The Foundation has amassed, cataloged, and scanned tens of thousands of documents relating to QSLs for both amateur radio and international broadcast stations. There are almost 4 million amateur QSLs on file at the foundation, and the broadcast collection has over 17,000 QSL cards, diplomas, bumper stickers, and photographs. You can browse some of the most interesting items in their collection on-line (<http://www.qsl.at>).

❖ QSLing Today

The QSL part of the radio hobby is every bit as alive today as it was decades ago. Every day tens of thousands of QSL cards are sent back and forth from hams and shortwave listeners (SWLers) alike, seeking that all important confirmation. But, while we're no longer at the peak of international and domestic broadcasting, the QSL fun remains.

I've collected QSLs since I was a kid in the 1960s, starting out with AM broadcasters and moving to shortwave. As a ham I've enjoyed collecting QSLs from contacts made throughout the world, but I still enjoy collecting the more interesting stations on the medium and HF bands.

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SENORE F.

QSL from pirate station Radio Metallica Worldwide claimed 10 kW of "pure awesome audio power" with operator listed as Dr. Tornado who signed the back of the card. (Courtesy: Author)

There have been many articles about confirming the shortwave and commercial broadcasters in *MT*, so I'll concentrate here on a beginner's look at QSLing the ham bands. Keep in mind that virtually all DXpeditions are happy to QSL SWL reports, but you'll have to observe the same rules required of hams to receive the card. Remember, too, that many ham related awards are also open to SWLers.

Many American hams don't QSL SWL reports; however, most European hams do. If there's any doubt, check <http://www.qrz.com>. Many hams explain their individual QSL policies there. If you're trying to QSL a foreign ham, there's a good chance they have a QSL manager in the States. That means that you need only send your report and a self-addressed, stamped envelope (SASE) to the address of the manager listed in QRZ.com. It's not only cheaper, but it's much faster.

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W1AF Harvard Wireless Club of Harvard University was established in 1909. In 1989 they were on the air celebrating 80 years as America's oldest amateur radio club. Stick around another 3 years and you can catch their centenary card! (Courtesy: Author)

If you're trying to confirm a foreign ham who has a European manager (many South American hams use European managers), it's a little different. You need to send your report with a self-addressed envelope (SAE) and put \$2 U.S. or 1 International Reply Coupon (IRC) inside the self-addressed envelope. This is referred to as "nesting" and it protects the IRC or dollars from being stolen. I use security lined envelopes which also protect the contents. Again, directions for such requirements are usually posted on the manager's page in QRZ.com. Receiving QSLs this way is not as fast as using a stateside manager, but it usually takes only a few weeks.

If you're trying to confirm a foreign ham who has no manager, you have two options: "Direct" or "Through the Bureau." Direct means that you use the address for that operator as listed in QRZ.com. Again, send your report with an SAE and \$2 (U.S.) or 1 IRC as directed on their page.

The U.S. dollar has taken a beating in the last couple of years. It used to be that \$1 covered return postage from virtually any country in the world to the U.S. That's no longer the case. Postage varies wildly around the world, and the safe bet right now is to send \$2 if you're sending direct and want a first class QSL return. If you want to use IRCs, you'll really have to look to find them. While most of the world still uses IRCs, they have become harder and harder to find in the U.S. If you can't find any at your local post office, your best bet may be to contact one of the shortwave clubs advertising in *MT* for information on buying IRCs.



Looking like a frontier outpost, transmitting facilities of Border Radio giant XEG sits in the shadow of Saddleback Mountain and its own antenna circa 1966. (Courtesy: Author)

If you've got all the time in the world and want to spend as little money as possible on foreign QSLs, you can use the "Bureau." Nearly all countries in the world have QSL bureaus set up for use by their members. The American Radio Relay League (ARRL) runs the U.S. bureau, and complete details of how the system works and who may use it are found on the ARRL web site at <http://www.arrl.org/qsl/qslin.html>. If you follow the explicit instruction there, you'll be able to use the Bureau and receive hundreds of QSL cards per year in this manner.

You don't have to be an ARRL member to receive QSLs via the Bureau, but you do have to be a member to send cards via the Bureau. ARRL membership is \$39/year and includes a subscription to *QST* magazine.



Radio Habana, Cuba QSL card from 1965. It remains a relic of the Cold War era but still has a good international DX program on air. (Courtesy: Author)

The Bureau is a waiting game and you can expect to wait several years to get QSLs from some of the harder to work DX countries. After years of sending off QSLs direct (with \$2 and SAE) to hams from ER (Moldova) with no results, I just received an unsolicited QSL via the bureau from ER1DA/QRP, a station I worked two years ago. The same day, I also received a QSL via the bureau from CE1URH (Chile) for a QSO on May 2, 2001 - 4-1/2 years via the bureau. Never give up on the bureau, but plan to live a

long time.

Keep a record of your outgoing QSLs. I have a separate spreadsheet which easily shows what went out and when. It's always interesting to see who responds the fastest. Indicate on your record the date sent and the method sent (direct, bureau or manager) and when the card was received.

❖ Finally: Ham Spirit

There's a concept as old as the hobby which is referred to as "Ham Spirit." The concept is that we're all hams enjoying the same hobby, and, regardless of wealth, fame or position, we should all help each other. Hams are constantly lending each other gear so that others can get on the air. We try to "Elmer" others into the hobby. If a ham sends you a QSL card, you are supposed to return the favor.

Some hams, particularly those situated in hard to find countries, states or counties, want the pleasure of operating without the bother of QSLing. This isn't the ham spirit. Some hams appear to have QSL milking operations in which they work massive pile-ups of hams, direct everyone to their manager with a request for \$2, and then send the QSLs by the bureau, making a tidy profit for operator and manager alike. This is not the ham spirit.

If you want a card from a ham, you must provide the self-addressed envelope and the means for the return postage. That's the ham spirit!

**It may well have been a triumph: there are few who could have predicted the vast majority of low cost shortwave radios would all be made in China.*

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ASK BOB

GENERAL QUESTIONS RELATED TO RADIO

Bob Grove, W8JHD

bobgrove@monitoringtimes.com

Q. *I'm interested in ham radio, but don't know where to start, I have so many questions (Joe Love, email)*

A. First, see if you can find a local amateur radio operator, or even a nearby radio club to help you. You can ask at a Radio Shack store or even your library. Sometimes public safety agencies have liaison with hams for emergency communications. Now let's take a look at some of your questions:

In layman's terms, what are the various types of ham radios called?

Originally, amateur radio equipment was separated into receivers and transmitters; now they are combined into transceivers since they share common circuitry. The radio bands (swaths of frequencies set aside for ham radio use) alternate throughout the spectrum with other services that share similar bands: aircraft, marine, commercial broadcast, fixed (point-to-point), etc.

Transceivers are offered by frequency range: HF (high frequency) transceivers occupy the shortwave amateur bands (between 1.8 and 30 MHz); VHF transceivers from 50-54, 144-148 and 222-225 MHz; UHF from 420-450, 902-928 and 1240-1300 MHz. Some wideband transceivers combine HF, VHF and even UHF into one transceiver.

Morse code (continuous wave or "CW") is allowed on any amateur frequency, although it is gradually being replaced by voice and data. Voice may be amplitude modulation, single-sideband (AM and SSB are found mostly in the HF bands) or frequency modulation (FM is restricted to frequencies above 25 MHz).

What are the main uses for each type of band or radio and what distances are they expected to reach?

Radio equipment is either fixed (base) for permanent installation, mobile for automotive use, or portable for hand-carried applications. Size and weight are the governing factors.

HF transceivers, depending upon their functions and output power, retail from the low hundreds up into the thousands; many aspiring hams start with used gear, readily available on the Internet and as trade-ins from the dealers.

Global communication is conducted on the HF bands, generally below about 10 MHz at night and above during the day due to solar influences on the upper atmosphere (ionosphere) which controls the reflection, absorption and refraction of radio waves.

VHF communications are decreasingly shorter as you rise in frequency, behaving more and more like light waves. While VHF and UHF communications can be in the hun-

dreds or even thousands of miles, line of sight – the visual horizon – is the norm.

Is it legal for unlicensed hobbyists to use transmit-capable radios as long as they only listen?

Yes.

Are there "best buys" for amateur radio equipment?

Several well-known companies, virtually all Japanese, manufacture amateur radio receivers, including Kenwood, Yaesu, Icom, Alinco and Ten-Tec (U.S.). While hams have favorites, the fact is that all of these companies produce fine equipment.

Price is directly related to features, since each additional function adds circuitry. Any amateur radio magazine will reveal virtually all the major and most minor manufacturers over just one or two issues of their advertising.

Another good source of descriptive and pricing information on products is a dealer's catalog like those from Universal Radio, Ham Radio Outlet (HRO) and Amateur Electronic Supply (AES).

Do people learn all about this through a license study course?

Yes. You can take a study course through your amateur radio club or on line, or you can study on your own using various study manuals or mail-order courses.

Probably your best concerted source of information is the American Radio Relay League (ARRL), our nuclear organization for the representation and protection of amateur radio in the U.S. See them on the web at <http://www.arrl.org>.

Q. *With all the frequency shuffling in the new band-plan scheme, are ambulances and hospitals still using the 463 MHz spectrum for medical communications? (Doug Chandler, email)*

A. Yes, but the FCC has authorized additional splinter channels under the spectrum reforming program. There are now 40 channels in 6.25 kHz steps between 462.950 and 463.19375 MHz.

Q. *I would like to get into mobile FM broadcasting so that I can advertise my business on my long commute to and from work.*

Is this legal? R.S.

A. The short answer is no, not from the car. By its very nature, broadcasting is restricted to a fixed geographical point: this is to assure that other licensees sharing frequencies available for this service do not suffer interference. A moving transmitter exceeds the boundaries set for a broadcaster.

You could, of course, apply for a commercial FM broadcasting license, then feed over a link (or cell phone) from the car to the fixed transmitter site. This is a pretty expensive venture for a small business, however.

A more realistic possibility is an unlicensed (Part 15) transmitter. These certainly can be used anywhere, but they are very low power, thus restricting the useful range, and they must not interfere with licensed services.

So, from a practical standpoint, you would be unable to choose a frequency that everyone else would be tuned to without intentionally interfering with a licensed service.

Q. *Is DSP being improved so that there will be a DSP-1, DSP-2, etc.? Or is it a fad? (Randell Boice, Greenwich, NY)*

A. DSP (digital signal processing, as opposed to analog signal processing) is a well-established, general technology, although analog processing is the oldest. It is not so narrowly-defined that there is a DSP-1 or DSP-2; it merely implies that the original received signal (and it can be either an analog or a digital signal) is converted into a digital system that a computerized program can manipulate for best reception. Such systems continue to be refined.

The advantage of digital signal processing is that it is far more flexible than analog in what it can do to enhance a signal. For example, if noise is present in an analog signal, it's hard to suppress without introducing distortion, whereas, with a digital signal, the various signal "bits" may be selectively retained or deleted depending upon whether they are part of the original information or are interference.

DSP is here to stay, but with digital signal processing, one additional step is required: It has to be re-converted back for our analog ears to hear.

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

THE MT ANSWER DESK

SPECIFIC FREQUENCY AND EQUIPMENT QUESTIONS

Larry Van Horn

larryvanhorn@monitoringtimes.com

Welcome to the inaugural *MT Help Desk* column. The purpose of this column is to answer specific radio hobby related questions from *MT* readers. These questions should relate to radio equipment, frequencies, listening techniques and other topics covering the entire radio spectrum. General radio and electronic questions will continue to be covered by Bob Grove in his *Ask Bob* column. Obviously, all questions received cannot be answered in this column, given space constraints, and due to time we cannot answer specific snail mail requests.

So, grab your computer keyboard and send in your hobby questions (one per reader please) to the *MT Help Desk* at larryvanhorn@monitoringtimes.com.

Q. *I talked to a member of a rural VFD in a place that still uses VHF high band fire frequencies. This person told me that the new VIPER system is patented to Motorola so all radios down to the last piece must be purchased only from Motorola. The modulation format for VIPER is non-APCO 25 as is the tracking format so only other VIPER units can demodulate the VIPER digital trunk signals or track them. The system will include all police-fire-EMS in North Carolina, forestry and game wardens, plus all local and county governments. After 7-1-2008 every police-fire-EMS vehicle in North Carolina will have one radio and scanner listeners will be shut out. (Anonymous-No Address Given, North Carolina) [One of several long letters we have received from this person.]*

A. Normally, we do not publish anonymous letters as a matter of policy (although we will withhold your name by request), but I will make an exception this one time, considering the sheer amount of misinformation being spread around the state of North Carolina about this radio system. Mr. Anonymous, your friend at the rural VFD is wrong on everything he thinks he knows about VIPER.

The VIPER (Voice Interoperability Plan for Emergency Responders) is not some secret Motorola trunk/digital protocol, but a new North Carolina statewide trunk system. The VIPER system is a Motorola SmartZone 4.1 (using Omnilink software), mixed-mode (3600 baud analog/digital) trunk system and it is 100% APCO Project 25 compliant.

I recently conducted an exclusive interview with the head of the VIPER system in Raleigh. Mr. Harold Meacomb, and we discussed all of the various rumors swirling around the state about the system. Meacomb stated, "This system will not shut out scanner listeners in the state of North Carolina. If you

have an analog only scanner and you want to monitor the digital talkgroups on the system, you will have to get an APCO-25 digital trunk tracker scanner." According to Meacomb the only anticipated encryption on the system will be the NC Governor security detail.

The goal of VIPER is to provide interoperable communications for all public safety agencies in North Carolina. It is not designed to entirely replace local systems, but it can. No one is being forced into this system. Our local Clay County officials have opted out, but neighboring Cherokee County will be a part of the system. And Motorola is not the only manufacturer of radio equipment for this system: E.F. Johnson also has equipment that can be used on VIPER.

We have been following developments on VIPER, the new statewide 460 MHz EMS repeater system, and the NC-CJIN MDT systems very closely and will be publishing a detailed article on all of this and how to monitor some of them in a future issue of *MT*.

Q. *Where have all the digital radio signals gone on HF? My old Universal decoder can't decode a thing. Utility and digital listening is dying. (Several MT readers.)*

A. All the digital signals haven't left HF, they have just left you behind. Even the ones that moved to satellite can be monitored. Just like our newer VHF/UHF scanners and the systems they monitor have evolved over the last ten years, so has the world of digital signals on HF. And, like the HF signals we monitor, the equipment we use to monitor these modes have advanced as well.

The days of hardware based decoders has been replaced by the more economical and technologically advanced software based systems. These types of decoding systems were unthinkable just 10 years ago, but thanks to more powerful PC computers, we can hear a lot more.

So what modes do we have now? Here is a list of modes that are decoded by the Wavecom family of software-based decoders. These are a far cry from the good old days of the Universal hardware decoders.

ACARS, AIS, ALF-RDS, ALIS/2, Amsat P3-D, ARQ6-90/98/E/E3, ARQ-M2-242/342, ARQ-M4-242/342, ARQ-N, ASCII, ATIS (Selcal Digital), AUM-13, Autospec, Baudot, BR6028, Bulg-ASCII, CCIR-1/7/CCITT (Selcal Analog), CIS-11/14/36/36-50/50-50, Codan, Coquelet-8/13/80, CTCSS (Selcal Analog), CW-Morse, DCS Selcal, DGPS, DTMF (Selcal Analog), DUP-ARQ/ARQ-2/FEC-2, EEA (Selcal Analog), EFR, EIA (Selcal Analog), ERMES, EURO (Selcal Analog), FEC-A, Feldhell, Flex, FM-Hell, FMS-BOS (Selcal Digital), GMDSS/

DSC-HF VHF UHF, Golay, G-TOR and G-TOR with different code table, GW-Clover/Pactor, HC-ARQ, HF-ACARS (HFDL), HNG-FEC, ICAO-Selcal (Annex 10), INMARSAT (see SAT-A/B/C/M/mM), METEOSAT, MFSK-8/16/20, MIL-188-110A Serial Tones 75-4800 bps/MIL-188-110A 16/39 tones, MIL-188-110B (Appendix C) 3200-12800 bps/MIL-188-110B 16/39 tones, MIL-188-141A (ALE)/B (Appendix C), MPT-1327, NATEL (Selca Analog), NMT-450, NOAA-GEOSAT, Packet-300/600/1200/9600, Pactor 1-8/Pactor-II 1-8/Pactor-II-FEC 1-8, Piccolo-MK6/MK12, POCSAG, POL-ARQ, Press-FAX, PSK-10/31/63F/125F, RUM-FEC, SAT-A-Telex, SAT-B-F (Inmarsat forward Telex/FAX/Data/Voice), SAT-C-TDMA/TDM (Inmarsat), SAT-M-F (Inmarsat forward Data/FAX), SAT-M-R (Inmarsat return, Data/FAX), SAT-mM-F (Inmarsat forward, Data/FAX), SAT-mM-R (Inmarsat return, Data/FAX), SAT-M/mM (Inmarsat Voice), SI-ARQ/AUTO/FEC, SITOR-ARQ/AUTO/FEC, SKYPER (POCSAG), SP-14, Spread-11/21/51, SSTV Automatic/Martin 1-4/Robot 8s/12s/24s/36s, SSTV SC-1 8s/16/32s, SSTV Scottie 1-4, SSTV Wraase SC-1 24/48/48s/96s, SSTV Wraase SC-2 30/60s/120s/180s, STANAG 4285 75-3600 bps, STANAG 4415 75 bps (NATO Robust), STANAG 4481 PSK, STANAG 4529 75-1800 bps, STANAG 4539 3200-12800 bps, STANAG 5066, SWED-ARQ, TWINPLEX ARQ, VDEW (Selcal Analog), Weather-FAX

Bottom line? There is a lot of exciting listening out there if you are well equipped and well versed in the new world of HF/VHF/UHF digital decoding.

Q. *I am looking for information reference the Canton Police and Stark County, Ohio, sheriff department radio system. I just want to hear law enforcement calls. I was told they use a single mode inversion voice scrambler/descrambler. I turned this info over to a radio guy and he built a descrambler, but it did not work. He told me it was because my radio is analog. My radio is a Uniden BC 250D with the card installed. This makes the radio digital, correct? At any rate, the radio repairman told me I would have to buy a new radio from Uniden or Radio Shack. Does Radio Shack or Bear Cat now sell the radio that I need? (James E. Vogley - Massillon, Ohio)*

A. According to the field reports we have received regarding this system, the Canton PD talkgroups (16 - Dispatch, 32 - PD2, 80 - PD3, 112 - Detectives, 144 - Traffic, and 208 - PD Events), as well as all three Stark County SO talkgroups (16048/16080/16112) are encrypted, and there is no scanner in the marketplace that can decode their encryption. Even if there were, it would be illegal.

Until next time, 73 and good hunting
- Larry:

Keeping Up with the Changes

January is the time for New Year's resolutions, and one of mine is to keep up with reader mail. This month we'll update you on activities in Indiana, help a reader select a digital scanner for his father, and print some reactions and suggestions related to the recent changes in Florida's scanner law.

❖ Johnson County, Indiana

Hi Dan,

I live in Johnson County, Indiana. I have a Uniden BearTracker 800 BCT-7 scanner. Can I pick up the local police and sheriff frequencies with their updated system?

Thanks, TJ

Johnson County is located in central Indiana just south of Indianapolis, and it's home to about 125,000 residents. The county seat is Franklin and the largest city is Greenwood. Since 2002, more than a dozen public safety agencies in Johnson County have been using the Indiana Project Hoosier SAFE-T (Safety Acting For Everyone - Together), a statewide 800 MHz trunked radio system. SAFE-T began in 1997 as a project to integrate federal, state and local radio communications onto a single network, as well as to improve coverage in the many rural areas of the state.

SAFE-T is a Motorola Type II system and carries both analog and APCO-25 digital voice transmissions.

Depending on where you are in Johnson County, you can hear SAFE-T transmissions from towers in Franklin, Greenwood, and Mooresville. Frequencies assigned to these repeater sites include:

Franklin: 866.0125, 866.4750, 866.5125, 867.0125, 867.0375, 867.3750, 867.4750, 867.5125, 867.9000, 868.0125, 868.3750,



868.4500, 868.9000 and 868.9750 MHz
Greenville: 859.7375, 866.4750, 866.8750, 867.4750, 867.9000 and 868.3750 MHz
Mooresville: 854.9625, 866.0125, 866.5125, 866.9000, 867.0125, 867.4250, 867.5125, 867.9750, 868.0125, 868.4750 and 868.8625 MHz

Dec	Hex	Description
48	003	County Emergency Management
64	004	County Animal Control
80	005	County Jail
96	006	County All-Call
112	007	County Wide
128	008	County Wide
144	009	County Wide
160	00A	County Wide (Administrative)
176	00B	County Emergency Medical Service
192	00C	County Fire
208	00D	County Fire (Fireground 1)
224	00E	County Fire (Fireground 2)
240	00F	County Fire (Fireground 3)
256	010	County Fire (Fireground 4)
272	011	County Fire (Fireground 5)
288	012	County Fire (Fireground 6)
304	013	Amity Fire (Administrative)
320	014	Nineveh Fire (Administrative)
336	015	Trafalgar Fire (Administrative)
352	016	Whiteland Fire (Administrative)
368	017	Needham Fire (Administrative)
384	018	Clark Fire (Administrative)
400	019	White River Township Fire (Administrative)
432	01B	Johnson County Fire (Dispatch)
448	01C	Greenwood Fire (Fireground)
464	01D	Greenwood Fire (Administrative)
528	021	Greenwood Fire Dispatch
576	024	New Whiteland Fire (Administrative)
592	025	New Whiteland Fire (Dispatch)
608	026	Franklin Emergency Medical Service
624	027	Franklin Fire (Administrative)
688	02B	Franklin Fire (Dispatch)
704	02C	Edinburgh City Fire (Administrative)
752	02F	Edinburgh City Fire (Dispatch)
768	030	Bargersville Fire (Administrative)
816	033	Bargersville Fire (Dispatch)
848	035	Johnson County Fire (All-Call)
880	037	Johnson County Courthouse
7552	1D8	Edinburgh Police (Car-to-Car)
7568	1D9	Edinburgh Police (Administrative)
7584	1DA	Edinburgh Police (Dispatch)
7600	1DB	Franklin Police (Supervisors)
7632	1DD	Franklin Police (Investigations)
7664	1DF	Franklin Police (Car-to-Car)
7680	1E0	Franklin City Police (Dispatch)
7696	1E1	New Whiteland Police (Administrative)
7712	1E2	New Whiteland Police (Car-to-Car)
7728	1E3	New Whiteland Police (Dispatch)

7744	1E4	Greenwood Police (Administrative)
7760	1E5	Greenwood Police (Supervisors)
7776	1E6	Greenwood Police (Investigations)
7792	1E7	Greenwood Police (East Car-to-Car)
7808	1E8	Greenwood Police (West Car-to-Car)
7824	1E9	Greenwood Police (East Dispatch)
7840	1EA	Greenwood Police (West Dispatch)
7888	1ED	Sheriff (Administrative)
7936	1F0	Sheriff (Tactical 1)
7952	1F1	Sheriff (Tactical 2)
7968	1F2	Sheriff (Car to Car)
7984	1F3	Sheriff (Car-to-Car)
8000	1F4	Sheriff (Dispatch)

Outside of the trunked system, you may be able to hear the Johnson County Sheriff on 155.610 MHz and 159.150 MHz, for Car-to-Car and back-up dispatch. Activity related to the county jail may be heard on 158.445 MHz.



The city of Franklin operates a separate trunked radio system using a technology called Logic Trunked Radio (LTR). Voice transmissions are analog on 856.7375, 857.7375 and 858.7375 MHz transmitted from a repeater site in the 600 block of Industrial Drive. Talkgroups for the Police Department are reported to be 0-06-032 and 0-10-030.

It's also reported that dispatch for the County Fire Department is simulcast on 154.010 MHz and dispatch for the city of Franklin is simulcast on 460.600 MHz.



Now that we have a sense of what radio systems are active in your area, TJ, let's review your scanner.

The Uniden Bearcat BCT7 is a 100-channel, 12-band mobile scanner that includes coverage in the 800 MHz and Aircraft bands:

- 26.965-27.405 ... Citizens Band
- 29-30 10-Meter Amateur Band
- 30-50 VHF Low Band
- 118-137 Aircraft
- 137-144 Military Land Mobile
- 144-148 2-Meter Amateur Band
- 148-174 VHF High Band
- 406-420 Government Land Mobile
- 420-450 70-cm Amateur Band
- 450-512 UHF Band

806-956Public Service (except for cellular)



Although the BCT-7 covers the right frequencies, it is not capable of tracking trunked conversations. It will only scan in *conventional* mode, meaning it simply checks for activity on each of the programmed frequencies in turn. When it detects a transmission it will stop and play the audio from that frequency until the transmission ends.

Because frequencies are shared in a trunked system, each transmission that makes up a conversation may take place on a different frequency. On a system that doesn't have much traffic, a conventional scanner may be able to catch each part of the conversation as it is scanning. However, a busy system may have multiple simultaneous conversations that hop around on different frequencies, with the result that you only hear bits and pieces of what is going on. This can be very frustrating.

The BCT-7 was introduced more than a decade ago and at the time had several innovative features, including a highway alert and pre-programmed frequencies. Alas, time and technology marches on, and the BCT-7 was eventually replaced by the BCT-8 BearTracker, which is capable of tracking Motorola, EDACS, and LTR analog trunked radio systems.

However, even the BCT-8 won't allow you to hear all of the activity on the SAFE-T system, since much of the law enforcement activity is in digital format. For that you will need a digital scanner capable of decoding APCO Project 25 transmissions. Models that can do this include:

Uniden BC250D, BC296D, BC785D, BC796D and BC396T
Radio Shack PRO-96 and PRO-2096

These scanners are available from many of the advertisers in this magazine.

❖ Knox County, Indiana

According to press reports, Knox County has agreed to donate their 800 MHz frequencies and repeater sites to the State of Indiana and then will transition to the SAFE-T system.

Knox County is located in southwestern Indiana, bordering Illinois and is home to about 40,000 residents. The county has operated a Motorola Type II analog system on six frequencies: 858.2625, 858.7625, 859.2625, 859.7625, 860.2625 and 860.7625 MHz. The repeater site is located about two miles east of the town of Vincennes, just south of Highway 50.

Decimal	Hex	Description
3216	0C9	Knox County Sheriff (Dispatch)
3248	0CB	Knox County Sheriff (Operations)

3280	0CD	Vincennes Police (Dispatch)
3312	0CF	Vincennes Police (Operations)
3344	0D1	Vincennes University Police (Dispatch)
3376	0D3	Vincennes University Police (Operations)
3408	0D5	Bicknell Police (Dispatch)
3440	0D7	Bicknell Police (Operations)
3472	0D9	Vincennes Police (Detectives)
3696	0E7	Edwardsport Fire
3728	0E9	Sandborn Fire
3760	0EB	Vincennes Fire
3792	0ED	Bicknell Fire
3824	0EF	Washington Township Fire
3856	0F1	Harrison Township Fire
3888	0F3	Oaktown Fire
3920	0F5	Decker Fire
3952	0F7	Johnson Township Fire
3984	0F9	Steen Township Fire
4016	0FB	Freelandville Fire
4048	0FD	Palmyra Township Fire
4080	0FF	Vincennes Township Fire
4112	101	Edwardsport Fire
4144	103	Sandborn Fire
4176	105	Vigo Township Fire
4208	107	Vincennes Fire
4240	109	Bicknell Fire
4272	10B	Washington Township Fire
4304	10D	Harrison Township Fire
4336	10F	Oaktown Fire
4368	111	Johnson Township Fire
4400	113	Decker Fire
4432	115	Steen Township Fire
4464	117	Freelandville Fire
4496	119	Palmyra Township Fire
4528	11B	Vincennes Township Fire
4560	11D	Knox County EMS (Dispatch)
4688	125	Knox County Coroner
4720	127	Knox County Emergency Management
4752	129	Knox County Parks Department
4784	12B	Vincennes City Government
4816	12D	Knox County Fire (All Units)
4848	12F	Knox County Law Enforcement (All Units)
4912	133	Vigo Township Fire
5008	139	Knox County EMS (Operations)
5136	141	Indiana State Police (Evansville District)

❖ Computer Interface Scanning

Dan,

I just stumbled upon your web page while doing some searching on the Internet and thought you would be able to help me. My father really enjoys listening to his scanner, but his does not have digital trunking. It seems that many of the conversations he used to enjoy listening to have converted to digital trunking. I am interested in purchasing a new scanner for him that has digital trunking, and I was wondering if there are some you would recommend. He just sets the radio in his bedroom, so it does not need to be handheld. I wasn't sure if there are certain 'features' I should be looking for in a radio, and I also do not know which brands are dependable. Any help you could provide would be greatly appreciated.

I also saw that you mentioned that there is software that allows for computer controlling of the scanner, or would I purchase it separately? What does it allow you to do that cannot be done without it?

Mark in Virginia

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Uniden and Radio Shack are the two primary suppliers of scanners that are able to track digital trunked radio systems. The scanners available from either of these suppliers have proven to be dependable, although there are certainly hobbyists that prefer one over the other.

Since you'd like this to be a relatively simple-to-operate scanner for your father to use at home, you might consider the PRO-2096 from Radio Shack. It's a mobile/base version of the handheld PRO-96 and comes with frequencies pre-programmed for many areas of the country. It does not require any manual adjustments for digital voice quality and with the latest firmware is able to follow the various types of APCO 25 transmissions.

Various software programs are available to control the PRO-96 and PRO-2096 from a computer, but the consensus seems to be that Win96 is the most capable of making full use of all the scanner features. You can find it on the Internet at <http://www.starrsoft.com/software/Win96/>

Please let me know how you make out with it!

❖ Florida Scanner Law

In the October column we discussed the Florida scanner law passed in June 2005 that makes it a crime to, among other things, transport a scanner without proper authorization. This poorly thought-out law elicited a number of responses from readers.

Dan,

"Interesting *Scanning Report* in the October 2005 issue of *Monitoring Times* about the Florida scanner restrictions. I am sure that the 100,000 plus auto racing fans (many from out of state) that will have scanners with them (out of the 200,000 fans in attendance) at the big auto races at Daytona this upcoming February 2006 will not know or care much about this Florida law. They will have scanners with them in the car trunk, in the passenger compartment, or will be using them as they approach the track on race day. What about all the NASCAR race officials and race teams who all have many scanners? Has Governor Jeb Bush given any thought to this? They also rent scanners for these races for those fans who do not own them. I suspect NASCAR is now so big in

Florida that they will tell the governor where to stick his new law if he or his police harass them or the race fans. Any comment?

"By the way, we do not have to wait until February 2006, because there is a big NASCAR race weekend at Homestead November 18 - 20, 2005! Most of the auto race scanners can be programmed to receive most if not all of the frequencies in question as noted in your article and early models of scanners can also receive some of the cell phone frequencies.

"Maybe NASCAR should contact Jeb Bush and explain the facts of the real world to him. Unfortunately, I would suspect that very few auto race fans or NASCAR officials read your magazine."

- Paul in Michigan

In politics, money talks. NASCAR is certainly a large enough economic lever that the Florida state government would sit up and listen if they chose to push the issue. *Speed Weeks* leading up to the Daytona 500 bring in half a million visitors and an estimated \$250 million to the state. The total economic impact of the Daytona International Speedway is well over \$800 million. Those kinds of numbers would get the attention of any politician.

The difficulty lies in bringing the negative aspects of the new scanner law to the attention of those NASCAR officials who work with state and local politicians and encouraging them to make an issue of it to legislators.

"Good day to you, Mr. Veeneman. I am writing to you from Puerto Rico and am a long time subscriber of *Monitoring Times* and a good scanner hobbyist as well. Going through the October issue of *Monitoring Times*, I came upon your article 'Florida Restricts Scanner Use'

"I have to confess that it really left me in shock.

"This new law signed by Governor Jeb Bush regarding the transportation and or possession of a scanner in a vehicle is a real blow to the future of scanner hobby. I just can not believe that things like that are really occurring in the United States and furthermore, I still cannot believe that 'security' has gone that far.

"What are the real reasons beyond this? Homeland Security?

"I just can not believe that a person who is planning or willing to commit and crime or unlawful act is going to purchase and use a scanner for such purpose other than finding out if the police is after him.

"I see no harm for any law-abiding citizen to follow police, emergency response unit or firefighters communications on duty.

"To go a little further, countless numbers of incidents can be mentioned, where common citizens listening to their scanners have acted on an emergency situation long before any response unit has arrived on the scene.

"The way I see it, the time will come when the scanning hobby will be considered unlawful and banned for good. Articles like yours might be asked 'in the name of safety or Homeland

Security' to cease or people like renowned Mr. Gene Hughes, the founder and publisher of *Police Call*, are going to be considered dangerous people for the type of publication to which they have devoted their lives.

"Not knowing what is the full content of the law or the ideas behind these laws, I am curious and I must ask, is there a prohibition for the possession of a scanner at a home in Florida?

"What is going to happen if for some reason a person changing a flat tire, is approached by a police officer and a recently purchased scanner is found or seen on his opened trunk?

"What is going to happen with the stores that sell scanners to the public? Is there any violation to the law?

"Some times, while not producing real creative laws, states or countries tend to cut and paste what they read elsewhere so I have no doubt that the same situation is going to happen in other states summing up to the existing ones, New York just to mention one.

"Getting a ham ticket just to avoid a big headache with the law won't solve the problem. I am an amateur radio operator myself, holding an Extra Class ticket and I have to accept that there are common people out there on scanning, shortwave, citizens band that are not interested in getting a ham ticket.

"For the well being of the hobby I believe this is a real concern and that scanner hobbyists should raise their voices regarding these annoying laws.

"My sincere appreciation for your very interesting column; keep up the good job."

- Hector in San Juan, Puerto Rico

The Florida scanner law, as written, is not clear on many of the points you raise. The transportation clause, for instance, at face value would seem to make it illegal for supply trucks to bring scanners into the state from manufacturers, or for stores to move scanners between retail outlets. It would also appear to be illegal to bring your scanner to a store for repair, or even drive it to the Post Office for shipment to a repair facility.

I don't believe this law has much to do with Homeland Security or any terrorist threat. It seems to be a quick and easy way for legislators to appease a few law enforcement officials and give the appearance of "doing something" about crime. As the saying goes, "Laws are like sausages, it is better not to see them being made."

I agree that scanner hobbyists should raise their voices. Florida residents should be encouraged to write to their state legislators, demanding that the scanner law be changed. Out-of-state hobbyists should also be writing to the state tourism board, clearly describing their displeasure at the scanner law and indicating that they will be spending their tourism dollars elsewhere.

That's all for this first month of the New Year. More information on scanners, scanner laws and related radio topics can be found on my website at <http://www.signalharbor.com>. I welcome your e-mail at danveeneman@monitoringtimes.com. Until next month, happy scanning!

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Frequency Coverage:

25,000-512,000 MHz., 764,000-775,987.5 MHz., 794,000-823,987.5 MHz., 849,012-868,876.5 MHz., 894,012-956,000 MHz., 1,240,000 MHz.-1,300,000 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

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Frequency Coverage:

25,000-54,000 MHz., 108,000-174,000 MHz., 216,000-224,980 MHz., 400,000-512,000 MHz., 806,000-823,987.5 MHz., 849,012-868,987.5 MHz., 894,012-956,000 MHz., 1,240,000 MHz.-1,300,000 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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Rome is Eternal, Roman CW isn't

AR, Roma Radio, began Italy's foremost maritime radio services in 1954, using various modes including Morse telegraphy on frequencies including the often-heard 8670 kilohertz (kHz), continuous-wave (CW). The CW ended on Halloween 2005. This farewell message ran, in Italian and English, for about a week:

"This is the final transmission from Roma Radio Morse service. We conclude our watch-keeping after many years of continuous service with pride and sadness on October the 31st. Telecom Italia coast stations wishes all seafarers fair winds and following seas. We salute all who have served our profession with skill and dedication through the years."

(Of course, the real message was all in uppercase, since Morse has no lower case.)

We salute Roma Radio for its 50+ years of service.

❖ Israeli Navy Also Leaving CW

Israel's notorious 4XZ, the Navy station which sent "numbers" to unknown military or intelligence units along with its traffic and weather observations, is rapidly phasing out Morse telegraphy as well. At press time, its "VVV" test markers and frequent CW broadcasts are down to sporadic appearances on one or two of these once-busy frequencies: 2680, 4241, 4331, 5159, 6379, 8103, 10046, 12984, and 13966 kHz CW.

This is all part of an overall modernization of Israeli military communications. The replacement IIF mode is digital, and sounds like another of those 39-tone, phase-shift-keyed modems used by various other military and civilian services. Each transmission starts with a two-second beep from six of the tones, then half a second with all 39, then a preamble of varying length depending on the encryption system used, and finally the message. Everything after the preamble is usually just a hiss.

❖ NATO Digital Conversion Continues

While Morse code continues to vanish, traditional Baudot radio teletype (RTTY) is also on the decline. Several

North Atlantic Treaty Organization (NATO) countries continue with the conversion to the single-tone digital modem that we discussed last month. It's STANAG 4285 (from STANdardization Agreement), but the character set in NATO's new system is still International Telegraph Alphabet #2 (ITA2).

Table #1 shows the latest STANAG 4285/ITA2 frequencies, and a few of the RTTY ones that had yet to convert at press time. Baud rate is shown as either 300 or 600, with the "interleave" always set to "long." "5N1" means five data bits, no parity bit, and only one stop bit. "5N2" uses two stop bits to better emulate old Baudot. In either case, it's also necessary to enable the ITA2 mode on most decoders.

A few unencrypted STANAG 4285 transmissions use characters in ASCII (American Standard Code for Information Interchange). This widely used code uses seven or eight bits, usually no parity, and one stop bit (7N1 or 8N1). One also encounters even parity (7E1), though this is more frequent on landline modems.

❖ Russian Beacon Changes

Don't worry – the single-letter beacons still use CW! These clustered navigation beacons, at far-flung Russian/ Commonwealth of Independent States military bases, are activated when needed by the fleets. Fall 2005 naval exercises had them all up and bleeping away.



The rare Cluster beacon "A," which occupies the x.1 kHz slot in all known clusters, was heard on 5154.1, 7039.1, 8495.1, 10872.1, 13528.1, 16332.1, and 20048.1 kHz CW, from a new location. It is no longer in the Far East, but in the Baku section of Azerbaijan just north of Iran on the Caspian Sea. This makes for a much better signal in Europe and North America.

Meanwhile, direction fixes by a reputable amateur radio group have put the location of cluster beacon "D," long thought to be Odessa, as perhaps 200 miles southeast in Sevastopol. Both cities are in the Crimean section of the Ukraine, on the same stretch of the Black Sea coast. Due to the possibility of remote transmitters, all published locations of these beacons should probably be considered as approximate regions.

Some solitary channel markers were also heard: "L" on 3202.9; "P" on 2330.9 and 3291.0; and "R" on 4325.8 and 5465.8, all CW.

❖ Small Correction

Last month this column called COAA, the seller of the excellent DSC decoder shareware, a "UK company." While its English-language web site is indeed in the UK, COAA is a Portuguese observatory. See you next month.

Table 1: NATO Teleprinting Frequencies
STANAG 4285 and ITA2 unless noted

Frequency	Call or Routing	Agency	Settings
2608.4	FUO	French Navy, Toulon	RTTY 75/850
2804.2	IDR	Italian Navy, Rome	600/L 5N1
4152.5	DHJ59	German Navy, Wilhelmshaven	ASCII
4214.0	IDR	Italian Navy, Rome	RTTY 75/850
4225.2	IDR	Italian Navy, Rome	600/L 5N1
4233.0	RFLIE	French Navy, Ft de France	300/L 5N2
4295.0	FUE	French Navy, Brest	RTTY 75/850
4333.0	FUX	French Navy, Le Port	300/L 5N1
4803.0	Unid	Unknown	300/L ASCII 8N1
6262.5	IDR	Italian Navy, Rome	600/L 5N1
6315.9	IDR	Italian Navy, Rome	300/L 5N1
6316.2	IDR	Italian Navy, Rome	300/L 5N1
6331.7	IDR	Italian Navy, Rome	600/L 5N1
6348.0	FUE	French Navy, Brest	600/L 5N2
6464.0	FUM	French Navy, Tahiti	RTTY 75/850
8149.2	IDR	Italian Navy, Rome	600/L 5N1
8300.0	RFLJE	French Forces, Dakar	RTTY 75/850
8342.0	FUJ	French Navy, Noumea	RTTY 150/850
8461.2	IDR	Italian Navy, Rome	600/L 5N1
8473.5	FUX	French Navy, Le Port	300/L 5N1
8478.5	RFLIE	French Navy, Ft de France	300/L 5N2
8451.0	FUO	French Navy, Toulon	300/L 5N2
8451.0	RFFMEA	French Navy, La Reine	300/L 5N2
8568.0	FUV	French Navy, Djibouti	300/L 5N2
8625.0	FUM	French Navy, Tahiti	600/L 5N2
11042.7	RFL	French Navy, Ft de France	600/L
11173.0	REGW	French MFA, Paris	1200/L ASCII 8N1
12200.3	Unid	Unknown NATO	600/L 5N1
12664.5	FUO	French Navy, Toulon	300/L 5N2
12664.5	FUX	French Navy, Le Port	300/L 5N1
12664.5	FUM	French Navy, Tahiti	300/L 5N2
12666.5	FUO	French Navy, Toulon	300/L 5N2
13031.2	RFLIE	French Navy, Ft de France	300/L 5N2
13042.5	FUV	French Navy, Djibouti	300/L 5N2
16907.0	FUV	French Navy, Djibouti	RTTY 75/850
16957.8	FUJ	French Navy, Noumea	300/L 5N1
16961.5	RFLIE	French Navy, Ft de France	300/L 5N1

ABBREVIATIONS USED IN THIS COLUMN

AFB.....	Air Force Base
ALE.....	Automatic Link Establishment
ARQ.....	Automatic Repeat Request teleprinting system
AWACS.....	Airborne Warning and Control System
CAMSLANT.....	Communication Area Master Station, Atlantic
CAMSPAC.....	Communication Area Master Station, Pacific
CARB.....	Channel Availability Radio Bulletin
CW.....	Morse code telegraphy ("Continuous Wave")
DEA.....	US Drug Enforcement Administration
DSC.....	Digital Selective Calling
E3.....	UK, Cyprus, Poacher tune and "numbers"
EAM.....	Emergency Action Message
E10.....	Israeli English phonetic "numbers"
FAX.....	Radiofacsimile
FEC.....	Forward Error Correction teleprinting system
HFDL.....	High-Frequency Data Link
HF-GCS.....	High-Frequency Global Communications System
ITA2.....	International Telegraph Alphabet #2 ("Baudot")
LSB.....	Lower Sideband
M10.....	CW "numbers," possibly "Czech Family"
MARS.....	US Military Affiliate Radio System
Meteo.....	Meteorological
MFA.....	Ministry of Foreign Affairs
MX.....	Russian single-letter beacons and markers
NATO.....	North Atlantic Treaty Organization
PACTOR.....	Packet Teleprinting Over Radio
RSA.....	Republic of South Africa
RTTY.....	Radio Teletype
SITOR-A.....	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B.....	Simplex Teleprinting Over Radio, FEC mode
STANAG.....	Standardization Agreement (NATO)
STANAG 4285.....	NATO single-tone modem teleprinting standard
UK.....	United Kingdom
Unid.....	Unidentified
US.....	United States
USCG.....	US Coast Guard
V2.....	Generic Cuban "female," 5-figure groups
VOLMET.....	Flying Weather (loosely from French)

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 ().

- 341.0 YYU-Nondirectional aero beacon, Kapuskasing, Ontario, Canada, CW at 0709. (Mark Morgan-OH)
- 355.0 YLD-Nondirectional beacon, Chappleau, Ontario, CW at 0700. (Morgan-OH)
- 400.0 ENS-Nondirectional beacon, Ensenada, Mexico, AM carrier and Morse identifier, at 2112. (Hugh Stegman-CA)
- 2187.5 002241022-Spanish Coast Guard, Coruna, making DSC test calls to itself at 2313. (Day Watson-UK)
- 2813.9 MTI-UK Royal Navy, Plymouth, RTTY CARBs at 1656. (Watson-UK)
- 3167.0 "F-2-Y"-US navy, link coordination with "T-6-E" and "O-6-P," at 1148. (Mark Cleary-SC)
- 3413.0 Shannon-North Atlantic VOLMET, Ireland, aviation weather at 0137. (Tom Severt-KS)
- 4030.0 Unid-CW repetition of "555 555 555 403 403 403 33 710 710 710 38" at 1903, then 5-figure groups at 1905. (Watson-UK) [Almost certainly M10, also uses 4029. -Hugh]
- 4079.0 RMP-Russian Navy, Kaliningrad, CW weather and navigation in Russian, at 1626. (Watson-UK)
- 4207.5 SVO-Olympia Radio, Greece, DSC test with ZIXM8, UK oil tanker *British Endurance*, at 0408. VRWP2-Hong Kong bulk carrier *Federal Hunter*, testing in DSC with Miami/Norfolk, at 0633. (Watson-UK)
- 4271.5 FUX-French Navy, Ft. de France, Martinique, STANAG 4285 at 1718. (Bob Hall-RSA)
- 4295.0 FUE-French Navy, Brest, RTTY test loop at 2342. (Severt-KS)
- 4316.0 NMN-USCG CAMSLANT Chesapeake, VA, with "Perfect Paul" stuck repeating the same word, finally back to weather at 0407. (Severt-KS)
- 4346.0 NMC-USCG CAMSPAC Point Reyes, FAX weather chart 0410. (Severt-KS)
- 4369.0 WLO-Mobile Radio, AL, Wilma advisory and traffic list at 2204. (Severt-KS)
- 4610.0 GYA-UK Royal Navy, Northwood, weather FAX, also on 8040 and 11086.5, at 1624. (Watson-UK)
- 4739.0 Fiddle-US Navy, Jacksonville, FL, working Cardfile 711 and Red Talon 712 (P-3Cs), at 0119. (Cleary-SC)
- 5052.1 PBC-Dutch Royal Navy, Goeree Island, RTTY CARB at 1359. (Watson-UK)
- 5696.0 Coast Guard Rescue 28-USCG, working CAMSLANT, on a search at 0351. (Rick Baker-OH) "R-9-J"-USCG, ops-normal for CAMSLANT at 0630. (Severt-KS)
- 5708.0 NW1-Nightwatch 1-US Airborne Command Post, calling NW2, ALE at 0124. (Baker-OH)
- 5732.0 LNT-USCG CAMSLANT, ALE-initiated voice ops-normal from J35/ Juliet 35, at 2151. (Severt-KS)
- 5850.0 OXT-Copenhagen Meteo, Denmark, FAX ice chart, also uses 9360, 13855, and 17510; at 0943. (Watson-UK)
- 6316.2 IDR-Italian Navy, Rome, ITA 2 CARB in STANAG 4285 (300 baud/long interleave), at 1827. (Watson-UK)
- 6357.0 PNRN5-Venezuelan Naval River Post #5, Rio Negro, calling BRIFFR15, Riverine Brigade Franz Risquez Iribarren, LSB ALE at 0329. (Baker-OH)
- 6519.0 WLO-Mobile Radio, AL, synthesized "female" weather and traffic list, at 0006. (Severt-KS)
- 6712.0 D-ALCI-Lufthansa Cargo MD-11F freighter, flight 8267, working 03, Reykjavik, HFDL at 1836. (Watson-UK)
- 6739.0 Offutt-US Air Force HF-GCS, all-frequency request for Tree Toad to phone Andrews, at 1249. (Cleary-SC)
- 6895.0 DHN-Venezuelan Hydrographic and Navigation Directorate, calling PR1, Naval Radio Station 1, ALE at 0435. (Baker-OH)
- 6915.0 VCO-Canadian Coast Guard, Sydney, NS, FAX ice chart at 1742. (Chris Smolinski-MD) [This may be a schedule change. Also 1121 and 1142. -Hugh]
- 6925.0 Unid-Pirate AM broadcast of apparently live music, same drummer as earlier on 10000, at 2200. (Morgan-OH)
- 7313.5 AFA2AJ-US Air Force MARS, VA, net control at 1201. (Cleary-SC)
- 7508.0 ZSJ-South African Navy, Silvermine, RTTY navigation warnings at 0925, weather FAX at 1110. (Hall-RSA)
- 7527.0 Juliet 32-US Coast Guard, setting radio guard with CAMSLANT at 1213. (Cleary-SC) CAMSPAC-USCG CAMSPAC Point Reyes, CA, securing guard with Coast Guard 1718, at 1639. (Severt-KS)
- 7650.0 R23485-US Army UH-60A, raised T2Z238, 2/238th Aviation, IN, in ALE, then voice check as "485," at 1449. (Baker-OH)
- 8047.0 R0316-US National Guard, working KBOING, Idaho Air National Guard, Boise, ALE at 1311. (Baker-OH)
- 8300.0 RFTJE-French Forces, Ivory Coast, with an RTTY test loop at 0447. (Ken Maltz-NY)
- 8423.0 SVO-Olympic Radio, Greece, "DE SVO" CW marker at 0449. (Maltz-NY)
- 8451.0 FUE-French Navy, Toulon, ITA2 test loop in STANAG 4285 (300/L), at 1810. (Watson-UK)
- 8451.0 FUE-French Navy, Toulon, STANAG 4285 at 1751. (Hall-RSA)
- 8500.0 VTH1/4/5-Indian Navy, Mumbai, RTTY marker at 1715. (Hall-RSA)
- 8581.9 PWZ33-Brazilian Navy, Rio De Janeiro, FAX weather chart at 0749. (Watson-UK)
- 8834.0 ZS-SFK-South African Airways flight 422 (Airbus A319), HFDL position for Johannesburg, at 1550. (Hall-RSA)
- 8912.0 Omaha 20 November-DEA, working Hammer, March AFB, CA, at 0004. (Severt-KS) Coast Guard 1705-USCG, working Victor 11 on a search, at 0252. (Baker-OH) Coast Guard 1720, setting guard with CAMSLANT at 1435. (Cleary-SC)
- 8930.0 Air Transat 730, patch to paramedics regarding sick passenger, at 0905. Reach 602-Amtran contract flight for US Air Force Air Mobility Command, patching dispatch via Stockholm, at 0915.

- 8971.0 Reach 967-World Airlines AMC contract, reporting Kuwait arrival to Stockholm, at 1440. (Clifford Webb-UK)
- 9025.0 Fighting Tiger 21-US Navy P-3C, working Golden Hawk, ME, at 1938. (Cleary-SC)
- 9041.0 Sentry 61-US Air Force AWACS, ALE-initiated patch to Raymond 24 (Tinker AFB, OK), at 1943. (Cleary-SC) TORMENTA-Mexican military ("Storm"), calling TRUENO ("Thunder"), on the "storm net" at 2357. (Baker-OH)
- 9153.0 5YE-Nairobi Meteo, RTTY weather at 1745. (Hall-RSA)
- 9190.0 Unid-Usually Cuban AM "numbers," but only carrier from 0500 to normal end of messages at 0545. Similar "schedule," with carrier only, on 8010 and 9323, at 0600 to 0645. (Sevart-KS) [V2 has been even more messy than usual, due to hurricanes. -Hugh]
- 9295.0 BNA-Venezuelan Navy, calling F22, Frigate *Almirante Brion*, ALE at 0342. (Baker-OH)
- 9323.4 ALBANY-NY National Guard, Albany, calling RHVNY, ALE at 1502. (Baker-OH)
- 9996.0 Cuban AM "Atencion" callup (V2), early and with bad hum at 0551, cut at 0553. Cuban AM "numbers" (V2), drifting badly, at 0658. (Sevart-KS)
- 10000.0 RWM-Standard time station, Moscow, CW pips at 1913. (Watson-UK)
- 10242.0 Unid-Pirate AM broadcast of a live trap drummer, then "Test, test, 1-2-3," fading in and out under WWV for a half hour, after 2128. (Morgan-OH)
- 10444.0 CAMSLANT-USCG, taking message from 015 for arrival at Clearwater, at 1431. (Sevart-KS)
- 10536.0 TRUENO-Mexican military ("Thunder"), calling CICLON25 ("Cyclone 25"), ALE at 1144. (Baker-OH)
- 10626.0 CFH-Canadian Forces, Halifax, FAX satellite image of hurricane Wilma, at 2250. (Sevart-KS)
- 11039.0 RFFXL-French Forces, Lebanon, encrypted ARQ message at 1428. (Watson-UK)
- 11109.0 DDH9-Hamburg Meteo, RTTY forecast in German, at 1418. (Watson-UK)
- 11111.0 TWLA-Spanish Guardia Civil, Vitoria, working 120 in ALE, at 0914. (Watson-UK)
- 11127.0 STAT22-Tunisian Ministry of Information, raising TUD in ALE, then traffic in PACTOR-II, at 0925. (Watson-UK)
- 11130.0 TWLC-Spanish Guardia Civil, Cantabria, raising TZSH in ALE, then data transmissions, at 1545. (Watson-UK)
- 11153.5 O2-Moroccan Army, calling GLOBAL in ALE, at 0703. (Watson-UK)
- 11159.0 Andrews-US Air Force, Andrews AFB, MD, calling Mug Beer, no joy at 1740. (Jeff Haverlah-TX)
- 11175.0 Reach 293-US Air Mobility Command, patch via Lajes HF-GCS, diverting from Baghdad to Kuwait at 2009. (Cleary-SC)
- 11205.0 Motown 7-MI Air National Guard C-130E, patch via Puerto Rico HF-GCS to Coronet Oak Ops (PR), at 1427. (Cleary-SC) Offutt, working AIR (spoken as call letters), possible exercise at 2028. Andrews, working Offutt, then identified as AIR, at 2115. (Haverlah-TX) [Possibly 789th Comm Squadron, Andrews AFB. -Hugh]
- 11226.0 CO0109-Continental Airlines flight 109, HFDL position for "03," Reykjavik, at 1615. (Watson-UK)
- 11232.0 Shark 45-US Joint Task Force, calling Smasher (FL), no joy at 1201. (Cleary-SC)
- 11271.0 61000288-US Air Force KC-135 tanker, ALE-dialed patch to Hilda (AMC operations, IL), at 1802. (Baker-OH)
- 11285.0 Sentry 31-US Air Force AWACS, patch via Halifax Military to Raymond 24, at 2136. (Cleary-SC)
- 11418.0 Air Force Rescue 971-US Air Force, patch via Trenton to Air Force Rescue Coordination Center, Langley AFB, VA, at 2004. (Cleary-SC)
- 11475.0 SIA 324-Singapore Airlines Boeing 777 (9V-SVM), working Chennai Radio, India, at 1859. (Webb-UK)
- 11494.0 RMP-Russian Navy, Kaliningrad, CW traffic at 1420. (Watson-UK)
- 12577.0 RBT-Algerian Embassy, Rabat, Morocco, working MAE, MFA Algiers, in ALE, then French traffic in Skyfax, at 1423. (Watson-UK)
- 12579.0 Coast Guard 1712-USCG HC-130, ops-normal for CAMSLANT at 1359. (Cleary-SC) D70-US Customs and Border Protection P-3C, calling CNT, CBP Central Region, in ALE, then voice as 370 working Hammer (US Customs, CA), at 1530. (Baker-OH)
- 12581.5 NMF-USCG, Boston, SITOR-B Marine Safety Information, at 1630. (Sevart-KS)
- 12603.0 WLO-Mobile Radio, AL, back after Katrina with CW identifier in SITOR-A sync bursts, at 1800. (Morgan-OH)
- 12664.5 Lincolnshire Poacher-British M16/SIS (E3), female 5-figure "numbers" voice, parallel on 14487, at 1807. (Sevart-KS)
- 12666.5 FUE-French Navy, Toulon, ITA2 test loop in STANAG 4285, at 1805. (Watson-UK)
- 12666.9 FUE-French Navy, Toulon, ITA2 test loop in STANAG 4285, at 0830. (Watson-UK)
- 12789.9 PWZ33-Brazilian Navy, Rio De Janeiro, weather FAX at 0803. (Watson-UK)
- 12857.0 NMG-USCG, New Orleans, FAX weather chart at 2016. (Sevart-KS)
- 13200.0 6WW-French Navy, Dakar, Senegal, RTTY test loop at 1208. (Watson-UK)
- 13257.0 Teal 89-US Air Force Reserve WC-130 "Hurricane Hunter," patch via Andrews HF-GCS, needing clearance to overfly Cuba, at 1748. (Cleary-SC)
- 13321.0 Canforce 2310-Canadian Forces, working Trenton Military at 2214. (Cleary-SC)
- 13510.0 ZS-SFD-South African Airways flight 338 (Airbus A319), HFDL position for Johannesburg, at 1203. ZS-SFG, flight 616 (A319), HFDL position for Johannesburg, at 1213. (Hall-RSA)
- 13596.7 CFH-Canadian Force, Halifax, NS, weather in FAX at 1210, and in RTTY at 1339. (Watson-UK) CFH-Canadian Forces, Halifax, NS, weather in RTTY and then FAX, at 2100. (Sevart-KS)
- 13882.5 FDI8-French Air Force, Nice, CW marker at 1513. (Watson-UK)
- 13883.0 DDK6-Hamburg Meteo, FAX surface analysis at 1810. (Watson-UK)
- 13885.9 DDK6-Pinnenberg Meteo, Germany, FAX surface chart at 1805. (Hall-RSA)
- 13907.0 Unid-Moscow Meteo, text weather observations in FAX, at 0946. (Watson-UK)
- 13920.0 60A-US DEA, position for Panther (Bahamas), at 2159. (Cleary-SC)
- 13927.1 VMC-Australian Bureau of Meteorology, Charleville, weak FAX at 1411. (Watson-UK)
- 13927.1 Catbird-US Navy, patch to Andrews Navy Ops via MARS station AFA2MH, at 2009. (Allan Stern-FL)
- 14996.0 Shark 44-US Joint Task Force C-130, patch via MARS AFA3HS, KS, to Smasher (FL) and Coronet Oak (PR), neither one picked up, at 1442. (Cleary-SC)
- 15016.0 RWM-Moscow time station, CW pips at 1540. (Watson-UK)
- 15025.0 Reach 6001-Air Mobility Command, patch via Puerto Rico HF-GCS to Bangor, ME, at 2127. (Cleary-SC)
- 15043.0 Shark 42-US Joint Task Force, working Smasher (FL), at 1914. (Cleary-SC)
- 15847.2 E30352IGM-US Air Force E3B, ALE direct dial to Raymond 24, then voice as Sentry 30, at 1736. (Baker-OH)
- 15867.0 Unid-Possible Sudanese MFA, Khartoum, calling 901 in PAC-TOR-I, passed Hayes modem setup codes and encrypted traffic, at 1420. (Watson-UK)
- 16135.0 Service Center-US Customs, working Omaha 670 at 1704. (Cleary-SC)
- 16804.5 KVM70-Honolulu Meteo, HI, FAX chart at 1902. (Maltz-NY)
- 16951.0 NMG-USCG New Orleans, DSC test at 1422. (Watson-UK)
- 16951.5 RFTJ-French Forces, Dakar, Senegal, RTTY test loop at 1735. (Hall-RSA)
- 16979.9 6WW-French Navy, Dakar, Senegal, RTTY marker at 1204. (Watson-UK)
- 17231.0 PWZ33-Brazilian Navy, Rio De Janeiro, FAX weather chart at 1635. (Watson-UK)
- 18205.5 CWA-Cerrito Radio, Uruguay, CW marker at 1013. (Watson-UK)
- 18326.7 MAE-Algerian MFA, Algiers, raising ADZ, Agadez, Niger, in ALE, then French traffic in Skyfax, at 1440. (Watson-UK)
- 20048.0 Unid-Egyptian MFA Cairo, working Algiers in SITOR-A, at 1200. (Watson-UK)
- 20048.1 "C"-Russian Navy, Moscow, CW single-letter beacon (MX), at 1154. (Watson-UK)
- 22387.0 "A"-Russian Navy, Baku, Azerbaijan, single-letter beacon (MX), at 1155. (Watson-UK) [New location. -Hugh]
- 22456.7 SVO-Olympia Radio, Greece, CW marker at 0855. (Hall-RSA)
- FUV-French Forces, Djibouti, STANAG 4285 at 1155. (Hall-RSA)

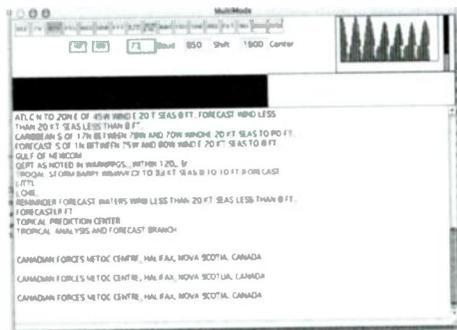
Digital Utility Software for the Rest of Us

This month we take a look at the very useful MultiMode digital decoder software package for the splendid line of Apple Mac computers.

❖ Made for Macs

In world where Microsoft Windows is still king, Apple and its innovative line of laptops and desktops, powered by their OS X operating system released a few years ago, have been making steady inroads into previously solid "Big Redmond" territory.

Along with the dominance of Windows comes a plethora of digital decoding software for that platform, whether hardware-based, via interface or the soundcard. With Black Cat Systems' MultiMode, Mac users have something to cheer about and it does a great job decoding many key data modes on HF and VHF today. While we didn't try it during our test, the program can also be used to transmit data when interfaced to a suitably equipped transmitter.



The current version 5.6.0 of MM is available in two flavors: Standard and Lite. The standard version, available for \$89, supports the following data modes; those with an asterisk also support transmit.

- CW, Morse *
- RTTY (BAUDOT, ASCII and KG84) *
- HF Facsimile
- Slow Scan TV *
- SITOR-A aka ARQ
- SITOR-B (including NAVTEX *)
- VHF ACARS
- AX.25 Packet Radio *
- PSK31 *
- MIL-STD-188-141A ALE
- Tone/Selcal modes: DTMF, CTCSS, EIA EEA, ZVEI1, ZVEI2, ZVEI3, PZVEI, DZVEI PDZVEI, NATEL, EURO, MODAT, CCITT, VDEW, CCIR, CCIR7 and PCCIR
- LORAN-C
- MT63 *
- Hellschreiber *
- Globe Wireless Channel Free Signal
- CHU Canada FSK Time information packets
- EAS Emergency Alert System *

While not inclusive of some of the common, more complex modes in use today, MM has a good balance of choices given what's actually on the air. If it were to include PacTOR (a challenge, due to the inventor SCS's copyright and licensing fees) and perhaps ARINC635 (aka HF ACARS), this would be a package capable of handling most of anything on HF at any time.

The lite version, available for \$29, supports just the first three modes and is for reception only. Users of older, pre-OS X Macs are also catered to by MM 3, which runs on System 8 or 9. A fully functional demo version of the software is available for free download and will run for a short time before it reminds you to register the software.

❖ Away We Go

Some Macs are blessed with an audio input socket, so in this case, feeding MM with audio is a simple matter of connecting a line-level signal to the computer. Since the iBook here at "Digital Towers" has no audio input, we used a simple \$30 iMic audio-to-USB interface from Griffin (see Resources) to convert line-level signals into digital audio for the computer. When running, MM automatically detects the interface and asks whether it should be used as the program's audio source.

On starting up, the program displays a fairly intuitive screen with an area for decoded text, an audio spectrum display, and a mode dependent area with various user-selectable settings such as speed, shift, center frequency, and so on. Choosing a mode to decode is as simple as selecting it from the Modes menu; the display reconfigures various screen elements accordingly and prepares to decode.

❖ How Does It Work?

We found all modes adequately decoded, though many weaker signals were only partially copied as compared to other (and admittedly more expensive) decoders, though this may be due to the iMic rather than the program itself. We got great results decoding:

- NAVTEX from US coast stations on 518 kHz
- Facsimile from the Royal Navy on 8041 kHz
- CW sea condition reports from Israel's 4XZ in Haifa
- Venezuelan Army ALE on 6833 kHz
- RTTY weather from the German DWD on 14467 kHz, and
- CTCSS decoding on the local VHF fire and police channels

Standard Baudot RTTY can sometimes take too long to "sync up" even with strong enough signals (again, perhaps a problem from the iMic), and we had little luck with SITOR-A from a strong-enough Egyptian Diplomatic Service sig-

nal from Cuba. We also found the display of ALE information to be a little different from most other implementations, which took getting used to. While we saw soundings and LQAs (see August 2005 *Digital Digest* for an explanation of ALE terms), we weren't able to test if the program decodes AMD messages and CMD data which the manual suggests it does.

For the HF listener, we found a number of interesting features not present in many other decoders. For example, MM will automatically test and recognize NATO encrypted RTTY transmissions by the sync sequence sent before each message. All that is required is to correctly tune the signal, set the speed and shift and click the "KG84" button. MM was also the first, and remains one of the few programs to decode the channel marker bursts sent by Globe Wireless stations throughout the world. We described them here in *DD* June and July 2004.

My father also reports excellent and reliable results using an iMic as audio source to a Mac Mini. He finds fax pictures to be particularly crisp and well-rendered even in low signal conditions, and he enjoys good results listening to VHF ACARS from the many aircraft crisscrossing the busy sky over his location in eastern England. He reports the PSK31 implementation is also very good, mimicking Digipan and other panoramic displays where one can simply click one of a number of closely spaced signals in the display and the program takes care of fine-tuning and decoding automatically.

Decoded text and fax or SSTV pictures can all be saved to disk for long-term unattended collection and later review. For unknown signals, the program supplies a baud speed, shift and autocorrelation module, which does a pretty good job of unraveling the odd stuff.

If you own a Mac and are looking to get into the digital utility listening game, you can't go wrong with MultiMode. Until next month, good digital DX.

Resources:

- Black Cat Systems <http://www.blackcatsystems.com>
- Griffin Technology <http://www.griffintechology.com/products/imic>

Daniel Sampson's PRIME TIME SHORTWAVE

<http://www.primetimeshortwave.com>

Your guide for up-to-date English shortwave schedules sorted by time, country and frequency plus a DX media program guide and newsletter

"Voice of South America" - Another Opportunity Lost

Voz Cristiana, from Miami, via Chile, in Spanish to Mexico, puts in a super signal all day on 17680 (although overshadowed in some areas currently by R. Martí, Delano, on 17670). What a pity that this facility (or another transmitter at Calera de Tango, near Santiago) is not used for a "Voice of South America" external service. If Chile is not interested, one or more other countries could back it and provide a terrific service to the rest of the world in English and other languages, conveying South American news, culture, and yes, politics. But no one has the vision to do it.

Raúl Saavedra in Tiquicia (Costa Rica) agrees it's a 5 by 5 signal: "I see it as a dream to keep hoping that someday a group of South American countries will reach an agreement for a shared major SW outlet; as you know there are different points of political view. We have just seen the recent experience with the TV channel supported by Venezuela; it's like trying to set in place 50 monkeys for a photo. I bet that mega SW SAM station would have to come from Brazil; I don't see any other country with the resources to do that."

❖ Online B-05 Schedules

Most comprehensive (except for Latin Americans) is Eike Bierwirth's compilation, both in frequency and time order; via <http://www.eibi.de.vu/>

Nagoya DX Circle also puts together independently a list by frequency via <http://www2.starcat.ne.jp/~ndxc/>

High Frequency Coordinating Committee deletes hundreds of entries before making their schedules public; look for the zipped file under Public Data at <http://www.hfcc.org>

❖ URL Correction

The editor provided an incorrect link last month for the condig list. Condig is a yahoo group which you can find at <http://groups.yahoo.com/group/condiglist/>

AFGHANISTAN [non] R. Solh, PsyOps: 0200-1200 on 11675 via Dhabbaya, UAE; 1200-1500 15265, 1500-1800 9875, both Rampisham, UK (Bernd Trutenau, Lithuania, DX LISTENING DIGEST) Well heard with enjoyable music until 1500 on 15265; I don't even realize my psy is being opped. After 1500 mixes with R. Japan in English (gh, OK) Also loud and clear at 1400 (Joe Hanlon, NJ, *ibid.*)

ALBANIA R. Tirana's B-05 schedule last month was modified before it went into effect. English to Eu at 1945-2000 on 7465 and 7530 ex-6225, Mon-Sat only, as is English to NAm Tue-Sun only. 7455 is also used for Albanian daily at 0000-0130 (Observer, Bulgaria) Yes, 7455 with RTTY QRM

ANTARCTICA Greece had planned to use Delano on 15475 this winter at 1600-2200, which would have wiped out reception of LRA-36, on 15476 at 1800-2100. Fortunately, VOG was persuaded to use 15485 instead (gh) 15476, LRA 36, Radio Nacional Arcángel San Gabriel, heard at 2030 including a talk on penguins, no interference to 2102* (Manuel Méndez, Spain, DXLD)

ARMENIA V. of Armenia, B-05 English shifted to 1925-1944 on 9965 (gh) 305 degrees, 500 kW from Yerevan, also used at 0300-0345 including Spanish at 260 degrees. The only transmission intended for NAm from here is a V. of Russia relay at 0200-0400 on 7250, 305 degrees (BCDX)

AUSTRALIA Even after B-05 began, RA online schedules though labeled as current, had not really been updated. I was hearing, e.g., unlisted 17785 at 2200-2400 instead of 21740, and on-air frequency change announcements were also outdated (gh, WORLD OF RADIO) Schedule on the website is always wrong. Correct schedule from Nigel Holmes does show this (Sean D. Gilbert, G4UCJ/G4001SWL, International Editor - WRTH) Other 100 kW from Shepparton designated for NAm as well as Pac: 2100-2300 15515, 0000-0200 17715, 0200-0700 15515, 0500-0800 15160, 0700-0900 13630, 0800-1400 9580, 0800-1600 9590, 1700-2100 11880. Many other broadcasts to the Pacific are also audible here (gh)

Temporary NT service via Shepparton on 11880: heard at 0830 and another day at 0727 (Luca Botto Fiora, Italy, BDXC-UK and *playdx*) ABC verified this with map card for a report sent to Darwin (Johno Wright, Australian DX News) Was scheduled 2330-0800 while each of the three NT transmitters were being replaced with RIZ 50 kW units, but would have to be customized to run on 120 m (Kai Ludwig, Germany, DXLD) Nigel Holmes of RA says the three old units were too unreliable, so the contractor was paying for replacing them. Tennant Creek will have DRM capability (Chris Hambly, Vic., *ibid.*) Contractor would be Broadcast Australia, the sole national transmitter operator (Bernd Trutenau, Lithuania, *ibid.*) In mid-October, 2310 Alice and // 2485 Katherine were being heard at 1036-1102 (Scott Barbour, NH, *ibid.*)

BANGLADESH According to Md. Motiar Rahman, Senior Engineer of Bangladesh Betar, they were not using 4880 for domestic service as of mid-Oct. They will

start again in March 2006 when they will complete the new transmitter (Takahito Akabayashi, Japan, DXLD)

BELARUS R. Station Belarus B-05 English to Eu: 2030-21 Mon/Tue/Thu/Fri, 22-2230 Sun on 7440 7340 7125; NAm 0300-0330 Mon/Tue/Wed/Thu/Fri/Sat, 0330-04 Sun on 7210 6155 5970 (<http://www.tvr.by/eng/radiobel.asp> via Mike Barraclough, UK, DXLD)

BHUTAN Contrary to previous reports, BBS is not shutting down SW but expanding. Mr. V. K. Baleja of AIR Khampur near Delhi told me and other visiting DXers that he recently came back from a trip to Bhutan after doing extensive repairs on the BBS SW transmitter (50 kW SK45S3) which had modulation problems. He also informed that BBS is soon going to install another 100 kW SW transmitter with the help of Indian government. Then I found on BBS website an official bid invitation notice (Alokesh Gupta, India, DXLD) Which was valid only during November, required payments up front for documents and a security deposit (gh) Well heard at 0100 on 6035 here in Calcutta, English at 0500-0600 & 0800-0900, timings perhaps for single shift work employees -- certainly not convenient for listeners (Alok Dasgupta, BC-DX) Heard from 0103 until 0115 fade-out (Rumen Pankov, Bulgaria, BDXC-UK Communication)

BULGARIA R. Varna, "Hello Sea" in Bulgarian: Sun 2200-0400 Mon to the Black Sea on 7600, 100 kW non-directional from Varna (Observer, Bulgaria)

BURMA [non] B-05 Democratic Voice of Burma: 1430-1530 15480 Almaty 200 kW, 131 degrees and 17495 Madagascar 250 kW, 55 degrees; 2330-0030 5955 Jülich, 100 kW, 70 degrees (Observer, Bulgaria)

CAMEROON [non] Starting 30 October: Radio Free Southern Cameroons, Sundays 1800-1900 via Krasnodar, Russia, 12130, 300 kW, TDP-brokered. For background and mission statement see <http://www.fdrsouthern-cameroons.info> (Bernd Trutenau, Lithuania, DXLD) Says it originates in Buea; promoting secession of two English speaking states from rest of Cameroons -- "Long Live Radio Free Southern Cameroons, Long Live the Federal Republic of Southern Cameroons" (gh)

CANADA Voice of Joy, mentioned in last month's lead, was a special series of broadcasts only in October via Sackville sponsored by an organization in Dallas which does not have a website, and is not affiliated with <http://www.voiceofjoy.net> according to Dean Phillips (gh)

CHINA Yet another Chinese jamming technique: at 1400 on 7330, Chinese talk with multiple quick echoes three or four times, to block BBC in Chinese via Vladivostok. Bear that in mind when you hear CRI in English clearly relayed via Albania, Canada, Chile, Cuba, French Guiana, Mali, Toronto, Washington DC, or wherever (gh)

During the entire B-04 season, CRI in English via Canada was on 15230 at 1300-1500, colliding with Habana which has used 15230 forever. And it's happening again in the B-05 season! (gh) But this time in early November, RHC was asking for reception reports about this conflict (Ruben Guillermo Margenet, Argentina, DXLD) So maybe something will have been done about it (gh)

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-05=winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

CUBA Three RHC frequencies sometimes stay on past 0700; in early Nov, 9550, 6060 and 11760 all with // program of low-key guitar music until 0730. A few nights later I Ded as CMBF, Radio Musical Nacional, another domestic network not normally heard on SW; R. Reloj is usually the recipient of such relays. On Sunday only, 6000 stays on until 0730 for the weekly Esperanto service of RHC, repeated at 1500 on 11760 (gh)

CZECH REPUBLIC [non] In mid-Oct, R. Prague tested a relay via Sackville at 0330 on 6040 (Australian DX News) In B-05 another secret relay showed up, 0400 on 6100, not on published schedule, well heard here (gh, OK) Sackville relays may sound like a good idea for NAM, but present problems for at least much of the NE quadrant of the U.S. (John Figliozzi, NY, DXLD) In the skip zone, but these are for C&W North America, which do work OK from a propagational standpoint. Europeans already have Eastern NAM covered directly, or from other relays (gh) Experimental and consequently not listed in B05 schedule, via Canada to C&W NAM. Reports very much appreciated (Oldrich Cip, R. Prague, via Wolfgang Büschel, DXLD)

ECUADOR Allen Graham announced that HCJB would broadcast in a new language, Kulina, spoken in northern Brazil, at 2250 each day on 12020. I could hear it, but not actually starting until 2256, for only a few minutes, with Portuguese from 2300. Begins with a chant containing just three notes, F, A flat and B flat, plus a fourth note, down to E flat, which seems to end each chanted phrase (Tim Hendel, AL, DXLD) It's 50 kW at 100 degrees; not clear why transmitter breaks before 2300, supposed to be same. On Nov 11 it was introduced as program 13, reading from Genesis 4 in the masculine dialect of Kulina. At this rate, it will take until doomsday to get to Revelation 22:21. (gh) Enciclopedia dos Povos Indigenas says pronunciation of the Kulina language varies markedly between men and women! <http://www.socioambiental.org/pib/english/portugues/epi/kulina/nome.shtm> (Fernando de Sousa Ribeiro, Portugal, DXLD)

EGYPT R. Cairo, English to Eu at 2115 Oct 26 was on 9999 instead of 9990 (Christopher Lewis, England, Oct 26, DXLD) Also here wiping out WWV at 2230, possible punchup error (Joe Hanlon, NJ, *ibid.*)

R. Cairo, English to NAM at 2300-2430 worked OK in A-05 season; supposed to stay on 11885 for B-05, but no longer in the clear, with WYFR to Brazil overriding its winter-weakened signal. WYFR asserts priority to use of 11885 at this hour, so I recommended to R. Cairo that they move to 9475, which was open, should propagate better, and previously used by them, altho at a later hour. No reply at presstime; will they have changed by now? 11885 is also a Taiwan/Mainland battleground (gh) 11885 is worthless, covered by co-channel. The 0200 is 'reasonable', still low modulation, 7260 splash (Bob Thomas, CT, DXLD) 7270 for Cairo at 0200-0330, in the 40m hamband! (from tentative schedule via Alokesh Gupta, DXLD)

FALKLAND ISLANDS [non] BBCWS published self-contradictory B-05 schedule for *Calling the Falkland Islands*, Tue & Fri only at 2130-2145 direct from UK, though Ascension is much closer: was it on 11680 or 11720? At first, nothing audible on either: 11720 clear and 11680 masked by a much stronger BBCWS via French Guiana to Caribbean on 11675, which in the A-05 season had closed just in time at 2130. We kept monitoring, and finally with the help of Bernie O'Shea, Ont., Dave Kenny, UK, and Wolfgang Büschel, Germany, confirmed that the service is on 11680; probably with severe interference in the target area, too (gh)

FRANCE Well into the B-05 season, RFI still had not published a current schedule in English. Some frequencies we found useful: at 1400-1500 on 17515; 1600-1700 on 15160, 15365, 15605 (gh)

There have been slight changes in the style of presentation of RFI's 24-hour service in French. An urgent-sounding, repetitive news theme has been replaced with a more melodic, gentler theme with some piano. There also seems to be more of an effort to emphasize specific world regions at the start of relevant half-hours. The long-running African music program *Couleurs Tropicales* moved and doubled its length, now 2110-2130 & 2140-2200 M-F on 9790 (Mike Cooper, GA, DXLD)

GEORGIA A letter from someone at Radio Georgia to Walter Eibl, via the A-DX list, said that most language services had been off the air since August. The situation was entirely unclear and the editorial staff assumed that financial problems were in fact only a pretext to dissolve the foreign service (Kai Ludwig, DXLD)

GREECE [and non] Voice of Greece has English only: Daily 1930-2000 R. Philia program to Eu on 7430; Sat 1500-1600 *Hellenes Around the World* to Eu 9420 12105 15630; NAM via Delano 9775; Sun 1105-1200 *It's All Greek to Me* (music) to Eu 12105, 15630, 17525 (John Babbis, MD, DXLD) Mid-day Delano relay, the rest in Greek, is 15485 at 1600-2200, ex-17705, instead of originally planned 15475, in deference to LRA-36 Antarctica. 15485 collides, however, with Chile and BBC (gh)

GREENLAND Correction to last month: the winter schedule of KNR relay on 3815-USB via OZL Ammassalik, in Tasilaq, is 1600-1715 and 2100-2215 UT, not 2200-2315. Mid-winter should be the best chance to hear it in NAM (gh)

GUAM Only one frequency in the traditional 41m band is in use, by any private US station, KSDA, 7150, though other Pacific stations beyond Hawaii could also do so, KTWB, KHBN and KFBS. Of course, IBB makes heavy use of that band. KTWB dips into the aeronautical band, 15070, for half an hour at 0815 to see if there are any objections; is this OK with Alfa Lima International? (gh, from FCC B-05 schedule)

INDIA Well after Oct 30, the four AIR 90-meter frequencies still had not changed to 60 meters as planned (Jouko Huuskonen, Finland, DXLD; Jose Jacob, dx india) Delayed, as they were still waiting for approval from WPC (Wireless Planning & Coördination Wing, Ministry of Communications &

Information Technology, Dept. of Telecommunications, Government of India, which allocates the frequencies). Notes from our meeting with AIR frequency management officials:

a) They confirmed that e-mailed reception reports with audio files having clear IDs are verified directly from Delhi instead of forwarding to the regional stations. Expect a faster response if your e-mailed report contains an audio file.

b) Very soon AIR will start sending E-QSLs for E-mailed reception reports (Alokesh Gupta, New Delhi, DXLD) See Dec

AIR now has synchronized two 500 kW transmitters from Bangalore in English on 11620 at 2045-2230, one to Au/NZ at 120 degrees, the other to Eu at 325 degrees. Ideally should also reach many parts of the world including ENAm. And at 2245-0045 two 500 kW Bangalores on 13605, one 38 degrees to NE Asia and one 90 degrees to SE Asia; may reach parts of WNAm (Dxasia.info via Andy Sennitt, DXLD) If you still can't hear them on SW: Audio files for AIR news bulletins in Hindi & English are now available: <http://www.newsonair.com/> (Alokesh Gupta, DXLD)

INDONESIA For the first time in 35 years I have received a reply from RRI, not to my PO box nor my home address -- I discovered it on the RRI website. How? Simply by putting my full name in Google. This led to their Spanish webpage, where they replied to my complaint about never receiving a reply from them, and how hard it was to hear RRI in Argentina, by giving their postal, phone, fax and e-mail addresses (Rubén Guillermo Margenet, Rosario, DXLD)

INTERNATIONAL WATERS [non?] On 9133 USB, Information Radio via Coalition Maritime Forces at Bahrain, 0140-0200, Farsi announcement, traditional Arabic music; no signal at all on 6125, so obviously only one frequency used (Bjarke Vestesen, Denmark, DSWCI DX Window) 18727 with abrupt sign on in mid-sentence at *1600-1640 fade out, Arabic and Kurdish talks about Iraq, three days in mid-Oct, strong at first but quickly deteriorating with deep fades. Later direction-finding from Europe put it on this line: Adana (Central Turkey) - Westernmost Iraq - Thumrait (Oman) - Diego Garcia (Indian Ocean). (Anker Petersen, Denmark, *ibid.*)

IRAN V. of the Islamic Republic of Iran B-05 English registered as: 0130-0230 6120 9665, 1030-1130 15460 15480 1530-1630 7330 9940, 1930-2030 6010 7320 7350 9855 9925 11695 (Wolfgang Bueschel, World DX Club Contact)

KOREA NORTH [non] According to Asian Broadcasting Institute, the Investigation Commission on Missing Japanese Probably Related to North Korea started daily SW broadcast *Shiokaze* (sea breeze) to North Korea from October 30 at 1430-1500 on 5890 (Takahito Akabayashi, Japan, DXLD) First two days was at 1530 instead (Dave Kernick, Mike Barraclough, *ibid.*) Some bubble jamming; site reported to be Angarsk, Russia (near Irkutsk). (Walt Salmaniw, BC, CRW) Registered 5890 at 1430-1500 to zones 43-45 via Irkutsk, 100 kW, 125 degrees (Wolfgang Büschel, BCDX)

LAOS [non] Hmong Lao Radio via WHRI, B-05: Sat 1200, Sun 1300 on 7520, a bit early in Hminnesota (gh)

LITHUANIA R. Vilnius, English to NAM: 2330-2400 on 7325, 0030-0100 on 9875 (Bernd Trutenau, Lithuania, DXLD) Absolutely terrible reception, weak signals and heavy QRM (Bob Thomas, CT, WORLD OF RADIO)

NETHERLANDS [and non] R. Netherlands B-05 program changes include Amsterdam Forum moved to Sundays for almost an hour; *Saturday Connection* with comment, analysis, mailbag for half an hour (Mike Shaw, Head of the English Language Service, RN, via Paul Gager, Austria, BDXC-UK) B-05 transmission schedule eliminated any SW or MW English to Europe or UK (Erik Koie in Copenhagen, DXLD)

In early Nov there was a water shortage in Madagascar, making the power supply unreliable at our relay station; so Flevo site in Holland substituted as necessary (Andy Sennitt, RN, DXLD) Some Bonaire transmissions were also missing, or subject to transmitter dropouts (Will Martin, gh, *ibid.*) On one occasion, 11655 at 1900-2000 had both Flevo and Madagascar with a 2-second echo (Roger Chambers, NY, *ibid.*)

NIGERIA At the start of B-05 it seemed that the only active frequency of VON was 7255 (Thorsten Hallmann, Germany, DXLD) Powerful, opening at 0500 in English, clear audio during news, but terribly muffled with recorded programs (Raul Saavedra, Costa Rica, DXLD)

PAKISTAN PBC B-05 English: 1600-1615 on 15725, 11570, 9385, 6215. Urdu to WEu at 0800-1104 on 15100, 17835. Assami to SAs 0045-0115 on 7445, 9340 (Ifrikhar Hussain Malik, Engineering Manager, PBC via Eric Zhou, China; Alokesh Gupta, India, DXLD) 0800 Urdu actually heard with news in English until 0810 but virtually unintelligible due to some sort of transmitter problem. At 1600 audible only on 9385 (Harry Brooks, UK, *ibid.*) Another English newscast probably at 1100; and the 0045 Assami is allegedly partly or mostly in English (gh)

PAPUA NEW GUINEA I had previously been able to hear Wantok Radio Light, 7120, only when visiting nearby Queensland, but now heard back in NZ with good strength at 0930 and also at 1900, maybe with new stronger transmitter (Barry Hartley, WORLD OF RADIO)

PERU On 4299.69, Radio Bella, Tingo Maria with music and greetings at 1000. Tingo Maria, magnificently situated on the lush tropical foothills of the eastern Andes, is one of the entrances to the Amazon basin. Tingo means union, of two rivers: the Rio Huallaga and the Rio Manzon. Maria is the name of a woman who used to live there before the city was founded. When the city developed, the inhabitants decided to name it after this woman: Tingo Maria. It's called *La Ciudad de la Bella Durmiente*, which could be translated as The City of the Beautiful Sleeping Woman: Tingo Maria lies at the foot of a mountain which has the shape of a sleeping woman, lying on her back, with an Inca crown on her head (Björn Malm, <http://www.malm-ecuador.com>)

POLAND R. Polonia B-05 English: 1300-1400 9525 285 degrees, 11850 310; 1800-1900 7265 270, 7220 285 (Paul Gager, Austria, BDXC-UK) 11850 best azimuth for here, fair with flutter, but rattling jammer noise from Cuba on 11845, even though Marti is not using 11845 at all in the winter; 11845 also occupied by pulsing jammer against nothing at 2249 (gh, OK)

RUSSIA R. Station Pacific Ocean changed time and frequency to *0935-1000* on 5960, mostly woman talking, with constant background music, many IDs for Radiostantsiya Tikhyy Okean. As advised by e-mail, later in Nov added // 7330, but 5960 slightly better (Ron Howard, CA, DXLD) 5960 also better here, opening with Govorit Vladivostok (Iwao Nagatani, Japan, *ibid.*)

SÉNÉGAL [non] West Africa Democracy Radio heard in early Oct was only testing again. By early Nov, the website <http://www.wadr.org/> finally began to come to life, but many of the links went nowhere; by mid-November, a color-coded English program grid appeared for 0700-0900, and French 0900-1100 (gh) WADR started 14 November, on 17555. Phase 1, ending 1 January, focuses on the Mano River Union countries (via Dr Hansjoerg Biener, DXLD) First day had problems: open carrier and early close, wadr@wadr.org or P. O. Box 16650, Dakar Fann, Sénégal (Jari Savolainen, Finland, *ibid.*) Via Rampisham, UK (Bernd Trutenau, Lithuania, *ibid.*) The West Africa Democracy Project is supported by the Open Society Initiative for West Africa (Media Network blog) OSIWA is part of the Soros Foundation. Group has received \$800,000 in funding (clandestineradio.com via kimandrewelliott.com)

SOLOMON ISLANDS SIBC reactivated 9545, heard one night only around 0900 clashing with Deutsche Welle on same; // 5020 but an overmodulated, distorted, virtually unintelligible mess! They do have two transmitters. They only way I could actually identify 9545 was to // to 5020. Adrian Sainsbury was in the Solomons a few months ago on behalf of RNZI and said the SIBC was about to reactivate 9545 with a new transmitter (Barry Hartley, NZ, DXLD)

SPAIN REE confirmed on B-05 channel of 6055 for English at 0000-0100, well heard here (gh, OK) has slight co-channel QRM (Bob Thomas, CT, DXLD) That would be IBC Tamil from UK to Sri Lanka.

As for REE in Spanish, *La Boñera de Ulises* remains at 1405 Tuesdays, best on 17595. Program list at <http://www.rtve.es/rne/ree/program-cob.htm> reveals it's now also at 2205 Tue on 9630 and UT Mon 0405, when there are multiple frequencies including CR relay. *Nuestro Sello*, the program of mostly classical music from RTVE's own label, had been inconveniently scheduled on REE during the A-season, but now is M-F 0505-0555, to Americas on 5965-CR, 6040, 6055, 9675 (gh)

SRI LANKA Robin Viegos in Bombay reports that from October 24, SLBC merged Hindi & English services at 1330-1530 in 11905 & 7275 (dxasia.info via Alokesh Gupta, HCDX) See SPAIN

THAILAND R. Thailand B-05 English, via Udon Thani u.o.s.:

0000-0030	9680 Af
0030-0100	5890 NAM (Greenville)
0300-0330	5890 NAM (Delano)
0530-0600	13770 Eu
1230-1300	9810 As/Pac
1400-1430	9725 As/Pac
1900-2000	9805 Eu
2030-2045	9535 Eu (gh)

TURKEY VOT in Turkish on 15350 is getting increasingly distorted and weakly modulated, heard around 1330-1500, quite a pity, since they play so much great music. Also at 1920, 9460 had the same severe distortion (gh)

VOT B-05 English: 1330-1425 11735 15155; 1930-2025 6055; 2130-2225 9525; 2300-2355 5960; 0400-0455 6020 7240 (via Alokesh Gupta, DXLD) Live from Turkey call-in is Tue at 1950, Thu at 1350, best here on 15155 (gh) Schedule is revised January 1 with addition of Italian, expansion of Spanish to an hour, Serbian merged with Croatian, rescheduling of other languages, but none of this affecting English (via Observer, Bulgaria)

UKRAINE RUI B-05 English as last month, except 5840, not 5830 at 2200 to Eu (via Alokesh Gupta, DXLD)

UK BBCWS is to launch TV in Arabic as part of a wide-ranging restructure. WS Director Nigel Chapman outlined plans to launch the service in Arabic, as well as increasing investment in new media and funding more FM radio distribution globally. As part of the reprioritization, WS will close 10 languages: Bulgarian, Croatian, Czech, Greek, Hungarian, Kazakh, Polish, Slovak, Slovene and Thai languages will cease by March 2006 (BBC News Oct 25 via Mike Barraclough) This led to objections in the countries affected, notably Thailand, Czech Republic and Poland; and from trade unions at the BBC. Is one new TV language service worth ten lost radio language services? Arabic TV will not be ready to start until 2007. Some of the radio language services may stop as early as Dec 31 (gh)

BBC previously entered the Arabic television market, in conjunction with the Saudi-owned company Orbit, but it foundered in 1996 following issues of editorial control. That same year al-Jazeera launched, based in Qatar, and recruited a number of former BBC Arabic staff members. Al-Jazeera is launching a new 24-hour English-language channel - al-Jazeera International -- next spring (BBC News via Dave Harries, DXLD) UK press is divided over the plan: *Times* is for it, *Guardian* against (Media Network blog) Two days later, the National Union of Journalists headlined: *The NUJ campaign to save 10 language services under threat at BBC World Service is gathering huge support in Parliament* (via Rich Cuff, swprograms)

[non] Another case of lack of internal communication, self-interference: BBC Spanish on 6110, UT Nov 5 at 0003 had a severe echo,

about one syllable apart. The VT Merlin B-05 schedule even admits it: both Ascension and French Guiana scheduled during this hour on 6110. While it's laudable to conserve frequencies by doubling up this way, it is also necessary to be sure the audio is synchronized. Duh!! (gh)

USA Following up last month's item on whether Mark McKinnon would be a Republican or Democrat on the Broadcasting Board of Governors: after objections from Senate Democrats, McKinnon was rebranded a Republican, thus leaving another vacant seat open for a real Democrat (via Kim Andrew Elliott)

Ideally, the BBG should not only be bipartisan, it should also consist of respected journalists who appreciate the value of editorial independence. Perhaps the solution would be to give the Associated Press a five-year contract to govern U.S. international broadcasting. The AP is a cooperative of newspapers and other news organizations whose ownerships represent the spectrum from Republican to Democrat, conservative to liberal. It is also the largest newsgathering organization in the world, whose resources would allow U.S. international broadcasting to be competitive with BBC. AP might balk at becoming associated with what many (mis)perceive as a U.S. propaganda operation. But the contract would be for five years, with no kibitzing by the government during that period. At the end of the five years, if the AP, or the government, or both, is not satisfied with the arrangement, it would end (Kim Elliott, *NASWA Journal*)

Liberal radio talker Ed Schultz was eagerly anticipating his debut on Armed Forces Radio, which had agreed to carry his program to nearly a million soldiers around the world. But on the day he was to begin, Oct 17, Allison Barber, the Pentagon's deputy assistant secretary for internal communications, called without explanation that the deal was off. Perhaps, Schultz said in an interview, it was just a coincidence that he had just been chastising Barber for coaching a group of U.S. soldiers in Iraq before a teleconference with Bush (Howard Kurtz, *The Washington Post* via Mike Cooper)

Just weeks after nixing an agreement literally at the last minute in what seemed to be a fit of ire over one of his broadcasts critical of a rehearsed encounter between President George W. Bush and some members of the military, Armed Forces Radio said it will in fact carry progressive talker Ed Schultz's increasingly popular radio talk show after all (Joe Gandelman, themoderatevoice.com via Kevin Redding, ABDX)

I have not heard AFRTS on 5446.5, 7811, or 12133.5 since early October (Brock Whaley, GA, DXLD) The "Key West" channels, blown off by a hurricane? Wilma? Still shown on the MyAFN page (gh)

As Hurricane Wilma was approaching, WRMI shut down Oct. 23, hoping to return soon if there was not too much damage and power was restored. But it took two weeks to get 9955 back on the air and more than three weeks for 7385, which had greater antenna damage (Jeff White, WRMI)

Dan Eylea of WYFR reported that there was no power and no phone at the station, considerable damage to the antenna field, but the building held up well (George Thurman, DXLD) WYFR was back on the air in less than a week (gh) B-05 frequency changes included far out-of-band 7780 replacing 7355, at 0300-0745 and 1045-1345; 6000 replacing 5745 and 5810 at 0500-1200 (WYFR) Overlapping with Habana's longtime use of 6000 (gh)

The FCC B-05 schedule of private US SW stations http://www.fcc.gov/ib/sand/neg/hf_web/B05FCC01.TXT shows WRNO no longer reserving 7355 for its long-delayed revival, but instead 7395 at 22-16, and 15420 at 16-23 (gh)

WORLD OF RADIO on some different WWCR frequencies: Thu 2130 on 7465, Sun 0330 on 5070, 0730 on 3215, Wed 1030 on 9985. **MUNDO RADIAL**: Fri & Mon 2215 on 7465. **WOR** on WBCQ: Wed 2300 7415, Thu 0000 on new 18910-CLSB, Sun & Mon 0400 on 9330, Mon 0515 on 7415. FEMA required WWCR to shift from 3210 to 3215; WBCQ from 17495 to 18910 (gh)

Sadly, in the name of Homeland Security they are kicking shortwave stations off their frequencies and things will probably get worse. I think the government is out to destroy domestic shortwave. WBCQ will remain on the air no matter what; free speech must survive! (Allan Weiner, WBCQ) *Church of the Subgenius Hour of Slack* moved to 0100 UT Sundays on 7415 (Larry Will, RFMA)

UZBEKISTAN R. Tashkent B-05 English: 0100-0130 7160, 7190; 1200-1230 5060, 7190; 1330-1400 5975, 7190; 2030-2100 & 2130-2200 7185 (via Erik Keie, DXLD)

VATICAN [non] WEWN is relaying Vatican Radio in Spanish M-F 1600-1630 & 2200-2230 on 9885, 15745; but not in English (gh)

VENEZUELA [non] Observed B-05 schedule of RNV via Cuba in Spanish: M-F 20-21 on 13680, 9550; 23-24 on 13680, 11760. 13680 at 23 collided with CRI via Canada thruout the A-season, but now is clear with CRI moved to 11970 (gh)

ZIMBABWE [non] For B-05, V. of the People, via Madagascar at 1659-1757 on 11705 ex-7120 (Andy Sennitt, DXLD) Jammer stayed on 7120 at first but then went to 11705 (David Pringle-Wood, Harare, *ibid.*)

Sudan Radio Service via UK coincidentally moved to 11705 at 17-18 ex-11715 (Observer, Bulgaria)

VOA tripled time for its Zimbabwe service, to half an hour each in Shona, English and Ndebele at 1700-1830 (VOA press) 4930 9830 12080 17785 (VOA schedules)

Until the Next, Best of DX and 73 de Glenn!

BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn

gaylevanhorn@monitoringtimes.com

0017 UTC on 5952.51

BOLIVIA: Radio Pio Doce. Spanish in the clear with WYFR 5950 still off. Talk from announcers at a remote site. Canned announcements in Aymara at 0030. Excessive noise from 5960 kHz. Bolivian's audible; **Radio Fides** (tent.) 9624.83, 1036-1055 (Dave Valko, PA/Cumbre) 9624.84, 1440-1520 (Arnaldo Slaen, Buenos Aires, Argentina) **Radio Nacional de Huanuni** 5967.98, 1020-1030; **Radio Juan XXIII** 6054.30, 2111-2121; **Radio Santa Ana** 4649.99, 2230-2240. **Radio Yura** (tent.) 4716.8, 0057-0111+ Spanish. (Harold Frodge, Midland, MI)

0025 UTC on 6925

PIRATE: Radio Free Whatever. Several IDs as, "The only thing worth listening to - Radio Free Whatever, coming to you from the right coast." Music in the genre of Radio Head and Wheezer. Noted also at 0429-0458*. Pirates audible; **WMPR** 6925, 2220-2249*; 2300-2319 and 2342-0000; **WHYP** 6925, 2311-2323; **The Old Vampire Radio** 6925, 2326-2352*; **The Crystal Ship** 6854, *2352-0024. (Joe Wood, Greenback, TN)

0059 UTC on 4775

BRAZIL: Radio Congonhas (tent). Portuguese echo spots with mentions of Macapa and Brazil. Religious spots and piano music prior to sign-off. Brazilian's audible; **Radio Difusora** 4924.9, 1015; **Radio Cancao Nova** 4825, 2246-2250 // 9675. (Frodge, MI; Slaen, ARG) **Radio Clube do Para** 4885, 0427-0432. (Wood, TN)

0055 UTC on 11800

ITALY: RAI. Item on Italy's aid to New Orleans recovery projects. (Fraser, ME) 11875 // 11800, *2050 with IDs and features. (Frodge, MI; Duane Hadley, Bristol, TN)

0114 UTC on 5755

USA: KAIJ. Dr. Scott's audio library with focus on explanation of Biblical Greek. **WWCR** 5050 at 0103; **AFRTS**-Key West, Florida 5446USB, 12133.5 USB at 2120. (Frodge, MI) **KJES** 15385, 1816-1826; (Wood, TN) **WBCQ** 7415 at 0015. (Bob Frazer, Belfast, ME; Frank Hillton, Charleston, SC)

0120 UTC on 5900

BULGARIA: Radio. Bulgarian text of schedules and freqs, followed by multilingual thanks to listeners. (Wood, TN) 11500 // 9500 at 1730. (Fraser, ME)

0300 UTC on 9345

ISRAEL: Kol Israel. Really nice big band music to jazz scat singing from Nat King Cole and Louis Armstrong. Good-very good signal. (Wood, TN) 15640 at 1920. (Fraser, ME) **Galei Zaal** 6973.13 at 0230. (Frodge, MI)

0313 UTC on 9420

GREECE: Voice of. Greek music program and usual VOG format. (Wood, TN) VOG 12105, 2122-2133+. (Frodge, MI) Greece's **Radio Filia** 12105, 1824-1859*. Greek and English IDs including mentions of FM and mediumwave frequencies. *Cultural Scene* segment followed by health, art and news about the environment. Numerous IDs followed by announcer's greetings to her family in Long Island, New York. Filia is one of several Greek relays on 12105 kHz. (Frodge, MI)

0319 UTC on 9460

TURKEY: Voice of. Turkish music followed by Turkish identification. (Wood, TN) 7300 at 2205. (Fraser, ME; Tom Banks Dallas, TX)

0325 UTC on 3291

GUYANA: Voice of. Calypso music to English announcement segments. Obituary notices until 0400 time pips and BBC news relay. Interference from co-channel numbers station 0357-0400. Poor signal quality. (Wood, TN; Rich D'Angelo, PA/NASWA Flashsheet)

0410 UTC on 9790

FRANCE: Radio France Int'l. Station identification as "Radio du Monde" and "RFI." News and sports with mentions of Premier League and a Spanish team. (Wood, TN) 1645 on 17605 // 17850, 15605. (Fraser, ME) **CBS2 Taiwan** relay 3965, 2241-2247+. (Frodge, MI)

0555 UTC on 9290

LATVIA: Radio Six Int'l. Carrier on at 0555 to 0600 ID opening as, "This is Radio Six International broadcasting from Glasgow Scotland." Mentioned their broadcast was for listeners in Europe, the Middle East and Asia, plus mentions of shortwave and FM. Mailing address in Glasgow and email address. Oldies music program including multiple IDs and email addresses to world news at 0610. More music and chatter to closing announcements at 0659. Signal weak but readable. (Valko, PA) 9290, 1345-1401*. (Edward Kusalik, Alberta, Canada)

0732 UTC on 6139.98

COLOMBIA: Radio Lider. Spanish. Complete station identification including mentions of AM, shortwave and station location. SINPO 34433. (Slaen, ARG) 6139.78, 0230-0250+ mixing with Cuba. (Brian Alexander, Mechanicsburg, PA/DXLD); 6139.78, 0500 (Volodya Salmaniw, Victoria, BC, Canada/DXLD) 6139.81, 1014-1033 poor/fair quality. (Scott Barbour, Intervale, New Hampshire/DXLD) 6139.8 at 1040. (Frodge, MI)

0910 UTC on 3350

PAPUA NEW GUINEA: Radio Northern. Tentative for fairly decent signal for segments, PNG's Radio Central 3290. 0951 relaying **NBC** (// 4890) but not // at 0955 check. C&W music at 0959 recheck followed by **NBC** native music and English news relay to 1012. PNG's **Wantok Radio Light** 7120 at 1020-1035. (Barbour, NH) **Radio Sandaun** 3204.5 at 1132; **Radio East Sepik** 3335 at 1144. (Valko, PA) **Radio East New Britain** 3385, 1014-1020. (Barbour, NH)

1048 UTC on 6399

KOREA (FPR): Korean. Continuous ballads to announcers at 1052. Time pips and identification into alternating announcer's segments. Fair as was // 6250 Kanggye. (Barbour, NH)

1135 UTC on 4920

CHINA-TIBET: Xizang PBS-Lhasa. Tentative Tibetan language as two announcers chat between ballads. Signal booming at tune // 4905 fair // 5240 poor. Winter DX is upon us in New Hampshire. (Barbour, NH)

1140 UTC on 9580

AUSTRALIA: Radio Australia. Program on minor British operas. (Bob Fraser, Belfast, ME) 6020, 1256-1306+ with ABC news at 1300; 9580, 1240-1247+ *Speaking Out* phone interviews segment. (Frodge, MI) Aussie's **VL8A Alice Springs** 4835, 0840 // 4910 Tennant Creek. (Banks, TX)

1530 UTC on 15360

UK: Radio Canada Int'l relay. Fair signal for Asian service conducting interview program with Ian Jones on the future of the Gaza Strip. (Fraser, ME)

1730 UTC on 17895

MOROCCO: Voice of America relay. Segment on Zimbabwean political news to station identification. **Radio Farda** 9865, 0401-0410 in Arabic including rap music and Mambo # 5. (Wood, TN)

2030 UTC on 15476

ANTARTICA: Radio Nacional Arcangel San Gabriel. Spanish. Romantic music tune selection to ID at 2053, including mailing address. Additional ID, "En la frecuencia de 15476 kilohertz Radio Nacional Arcangel San Gabriel, Base Esperanza, Antartida Argentina." Station sign-off at 2100. SINPO 45544. (Slaen, ARG)

2245 UTC on 7345

CZECH REP: Radio Prague. Review of the East German car the Rabat, a large number of which were dumped in the Czech Republic. (Fraser, ME) 7385, 1346-1357+; 7435, 0312. (Frodge, MI)

2246 UTC on 6070

CANADA: CFRX. Afternoon programming // 1010 AM service. **CKZN** St. John's Newfoundland, 6160 at 2101 with extensive maritime province weather for Newfoundland and Labrador. (Frodge, MI)

*Thanks to our contributors - Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times
English broadcast unless otherwise noted.*

PROGRAMMING SPOTLIGHT

WHAT'S ON WHEN AND WHERE?

John Figliozi

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Compleat Guide to BBC in North America

Happy New Year!

Following on to last month's column, here's a comprehensive listing of when and where you can hear what from the BBC. As you can see, any rumors you may have heard about the BBC no longer broadcasting to – nor being heard in – North America are just not to be believed. However, the plethora of platforms does present a dilemma. Unless you're downloading all of your radio from the internet on demand (utilitarian it may be, but where's the romance?), finding your favorite BBC World Service programs can be a stressful experience. Well, fear not! With our painstakingly compiled "Compleat Guide," everything you want or need to know on this score is right here in a handy, easy to use format.

All times are expressed in UTC and day abbreviations conform to those used in MT's **Shortwave Guide**. The shortwave frequencies listed all target regions other than North America and have been extensively researched. While generally providing acceptable reception here, they are more easily affected by propagation disturbances. Since the BBC does not identify its regional streams on-air, they are not identified in these listings.

Abbreviations Key:

Net-a = Internet Audio of "BBC World Service Radio" from www.bbc.co.uk/worldservice/schedules/031001_nofreqs.shtml

This is the Europe stream also heard parts of the day on shortwave.

Net-b = Internet Audio of the the "24 hour news channel" from http://www.bbc.co.uk/worldservice/schedules/031001_nofreqs.shtml

SIRI = Sirius Satellite Radio, channel 141 relaying the Public Radio International (PRI) stream.

XM+ = XM Satellite Radio, channel 131 or via Internet Audio from <http://playlist.yahoo.com/makeplaylist.dll?id=57024>, both relaying the Americas stream.

5975 - 21470 = shortwave frequencies

* = heard in western North America

Many local public radio stations in the U.S. also carry the BBC World Service relaying the PRI stream ("SIRI" in the Tuning column). Check local listings for the times in your area. In most instances, carriage occurs primarily during the overnight hours.

News bulletins are given at :01 and :30.

UTC	Day	Program	Tuning
0006	D	The World Today	SIRI, Net-b
	S	Top of the Pops	Net-a, XM+, 5975
	M	Documentary	(1) Net-a, XM+, 5975
	T-A	Outlook	Net-a, XM+, 5975
0032	S	Charlie Gillett	SIRI
		Sports International	Net-b
	M	Sports International	Net-a, XM+, 5975
		World Business Review	SIRI, Net-b
	T-A	World Business Report	SIRI, Net-b
0045	M	The Instant Guide	SIRI, Net-b
	T-A	Off the Shelf	Net-a, XM+, 5975
		Analysis	SIRI, Net-b
0106	S	In Concert	Net-a, XM+
		Global Business	SIRI

		World Briefing	Net-b			M-F	The World Today	11765
	M	Pick of the World	Net-a, XM+		M		Play of the Week	XM+
	M-A	World Briefing	SIRI, Net-b		T		Documentary (1)	XM+
	T	Documentary (1)	Net-a, XM+		W		Masterpiece	XM+
	W	Masterpiece	Net-a, XM+		H		Documentary (2)	XM+
	H	Documentary (2)	Net-a, XM+		F		Assignment	XM+
	F	Assignment	Net-a, XM+		A		Global Business	XM+
	A	Global Business	Net-a, XM+	0632	S		The Interview	Net-a, Net-b
0120	S	Sports Roundup	Net-b				The Word	SIRI
	M	World Business Review	SIRI, Net-b		M-F		Network Africa	11765
	T-A	World Business Report	SIRI, Net-b		T		The Music Feature	XM+
0132	S	The Interview	SIRI, Net-b		W		White Label	XM+
	M-F	The World Today	SIRI, Net-b		H		Charlie Gillett	XM+
	T	The Music Feature	Net-a, XM+		F		The Music Biz	XM+
	W	White Label	Net-a, XM+		A		World Football	Net-a
	H	Charlie Gillett	Net-a, XM+				Music Review	XM+
	F	The Music Biz	Net-a, XM+		0645	A	World Business Review	SIRI, Net-b
	A	Music Review	Net-a, XM+				The Instant Guide	SIRI
		People and Politics	SIRI, Net-b	0706	D		The World Today	Net-a, XM+, SIRI, 11765,
0145	M	Write On	Net-a, XM+				The Ticket	Net-b
0206	D	The World Today	SIRI, Net-b	0732	S		People and Politics	Net-a, SIRI, Net-b
	S	Play of the Week	Net-a, XM+, 5975				The Interview	XM+
	M	The Ticket	Net-a, XM+, 5975				Short Story	11765
	T	Health Matters	Net-a, XM+, 5975		M-F		Network Africa	11765
	W	Go Digital	Net-a, XM+, 5975		A		World Business Review	Net-a, XM+, Net-b
	H	Discovery	Net-a, XM+, 5975				Charlie Gillett	SIRI
	F	One Planet	Net-a, XM+, 5975		0745	A	World Football	11765
	A	Science in Action	Net-a, XM+, 5975				Analysis	Net-a, XM+, Net-b
0232	S	World Business Review	SIRI	0806	S		Correspondent	Net-a, XM+, SIRI, Net-b
		Reporting Religion	Net-b		M		Talking Point	Net-a, XM+, Net-b
	T	The World	Net-a, XM+, 5975				Health Matters	SIRI
	W	Everywoman	Net-a, XM+, 5975		T-F		Outlook	Net-a, XM+, Net-b
	H	Sports International	Net-a, XM+, 5975		T		Go Digital	SIRI
	F	The Interview	Net-a, XM+, 5975		W		Masterpiece	SIRI
	A	Heart and Soul	Net-a, XM+, 5975		H		Assignment	SIRI
		The World	SIRI		F		Science in Action	SIRI
		World Football	Net-b		A		Pick of the World	Net-a, XM+, Net-b
0245	S	The Instant Guide	Net-a, XM+, 5975				The Ticket	SIRI
	A	The Instant Guide	Net-a, XM+, 5975, SIRI,	0832	S		Reporting Religion	Net-a, XM+, SIRI, Net-b
	S	Correspondent	7160, Net-b		M-F		World Business Report	SIRI
			7160, Net-b	0845	M-F		Off the Shelf	Net-a, XM+, Net-b
	M-F	The World Today	Net-a, XM+, 5975, SIRI				The Instant Guide	SIRI
			7160, Net-b		T-F		Analysis	SIRI
	A	Assignment	Net-a, XM+, 5975, SIRI,		A		Write On	Net-a, XM+, Net-b
			7160, Net-b	0906	S		World Briefing	XM+, SIRI, Net-b
0332	S	People and Politics	Net-a, XM+, 5975, SIRI,				The Ticket	Net-a
			7160, Net-b		M-F		World Briefing	XM+
			7160		M		Documentary (1)	Net-a
	M-F	Network Africa	Net-a, SIRI, 7160, Net-b				Talking Point	SIRI
	A	The Interview	XM+, 5975		T-F		Outlook	SIRI
		Charlie Gillett	SIRI, 7160, 11765, Net-b		T		Masterpiece	Net-a
0406	D	World Briefing	Net-a, XM+, SIRI, 7160,		W		Documentary (2)	Net-a
	S	World Briefing	11765		H		Assignment	Net-a
			11765		F		Global Business	Net-a
	M	Talking Point	Net-a, XM+		A		World Briefing	Net-a, XM+
	T-F	Outlook	Net-a, XM+				Pick of the World	SIRI
	A	Pick of the World	Net-a, XM+	0932	S		People and Politics	XM+, Net-b
		Sports Roundup	7160, 11765				The Word	SIRI
0420	D	Sports Roundup	Net-a, XM+, 7160,				Analysis	XM+, Net-b
0432	S	Sports International	11765, Net-b		M-F		The Music Feature	Net-a
			11765		T		White Label	Net-a
			SIRI		W		Charlie Gillett	Net-a
	M-F	Network Africa	7160, 11765		H		The Music Biz	Net-a
	M	World Business Review	SIRI, Net-b		F		Music Review	Net-a
	T-F	World Business Report	SIRI, Net-b		A		World Football	Net-a, XM+, Net-b
	A	Reporting Religion	SIRI, Net-b	0945	M-F		Sports Roundup	XM+, Net-b
		Charlie Gillett	7160, 11765				Off the Shelf	SIRI
0445	M-F	Off the Shelf	Net-a, XM+		A		Write On	SIRI
	M	The Instant Guide	SIRI, Net-b				Documentary (2)	Net-a
	T-F	Analysis	SIRI, Net-b	1006	S		Documentary (2)	Net-a
	A	Write On	Net-a, XM+				Correspondent	XM+, 6195, Net-b
0506	D	World Briefing	Net-a, XM+, SIRI, 7160,				Assignment	SIRI
			11765, Net-b		M-F		World Update	XM+, 6195, SIRI, Net-b
0520	D	World Business Report	Net-a, XM+, SIRI, 7160,		M		Health Matters	Net-a
			11765, Net-b		T		Go Digital	Net-a
0532	S	Reporting Religion	Net-a, XM+, SIRI, 7160,		W		Discovery	Net-a
			11765, Net-b		H		One Planet	Net-a
	M-F	The World Today	Net-a, XM+, SIRI, Net-b		F		Science in Action	Net-a
		Network Africa	7160, 11765		A		Top of the Pops	Net-a
	A	People and Politics	Net-a, SIRI, 7160, 11765,	1032	S		Global Business	XM+, 6195, SIRI, Net-b
			Net-b				In Praise of God	Net-a
			Net-b		M		Reporting Religion	XM+, 6195, SIRI, Net-b
0606	D	World Football	XM+		T		The Word	Net-a
	S	The World Today	Net-a, SIRI, Net-b				Everywoman	Net-a
	S/A	The Ticket	XM+					
		Network Africa	11765					

W	Sports International	Net-a	M-F	World Briefing	SIRI, 9740*, Net-b	1932	S	People and Politics	Net-a, 9410, XM+, SIRI, Net-b
H	The Interview	Net-a		Focus on Africa	21470, 17830				
F	Heart and Soul	Net-a	M	Health Matters	Net-a, 12095, 17640, XM+		M-F	World Business Report	17830, 15400, Net-b, 12095
A	The Interview	XM+, 6195, SIRI, Net-b	T	Go Digital	Net-a, 12095, 17640, XM+		M	The Music Feature	Net-a, 9410
1045	F	The Instant Guide	W	Discovery	Net-a, 12095, 17640, XM+		T	White Label	Net-a, 9410
1106	S	World Briefing	H	One Planet	Net-a, 12095, 17640, XM+		W	Charlie Gillett	Net-a, 9410
		Documentary (2)	F	Science in Action	Net-a, 12095, 17640, XM+		H	The Music Biz	Net-a, 9410
	M-F	Caribbean Report	A	Sportsworld	Net-a, 12095, XM+, 21470, 17640, 9740*, 17830, Net-b		F	Music Review	Net-a, 9410
	M-A	World Briefing		The Ticket	Net-a, 12095, 17640		A	Reporting Religion	Net-a, SIRI, Net-b, 9410, 12095
1111	M-F	Caribbean Sport	1532	S	Charlie Gillett		2006	D	Newshour
1116	M-F	Caribbean Magazine			Net-a, 12095, 17640		S	In Concert	SIRI, 17830, 15400, Net-b, 12095
1120	M-F	British News			XM+, SIRI, Net-b		M	Health Matters	Net-a, XM+, 9410, 6195
1132	S	The Instant Guide			9740*		T	Go Digital	Net-a, 9410, 6195
		In Praise of God			17830, Net-b		M	Masterpiece	XM+
	M-F	Analysis			Net-a, 12095, 17640, XM+		W	Discovery	Net-a, 9410, 6195
	A	World Business Report			Net-a, 12095, XM+, 21470, 17640, 9740*, 17830, Net-b		H	One Planet	Net-a, 9410, 6195
		World Business Review			Net-a, 12095, 17640, XM+		F	Assignment	XM+
1145	S	Sports Roundup			Net-a, 12095, 17640, XM+		A	Science in Action	Net-a, 9410, 6195
	M-A	Sports Roundup			Net-a, 12095, 17640, XM+		2032	M	The Word
1206	S/A	Newshour			Net-a, 12095, 17640, XM+		T	The Music Feature	Net-a, 9410, 6195
					Net-a, 12095, 17640, XM+		W	Everywoman	Net-a, 9410, 6195
	M-F	Outlook			Net-a, 12095, 17640, XM+		H	White Label	Net-a, 9410, 6195
		Newshour			Net-a, 12095, 17640, XM+		F	Sports International	Net-a, 9410, 6195
	M-F	Caribbean Report			Net-a, 12095, 17640, XM+		2045	F	Charlie Gillett
1220	M-F	Caribbean Magazine			Net-a, 12095, 17640, XM+		H	The Interview	Net-a, 9410, 6195
1232	M-F	Newshour			Net-a, 12095, 17640, XM+		F	The Music Biz	Net-a, 9410, 6195
					Net-a, 12095, 17640, XM+		2055	D	Heart and Soul
1245	M-F	Off the Shelf			Net-a, 12095, 17640, XM+		S/A	Music Review	Net-a, 9410, 6195
1255	S/A	Sports News			Net-a, 12095, 17640, XM+			The Instant Guide	Net-b, 12095
					Net-a, 12095, 17640, XM+			Sports News	SIRI, 17830, 15400
	M-F	Sports News			Net-a, 12095, 17640, XM+		2106	S/A	Newshour
1306	S	Correspondent			Net-a, 12095, 17640, XM+		S		Net-a, 9410, 6195, XM+, 11675, SIRI, Net-b
					Net-a, 12095, 17640, XM+		M-F	African Perspective	15400
	M-F	Documentary (1)			Net-a, 12095, 17640, XM+			Sports News	11675, 15390
		Outlook			Net-a, 12095, 17640, XM+			Newshour	Net-a, 9410, 6195, XM+, SIRI, Net-b
	M	World Briefing			Net-a, 12095, 17640, XM+		M	Health Matters	15400
		Documentary (1)			Net-a, 12095, 17640, XM+		T	Go Digital	15400
	T	Masterpiece			Net-a, 12095, 17640, XM+		W	Discovery	15400
	W	Documentary (2)			Net-a, 12095, 17640, XM+		H	One Planet	15400
	H	Assignment			Net-a, 12095, 17640, XM+		F	Science in Action	15400
	F	Global Business			Net-a, 12095, 17640, XM+		A	Documentary (2)	15400
	A	Assignment			Net-a, 12095, 17640, XM+		2115	M-F	Caribbean Report
		Pick of the World			Net-a, 12095, 17640, XM+		2132	S	Charlie Gillett
					Net-a, 12095, 17640, XM+			Newshour	Net-a, 9410, 6195, XM+, 11675, SIRI, Net-b
1332	S	In Concert			Net-a, 12095, 17640, XM+		M	The Word	15400
		Reporting Religion			Net-a, 12095, 17640, XM+		T	Everywoman	15400
					Net-a, 12095, 17640, XM+		W	Sports International	15400
	M-F	The Word			Net-a, 12095, 17640, XM+		H	The Interview	15400
		Analysis			Net-a, 12095, 17640, XM+		F	Heart and Soul	15400
	M	The Music Feature			Net-a, 12095, 17640, XM+		A	In Praise of God	15400
		Inside the Premier League			Net-a, 12095, 17640, XM+		2145	F	The Instant Guide
	T-F	Analysis			Net-a, 12095, 17640, XM+		2155	D	Sports News
	W	White Label			Net-a, 12095, 17640, XM+				Net-a, 9410, 6195, XM+, SIRI, 11675
	T	Charlie Gillett			Net-a, 12095, 17640, XM+		2206	D	The World Today
	H	The Music Biz			Net-a, 12095, 17640, XM+		S	Documentary (1)	Net-b
	F	Music Review			Net-a, 12095, 17640, XM+			The World Today	Net-a, XM+, 5975
	A	The Interview			Net-a, 12095, 17640, XM+		M-F	The World Today	SIRI
		Sports International			Net-a, 12095, 17640, XM+		M	Health Matters	XM+, 5975
1345	M-F	Off the Shelf			Net-a, 12095, 17640, XM+		T	Go Digital	XM+, 5975
		Sports Roundup			Net-a, 12095, 17640, XM+		W	Discovery	XM+, 5975
	A	Write On			Net-a, 12095, 17640, XM+		H	One Planet	XM+, 5975
					Net-a, 12095, 17640, XM+		F	Science in Action	XM+, 5975
1406	S	Talking Point			Net-a, 12095, 17640, XM+		A	Top of the Pops	Net-a
					Net-a, 12095, 17640, XM+			Play of the Week	XM+, 5975
	M-F	Newshour			Net-a, 12095, 17640, XM+		2232	S	The World Today
		Documentary (1)			Net-a, 12095, 17640, XM+			Sports International	Net-a
	T	Masterpiece			Net-a, 12095, 17640, XM+			In Praise of God	XM+, 5975
	W	Go Digital			Net-a, 12095, 17640, XM+		M-F	World Business Report	Net-a
		Documentary (2)			Net-a, 12095, 17640, XM+			Outlook	SIRI
	H	Discovery			Net-a, 12095, 17640, XM+		M	The Word	XM+, 5975
		Assignment			Net-a, 12095, 17640, XM+		T	Everywoman	XM+, 5975
	F	One Planet			Net-a, 12095, 17640, XM+		W	Sports International	XM+, 5975
		Global Business			Net-a, 12095, 17640, XM+		H	The Interview	XM+, 5975
	A	Science in Action			Net-a, 12095, 17640, XM+		F	Heart and Soul	XM+, 5975
		Sportsworld			Net-a, 12095, 17640, XM+		A	People and Politics	Net-b
1432	M	The Music Feature			Net-a, 12095, 17640, XM+		2245	M	The Interview
		The Word			Net-a, 12095, 17640, XM+		T-F	Inside the Premier League	Net-a
	T	White Label			Net-a, 12095, 17640, XM+		F	Sports Roundup	Net-a
		Everywoman			Net-a, 12095, 17640, XM+		2306	D	The Instant Guide
	W	Charlie Gillett			Net-a, 12095, 17640, XM+			The World Today	Net-a, XM+, 5975, SIRI, Net-b
		Sports International			Net-a, 12095, 17640, XM+		2332	F	World Football
	H	The Music Biz			Net-a, 12095, 17640, XM+			Reporting Religion	Net-a, XM+, 5975, Net-b
		The Interview			Net-a, 12095, 17640, XM+		A	Reporting Religion	Net-a, XM+, 5975, SIRI, Net-b
	F	Music Review			Net-a, 12095, 17640, XM+				
		Heart and Soul			Net-a, 12095, 17640, XM+				
1445	F	The Instant Guide			Net-a, 12095, 17640, XM+				
1506	S	Global Business			Net-a, 12095, 17640, XM+, SIRI, 17830, Net-b				
					Net-a, 12095, 17640, XM+				
		In Concert			Net-a, 12095, 17640, XM+				
		Documentary (1)			Net-a, 12095, 17640, XM+				

THE QSL REPORT

VERIFICATIONS RECEIVED BY OUR READERS

Gayle Van Horn

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Electronic QSLing...the list grows!

Several years ago, as the internet began to take off and set the hobby on fire, I made a prediction to friends and hobbyists. I predicted electronic QSLing would become a standard used by broadcasters to offset the cost of high postage. As crazy as it seemed in 2000, it has become a reality, much to the dismay of many a collector who prefers a personal reply, including myself.

Electronic QSLing via email has become an alternative trend used by shortwave, clandestine, pirate and utility stations. Unfortunately, the list broadens each month (as do the tempers!) to now include medium wave and FM.

Why not consider using my cut and paste method to electronic QSLing? Using your favorite word processing program, cut and paste your email verification into a blank page. Adjust the font size, or use a decorative style, graphics or add color to the text. Colored or acid free designer paper is readily available at office supply or discount

chain stores. Slipped into a top-loading document protector, it improves the appearance over a stale email message.

Is free one of your favorite words when it comes to cost-cutting in your hobby? Sending reception reports via email is an alternative. There is no postage cost, creative enclosures, the threat of postal theft, or funny looks from a postal clerk. As you peruse the pages of Addresses Plus (pgs. 295-361) in *Passport to World Band Radio 2006*, you'll find most stations include their web and email addresses.

Not sure on AM/FM or utility electronic reporting? Try using a google search at <http://www.google.com> with the call, station name or frequency, and you may just find a website with an email link.

Electronic QSLing may not be the preferred response, but surely it is better than none at all. Get creative and keep *MT* informed of your replies!

AMATEUR RADIO

Aland Islands OH0Z, 15 meter SSB. Two full data color cards. Received in 11 days for an SASE to QSL Manager, WOMM, Laurent D. Thomin, 1615 Beaconsire Road, Houston, TX 77077-3817. Laurent is a longtime *MT* subscriber. (Larry Van Horn N5FPW, NC)

Argentina LTIF, 20 meter SSB. Full data color picture card. Received in 30 days for a SASE to QSL Manager, AC7DX Ron G. Lago, P.O. Box 25426, Eugene, OR 97402. (Van Horn, NC)

Wake Island KH9/W0CN (OC-053), 20 meters SSB. Full data color aerial picture. Received in 26 days for an SASE to QSL Manager, K9JS Jonathan L. Schulz, 813 West Washington, Harvard, IL 60030. (DXCC Country # 177/20 meter DXCC



138). (Van Horn, NC)

AUSTRALIA

ABC Perth/Western Australia Service SW Relay, 7875 kHz USB. Returned my prepared card signed and stamped, plus accompanying letter, signed by Mark Yates, A/Resource Manager. Noted they no longer have QSL cards and to consider this letter as a confirmation. Station bookmarks and stickers enclosed. Received in 24 days for an English report. Station address: ABC Western Australia Service, 30 Fielder Street (cnr Royal) East Perth, Western Australia. Reply received from; GPO Box 9994 Perth, Western Australia 6848. (Edward Kusalik, Alberta, Canada)

BRAZIL

Radio Bare Ondas Tropicais 4895 kHz. Full data Portuguese/English verification letter unsigned, but stamped "verified," plus station stickers. Received in 35 days for a Portuguese report, mint stamps (used on enclosed SASE), and one IRC (returned). Station address: Av. Carvalho Leal 250, Cachoeirinha, 69065-000 Manaus AM Brasil. (Frank Hillton, Charleston, SC)

CHINA (Taiwan)

Voice of Han via CBS, 9745 kHz. Full data multicolored Satellite Dish/Armed Service card unsigned, plus accompanying schedule brochure. Received in 16 months, 53 days after follow-up report. Station address: The Voice of Han Broadcasting, B Building 5 F No. 3, Sin Yi Road, section 1, Taipei, Taiwan R.O.C. (Kusalik, CAN)

DJIBOUTI

Radio Djibouti 4780 kHz. Full data prepared card stamped and signed as Chef des Services Technique, plus full data French verification letter from same. Received in 85 days for a French report and two IRCs. Station address: Boite Postale 97, Djibouti. Reply received from Saint Laurent du Var, Djibouti. Email: rdtech@intnet.dj (T.J. Taylor, Ontario, Canada)

MEDIUM WAVE

KDZR 1640 kHz AM, Lake Oswego, Oregon. No data folding thank you QSL card signed by "Radio Disney Family," plus 1640 key chain. Received in 120 days for an AM report. Station address: 3030 SW Moody, Suite 210, Portland, OR 97201. (Patrick Martin, Seaside, OR)

KOPT 1600 kHz AM. Long letter with transmitter information signed by Randy Larson-Chief Engineer. Received in 18 days for an AM report. Station address: 895 Country Club Road, Suite A-200, Eugene, OR 97401. (Martin, OR)

WIMA 1150 kHz AM. Nice QSL certificate signed by Mark D. Gierhart-Director of Engineering. Personal note and station bumper sticker enclosed. Received in 66 days for a DX Test report. Station address: 667 W. Market Street, P.O. Box 1128, Lima, OH 45802-1128. (Martin, OR)

WMVP 1000 kHz AM. Two-page verification letter from Chris Papendick, Production Engineer, plus brochure on station's history as former WCFL. Received in 14 days for a CD report. Station address: 190 N. State Street, Chicago, IL 60601. (Martin, OR)

MOLDOVA

Voice of Russia 9665 kHz. Partial data card and letter. Received in 82 days for an English report. Station address: 113326, Pyatnitskaya str., 25, Moscow, Russia. (Wood, TN)

TAJIKISTAN

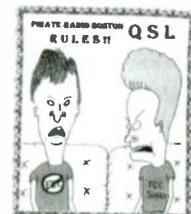
Radio Free Asia 11540 kHz. Full data 2005 commemorative Rooster card unsigned. Received in six months for an English report and US mint postage (returned). QSL address: 2025 M. Street NW, Washington, DC 20036. (Hillton, SC)

UTILITY

Gander Radio 3485 kHz SSB. Partial data letter signed by Ken Stack. Received in 177 days for an English utility report, applause card, one US dollar and one IRC. Station address: Gander International Flight Service Station (Gander Radio) P.O. Box 328, Gander, NF Canada A1V 1W7. (Joe Wood, Greenback, TN)

PIRATE

Radio Boston 6925 kHz. Full data card plus mini CD. Received in 115 days QSL maildrop: P.O. Box 146, Stoneham, MA 02180 email:



HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ③ ④ ⑥ ⑦

Convert your time to UTC.

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

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

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page 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:

Day Codes	
s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly
occ:	occasional
DRM:	Digital Radio Mondiale

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

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
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
oc:	Oceania
pa:	Pacific
sa:	South America
va:	various

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. They are only authorized on a non-interference basis until that date.
- 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

MT MONITORING TEAM

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Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D'Angelo, *NASWA Flash Sheet*; *BCL News*; *Cumbre DX*; Glenn Hauser, *Enid, OK/DX Listening Digest*, Md. Azizul Alam, *Rajshahi*, Bangladesh; Daniel Sampson/*Prime Time-SW*; *DX Window*; *Observer*, Bulgaria; ODXA/DX Ontario; Larry Van Horn N5FPW, MT Asst. Editor; *Hard Core DX*; *NASWA Journal*; WWDX.

**GLENN HAUSER'S
 WORLD OF RADIO**
<http://www.worldofradio.com>

For the latest DX and programming news, amateur nets, DX program schedules, audio archives and much more!

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

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

0000	0015	vi	Cambodia, National Radio	11940as		
0000	0015		Japan, Radio	6145na	13650as	17810as
0000	0030		Australia, HCJB	15530as		
0000	0030		Burma, Dem Voice of Burma		5955eu	
0000	0030		Egypt, Radio Cairn	11885na		
0000	0030		Thailand, Radio	9680af		
0000	0030		UK, BBC World Service	3915as	5970as	
			6195as	9410as	9740as	11945as
0000	0030		USA, Voice of America	6235as	7120va	
			9890va	11760va	15185va	15290va
			17740va			
0000	0045		India, All India Radio	9705as	9950as	
			11620as	11645as	13605as	
0000	0057		Canada, Radio Canada Intl	9755am	9800as	
0000	0059		Spain, Radio Exterior Espana	6055na		
0000	0100		Anguilla, Caribbean Beacon	6090am		
0000	0100		Australia, ABC NT Alice Springs		2310irr	
			4835do			
0000	0100		Australia, ABC NT Katherine	5025do		
0000	0100		Australia, ABC NT Tennant Creek		4910do	
0000	0100		Australia, Radio	9660pa	12080pa	13630pa
			13670va	15240pa	17715va	17750as
			17775as	17795pa		
0000	0100		Bulgaria, Radio	7400na	9700na	
0000	0100		Canada, CFRX Toronto ON	6070do		
0000	0100		Canada, CFVP Calgary AB	6030do		
0000	0100		Canada, CKZN St John's NF	6160do		
0000	0100		Canada, CKZU Vancouver BC	6160do		
0000	0100		China, China Radio Intl	6020na	6075as	
			7180as	7345eu	9570na	
0000	0100		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0000	0100		Germany, Deutsche Welle	6030as	7290as	
0000	0100		Guyana, Voice of	3290do		
0000	0100		Malaysia, Radio	7295as		
0000	0100	vi	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0000	0100		Netherlands, Radio	6165na		
0000	0100		New Zealand, Radio NZ Intl	17675pa		
0000	0100	DRM	New Zealand, Radio NZ Intl	15720pa		
0000	0100	vi	Papua New Guinea, Wantok R.Light		7120va	
0000	0100		Sierra Leone, Radio UNAMSIL	6137do		
0000	0100		Singapore, Mediacorp Radio	6150do		
0000	0100		UK, BBC World Service	5975ca		
0000	0100	DRM	UK, BBC World Service	6010na		
0000	0100		USA, AFRTS	4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb	12579usb
			12133usb	12579usb	13362usb	13855usb
0000	0100		USA, KAIJ Dallas TX	5755na		
0000	0100		USA, KTBN Salt Lake City UT	7505na		
0000	0100		USA, KWHR Naalehu HI	17655as		
0000	0100		USA, WBCQ Kennebunk ME	5110na	7415na	
			9330na			
0000	0100		USA, WBOH Newport NC	5920am		
0000	0100		USA, WEWN Birmingham AL	5875va	7540va	
			11870va	13615va		
0000	0100		USA, WHRA Greenbush ME	5850na	5875na	
			6195na			
0000	0100		USA, WHRI Noblesville IN	7315am	7490am	
			15665am			
0000	0100		USA, WINB Red Lion PA	9320am		
0000	0100	twfha	USA, WRMI Miami FL	7385am	9955am	
0000	0100		USA, WTJC Newport NC	9370na		
0000	0100		USA, WWCR Nashville TN	3215na	5070na	
			7465na	13845na		
0000	0100		USA, WWRB Manchester TN	3185na	5050na	
			5745na	6890na		
0000	0100		USA, WYFR Okeechobee FL	6065am	9505am	
			17805va			
0000	0100		Zambia, Christian Voice	4965af		
0005	0030	sm	Austria, Radio Austria Intl	7325ca		
0013	0030	twfha	Austria, Radio Austria Intl	7325ca		
0015	0030	a	Austria, Radio Austria Intl	7325ca		
0030	0045	s	Germany, Pan American BC	9740as		
0030	0100		Australia, Radio	15415as		
0030	0100	fas	Germany, Bible Voice Broadcasting		6010as	
0030	0100		Lithuania, Radio Vilnius	9875na		
0030	0100		Thailand, Radio	5890na		
0030	0100		UK, BBC World Service	11955as	15280as	
			15310as	17655as	17790as	
0030	0100		UK, BBC World Service	5970as	6195as	
			9410as	9740as	11955as	15280as
			15310as	15360as	17790as	
0030	0100		USA, Voice of America	7130va	9620va	
			11805va	15205va		
0033	0100	sm	Austria, Radio Austria Intl	7325va		
0040	0100		Vatican City, Vatican Radio	7335as	9865as	
0043	0058	twfha	Austria, Radio Austria Intl	7325na		
0043	0058	a	Austria, Radio Austria Intl	17855va		
0045	0100		Pakistan, Radio	7445as	9340as	
0055	0100		Italy, RAI Intl	11800na		

0100	0115	m	Australia, HCJB	15405as		
0100	0115		Italy, RAI Intl	11800na		
0100	0115		Pakistan, Radio	7445as	9340as	
0100	0127		Czech Rep, Radio Prague Intl		6200na	7345na
0100	0128		Vietnam, Voice of	6175na		
0100	0130		Australia, Radio	17775as		
0100	0130	s	Germany, Universal Life		9485as	
0100	0130		Slavakia, Radio Slavakia Intl		7230na	9440sa
0100	0130		Uzbekistan, Radio Tashkent		7160as	7190as
0100	0159		Canada, Radio Canada Intl		9755am	
0100	0200		Anguilla, Caribbean Beacon		6090am	
0100	0200		Australia, ABC NT Katherine		5025do	
0100	0200		Australia, ABC NT Tennant Creek			4910do
0100	0200		Australia, Radio	9660pa	12080pa	13630pa
			13670va	15415as	15240pa	17715as
			17750as	17795pa		
0100	0200		Canada, CFRX Toronto ON		6070do	
0100	0200		Canada, CFVP Calgary AB		6030do	
0100	0200		Canada, CKZN St John's NF		6160do	
0100	0200		Canada, CKZU Vancouver BC		6160do	
0100	0200		China, China Radio Intl		6005na	6020na
			6075as	7180as	9570na	9580na
0100	0200		Costa Rica, University Network		5030va	6150va
			7375va	9725va		
0100	0200		Cuba, Radio Havana		6000na	6060na
			9820na			
0100	0200		Guyana, Voice of	3291do		
0100	0200		Indonesia, Voice of		9525as	11785pa
			15150al			
0100	0200		Japan, Radio	6030va	11860as	11935sa
			153235as	17560va	17685oc	17810as
			17825am	17845as		
0100	0200		Malaysia, Radio	7295as		
0100	0200	vi	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0100	0200		Netherlands, Radio		6165na	
0100	0200		New Zealand, Radio NZ Intl		17675pa	
0100	0200	DRM	New Zealand, Radio NZ Intl		15720pa	
0100	0200		North Korea, Voice of		7140as	9345as
			9730am	11735ca	13760ca	15180ca
0100	0200	vi	Papua New Guinea, Wantok R.Light			7120va
0100	0200		Romania, Radio Romania Intl		11970na	
0100	0200		Sierra Leone, Radio UNAMSIL		6137do	
0100	0200		Singapore, Mediacorp Radio		6150do	
0100	0200		UK, BBC World Service		6195as	9410as
			11955as	15280as	15310as	15360as
			17790as			
0100	0200		Ukraine, Radio Ukraine Intl		5910na	
0100	0200		USA, AFRTS	4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb	12579usb
			12133usb	12579usb	13362usb	13855usb
0100	0200		USA, KAIJ Dallas TX	5755na		
0100	0200		USA, KTBN Salt Lake City UT	7505na		
0100	0200		USA, KWHR Naalehu HI	17655as		
0100	0200		USA, Voice of America		7200va	11820va
			17740va			
0100	0200		USA, WBCQ Kennebunk ME		5110na	7415na
			9330na			
0100	0200		USA, WBOH Newport NC		5920am	
0100	0200		USA, WEWN Birmingham AL		5875va	7540va
			11870va	13615va		
0100	0200		USA, WHRA Greenbush ME		5850na	5875na
0100	0200	twfha	USA, WHRI Noblesville IN		5835am	5860am
0100	0200	sm	USA, WHRI Noblesville IN		7315am	7490am
0100	0200		USA, WINB Red Lion PA		9320am	
0100	0200	twfha	USA, WRMI Miami FL		7385am	9955am
0100	0200		USA, WTJC Newport NC		9370na	
0100	0200		USA, WWCR Nashville TN		3215na	5070na
			5935na	7465na		
0100	0200		USA, WWRB Manchester TN		3185na	5050na
			5745na	6890na		
0100	0200		USA, WYFR Okeechobee FL		6065am	9505am
			15060as			
0100	0200		Zambia, Christian Voice		4965af	
0115	0130	twfha	Armenia, FEBA		5885eu	
0130	0200		Australia, HCJB		15405as	
0130	0200		Iran, Voice of the Islamic Rep		6120am	9665am
0130	0200		Sweden, Radio		11550va	
0130	0200	twfha	USA, Voice of America		7405va	9775va
			13740va			

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

0200	0220		Vatican City, Vatican Radio	7335as	9865as	
0200	0227		Czech Rep, Radio Prague Intl	6200na	7345na	
0200	0228		Hungary, Radio Budapest		9515na	
0200	0230	s	Australia, HCJB	15405as		
0200	0230	vi	Croatia, Croatian Radio		9925sa	
0200	0230		Iran, Voice of the Islamic Rep		6120am	9665am
0200	0300		Anguilla, Caribbean Beacon		6090am	
0200	0300	twfha	Argentina, RAE	11710am		

0200	0300	Australia, ABC NT Alice Springs 4835do	2310irr	
0200	0300	Australia, ABC NT Katherine 5025do		
0200	0300	Australia, ABC NT Tennant Creek 4910do		
0200	0300	Australia, Radio 9660pa 13670va 15415as 15240pa	13630pa 15515pa	
0200	0300	Canada, CFRX Toronto ON 6070do		
0200	0300	Canada, CFVP Calgary AB 6030do		
0200	0300	Canada, CKZN St John's NF 6160do		
0200	0300	Canada, CKZU Vancouver BC 6160do		
0200	0300	China, China Radio Intl 11770as	13640as	
0200	0300	Costa Rica, University Network 5030va 7375va 9725va	6150va	
0200	0300	Cuba, Radio Havana 6000na 9820na	6060na	
0200	0300	Egypt, Radio Cairo 7270na		
0200	0300	Guyana, Voice of 3291do		
0200	0300	Malaysia, Radio 7295as		
0200	0300	Namibia, Namibian BC Corp 3270do 6060do 6175do	3290do	
0200	0300	New Zealand, Radio NZ Intl 17675pa		
0200	0300	New Zealand, Radio NZ Intl 15720pa		
0200	0300	North Korea, Voice of 13650as	15100as	
0200	0300	Popua New Guinea, Wantok R.Light 7120va		
0200	0300	Philippines, Radio Pilipinas 11885va 17665va	15270va	
0200	0300	Russia, Voice of 7180na 15425no 15475na	7250na 15595na	7350na
0200	0300	Sierra Leone, Radio UNAMSIL 6137do		
0200	0300	Singapore, Mediacorp Radio 6150do		
0200	0300	South Korea, Rodio Korea Intl 9560na 15575na	11810sa	
0200	0300	Taiwan, Radio Taiwan Intl 5950na 11875as 15465as	9680na	
0200	0300	UK, BBC World Service 5975ca 9750af 9825ca 11955as 12095ca	6195me	
0200	0300	USA, AFRTS 15280as 15310as 15360as 17790as		
0200	0300	USA, AFRTS 4319usb 5446usb 5765usb		
0200	0300	USA, AFRTS 7590usb 7812usb 12133usb 12579usb	12579usb	13855usb
0200	0300	USA, KAIJ Dallas TX 5755na		
0200	0300	USA, KJES Vado NM 7555na		
0200	0300	USA, KTBN Salt Lake City UT 7505na		
0200	0300	USA, KWHR Naalehu HI 17655as		
0200	0300	USA, WBCQ Kennebunk ME 5110na 9330na	7415na	
0200	0300	USA, WBOH Newport NC 5920am		
0200	0300	USA, WEWN Birmingham AL 5875va 11870va 13615va	7540va	
0200	0300	USA, WHRA Greenbush ME 5850na	5875na	
0200	0300	USA, WHRI Noblesville IN 5835am 7315am	5860am 7490am	
0200	0300	USA, WHRI Noblesville IN 7315am		
0200	0300	USA, WINB Red Lion PA 9320am		
0200	0300	USA, WRMI Miami FL 7385am 9370na	9955am	
0200	0300	USA, WTJC Newport NC 9370na		
0200	0300	USA, WWCR Nashville TN 3215na 5765na 5935na	5070na	
0200	0300	USA, WWRB Manchester TN 3185na 5745na 6890na	5050na	
0200	0300	USA, WYFR Okeechobee FL 5985va 9505am 11855va	6065am	
0200	0300	Zambia, Christian Voice 4965af		
0215	0230	Nepal, Radio 3230as 7165as	5005as 6100as	
0230	0258	Vietnam, Voice of 6175na		
0230	0300	Sweden, Radio 6010na		
0245	0300	Albania, Radio Tirana 6115eu	7455eu	
0245	0300	Myanmar, Radio 9730do		
0250	0300	Vatican City, Vatican Radio 7305am	9605am	

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

0300	0320	Vatican City, Vatican Radio 7305am	9605am	
0300	0330	Belarus, Radio 5970eu	6155eu	7210eu
0300	0330	Belarus, Radio 5970eu	6155eu	7210eu
0300	0330	Egypt, Radio Cairo 7270na		
0300	0330	Myanmar, Radio 9730do		
0300	0330	Philippines, Radio Pilipinas 11885va 17665va	15270va	
0300	0330	Thailand, Radio 5890na		
0300	0330	UK, BBC World Service 3255af 6005af 6190af 6195me 7160as	5975ca 7160as 15280as 21660as	
0300	0330	USA, KJES Vado NM 7555na		
0300	0330	Vatican City, Vatican Radio 7360af		
0300	0330	New Zealand, Radio NZ Intl 17675pa		
0300	0358	New Zealand, Radio NZ Intl 15720pa		
0300	0400	Anguilla, Caribbean Beacon 6090am		
0300	0400	Australia, ABC NT Alice Springs 4835do	2310irr	
0300	0400	Australia, ABC NT Katherine 5025do		
0300	0400	Australia, ABC NT Tennant Creek 4910do		

0300	0400	Australia, CVC International 13685as		
0300	0400	Australia, Radio 9660pa 13670va 15415as 15240pa	12080pa 15515pa	13630pa 15515pa
0300	0400	Bulgaria, Radio 7400na		9700na
0300	0400	Canada, CBC NQ SW Service 9625na		
0300	0400	Canada, CFRX Toronto ON 6070do		
0300	0400	Canada, CFVP Calgary AB 6030do		
0300	0400	Canada, CKZN St John's NF 6160do		
0300	0400	Canada, CKZU Vancouver BC 6160do		
0300	0400	China, China Radio Intl 9690na 15110as 11770as	9790na	
0300	0400	Costa Rica, University Network 5030va 7375va 9725va	6150va	
0300	0400	Cuba, Radio Havana 6000na 9820na	6060na	
0300	0400	Guyana, Voice of 3291do		
0300	0400	Japan, Radio 21610oc		
0300	0400	Malaysia, Radio 7295as		
0300	0400	Malaysia, Voice of 6175as	9750as	15295as
0300	0400	Namibia, Namibian BC Corp 3270do 6060do 6175do	3290do	3290do
0300	0400	North Korea, Voice of 9730as	7140as	9345as
0300	0400	Oman, Radio Oman 15355as		
0300	0400	Papua New Guinea, Wantok R.Light 7120va		
0300	0400	Russia, Voice of 7180no 15475na 15595na	7350na	15425na
0300	0400	Rwanda, Radio 6055do		
0300	0400	Sierra Leone, Radio UNAMSIL 6137do		
0300	0400	Singapore, Mediacorp Radio 6150do		
0300	0400	South Africa, Channel Africa 3345af		7390af
0300	0400	Taiwan, Radio Taiwan Intl 5950na 15320as	15215sa	
0300	0400	Uganda, Radio 4976do	5026do	7196do
0300	0400	UK, Sudan Radio Service 9625va		
0300	0400	USA, AFRTS 4319usb 5446usb 5765usb		
0300	0400	USA, AFRTS 7812usb 12133usb 12579usb	12133usb 13362usb	5765usb 13855usb
0300	0400	USA, KAIJ Dallas TX 5755na		
0300	0400	USA, KTBN Salt Lake City UT 7505na		
0300	0400	USA, KWHR Naalehu HI 17655as		
0300	0400	USA, Voice of America 4930af 6045af 6080af	6035af 7290af	7340af
0300	0400	USA, WBCQ Kennebunk ME 5110na 9330na	7415na	
0300	0400	USA, WBOH Newport NC 5920am		
0300	0400	USA, WEWN Birmingham AL 5875va 11870va 13615va	7540va	
0300	0400	USA, WHRA Greenbush ME 5850na	5875na	
0300	0400	USA, WHRI Noblesville IN 5835am 7315am	5860am 7490am	
0300	0400	USA, WHRI Noblesville IN 7315am		
0300	0400	USA, WINB Red Lion PA 9320am		
0300	0400	USA, WRMI Miami FL 7385am 9370na	9955am	
0300	0400	USA, WTJC Newport NC 9370na		
0300	0400	USA, WWCR Nashville TN 3215na 5765na 5935na	5070na	
0300	0400	USA, WWRB Manchester TN 3185na 5745na 6890na	5050na	
0300	0400	USA, WYFR Okeechobee FL 6065am 11740va 15255va	9505am	
0300	0400	Zambia, Christian Voice 4965af		
0300	0400	Zimbabwe, ZBC Corp 5975do		
0330	0358	Hungary, Radio Budapest 9775eu		
0330	0358	Vietnam, Voice of 6175am		
0330	0400	Albania, Radio Tirana 6115eu	7455eu	
0330	0400	Sweden, Radio 6010na		
0330	0400	UK, BBC World Service 6190af 7160af	3255af 11765af	6005af 12035af

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

0400	0427	Czech Rep, Radio Prague Intl 6200na	7345na	
0400	0430	France, Radio France Intl 9805va 11995va	5835va 9555va	
0400	0430	USA, Voice of America 6080af 7290af	4930af 9575af	4960af 9775af
0400	0500	Anguilla, Caribbean Beacon 6090am		
0400	0500	Australia, ABC NT Alice Springs 4835do	2310irr	
0400	0500	Australia, ABC NT Katherine 5025do		
0400	0500	Australia, ABC NT Tennant Creek 4910do		
0400	0500	Australia, CVC International 13685as		
0400	0500	Australia, Radio 9660pa 12080pa 13670va 15415as 15240pa	13670va 15515pa	13670va 15515pa
0400	0500	Canada, CBC NQ SW Service 9625na		
0400	0500	Canada, CFRX Toronto ON 6070do		
0400	0500	Canada, CKZN St John's NF 6160do		
0400	0500	Canada, CKZU Vancouver BC 6160do		
0400	0500	China, China Radio Intl 6190na	9755na	
0400	0500	Costa Rica, University Network 5030va	6150va	

SHORTWAVE GUIDE

0400	0500		7375va	9725va		
			Cuba, Radio Havana	6000na	6060na	
			9820na			
0400	0500		Germany, Deutsche Welle	6180af	9710af	
			15445af			
0400	0500		Guyana, Voice of	3291do		
0400	0500		Malaysia, Radio	7295as		
0400	0500		Malaysia, Voice of	6175as	9750as	15295as
0400	0500	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0400	0500		New Zealand, Radio NZ Intl	15720pa		
0400	0500	DRM	New Zealand, Radio NZ Intl	13690po		
0400	0500		Nigeria, Radio/Kaduna	6090do		
0400	0500	vl	Papua New Guinea, Wantok R.	Light	7120va	
0400	0500		Romania, Radio Romania Intl	6125na	9515na	
			9690as	11895as		
0400	0500		Russia, Voice of	7150no	7180na	7350na
			9840na	12010na	15475na	
0400	0500	DRM	Russia, Voice of	15595na		
0400	0500	vl	Rwanda, Radio	6055do		
0400	0500		Sierra Leone, Radio UNAMSIL	6137do		
0400	0500		Singapore, MediCorp Radio	6150do		
0400	0500		South Africa, Channel Africa	7390af		
0400	0500		Turkey, Voice of	6020va	7240va	
0400	0500	vl	Uganda, Radio	4976do	5026do	7196do
0400	0500		UK, BBC World Service	3255af	6005af	
			6195eu	7130eu	7160af	11760me
			11765af	12035af	15280as	15310as
			15575me	15420af	17760as	17790as
			21660as			
0400	0500	DRM	UK, BBC World Service	6010no		
0400	0500	vl/ mtwhf	UK, Sudan Radio Service	9625va		
0400	0500		Ukraine, Radio Ukraine Intl	5910no		
0400	0500		USA, AFRTS	4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb	12579usb
			12133usb	12579usb	13362usb	13855usb
0400	0500		USA, KAIJ Dallas TX	5755na		
0400	0500		USA, KTVN Salt Lake City UT	7505na		
0400	0500		USA, KWHR Naalehu HI	17655as		
0400	0500		USA, WBCQ Kennebunk ME	5110na	7415na	
			9330na			
0400	0500		USA, WBOH Newport NC	5920am		
0400	0500		USA, WEWN Birmingham AL	5875va	7540va	
			11870va	13615va		
0400	0500		USA, WHRA Greenbush ME	5850na	5875na	
0400	0500	twhfa	USA, WHRI Noblesville IN	6100am	7315am	
0400	0500	sm	USA, WHRI Noblesville IN	7315am	7490am	
0400	0500		USA, WMLK Bethel PA	9265eu	9955eu	
0400	0500	twhfa	USA, WRMI Miami FL	7385am	9955am	
0400	0500		USA, WTJC Newport NC	9370na		
0400	0500		USA, WWCR Nashville TN	3215na	5070na	
			5765na	5935na		
0400	0500		USA, WWRB Manchester TN	3185na	5050na	
			5745na	6890na		
0400	0500		USA, WYFR Okeechobee FL	6065am	6855am	
			7780va	9505am	9715am	
0400	0500		Zambia, Christian Voice	6065af		
0400	0500	vl	Zimbabwe, ZBC Corp	5975do		
0430	0445		Israel, Kol Israel	6280vo	7545vo	15640va
			17600va			
0430	0500		Australia, Radio	15415as		
0430	0500		Czech Rep, Radio Prague Intl	9885va	11600va	
0430	0500		Nigeria, Radio/Ibadan	6050do		
0430	0500		Nigeria, Radio/Kaduna	4770do		
0430	0500		Nigeria, Radio/Lagos	3326do	4990do	
0430	0500		Swaziland, TWR	3200af	4775af	
0430	0500		USA, Voice of America	4930af	4960af	
			9575of	9775of		
0445	0500		Italy, RAI Intl	5965af	6120af	7170af

0500	0600		Canada, CKZU Vancouver BC	6160do		
0500	0600		China, China Radio Intl	5960na	6190na	
			7220af	11880as	15350as	15465as
			17505va	17540as		
0500	0600		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0500	0600		Cuba, Radio Havana	6000va	6060va	
			9550va	9820va	11760va	
0500	0600		Germany, Deutsche Welle	7285af	9565af	
			12035af	15410af		
0500	0600		Guyana, Voice of	3291do		
0500	0600		Japan, Radio	5975eu	6110na	7230eu
			15195as	17810as	21755oc	
0500	0600		Malaysia, Radio	7295as		
0500	0600		Malaysia, Voice of	6175as	9750os	15295as
0500	0600	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0500	0600		Netherlands, Radio	6165na	11710oc	
0500	0600		New Zealand, Radio NZ Intl	15720pa		
0500	0600	DRM	New Zealand, Radio NZ Intl	13690pa		
0500	0600		Nigeria, Radio/Ibadan	6050do		
0500	0600		Nigeria, Radio/Kaduna	4770do	6090do	
0500	0600		Nigeria, Radio/Lagos	3326do	4990do	
0500	0600		Nigeria, Voice of	7255af		
0500	0600	vl	Papua New Guinea, Wantok R.	Light	7120va	
0500	0600		Russia, Voice of	7150na	7180na	12010na
			15425na			
0500	0600		Sierra Leone, Radio UNAMSIL	6137do		
0500	0600		Singapore, MediCorp Radio	6150do		
0500	0600		South Africa, Channel Africa	7240af	11875af	
0500	0600		Swaziland, TWR	3200af	4775af	9500af
0500	0600	vl	Uganda, Radio	4976do	5026do	7196do
0500	0600		UK, BBC World Service	6195va	9410va	
			11760me	12095eu	15575me	
0500	0600		UK, CVC International	9430af		
0500	0600	vl/ mtwhf	UK, Sudan Radio Service	11795va		
0500	0600		USA, AFRTS	4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb	12579usb
			12133usb	12579usb	13362usb	13855usb
0500	0600		USA, KAIJ Dallas TX	5755na		
0500	0600		USA, KTVN Salt Lake City UT	7505na		
0500	0600		USA, KWHR Naalehu HI	11565as	15610as	
0500	0600		USA, Voice of America	4930af	6035af	
			6080af	6105af	7295af	13710af
0500	0600		USA, WBCQ Kennebunk ME	5110na	7415na	
			9330na			
0500	0600		USA, WBOH Newport NC	5920am		
0500	0600		USA, WEWN Birmingham AL	5850va	7540va	
			7570va	11870va		
0500	0600		USA, WHRA Greenbush ME	5875na	7555na	
0500	0600	twhfa	USA, WHRI Noblesville IN	6100am	7315am	
0500	0600	sm	USA, WHRI Noblesville IN	7315am	7490am	
0500	0600		USA, WMLK Bethel PA	9265eu	9955eu	
0500	0600	twhfa	USA, WRMI Miami FL	7385am		
0500	0600		USA, WTJC Newport NC	9370na		
0500	0600		USA, WWCR Nashville TN	3215no	5070na	
			5765na	5935na		
0500	0600		USA, WWRB Manchester TN	3185na		
0500	0600		USA, WYFR Okeechobee FL	6855am	9355va	
0500	0600		Zambia, Christian Voice	6065af		
0500	0600	vl	Zimbabwe, ZBC Corp	5975do		
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915do	
0530	0600		Australia, Radio	15415as		
0530	0600		Thailand, Radio	13770eu		
0530	0600	mtwhf	UK, BBC World Service	17885of		
0530	0600		UK, BBC World Service	11955as	15310as	
			15360as	17760as	17790as	21660as
0545	0600	vl	Rwanda, Radio	6055do		

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

0500	0507	twhfos	Canada, CBC NQ SW Service	9625na		
0500	0530		France, Radio France Intl	11850va	11995va	
			15155vo			
0500	0530	vl	Rwanda, Radio	6055do		
0500	0530		UK, BBC World Service	6005af	6190of	
			7160af	11955as	15280as	
			15310os	15420of	17640af	17760as
			17790as	21660os		
0500	0530		Vatican City, Vatican Radio	7360af	9660af	
			11625af			
0500	0600		Anguilla, Caribbean Beacon	6090om		
0500	0600		Australia, ABC NT Alice Springs	4835do	2310irr	
0500	0600		Australia, ABC NT Katherine	5025do		
0500	0600		Australia, ABC NT Tennant Creek		4910do	
0500	0600		Australia, CVC International	13685as		
0500	0600		Australia, Radio	9660pa	12080pa	13630pa
			13670pa	15160va	15240pa	15515pa
			17750as			
0500	0600		Bhutan, BBS	6035as		
0500	0600		Canada, CFRX Toronto ON	6070do		
0500	0600		Canada, CKZN St John's NF	6160do		

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

0600	0605	vl	Croatia, Crotion Radio	13820na		
0600	0615	os	South Africa, TWR	11640af		
0600	0630		UK, BBC World Service	6005af	6190of	
			6195af	7160of	9410af	11765af
			11940af	17640af		
0600	0630		USA, Voice of America	4930of	6035af	
			6080af	6105af	7295af	11835af
			11995af	13710af		
0600	0630		Vatican City, Vatican Radio	4005af	5885eu	
			7250eu			
0600	0645	mtwhf	South Africa, TWR	11640af		
0600	0700		Anguilla, Caribbean Beacon	6090am		
0600	0700		Australia, ABC NT Alice Springs	4835do	2310irr	
0600	0700		Australia, ABC NT Katherine	5025do		
0600	0700		Australia, ABC NT Tennant Creek		4910do	
0600	0700		Australia, CVC International	15355as		
0600	0700		Australia, Radio	9660pa	11880pa	12080pa
			13630pa	13670va	15160pa	15240pa
			15415as	15515pa	17750os	
0600	0700		Canada, CFRX Toronto ON	6070do		
0600	0700		Canada, CFVP Calgary AB	6030do		
0600	0700		Canada, CKZN St John's NF	6160do		

0600	0700	Canada, CKZU Vancouver BC	6160do	
0600	0700	China, China Radio Intl	6115na	11770as
		11880as	15140as	15465as
		17540as		17505va
0600	0700	Costa Rica, University Network	5030va	6150va
		7375va	9725va	11870va
0600	0700	Cuba, Radio Havana	6000va	6060va
		9550va	9820va	11760va
0600	0700	Germany, Deutsche Welle	6140eu	7225af
		11785af	15440af	
0600	0700	Ghana, Ghana BC Corp	3366do	4915do
0600	0700	Guyana, Voice of	3291do	
0600	0700	Japan, Radio	7230eu	11690am
		11740as	11760as	11715as
			15195as	17870oc
0600	0700	Liberia, ELWA	4760do	
0600	0700	Malaysia, Radio	7295as	
0600	0700	Malaysia, Voice of	6175as	9750as
0600	0700	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
0600	0700	New Zealand, Radio NZ Intl	15720pa	
0600	0700	DRM New Zealand, Radio NZ Intl	13690pa	
0600	0700	Nigeria, Radio/Ibadan	6050do	
0600	0700	Nigeria, Radio/Kaduna	4770do	6090do
0600	0700	Nigeria, Radio/Lagos	3326do	4990do
0600	0700	Nigeria, Voice of	7255af	
0600	0700	Papua New Guinea, Wantok R.Light	7120va	
0600	0700	Russia, Voice of	1766soc	17805oc
0600	0700	Sierra Leone, Radio UNAMSIL	6137do	
0600	0700	Sierra Leone, SLBS 3316do		
0600	0700	Singapore, Mediacorp Radio	6150do	
0600	0700	Solomon Islands, SIBC	5020do	9545do
0600	0700	South Africa, Channel Africa	7240af	15255af
0600	0700	Swaziland, TWR	4775af	9500af
0600	0700	UK, BBC World Service	17885af	
0600	0700	UK, BBC World Service	6195eu	9410eu
		11955as	12095eu	15360as
		15565eu	15575me	17790as
0600	0700	USA, CVC International	9430af	
0600	0700	USA, AFRTS	4319usb	5446usb
		7590usb	7812usb	12133usb
		12133usb	12579usb	13855usb
0600	0700	USA, KAIJ Dallas TX	5755na	
0600	0700	USA, KTBN Salt Lake City UT	7505na	
0600	0700	USA, KWHR Naalehu HI	11565as	15610as
0600	0700	USA, WBCQ Kennebunk ME	5110na	7415na
0600	0700	USA, WBOH Newport NC	5920am	
0600	0700	USA, WEWN Birmingham AL	5850va	7540va
		11870va		
0600	0700	USA, WHRA Greenbush ME	6135na	7555na
0600	0700	USA, WHRI Noblesville IN	5860am	5875am
		7315am		
0600	0700	USA, WMLK Bethel PA	9265eu	9955eu
0600	0700	USA, WRMI Miami FL	7385am	
0600	0700	USA, WTJC Newport NC	9370na	
0600	0700	USA, WWCR Nashville TN	3215na	5070na
		5765na	5935na	
0600	0700	USA, WWRB Manchester TN	3185na	
0600	0700	USA, WYFR Okeechobee FL	5810va	7780va
		11530af	11580va	
0600	0700	Vanuatu, Radio	4960do	
0600	0700	Yemen, Rep of Yemen Radio	9780me	
0600	0700	Zambia, Christian Voice	6065af	
0600	0700	Zimbabwe, ZBC Corp	5975do	
0605	0630	Austria, Radio Austrio Intl	17870me	
0630	0700	Romania, Radio Romania Intl	15135pa	17780pa
0630	0700	UK, BBC World Service	6005af	6190af
		6195va	7160af	9410af
		11940af	15400af	11765af
0630	0700	UK, BBC World Service	17885af	
0630	0700	USA, Voice of America	6080af	7295af
		11835af		
0630	0700	Vatican City, Vatican Radio	9660af	11625af
		13765af		
0630	0700	Vatican City, Vatican Radio	9660af	11625af
		13765af		

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

0700	0710	Vatican City, Vatican Radio	4005eu	5885eu
		6185eu	7250eu	9645eu
		15595eu		11740eu
0700	0715	UK, BBC World Service	6005af	6190af
		9410af	11765af	11940af
		15400af	15485af	12095af
				17640af
0700	0715	UK, BBC World Service	17885af	
0700	0730	Slovakia, Radio Slovakia Intl	13715pa	15460pa
0700	0730	UK, BBC World Service	11760me	15575me
0700	0745	USA, WYFR Okeechobee FL	7780va	
0700	0759	New Zealand, Radio NZ Intl	15720pa	
0700	0759	DRM New Zealand, Radio NZ Intl	13690pa	
0700	0800	Anguilla, Caribbean Beacon	6090am	
0700	0800	Australia, ABC NT Alice Springs		2310irr
		4835do		
0700	0800	Australia, ABC NT Katherine	5025do	

0700	0800	Australia, ABC NT Tennant Creek	4910do	
0700	0800	Australia, CVC International	15355as	
0700	0800	Australia, HCJB	11750pa	
0700	0800	Australia, Radio	9660pa	9710pa
		12080pa	13630pa	11880pa
		15415as	17750as	15160pa
				15240pa
0700	0800	Canada, CFRX Toronto ON	6070do	
0700	0800	Canada, CFVP Calgary AB	6030do	
0700	0800	Canada, CKZN St John's NF	6160do	
0700	0800	Canada, CKZU Vancouver BC	6160do	
0700	0800	China, China Radio Intl	11785eu	11880as
		15350as	15465as	17490eu
				17540as
0700	0800	Costa Rica, University Network	5030va	6150va
		7375va	9725va	11870va
0700	0800	Eqt Guinea, Radio Africa	15190af	
0700	0800	France, Radio France Intl	11725va	15605va
0700	0800	Germany, Deutsche Welle	6140eu	
0700	0800	Ghana, Ghana BC Corp	3366do	4915do
0700	0800	Guyana, Voice of	3291do	5950do
0700	0800	Liberia, ELWA	4760do	
0700	0800	Liberia, Star Radio	9525af	
0700	0800	Malaysia, Radio	7295as	
0700	0800	Malaysia, Voice of	6175as	9750as
0700	0800	Myanmar, Radio	9730do	15295as
0700	0800	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
0700	0800	Nigeria, Radio/Ibadan	6050do	
0700	0800	Nigeria, Radio/Kaduna	4770do	6090do
0700	0800	Nigeria, Radio/Lagos	3326do	4990do
0700	0800	Papua New Guinea, Wantok R.Light	7120va	
0700	0800	Russia, Voice of	1766soc	17805oc
0700	0800	Sierra Leone, Radio UNAMSIL	6137do	
0700	0800	Sierra Leone, SLBS 3316do		
0700	0800	Singapore, Mediacorp Radio	6150do	
0700	0800	Solomon Islands, SIBC	5020do	9545do
0700	0800	South Africa, Channel Africa	7240af	15255af
0700	0800	Swaziland, TWR	4775af	9500af
0700	0800	UK, BBC World Service	17885af	
0700	0800	UK, BBC World Service	6195eu	9410eu
		11955as	12095eu	15360as
		15565eu	15575me	17790as
0700	0800	USA, CVC International	9430af	
0700	0800	USA, AFRTS	4319usb	5446usb
		7590usb	7812usb	12133usb
		12133usb	12579usb	13855usb
0700	0800	USA, KAIJ Dallas TX	5755na	
0700	0800	USA, KTBN Salt Lake City UT	7505na	
0700	0800	USA, KWHR Naalehu HI	11565as	15610as
0700	0800	USA, WBCQ Kennebunk ME	5110na	7415na
0700	0800	USA, WBOH Newport NC	5920am	
0700	0800	USA, WEWN Birmingham AL	5850va	7540va
		11870va		
0700	0800	USA, WHRA Greenbush ME	6135na	7465na
0700	0800	USA, WHRI Noblesville IN	5860am	5875am
		7315am		
0700	0800	USA, WMLK Bethel PA	9265eu	9955eu
0700	0800	USA, WRMI Miami FL	7385am	
0700	0800	USA, WTJC Newport NC	9370na	
0700	0800	USA, WWCR Nashville TN	3215na	5070na
		5765na	5935na	
0700	0800	USA, WWRB Manchester TN	3185na	
0700	0800	USA, WYFR Okeechobee FL	5810va	7780va
		11530af	11580va	
0700	0800	Vanuatu, Radio	4960do	
0700	0800	Yemen, Rep of Yemen Radio	9780me	
0700	0800	Zambia, Christian Voice	6065af	
0700	0800	Zimbabwe, ZBC Corp	5975do	
0700	0800	Austria, Radio Austrio Intl	17870me	
0700	0800	Romania, Radio Romania Intl	15135pa	17780pa
0715	0800	UK, BBC World Service	6005af	6190af
		6195va	7160af	9410af
		11940af	15400af	11765af
0715	0800	UK, BBC World Service	17885af	
0730	0800	Vatican City, Vatican Radio	4005va	5885va
0730	0745	Vatican City, Vatican Radio	6185va	7250va
		15595va		11740va
0730	0800	Bulgaria, Radio	9500eu	11500eu
0730	0800	Georgia, Radio Georgia	11805eu	
0730	0800	Germany, Bible Voice Broadcasting		5945eu
0730	0800	Guam, TWR/KTWR	15255as	
0730	0800	UK, BBC World Service	11760me	15575me
0740	0800	Guam, TWR/KTWR	15225as	
0745	0800	Albania, TWR	11865eu	
0745	0800	Albania, TWR	11865eu	
0745	0800	Monaco, TWR	9800eu	

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

0800	0827	Czech Rep, Radio Progue Intl	7345eu	9860eu
0800	0830	Australia, ABC NT Katherine	5025do	
0800	0830	Australia, ABC NT Tennant Creek	4910do	
0800	0830	Liberia, ELWA	4760do	
0800	0830	Malaysia, Voice of	6175as	9750as
0800	0830	Myanmar, Radio	9730do	
0800	0830	Swaziland, TWR	4775af	6120af
0800	0830	Albania, TWR	11865eu	9500af
0800	0900	mtwhf Anguilla, Caribbean Beacon	6090am	
0800	0900	Australia, ABC NT Alice Springs		2310irr

0800	0900	4835do			
0800	0900	Australia, CVC International	15355as		
0800	0900	Australia, HCJB	11750pa		
0800	0900	Australia, Radio	5995pa	9580pa	9590pa
		9710pa	12080pa	13630pa	15240as
		17750as			
0800	0900	Bhutan, BBS	6035as		
0800	0900	Canada, CFRX Toronto ON	6070da		
0800	0900	Canada, CFVP Calgary AB	6030da		
0800	0900	Canada, CKZN St John's NF	6160da		
0800	0900	Canada, CKZU Vancouver BC	6160da		
0800	0900	China, China Radio Intl	11785eu	11880as	
		15350as	15465as	17490eu	17540as
0800	0900	Costa Rica, University Network	5030va	6150va	
		7375va	9725va	11870va	
		Eqt Guinea, Radio Africa	15190af		
0800	0900	as			
0800	0900	Germany, Bible Voice Broadcasting		5945eu	
0800	0900	Germany, Deutsche Welle	6140eu		
0800	0900	DRM			
0800	0900	Germany, Deutsche Welle	21675af		
0800	0900	vl			
0800	0900	Ghana, Ghana BC Corp	3366do	4915da	
0800	0900	mtwhf			
0800	0900	Guam, TWR/KTWR	11840as	15225as	
0800	0900			5950do	
0800	0900	Guyana, Voice of	3291do	9525as	11785pa
		Indonesia, Voice of	15150af		
		Italy, IRRS	13840va		
0800	0900	vl/as			
0800	0900	Liberia, Star Radio	9525af		
0800	0900	Malaysia, Radio	7295as		
0800	0900	Malaysia, Voice of	15295as		
0800	0900	mtwhf			
0800	0900	Manaca, TWR	9800eu		
0800	0900	DRM			
0800	0900	New Zealand, Radio NZ Intl	9885pa		
0800	0900	New Zealand, Radio NZ Intl	9460pa		
0800	0900	Nigeria, Radio/Ibadan	6050da		
0800	0900	Nigeria, Radio/Kaduna	4770da	6090da	
0800	0900	Nigeria, Radio/Lagos	3326da	4990da	
0800	0900	Papua New Guinea, Catholic Radio		4960da	
0800	0900	Papua New Guinea, NBC	4890da		
0800	0900	vl			
0800	0900	Papua New Guinea, Wantak R.Light		7120va	
0800	0900	Russia, Voice of	17495ac	17665ac	17805ac
0800	0900	Sierra Leone, Radio UNAMSIL	6137da		
0800	0900	irreg/vl			
0800	0900	Sierra Leone, SLBS 3316do			
0800	0900	Singapore, Mediacorp Radio	6150da		
0800	0900	vl			
0800	0900	Salaman Islands, SIBC	5020da	9545do	
0800	0900	s			
0800	0900	South Africa, Radio League	7205af	17700af	
0800	0900	South Korea, Radio Korea Intl	9570as	9640eu	
0800	0900	Taiwan, Radio Taiwan Intl	9610va		
0800	0900	UK, BBC World Service	6190af	6195as	
		9740as	11760me	11940af	15280as
		15310as	15360as	15400af	15485af
		15575me	17640af		
0800	0900	UK, CVC International	15640af		
0800	0900	USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	13362usb	13855usb
0800	0900	USA, KAIJ Dallas TX	5755na		
0800	0900	USA, KNLS Anchar Paint AK	9615as		
0800	0900	USA, KTBN Salt Lake City UT	7505na		
0800	0900	USA, KWHR Naalehu HI	9930as	11565as	
0800	0900	USA, WBOH Newport NC	5920am		
0800	0900	USA, WEWN Birmingham AL	5850na	7540na	
		11870va			
0800	0900	USA, WHRA Greenbush ME	6135na	7465na	
0800	0900	USA, WHRI Noblesville IN	5860am	5875am	
		7315am			
0800	0900	USA, WMLK Bethel PA	9265eu	9955eu	
0800	0900	twhfa			
0800	0900	USA, WRMI Miami FL	7385am		
0800	0900	USA, WTJC Newport NC	9370na		
0800	0900	USA, WWCR Nashville TN	3215na	5070na	
		5765na	5935na		
0800	0900	USA, WWRB Manchester TN	3185na		
0800	0900	USA, WYFR Okeechobee FL	5950am	5745am	
		5985am	6855af	9930af	
0800	0900	vl			
0800	0900	Vanuatu, Radio	4960da		
0800	0900	Zambia, Christian Voice	6065af		
0815	0850	a			
0815	0850	Albania, TWR	11865eu		
0815	0850	a			
0815	0900	f			
0815	0900	Manaca, TWR	9800eu		
0815	0900	as			
0815	0900	Germany, Bible Voice Broadcasting		5945eu	
0830	0900	Guam, TWR/KTWR	11840as		
0830	0900	Australia, ABC NT Katherine	2485do		
0830	0900	Australia, ABC NT Tennant Creek		2325do	
0830	0900	Australia, Radio	15415as		

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

0900	0900	USA, WBCQ Kennebunk ME	5110na	7415na	
0900	0915	a			
0900	0915	vl			
0900	0920	mtwhf			
0900	0920	s			
0900	0920	Albania, TWR	11865eu		
0900	0920	s			
0900	0920	Manaca, TWR	9800eu		
0900	0930	mtwhf			
0900	0945	s			
0900	1000	Germany, Bible Voice Broadcasting		5945eu	
0900	1000	Anguilla, Caribbean Beacon	6090am		
0900	1000	Australia, ABC NT Alice Springs	4835irr	2310da	

0900	1000	Australia, ABC NT Katherine	2485do		
0900	1000	Australia, ABC NT Tennant Creek		2325da	
0900	1000	Australia, CVC International	11955as		
0900	1000	Australia, Radio	9580pa	9590pa	11880as
		15240as			
0900	1000	Canada, CFRX Toronto ON	6070da		
0900	1000	Canada, CFVP Calgary AB	6030da		
0900	1000	Canada, CKZN St John's NF	6160da		
0900	1000	Canada, CKZU Vancouver BC	6160da		
0900	1000	China, China Radio Intl	15210pa	17490eu	
		17690pa			
0900	1000	Costa Rica, University Network	5030va	6150va	
		7375va	9725va	11870va	13750va
0900	1000	Eqt Guinea, Radio Africa	15190af		
0900	1000	DRM			
0900	1000	Germany, Deutsche Welle	6140eu		
0900	1000	Germany, Deutsche Welle	21675af		
0900	1000	Guyana, Voice of	3291da	5950da	
0900	1000	vl/as			
0900	1000	Italy, IRRS	13840va		
0900	1000	a			
0900	1000	Italy, IRRS	15725va		
0900	1000	Malaysia, Radio	7295as		
0900	1000	vl			
0900	1000	Namibia, Namibian BC Corp	3270da	3290da	
		6060da	6175da		
0900	1000	New Zealand, Radio NZ Intl	9885pa		
0900	1000	DRM			
0900	1000	New Zealand, Radio NZ Intl	9460pa		
0900	1000	Nigeria, Radio/Ibadan	6050da		
0900	1000	Nigeria, Radio/Kaduna	4770da	6090da	
0900	1000	Nigeria, Radio/Lagos	3326da	4990da	
0900	1000	Papua New Guinea, Catholic Radio		4960da	
0900	1000	Papua New Guinea, NBC	4890da		
0900	1000	vl			
0900	1000	Papua New Guinea, Wantak R.Light		7120va	
0900	1000	Russia, Voice of	17495ac	17665ac	17665ac
0900	1000	DRM			
0900	1000	Russia, Voice of	12060eu		
0900	1000	vl			
0900	1000	Rwanda, Radio	6055da		
0900	1000	Sierra Leone, Radio UNAMSIL	6137da		
0900	1000	irreg/vl			
0900	1000	Sierra Leone, SLBS 3316do			
0900	1000	v			
0900	1000	Salomon Islands, SIBC	5020da	9545da	
		UK, BBC World Service	6190af	6195as	
		9605as	9740as	11760me	11940af
		15280as	15310as	15360as	15400af
		15485af	15575me	17640af	17830af
		17760as	17790as	17885af	21470af
		21660as			
0900	1000	USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	13362usb	13855usb
0900	1000	USA, KAIJ Dallas TX	5755na		
0900	1000	USA, KTBN Salt Lake City UT	7505na		
0900	1000	USA, KWHR Naalehu HI	9930as	11565as	
0900	1000	USA, Voice of America	15615va		
0900	1000	USA, WBCQ Kennebunk ME	5110na	7415na	
0900	1000	USA, WBOH Newport NC	5920am		
0900	1000	USA, WEWN Birmingham AL	5850na	7540na	
		11870va			
0900	1000	USA, WHRA Greenbush ME	6135na	7465na	
0900	1000	USA, WHRI Noblesville IN	5860am	5875am	
		7520am			
0900	1000	USA, WRMI Miami FL	9955am		
0900	1000	USA, WTJC Newport NC	9370na		
0900	1000	USA, WWCR Nashville TN	3215na	5070na	
		5765na	5935na		
0900	1000	USA, WWRB Manchester TN	3185na		
0900	1000	USA, WYFR Okeechobee FL	5745am	5985am	
		6885as	9450as	9755am	
0900	1000	vl			
0900	1000	Vanuatu, Radio	4960do		
0900	1000	Zambia, Christian Voice	6065af		
0930	1000	Australia, Radio	15415as		

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

1000	1029	Czech Rep, Radio Prague Intl	21745va		
1000	1030	Australia, CVC International	11955as		
1000	1030	Mangolia, Voice of	12085as		
1000	1059	New Zealand, Radio NZ Intl	9885pa		
1000	1059	DRM			
1000	1100	New Zealand, Radio NZ Intl	9460pa		
1000	1100	Anguilla, Caribbean Beacon	11775am		
1000	1100	Australia, ABC NT Alice Springs	4835irr	2310da	
1000	1100	Australia, ABC NT Katherine	2485do		
1000	1100	Australia, ABC NT Tennant Creek		2325da	
1000	1100	Australia, Radio	9580pa	9590pa	11880as
		15240as	15415as		
1000	1100	Canada, CFRX Toronto ON	6070do		
1000	1100	Canada, CFVP Calgary AB	6030do		
1000	1100	Canada, CKZN St John's NF	6160do		
1000	1100	Canada, CKZU Vancouver BC	6160do		
1000	1100	China, China Radio Intl	15210pa	17490eu	
		17690pa			
1000	1100	Costa Rica, University Network	5030va	6150va	
		7375va	9725va	11870va	13750va
1000	1100	Guyana, Voice of	3291do	5950do	
1000	1100	India, All India Radio	13710ac	15020as	
		15260as	15235as	17510oc	17800as
		17895oc			

1000	1100	a	Italy, IRRS	15725va		
1000	1100	vl/as	Italy, IRRS	13840va		
1000	1100		Japan, Radio	6120na	9695as	11730as
				17585eu	17720va	21755oc
1000	1100	DRM	Luxembourg, Radio		7145eu	
1000	1100		Malaysia, Radio	7295as		
1000	1100		Malaysia, Voice of	6175as	15295as	
1000	1100		Netherlands, Radio		7315as	9795as
				12065va		
1000	1100		Nigeria, Voice of	7255af		
1000	1100		North Korea, Voice of		6185as	6285am
				9335ca	9850as	
1000	1100		Papua New Guinea, Catholic Radio			4960do
1000	1100		Papua New Guinea, NBC		4890do	
1000	1100	vl	Papua New Guinea, Wantok R.Light			7120va
1000	1100		Singapore, Mediacorp Radio		6150do	
1000	1100	vl	Solomon Islands, SIBC		5020do	9545do
1000	1100	vl	South Africa, Channel Africa		11825af	
1000	1100		UK, BBC World Service		6190af	6195va
				9605as	9740as	11760me
				15280as	15310as	15360as
				15575me	17640af	17790me
				21470af		17885af
1000	1100as		UK, BBC World Service		15400af	17830af
1000	1100		USA, AFRTS		4319usb	5446usb
					7590usb	7812usb
					12133usb	12579usb
					12133usb	12579usb
					12133usb	12579usb
1000	1100		USA, KAIJ Dallas TX		5755na	
1000	1100		USA, KNLS Anchor Point AK		9615as	
1000	1100		USA, KTVN Salt Lake City UT		7505na	
1000	1100		USA, KWHR Naalehu HI		9930as	11565as
1000	1100		USA, Voice of America		15615va	
1000	1100		USA, WBCQ Kennebunk ME		5110na	
1000	1100		USA, WBOH Newport NC		5920am	
1000	1100		USA, WEWN Birmingham AL		5850na	7540na
					11870va	
1000	1100		USA, WHRA Greenbush ME		6135na	
1000	1100		USA, WHRI Noblesville IN		6095am	7520am
					9495am	
1000	1100		USA, WRMI Miami FL		9955am	
1000	1100		USA, WTJC Newport NC		9370na	
1000	1100		USA, WWCR Nashville TN		5070na	5765na
					5935na	9985na
					15825na	
1000	1100		USA, WWRB Manchester TN		3185na	
1000	1100		USA, WYFR Okeechobee FL		5950am	5985am
					6000am	6855am
					9450as	
1000	1100		Zambia, Christian Voice		9865af	
1030	1045	mtwhf	Ethiopia, Radio		5990af	7110af
1030	1045		Israel, Kol Israel		15640va	17535va
1030	1058		Vietnam, Voice of		7285as	
1030	1100		Australia, HCJB		15400as	
1030	1100	s	Germany, Bible Voice Broadcasting			5895as
1030	1100		Iran, Voice of the Islamic Rep		15460as	15480as
1030	1100		UK, BBC World Service		6195as	9740as
					11945as	15310as
					17790as	

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

1100	1128		Vietnam, Voice of	9840as	7220as	7285as
1100	1130		Australia, HCJB	15400as		
1100	1130		Australia, Radio	15240as		
1100	1130		Iran, Voice of the Islamic Rep		15460as	15480as
1100	1130		UK, BBC World Service		6190af	6195as
					9740as	11760me
					11945as	15310as
					15575me	17640af
					17790as	
1100	1159	s	Germany, Universal Life		6055me	
1100	1200		Anguilla, Caribbean Beacon		11775am	
1100	1200		Australia, ABC NT Alice Springs			2310do
					4835irr	
1100	1200		Australia, ABC NT Katherine		2485do	
1100	1200		Australia, ABC NT Tennant Creek			2325do
1100	1200		Australia, CVC International		13635as	
1100	1200		Australia, Radio		5995pa	6020pa
					9560as	9580pa
					9590pa	11880as
					12080pa	
1100	1200	as	Canada, CBC NQ SW Service		9625na	
1100	1200		Canada, CFRX Toronto ON		6070do	
1100	1200		Canada, CFVP Calgary AB		6030do	
1100	1200		Canada, CKZN St John's NF		6160do	
1100	1200		Canada, CKZU Vancouver BC		6160do	
1100	1200		China, China Radio Intl		5960na	13665eu
					17490eu	
1100	1200		Costa Rica, University Network		5030va	6150va
					7375va	9725va
					11870va	13750va
1100	120C		Ecuador, HCJB		12005am	21455am
1100	1200		Germany, Overcomer Ministries			6110eu
					9855va	
1100	120C	a	Italy, IRRS	15725va		
1100	1200	vl/as	Italy, IRRS	13840va		
1100	1200		Japan, Radio	9695as	11730as	
1100	1200	DRM	Luxembourg, Radio		7145eu	
1100	1200		Malaysia, Radio	7295as		
1100	1200		Malaysia, Voice of	6175as	15295as	

1100	1200	DRM	Netherlands, Radio		7240eu	
1100	1200		New Zealand, Radio NZ Intl		15530pa	
1100	1200	DRM	New Zealand, Radio NZ Intl		9460pa	
1100	1200		Nigeria, Voice of		7255af	
1100	1200		Papua New Guinea, Catholic Radio			4960do
1100	1200		Papua New Guinea, NBC		4890do	
1100	1200	vl	Papua New Guinea, Wantok R.Light			7120va
1100	1200		Singapore, Radio Singapore Intl			6080as
					6150as	
1100	1200	vl	South Africa, Channel Africa		11825af	
1100	1200		Taiwan, Radio Taiwan Intl		7445as	
1100	1200		USA, AFRTS		4319usb	5446usb
					7590usb	7812usb
					12133usb	12579usb
					12133usb	12579usb
1100	1200		USA, KAIJ Dallas TX		5755na	
1100	1200		USA, KTVN Salt Lake City UT		7505na	
1100	1200		USA, KWHR Naalehu HI		9930as	11565as
1100	1200		USA, Voice of America		13865va	15615va
					17555va	
1100	1200		USA, WBOH Newport NC		5920am	
1100	1200		USA, WEWN Birmingham AL		5850na	7540na
					11870na	
1100	1200		USA, WHRA Greenbush ME		6135na	
1100	1200		USA, WHRI Noblesville IN		6095am	7520am
					9495am	
1100	1200		USA, WINB Red Lion PA		9320am	
1100	1200		USA, WRMI Miami FL		9955am	
1100	1200		USA, WTJC Newport NC		9370na	
1100	1200		USA, WWCR Nashville TN		5070na	5765na
					5935na	9985na
					15825na	
1100	1200		USA, WWRB Manchester TN		3185na	
1100	1200		USA, WWRB Manchester TN		3185na	
1100	1200		USA, WYFR Okeechobee FL		5950am	5985am
					6000am	7780va
					9550va	9625va
					9755am	
1100	1200		Zambia, Christian Voice		9865af	
1105	1200		Greece, Voice of		12105eu	15630eu
1130	1157		Czech Rep, Radio Prague Intl		11640eu	21745va
1130	1159	a	Germany, Universal Life		6055me	
1130	1200		Australia, HCJB		15425as	
1130	1200	a	Germany, Bible Voice Broadcasting			15950as
1130	1200	s	Germany, Bible Voice Broadcasting			15950as
1130	1200		Guam, AWR/KSDA 11915as			
1130	1200		UK, BBC World Service		6190af	11940af
					15485af	17640af
					17830af	17885af
					21470af	
1130	1200		Vatican City, Vatican Radio		15595va	17515va
1145	1200	vl	Libya, Voice of Africa		17695af	21675af
					21695af	

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

1200	1215	vl	Cambodia, National Radio		11940as	
1200	1230		France, Radio France Intl		15275va	21620va
1200	1230		Malaysia, Voice of		15295as	
1200	1230		UAE, AWR Africa		15110as	
1200	1230		Uzbekistan, Radio Tashkent			5060as
1200	1259		Canada, Radio Canada Intl			7105as
1200	1300		Anguilla, Caribbean Beacon			11775am
1200	1300		Australia, ABC NT Alice Springs			2310do
					4835irr	
1200	1300		Australia, ABC NT Katherine		2485do	
1200	1300		Australia, ABC NT Tennant Creek			2325do
1200	1300		Australia, CVC International		13635as	
1200	1300		Australia, Radio		5995pa	6020pa
					9560pa	9580pa
					9590pa	11880pa
1200	1300	as	Canada, CBC NQ SW Service		9625na	
1200	1300		Canada, CFRX Toronto ON		6070do	
1200	1300		Canada, CFVP Calgary AB		6030do	
1200	1300		Canada, CKZN St John's NF		6160do	
1200	1300		Canada, CKZU Vancouver BC		6160do	
1200	1300		China, China Radio Intl		9730as	9760pa
					11760pa	11980as
					13685eu	13790eu
					17490eu	
1200	1300		Costa Rica, University Network		9725va	11870va
					13750va	
1200	1300		Ecuador, HCJB		12005am	21455am
1200	1300	a	Italy, IRRS	15725va		
1200	1300	vl/as	Italy, IRRS	13840va		
1200	1300	DRM	Luxembourg, Radio		7145eu	
1200	1300		Malaysia, Radio	7295as		
1200	1300		Malaysia, Voice of	6175as		
1200	1300		Netherlands, Radio		9890na	
1200	1300		New Zealand, Radio NZ Intl		15530pa	
1200	1300	DRM	New Zealand, Radio NZ Intl		9460pa	
1200	1300		Nigeria, Voice of		7255af	
1200	1300		Papua New Guinea, Catholic Radio			4960do
1200	1300		Papua New Guinea, NBC		4890do	
1200	1300	vl	Papua New Guinea, Wantok R.Light			7120va
1200	1300		Singapore, Radio Singapore Intl			6080as
					6150as	
1200	1300		South Korea, Radio Korea Intl		9650na	
1200	1300		Taiwan, Radio Taiwan Intl		7130as	
1200	1300		UK, BBC World Service		6190af	6195as

1200	1300	9605ca	9740as	11760me	11855ca
1200	1300	11940af	11945as	15190ca	15310as
		15485af	15575me	17640af	17790as
		17885af	21470af		
		Ukraine, Radio Ukraine Intl	9925eu		
		USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	13362usb	13855usb
1200	1300	USA, KAIJ Dallas TX	5755na		
1200	1300	USA, KNLS Anchor Point AK	7355as	9615as	
1200	1300	USA, KTVN Salt Lake City UT	7505na		
1200	1300	USA, KWHR Naalehu HI	9930as	11520as	
1200	1300	USA, Voice of America	6110va	9645va	
		9760va	11705va	11715va	15665va
1200	1300	USA, WBCQ Kennebunk ME	9330na	18910na	
1200	1300	USA, WBOH Newport NC	5920am		
1200	1300	USA, WEWN Birmingham AL	5850na	7540na	
		11870na			
1200	1300	USA, WHRA Greenbush ME	11785na	15665na	
1200	1300	USA, WHRI Noblesville IN	6095am	7520am	
		9495am	9840am		
1200	1300	USA, WINB Red Lian PA	9320am		
1200	1300	USA, WRMI Miami FL	9955am		
1200	1300	USA, WTJC Newport NC	9370na		
1200	1300	USA, WWCR Nashville TN	5070na	5765na	
		5935na	9985na	15825na	
1200	1300	USA, WWRB Manchester TN	3185na		
1200	1300	USA, WYFR Okeechabee FL	5950am	5985am	
		17505va			
1200	1300	Zambia, Christian Voice	9865af		
1215	1300	Egypt, Radio Caira	17835as		
1230	1245	Germany, Bible Voice Broadcasting		15950as	
1230	1258	Vietnam, Voice of	9840as	12020as	
1230	1300	Bangladesh, Bangla Betar	7185as		
1230	1300	Bulgaria, Radio	11700eu	15700eu	
1230	1300	Thailand, Radio	9810va		

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

1300	1329	Canada, Radio Canada Intl	9665as	9725as	
1300	1330	Ecuador, HCJB	12005am	21455am	
1300	1330	Egypt, Radio Caira	17835as		
1300	1330	Uzbekistan, Radio Tashkent	5975as	7190as	
1300	1400	Anguilla, Caribbean Beacon	11775am		
1300	1400	Australia, CVC International	13635as		
1300	1400	Australia, Radio	5995pa	6020pa	9560pa
		9580pa	9590pa		
1300	1400	as	Canada, CBC NQ SW Service	9625na	
1300	1400	Canada, CFRX Taranta ON	6070da		
1300	1400	Canada, CFVP Calgary AB	6030da		
1300	1400	Canada, CKZN St John's NF	6160da		
1300	1400	Canada, CKZU Vancouver BC	6160da		
1300	1400	China, China Radio Intl	9570na	11760pa	
		11885pa	11900pa	11980as	13610eu
		13790eu	15230na		
1300	1400	Costa Rica, University Network	9725va	11870va	
		13750va			
1300	1400	Germany, Deutsche Welle	6140eu		
1300	1400	Germany, Overcamer Ministries		6110eu	
		9855va			
1300	1400	Jordan, Radio	11690na		
1300	1400	vi	Libya, Voice of Africa	21675af	21695af
1300	1400	DRM	Luxembourg, Radio	7145eu	
1300	1400	Malaysia, Radio	7295as		
1300	1400	Malaysia, Voice of	6175as		
1300	1400	DRM	New Zealand, Radio NZ Intl	9870pa	
1300	1400	New Zealand, Radio NZ Intl	7230pa		
1300	1400	Nigeria, Voice of	7255af		
1300	1400	North Korea, Voice of	7570eu	9335na	
		11710na	12015eu		
1300	1400	Papua New Guinea, Catholic Radio	4960da		
1300	1400	Papua New Guinea, NBC	4890da		
1300	1400	vi	Papua New Guinea, Wantok R.Light	7120va	
1300	1400	Poland, Radio Palonia	9525eu	11850eu	
1300	1400	Romania, Radio Romania Intl	17745eu		
1300	1400	Singapore, Radio Singapore Intl	6150as	6080as	
1300	1400	South Korea, Radio Korea Intl	9570na	9770na	
1300	1400	UK, BBC World Service	6190af	6195as	
		9740as	11760me	11940af	11945as
		15190ca	15310as	15420af	15485af
		15575me	17640af	17790as	17830af
		17885af	21470af		
1300	1400	USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	13362usb	13855usb
1300	1400	USA, KAIJ Dallas TX	5755na		
1300	1400	USA, KTVN Salt Lake City UT	7505na		
1300	1400	USA, KWHR Naalehu HI	9930as	11520as	
1300	1400	USA, Voice of America	6110va	9645va	
		9760va	11705va		
1300	1400	USA, WBCQ Kennebunk ME	7415na	9330na	
		18910na			
1300	1400	USA, WBOH Newport NC	5920am		

1300	1400	USA, WEWN Birmingham AL	9955na	11645na	
		15745na			
1300	1400	USA, WHRA Greenbush ME	11785na	15665na	
1300	1400	USA, WHRI Noblesville IN	7520am	9840am	
		12020am			
1300	1400	as	USA, WHRI Noblesville IN	9495am	
1300	1400	USA, WINB Red Lian PA	13570am		
1300	1400	USA, WRMI Miami FL	7385am		
1300	1400	USA, WTJC Newport NC	9370na		
1300	1400	USA, WWCR Nashville TN	7465na	9985na	
		13845na	15825na		
1300	1400	USA, WWRB Manchester TN	9320na		
1300	1400	USA, WYFR Okeechabee FL	7580as	11560as	
		11830am	11865am	11910am	11830am
1300	1400	Zambia, Christian Voice	9865af		
1305	1320	am	Austria, Radio Austria Intl	17885va	
1305	1330	s	Austria, Radio Austria Intl	17855va	
1330	1400	s	Australia, HCJB	15405as	
1330	1400	mtwhfa	Guam, AWR/KSDA 15660as		
1330	1400	Guam, TWR/KTWR 9585as			
1330	1400	India, All India Radio	9690as	11620as	
		13710as			
1330	1400	Laos, National Radio	7145as		
1330	1400	Sweden, Radio	7420va	11550va	15240na
1330	1400	Turkey, Voice of	11735va	15155eu	
1345	1400	mtwhf	Austria, Radio Austria Intl	17855va	

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

1400	1415	Russia, FEBA	7370as		
1400	1429	Czech Rep, Radio Prague Intl	11600as	21745na	
1400	1430	DRM	Canada, Radio Canada Intl	7240eu	
1400	1430	a	Germany, Pan American BC	15650as	
1400	1430	Thailand, Radio	9725va		
1400	1430	Turkey, Voice of	11735ac	15155eu	
1400	1500	Anguilla, Caribbean Beacon	11775am		
1400	1500	Australia, CVC International	13635as		
1400	1500	Australia, HCJB	15390as		
1400	1500	Australia, Radio	5995pa	6020pa	6080as
		7240pa	9590pa	9625pa	11750as
1400	1500	as	Canada, CBC NQ SW Service	9625na	
1400	1500	Canada, CFRX Taranta ON	6070da		
1400	1500	Canada, CFVP Calgary AB	6030da		
1400	1500	Canada, CKZN St John's NF	6160da		
1400	1500	Canada, CKZU Vancouver BC	6160da		
1400	1500	Canada, Radio Canada Intl	9515am	13655am	
		17820am			
1400	1500	China, China Radio Intl	9560as	9700eu	
		9795eu	11765as	11775as	13610eu
		13675na	13685af	13740na	15230na
		17630af			
1400	1500	Costa Rica, University Network	9725va	11870va	
		13750va			
1400	1500	France, Radio France Intl	7180as	9580as	
		17515as			
1400	1500	as	Germany, Bible Voice Broadcasting	13645as	
1400	1500	Germany, Deutsche Welle	6140eu		
1400	1500	Germany, Overcamer Ministries		6110eu	
		9855va			
1400	1500	Guam, TWR/KTWR 9975as			
1400	1500	India, All India Radio	9690as	11620as	
		13710as			
1400	1500	Japan, Radio	7200as	9875as	11840ac
1400	1500	Jordan, Radio	11690na		
1400	1500	DRM	Luxembourg, Radio	7145eu	
1400	1500	Malaysia, Radio	7295as		
1400	1500	Malaysia, Voice of	6175as		
1400	1500	Netherlands, Radio	9345as	12080as	
		15595as			
1400	1500	New Zealand, Radio NZ Intl	9870pa		
1400	1500	DRM	New Zealand, Radio NZ Intl	7230pa	
1400	1500	Nigeria, Voice of	7255af		
1400	1500	Oman, Radio Oman	15140as		
1400	1500	vi	Papua New Guinea, Wantok R.Light	7120va	
1400	1500	Singapore, Mediacorp Radio	6150da		
1400	1500	vi	South Africa, Channel Africa	11825af	
1400	1500	Taiwan, Radio Taiwan Intl	15265as		
1400	1500	UK, BBC World Service	5970as	6190af	
		6195as	9740as	11940af	11760me
		12095eu	15310as	15485af	15565eu
		15575me	17640eu	17790as	17830af
		21470af	21660af		
1400	1500	a	UK, BBC World Service	12095af	
1400	1500	USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	13362usb	13855usb
1400	1500	USA, KAIJ Dallas TX	5755na		
1400	1500	USA, KJES Vada NM	11715na		
1400	1500	USA, KNLS Anchor Point AK	9655as		
1400	1500	USA, KTVN Salt Lake City UT	7505na		
1400	1500	USA, KWHR Naalehu HI	9930as		
1400	1500	USA, Voice of America	6110va	7125va	
		9645va	9760va	11705va	15425va
1400	1500	USA, WBCQ Kennebunk ME	7415na	9330na	

1400	1500		18910na		
1400	1500		USA, WBOH Newpart NC	5920am	
			USA, WEWN Birmingham AL	9955na	11645na
			15745na		
1400	1500		USA, WHRA Greenbush ME	11530na	15665na
1400	1500	as	USA, WHRI Nablesville IN	9495am	15105am
1400	1500		USA, WHRI Nablesville IN	9840am	11785am
			12020am	13790am	
1400	1500		USA, WINB Red Lian PA	13570am	
1400	1500		USA, WRMI Miami FL	7385am	
1400	1500		USA, WTJC Newpart NC	9370na	
1400	1500		USA, WWCR Nashville TN	7465na	9985na
			13845na	15825na	
1400	1500		USA, WWRB Manchester TN	9320na	
1400	1500		USA, WYFR Okeechabee FL	7580as	11560as
			11830am	11910am	13695am
1400	1500		Zambia, Christian Voice	9865af	17750am
1415	1430		Nepal, Radio	3230as	5005as
			7165as		6100as
1430	1445	sm	Germany, Pan American BC	16650as	
1430	1445	a	Germany, Pan American BC	15650me	
1430	1500		Australia, Radio	9475as	11660as
1430	1500	DRM	South Korea, Radia Korea Intl	9770eu	
1430	1500		Sweden, Radio	11550va	
1445	1500	a	Germany, Pan American BC	15650me	

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

1500	1500		France, Radio France Intl	7180as	17515as
1500	1515	s	Germany, Pan American BC	15650as	
1500	1515		Russia, FEBA	7340as	
1500	1528		Vietnam, Voice of	9550va	9840va
			13860va		12020va
1500	1530		Australia, HCJB	15425as	
1500	1530	h	Germany, Bible Voice Broadcasting		13645as
1500	1530		Mongolia, Voice of	12015eu	
1500	1530		UK, BBC World Service	6190af	11860af
			11940af	12095af	15400af
			15485af	17830af	21490af
			USA, Voice of America	7175va	9760va
			9795va	15460va	
1500	1557		Canada, Radio Canada Intl	9635as	11975as
1500	1600		Anguilla, Caribbean Beacon	11775am	
1500	1600		Australia, CVC International	13635as	
1500	1600		Australia, Radio	5995pa	6080as
			9475as	9590pa	7240pa
			Canada, CBC NQ SW Service	9625na	91660as
1500	1600	as	Canada, CFRX Toronto ON	6070do	
1500	1600		Canada, CFVP Calgary AB	6030do	
1500	1600		Canada, CKZN St John's NF	6160do	
1500	1600		Canada, CKZU Vancouver BC	6160do	
1500	1600		Canada, Radio Canada Intl	9515am	13655am
			17820am		
1500	1600		China, China Radio Intl	7160as	9435eu
			9525eu	9785as	11775as
			13740na	17630af	13685af
1500	1600		Costa Rica, University Network	9725va	11870va
			13750va		
1500	1600		Germany, Deutsche Welle	6140eu	
1500	1600	a	Greece, Voice of	12105va	15630va
1500	1600		Japan, Radio	6190as	7200as
			9875as		9505am
1500	1600		Jordan, Radio	11690na	
1500	1600	DRM	Luxembourg, Radio	7145eu	
1500	1600		Malaysia, Radio	7295as	
1500	1600		Malaysia, Voice of	6175as	
1500	1600		Netherlands, Radio	9345as	12080as
1500	1600		New Zealand, Radio NZ Intl	9870pa	
1500	1600	DRM	New Zealand, Radio NZ Intl	7230pa	
1500	1600		North Korea, Voice of	7570eu	9335na
			11710na	12015eu	
1500	1600	vi	Papua New Guinea, Wantok R.Light	7120va	
1500	1600		Russia, Voice of	6205as	7260as
			7415as		7350as
1500	1600	DRM	Russia, Voice of	5810eu	
1500	1600		Singapore, Mediacorp Radio	6150do	
1500	1600	vi	South Africa, Channel Africa	17770af	
1500	1600	DRM/ f	Taiwan, Radio Taiwan Intl	9770eu	
1500	1600		UK, BBC World Service	5970as	5975as
			6195as	9740as	12095eu
			15565eu	17640eu	15310as
			UK, CVC International	15680af	
1500	1600		UK, Sudan Radio Service	15530va	
1500	1600	vi/ mtwhf	USA, AFRTS	4319usb	5446usb
			7590usb	7812usb	12133usb
			12133usb	12579usb	13855usb
1500	1600		USA, KAIJ Dallas TX	13815na	
1500	1600		USA, KJES Vado NM	11715na	
1500	1600		USA, KTBN Salt Lake City UT	7505na	
1500	1600		USA, KWHR Naalehu HI	9930as	
1500	1600		USA, Voice of America	6110va	7125va
			9645va	9685va	11835va
			13600af	13735va	11895va
			17895af		17715af

1500	1600		USA, WBCQ Kennebunk ME	7415na	9330na
			18910na		
1500	1600		USA, WBOH Newpart NC	5920am	
1500	1600		USA, WEWN Birmingham AL	9955na	11645na
			15745na		
1500	1600		USA, WHRA Greenbush ME	11530na	15665na
1500	1600		USA, WHRI Nablesville IN	9840am	11785am
			13760am	13790am	
1500	1600as		USA, WHRI Nablesville IN	15105am	
1500	1600		USA, WINB Red Lian PA	13570am	
1500	1600		USA, WRMI Miami FL	7385am	
1500	1600		USA, WTJC Newpart NC	9370na	
1500	1600		USA, WWCR Nashville TN	9985na	13845na
			12160na	13845na	15825na
1500	1600		USA, WWRB Manchester TN	9320na	11915na
1500	1600		USA, WYFR Okeechabee FL	6280as	11830am
			11910am	15520as	15770va
			Zambia, Christian Voice	9865af	17750am
1500	1600		Germany, Bible Voice Braadcasting		12035as
1500	1700	a	Russia, FEBA	7340as	
1515	1545	w	Germany, Pan American BC	11610as	
1530	1545	s	Germany, Pan American BC	15650me	
1530	1600	mh	Germany, Bible Voice Braadcasting		12035as
1530	1600		Iran, Voice of the Islamic Rep	7330as	9940as
1530	1600	vi	UAE, AWR Africa	9530as	
1530	1600		UK, BBC World Service	6190af	11940af
			12095af	15400af	15485af
			21470af	21660af	17830af
1530	1600		USA, Voice of America	7175va	9760va
			15460va		
1530	1600		Vatican City, Vatican Radio	9310as	11850as
			13765as		
1545	1600	s	Germany, Pan American BC	15650me	

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

1600	1615		Pakistan, Radio	6215as	9385af
			15725af		11570af
1600	1615		UK, BBC World Service	6190af	11940af
			12095af	15400af	15485af
			17830af	21660af	17820af
1600	1628	s	Hungary, Radio Budapest	6025eu	9565eu
1600	1628		Vietnam, Voice of	7280va	9550va
			11630va	13860va	9730va
1600	1629	a	Germany, Universal Life	15640me	
1600	1630	s	Germany, Pan American BC	15650me	
1600	1630		Guam, AWR/KSDA	9585as	12065as
1600	1630		Iran, Voice of the Islamic Rep	7330as	9940as
1600	1630		Myanmar, Radio	9730do	
1600	1650		New Zealand, Radio NZ Intl	9870pa	
1600	1650	DRM	New Zealand, Radio NZ Intl	7230pa	
1600	1659		Canada, Radio Canada Intl	9515am	13655am
			17870am		
1600	1700		Anguilla, Caribbean Beacon	11775am	
1600	1700		Australia, CVC International	13635as	
1600	1700		Australia, Radio	5995pa	6080as
			9475as	9710pa	7240pa
1600	1700	a	Canada, CBC NQ SW Service	9625na	11660as
1600	1700		Canada, CFRX Toronto ON	6070do	11750as
1600	1700		Canada, CFVP Calgary AB	6030do	
1600	1700		Canada, CKZN St John's NF	6160do	
1600	1700		Canada, CKZU Vancouver BC	6160do	
1600	1700		China, China Radio Intl	7255eu	9435eu
			9525eu	9570af	11900af
1600	1700		Costa Rica, University Network	11870va	13750va
1600	1700		Ethiopia, Radio	5990af	7110af
			9560af	970af	7165af
1600	1700		France, Radio France Intl	9730va	11615va
			15160va	15365va	15605va
1600	1700		Germany, Deutsche Welle	6170as	9795as
			11695as		
1600	1700		Jordan, Radio	11690na	
1600	1700	DRM	Luxembourg, Radio	7145eu	
1600	1700		Malaysia, Radio	7295as	
1600	1700		Malaysia, Voice of	6175as	
1600	1700		North Korea, Voice of	9990va	11545va
1600	1700	vi	Papua New Guinea, Wantok R.Light	7120va	
1600	1700		Russia, Voice of	4965as	4975as
			6130eu	7260as	7320eu
			9470me		7415as
1600	1700		South Korea, Radio Korea Intl	5975va	
1600	1700		Taiwan, Radio Taiwan Intl	11815as	
1600	1700		UK, BBC World Service	3915as	5975as
			6195as	7160as	9410as
			12095eu	15105eu	940as
			UK, CVC International	15680af	15310as
			UK, Sudan Radio Service	15530va	15565eu
1600	1700	vi/ mtwhf	USA, AFRTS	4319usb	5446usb
			7590usb	7812usb	12133usb
			12133usb	12579usb	13855usb
1600	1700		USA, KAIJ Dallas TX	13815na	
1600	1700		USA, KJES Vado NM	11715na	
1600	1700		USA, KTBN Salt Lake City UT	7505na	
1600	1700		USA, KWHR Naalehu HI	9930as	
			USA, Voice of America	6110va	7125va
			9645va	9685va	11835va
			13600af	13735va	11895va
			17895af		17715af

1600	1700		USA, Voice of America 11835va 13600va 15445va 17640va	4930af 9685va 15240af 15255va 17895af	
1600	1700	mtwhf	USA, Voice of America 9645va 9760va	6160va 7125va	
1600	1700		USA, WBCQ Kennebunk ME 18910na	7415na 9330na	
1600	1700		USA, WBOH Newport NC	5920am	
1600	1700		USA, WEWN Birmingham AL 15745va 15785va	11645va 13615va	
1600	1700		USA, WHRA Greenbush ME	11530na 17650na	
1600	1700		USA, WHRI Noblesville IN 15105am	9840am 13760am	
1600	1700	mtwhf	USA, WINB Red Lion PA	9740am	
1600	1700	as	USA, WINB Red Lion PA	13570as	
1600	1700	mtwhfa	USA, WMLK Bethel PA	9265eu	
1600	1700		USA, WRMI Miami FL	9955am	
1600	1700		USA, WTJC Newport NC	9370na	
1600	1700		USA, WWCR Nashville TN 13845na 15825na	9985na 12160na	
1600	1700		USA, WWRB Manchester TN	9320na 11915na	
1600	1700		USA, WYFR Okeechobee FL 11865am 13695am	6085va 11830am 15520as 17750am	
1600	1700		18980va 21455va	21525af	
1600	1700		Zambia, Christian Voice	9865af	
1605	1620	asm	Austria, Radio Austria Intl	13675na	
1615	1630	twhf	Austria, Radio Austria Intl	13675na	
1615	1700		UK, BBC World Service 12095af 15400af 17820af 21660af	6190af 11940af 15420af 15485af	
1615	1700	as	UK, BBC World Service	11860af 21490af	
1630	1700		Egypt, Radio Cairo 11785af		
1630	1700	s	Germany, Bible Voice Broadcasting	9460me	
1630	1700		Guam, AWR/KSDA 11980as		
1640	1700	mtwhf	Germany, Bible Voice Broadcasting	9460me	
1645	1700	m	Austria, Radio Austria Intl	13675na	
1645	1700	a	Germany, Bible Voice Broadcasting	9460me	
1651	1700		New Zealand, Radio NZ Intl	9870pa	
1651	1700	DRM	New Zealand, Radio NZ Intl	7230pa	

1700	1800		USA, WEWN Birmingham AL 15745va 15785va	11645va 13615va	
1700	1800		USA, WHRA Greenbush ME	11530na 17650na	
1700	1800		USA, WHRI Noblesville IN 13760am 15105am	9840am 11885am	
1700	1800	mtwhf	USA, WINB Red Lion PA	9740am	
1700	1800	as	USA, WINB Red Lion PA	13570am	
1700	1800	mtwhfa	USA, WMLK Bethel PA	9265eu 15265eu	
1700	1800	mtwhfa	USA, WMLK Bethel PA	9265eu 15265eu	
1700	1800		USA, WRMI Miami FL	9955am	
1700	1800		USA, WTJC Newport NC	9370na	
1700	1800		USA, WWCR Nashville TN 13845na 15825na	9985na 12160na	
1700	1800		USA, WWRB Manchester TN	9320na 11915na	
1700	1800		USA, WYFR Okeechobee FL 15250na	6085va 11830am 15520as 17750am	
1700	1800		18980va 21455va	21525af	
1700	1800		USA, WYFR Okeechobee FL 11865am 13695am	6085va 11830am 15520as 17750am	
1700	1800		18980va 21455va	21525af	
1700	1800		Zambia, Christian Voice	9865af	
1700	1800		Austria, Radio Austria Intl	13675na	
1700	1800		Austria, Radio Austria Intl	13675na	
1700	1800		UK, BBC World Service 12095af 15400af 17820af 21660af	6190af 11940af 15420af 15485af	
1700	1800		UK, BBC World Service	11860af 21490af	
1700	1800		Egypt, Radio Cairo 11785af		
1700	1800		Germany, Bible Voice Broadcasting	9460me	
1700	1800		Guam, AWR/KSDA 11980as		
1700	1800		Germany, Bible Voice Broadcasting	9460me	
1700	1800		Austria, Radio Austria Intl	13675na	
1700	1800		Germany, Bible Voice Broadcasting	9460me	
1700	1800		New Zealand, Radio NZ Intl	9870pa	
1700	1800		New Zealand, Radio NZ Intl	7230pa	

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

1700	1710	mtwh	Moldova, Radio PMR	5960eu	
1700	1715	mtwf	Germany, Bible Voice Broadcasting	9460me	
1700	1720	f	Moldova, Radio PMR	5960eu	
1700	1727		Czech Rep, Radio Prague Intl	5930eu 15710af	
1700	1728		Vietnam, Voice of 9725eu		
1700	1730		France, Radio France Intl	11615va 15605va	
1700	1730		Jordan, Radio 11690na		
1700	1730		Swaziland, TWR 3200af		
1700	1745	h	Germany, Bible Voice Broadcasting	9460me	
1700	1750		New Zealand, Radio NZ Intl	9870pa	
1700	1750	DRM	New Zealand, Radio NZ Intl	7230pa	
1700	1800		Anguilla, Caribbean Beacon	11775am	
1700	1800		Australia, CVC International	13635as	
1700	1800		Australia, Radio 5995pa	6080as 7240pa	
1700	1800		9475as 9580pa	9710pa 11880pa	
1700	1800	a	Canada, CBC NQ SW Service	9625na	
1700	1800		Canada, CFRX Toronto ON	6070do	
1700	1800		Canada, CFVP Calgary AB	6030do	
1700	1800		Canada, CKZN St John's NF	6160do	
1700	1800		Canada, CKZU Vancouver BC	6160do	
1700	1800		China, China Radio Intl 9570af 11900af	6100eu 7255eu	
1700	1800		Costa Rica, University Network	11870va 13750va	
1700	1800		Egypt, Radio Cairo 11785af		
1700	1800		Eqt Guinea, Radio Africa	15190af	
1700	1800	as	Germany, Bible Voice Broadcasting	9460me	
1700	1800		Japan, Radio 9535am	11970eu 15355va	
1700	1800	DRM	Luxembourg, Radio	7145eu	
1700	1800		Malaysia, Radio 7295as		
1700	1800		Malaysia, Voice of 6175as		
1700	1800		Nigeria, Voice of 7255va		
1700	1800	vl	Papua New Guinea, Wantok R.Light	7120va	
1700	1800		Russia, Voice of 5910as	7320eu 7360va	
1700	1800		7415as 9470me		
1700	1800		South Africa, Channel Africa	15285af	
1700	1800		Taiwan, Radio Taiwan Intl	11850af	
1700	1800		UK, BBC World Service	3915as 5975as	
1700	1800		6195eu 7160as 9410eu 9740as		
1700	1800		12095eu 15105eu	15310as	
1700	1800		UK, CVC International	15680af	
1700	1800	vl/ mtwhf	UK, Sudan Radio Service	11705va	
1700	1800		USA, AFRTS 4319usb	5446usb 5765usb	
1700	1800		7590usb 7812usb	12133usb 12579usb	
1700	1800		12133usb 12579usb	13362usb 13855usb	
1700	1800		USA, KAIJ Dallas TX	13815na	
1700	1800		USA, KTBN Salt Lake City UT	15590na	
1700	1800		USA, KWHR Naalehu HI	9930as	
1700	1800		USA, Voice of America 15445af	13710af 15240af	
1700	1800		USA, WBCQ Kennebunk ME 18910na	7415na 9330na	
1700	1800		USA, WBOH Newport NC	5920am	

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

1800	1810		Zanzibar, Radio Tanzania	11735af	
1800	1815	a	Germany, Bible Voice Broadcasting	7210me	
1800	1827		Czech Rep, Radio Prague Intl	5930eu 9400va	
1800	1828		Vietnam, Voice of 7280va	9730va	
1800	1829	s	Germany, Universal Life	15675af	
1800	1830	w f	Austria, AWR Europe	9815af	
1800	1830		Egypt, Radio Cairo 11785af		
1800	1830	a	Germany, Bible Voice Broadcasting	9460me	
1800	1830		South Africa, AWR Africa 11925af	3215af 3345af	
1800	1830		Swaziland, TWR 3200af	9500af	
1800	1830		UK, BBC World Service 6190af 6195af	3255af 5975as 9740as 12095af	
1800	1850		New Zealand, Radio NZ Intl	11980pa	
1800	1850	DRM	New Zealand, Radio NZ Intl	11610pa	
1800	1859		Canada, Radio Canada Intl 11875af 17740af	7185af 9770af	
1800	1900		Anguilla, Caribbean Beacon	11775am	
1800	1900	mtwhf	Argentina, RAE 9690eu	15345eu	
1800	1900		Australia, Radio 6080pa	7240pa 9475as	
1800	1900		9580pa 9710pa	11880pa	
1800	1900		Canada, CFRX Toronto ON	6070do	
1800	1900		Canada, CFVP Calgary AB	6030do	
1800	1900		Canada, CKZN St John's NF	6160do	
1800	1900		Canada, CKZU Vancouver BC	6160do	
1800	1900		China, China Radio Intl	6100eu	
1800	1900		Costa Rica, University Network	11870va 13750va	
1800	1900		Eqt Guinea, Radio Africa	15190af	
1800	1900	fsw	Germany, Bible Voice Broadcasting	9460me	
1800	1900	as	Germany, Bible Voice Broadcasting	9730me	
1800	1900		India, All India Radio 9950eu 11620eu	7410eu 9445eu 11935af 13605af	
1800	1900		15075af 15155as	17670af	
1800	1900		Liberia, ELWA 4760do		
1800	1900		Malaysia, Radio 7295as		
1800	1900		Malaysia, Voice of 6175as		
1800	1900		Netherlands, Radio 11655af	6020af 9895af	
1800	1900		Nigeria, Voice of 7255va		
1800	1900		North Korea, Voice of	7570eu 12015eu	
1800	1900	vl	Papua New Guinea, Wantok R.Light	7120va	
1800	1900		Philippines, Radio Pilipinas 17720va	11720va 15190va	
1800	1900		Poland, Radio Polonia	7220eu 7265eu	

1800	1900	Romania, Radio Romania Intl	7120eu	9640eu
1800	1900	Russia, Voice of	5910as	7360va
		11519af		7415as
1800	1900	Taiwan, Radio Taiwan Intl	3965eu	
1800	1900	UK, BBC World Service	6195eu	9410eu
		12095eu		
1800	1900	UK, CVC International	9765af	
1800	1900	USA, AFRTS	4319usb	5446usb
		7590usb	7812usb	12133usb
		12133usb	12579usb	13362usb
				13855usb
1800	1900	USA, KAIJ Dallas TX	13815na	
1800	1900	USA, KTBN Salt Lake City UT	15590na	
1800	1900	USA, KWHR Naalehu HI	9930as	
1800	1900	USA, Voice of America	4930af	6035af
		11975af	13710af	15240af
				17895af
1800	1900	USA, WBCQ Kennebunk ME	7415na	9330na
		18910na		
1800	1900	USA, WBOH Newport NC	5920am	
1800	1900	USA, WEWN Birmingham AL	11645va	13615va
		15745va	15785va	
1800	1900	USA, WHRA Greenbush ME	11530na	17650na
1800	1900	USA, WHRI Noblesville IN	9840am	11885am
		15105am		
1800	1900	USA, WINB Red Lion PA	9740am	
1800	1900	USA, WINB Red Lion PA	13570am	
1800	1900	USA, WMLK Bethel PA	9265eu	15265eu
1800	1900	USA, WRMI Miami FL	9955am	
1800	1900	USA, WTJC Newport NC	9370na	
1800	1900	USA, WWCR Nashville TN	9985na	12160na
		13845na	15825na	
1800	1900	USA, WWRB Manchester TN	9320na	11915na
		15250na		
1800	1900	USA, WYFR Okeechobee FL	3955va	7425me
		13695am	13800am	17525am
		18980va		17795am
1800	1900	Yemen, Rep of Yemen Radio	9780me	
1800	1900	Zambia, Christian Voice	4965af	
1815	1830	Libya, Voice of Africa	9485af	11615af
		11635af	11715af	11860af
1815	1900	Bangladesh, Bangla Betar	7185as	
1830	1845	Israel, Kol Israel	7545va	9345va
1830	1900	Bulgaria, Radio	5800eu	7500eu
1830	1900	Swaziland, TWR	3200af	
1830	1900	Sweden, Radio	6065va	
1830	1900	UK, BBC World Service	3255af	5975me
		6005af	6190af	9410af
		9740me	11945af	12095af
		15400af	15470af	13700af
1845	1900	Congo, RTV Congolaise	4765af	5985af
1851	1900	New Zealand, Radio NZ Intl	15720pa	
1851	1900	New Zealand, Radio NZ Intl	13595pa	

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

1900	1915	Congo, RTV Congolaise	4765af	5985af
1900	1928	Vietnam, Voice of	7280va	9730va
1900	1930	Germany, Bible Voice Broadcasting		6015eu
1900	1930	Germany, Universal Life	13820me	
1900	1930	Lithuania, Radio Vilnius	9710eu	
1900	1930	Philippines, Radio Pilipinas	11720va	15190va
		17720va		
1900	1930	Germany, Bible Voice Broadcasting		7260af
		9460me		
1900	1945	India, All India Radio	7410eu	9445eu
		9950eu	11620eu	11935af
		15075af	15155as	17670af
				13605af
1900	2000	Anguilla, Caribbean Beacon	11775am	
1900	2000	Australia, Radio	6080pa	9500as
		9580pa	9710pa	11880pa
1900	2000	Canada, CFRX Toronto ON	6070do	
1900	2000	Canada, CFVP Calgary AB	6030do	
1900	2000	Canada, CKZN St John's NF	6160do	
1900	2000	Canada, CKZU Vancouver BC	6160do	
1900	2000	China, China Radio Intl	7295va	9440af
1900	2000	Costa Rica, University Network	11870va	13750va
1900	2000	Eat Guinea, Radio Africa	15190af	
1900	2000	Germany, Bible Voice Broadcasting		6015eu
		9460me		
1900	2000	Germany, Deutsche Welle	12025af	15470af
1900	2000	Germany, Overcomer Ministries		9845af
1900	2000	Ghana, Ghana BC Corp	3366do	4915do
1900	2000	Liberia, ELWA	4760do	
1900	2000	Malaysia, Radio	7295as	
1900	2000	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
1900	2000	Netherlands, Radio	7120af	9895af
		11655af		
1900	2000	Netherlands, Radio	15315na	15525na
		17735na		
1900	2000	New Zealand, Radio NZ Intl	15720pa	
1900	2000	New Zealand, Radio NZ Intl	13595pa	
1900	2000	Nigeria, Radio/Ibadan	6050do	
1900	2000	Nigeria, Radio/Kaduna	4770do	6090do
1900	2000	Nigeria, Radio/Lagos	3326do	4990do

1900	2000	Nigeria, Voice of	7255va	
1900	2000	North Korea, Voice of	7100af	9975va
		11535va	11910af	
1900	2000	Papua New Guinea, Catholic Radio		4960do
1900	2000	Papua New Guinea, NBC		4890do
1900	2000	Papua New Guinea, Wantok R.Light		7120va
1900	2000	Russia, Voice of	6175eu	7335af
		11510af		7360eu
1900	2000	Sierra Leone, Radio UNAMSIL		6137do
1900	2000	Sierra Leone, SLBS 3316do		
1900	2000	Solomon Islands, SIBC		5020do
1900	2000	South Africa, Channel Africa		3345af
1900	2000	South Africa, Radio League		3215af
1900	2000	South Korea, Radio Korea Intl		5975va
1900	2000	Sri Lanka, SLBC		6010eu
1900	2000	Swaziland, TWR		3200af
1900	2000	Sweden, Radio		11805eu
1900	2000	Thailand, Radio		9805eu
1900	2000	Uganda, Radio		4976do
1900	2000	UK, BBC World Service		3255af
		6005af	6190af	6195vo
		9630af	9740me	12095af
		15400af	15420af	17830af
				13700af
1900	2000	UK, CVC International		9765af
1900	2000	USA, AFRTS	4319usb	5446usb
		7590usb	7812usb	12133usb
		12133usb	12579usb	13362usb
				13855usb
1900	2000	USA, KAIJ Dallas TX		13815na
1900	2000	USA, KJES Vado NM		15385na
1900	2000	USA, KTBN Salt Lake City UT		15590na
1900	2000	USA, Voice of America		4930af
		6035af	9785va	11975af
		13640va	13710af	15240af
		17805af		15580af
1900	2000	USA, WBCQ Kennebunk ME		7415na
		18910na		9330na
1900	2000	USA, WBOH Newport NC		5920am
1900	2000	USA, WEWN Birmingham AL		11645va
		15745va	15785va	13615va
1900	2000	USA, WHRA Greenbush ME		11530na
1900	2000	USA, WHRI Noblesville IN		9840am
		15285am	15665am	15665na
				11885am
1900	2000	USA, WINB Red Lion PA		9740am
1900	2000	USA, WINB Red Lion PA		13570am
1900	2000	USA, WMLK Bethel PA		9265eu
1900	2000	USA, WRMI Miami FL		9955am
1900	2000	USA, WTJC Newport NC		9370na
1900	2000	USA, WWCR Nashville TN		9975na
		12160na	13845na	9985na
				15825na
1900	2000	USA, WWRB Manchester TN		9320na
		15250na		11915na
1900	2000	USA, WYFR Okeechobee FL		3230af
		6085va	17845af	18930va
				18980va
1900	2000	Zambia, Christian Voice		4965af
1900	2000	Zimbabwe, ZBC Corp		5975do
1915	1930	Libya, Voice of Africa		11635af
1915	2000	Germany, Bible Voice Broadcasting		9460me
1925	1945	Armenia, Voice of		4810eu
1930	1945	Libya, Voice of Africa		11715af
1930	2000	Germany, Bible Voice Broadcasting		7260af
1930	2000	Greece, Voice of		7430eu
1930	2000	Iran, Voice of the Islamic Rep		6010eu
		7350af	9855af	9925af
				11695af
1930	2000	Serbia & Montenegro, Intl Radio		6100eu
1930	2000	Slovakia, Radio Slovakia Intl		5915eu
1930	2000	Turkey, Voice of		6055eu
1935	1955	Italy, RAI Intl		6035eu
1945	2000	Albania, Radio Tirana		9760eu
1945	2000	Rwanda, Radio		6055do
				6225eu
				7530eu

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

2000	2015	Germany, Bible Voice Broadcasting		9460me
2000	2025	Israel, Kol Israel		6280va
		15640af	7545va	11590va
2000	2028	Hungary, Radio Budapest		3975eu
2000	2030	Germany, Bible Voice Broadcasting		6015eu
2000	2030	Iran, Voice of the Islamic Rep		6010eu
		7350af	9855af	9925af
				11695af
2000	2030	Mongolia, Voice of		12015eu
2000	2030	South Africa, AWR Africa		9655af
2000	2030	Swaziland, TWR		3200af
2000	2030	Turkey, Voice of		6055eu
2000	2030	USA, Voice of America		4930af
		6035af	11975af	13710af
		15580af		15240af
2000	2030	USA, Voice of America		4940af
2000	2030	Vatican City, Vatican Radio		7365af
		11625af		9755af
2000	2100	Anguilla, Caribbean Beacon		11775am
2000	2100	Australia, ABC NT Alice Springs		4835irr
				2310do
2000	2100	Australia, ABC NT Katherine		2485do
2000	2100	Australia, ABC NT Tennant Creek		2325do

2000	2100		Australia, Radio 9500as	11650pa	11660pa	
			11880pa	12080pa		
2000	2100	as	Australia, Radio 6080pa	7240pa		
2000	2100		Canada, CFRX Toronto ON	6070do		
2000	2100		Canada, CFVP Calgary AB	6030do		
2000	2100		Canada, CKZN St John's NF	6160do		
2000	2100		Canada, CKZU Vancouver BC	6160do		
2000	2100		China, China Radio Intl	5960eu	7190eu	
			7285eu	7295va	9440va	9490eu
			9600eu	11640af	13630af	
2000	2100		Costa Rica, University Network	13750va		
2000	2100		Eqt Guinea, Radio Africa	15190af		
2000	2100		Germany, Deutsche Welle	9735af	9830af	
			12025af	15410af		
2000	2100	vi	Ghana, Ghana BC Corp	3366do	4915do	
2000	2100		Indonesia, Voice of	9525as	11785pa	
			15150al			
2000	2100	vi/fs	Italy, IRRS	5775va		
2000	2100	vi/mtwha	Italy, IRRS	5775va		
2000	2100		Liberia, ELWA	4760do		
2000	2100		Malaysia, Radio	7295as		
2000	2100	vi	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
2000	2100		Netherlands, Radio	7120af	9895af	
			11655af	17810af		
2000	2100	as	Netherlands, Radio	15315na	15525na	
			17725na			
2000	2100		New Zealand, Radio NZ Intl	15720pa		
2000	2100	DRM	New Zealand, Radio NZ Intl	13595pa		
2000	2100		Nigeria, Radio/Ibadan	6050do		
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do	
2000	2100		Nigeria, Radio/Lagos	3326do	4990do	
2000	2100		Nigeria, Voice of	7255va		
2000	2100		Papua New Guinea, Catholic Radio		4960do	
2000	2100		Papua New Guinea, NBC	4890do		
2000	2100	vi	Papua New Guinea, Wantok R.Light		7120va	
2000	2100		Russia, Voice of	6145eu	7290eu	7330eu
			15735ca			
2000	2100		Sierra Leone, Radio UNAMSIL	6137do		
2000	2100	vi	Solomon Islands, SIBC	5020do	9545da	
2000	2100	vi	South Africa, Channel Africa	3345af		
2000	2100	mtwhf	Spain, Radio Exterior Espana	9595af	9680eu	
2000	2100	vi	Uganda, Radio	4976do	7196do	
2000	2100		UK, BBC World Service	3255af	6005af	
			6190af	6195va	9410va	9630af
			12095af	15400af	17830af	
2000	2100		UK, CVC International	7285af		
2000	2100		USA, AFRTS	4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb	12579usb
			12133usb	12579usb	13362usb	13855usb
2000	2100		USA, KAIJ Dallas TX	13815na		
2000	2100		USA, KJES Vado NM	15385na		
2000	2100		USA, KTBN Salt Lake City UT	15590na		
2000	2100		USA, WBCQ Kennebunk ME	7415na	9330na	
			18910na			
2000	2100		USA, WBOH Newport NC	5920am		
2000	2100		USA, WEWN Birmingham AL	11645va	13615va	
			15745va	15785va		
2000	2100		USA, WHRA Greenbush ME	11530na	15665na	
2000	2100		USA, WHRI Noblesville IN	9840am	11885am	
			15285am	15665am		
2000	2100	mtwhf	USA, WINB Red Lion PA	9740am		
2000	2100	as	USA, WINB Red Lion PA	13570am		
2000	2100	mtwhfa	USA, WMLK Bethel PA	9265eu	15265eu	
2000	2100		USA, WRMI Miami FL	9955am		
2000	2100		USA, WTJC Newport NC	9370na		
2000	2100		USA, WWCR Nashville TN	9975na	9985na	
			12160na	13845na	15825na	
2000	2100		USA, WWRB Manchester TN	9320na	11915na	
			15250na			
2000	2100		USA, WYFR Okeechobee FL	3230af	6020af	
			7360va	13800am	15195af	17725va
			17750va	17795am	17845af	18980va
2000	2100		Zambia, Christian Voice	4965af		
2000	2100	vi	Zimbabwe, ZBC Corp	5975do		
2000	2130		China, China Radio Intl	11640af	13630af	
2005	2100		Syria, Radio Damascus	9330eu	12085eu	
			13610al			
2025	2045		Italy, RAI Intl	6020af		
2030	2045	vi	Libya, Voice of Africa		11635af	
2030	2045		Thailand, Radio	9535eu		
2030	2058		Vietnam, Voice of	7280va	9550va	7280va
			9550va	11630va		
2030	2100	thf	Belarus, Radio	7125eu	7340eu	7440eu
2030	2100		Egypt, Radio Cairo	15375af		
2030	2100		Sweden, Radio	6065va	7420va	
2030	2100		USA, Voice of America	4930af	6035af	
			7595as	11975af	13710af	15240af
			15580af			
2030	2100		Uzbekistan, Radio Tashkent	7185as		
2045	2100		India, All India Radio	9910oc	9950eu	9445eu
			9910oc	9950eu	11620va	11715oc
2050	2100		Vatican City, Vatican Radio	4005eu	5885eu	
			7250eu			

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

2100	2120		Vatican City, Vatican Radio	4005eu	5885eu	
			7250eu			
2100	2127		Czech Rep, Radio Prague Intl	5930va	9430va	
2100	2130		Australia, ABC NT Katherine	2485do		
2100	2130		Australia, ABC NT Tennant Creek		2325do	
2100	2130		Australia, Radio	9500as	11695as	
2100	2130	a	Canada, CBC NQ SW Service	9625na		
2100	2130	vi/mtwha	Italy, IRRS	5775va		
2100	2130		South Korea, Radio Korea Intl	3955eu		
2100	2130	mtwhf	UK, BBC World Service	15390ca		
2100	2130		USA, Voice of America	7575as		
2100	2145		Nigeria, Radio/Ibadan	6050do		
2100	2159		Canada, Radio Canada Intl	5850eu	9770eu	
			15180am			
2100	2200		Anguilla, Caribbean Beacon	11775am		
2100	2200		Australia, ABC NT Alice Springs		2310do	
			4835irr			
2100	2200		Australia, Radio	9660pa	7240pa	11650pa
			11660pa	12080pa	13630pa	15515pa
2100	2200		Austria, AWR Europe	9830af		
2100	2200		Canada, CFRX Toronto ON	6070do		
2100	2200		Canada, CFVP Calgary AB	6030do		
2100	2200		Canada, CKZN St John's NF	6160do		
2100	2200		Canada, CKZU Vancouver BC	6160do		
2100	2200		China, China Radio Intl	9490eu	9600eu	
2100	2200		Costa Rica, University Network	13750va		
2100	2200		Egypt, Radio Cairo	15375af		
2100	2200		Eqt Guinea, Radio Africa	15190af		
2100	2200		Germany, Deutsche Welle	9615af	11690af	
2100	2200	vi	Ghana, Ghana BC Corp	3366do	4915do	
2100	2200		Guyana, Voice of	3291do	5950do	
2100	2200		India, All India Radio	7410eu	9445eu	
			9910oc	9950eu	11620va	11715oc
2100	2200	vi/fs	Italy, IRRS	5775va		
2100	2200		Japan, Radio	6035oc	6090eu	6180eu
			11855va	17825na	21670pa	
2100	2200		Liberia, ELWA	4760do		
2100	2200		Liberia, Star Radio	11960af		
2100	2200		Malaysia, Radio	7295as		
2100	2200	vi	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
2100	2200		New Zealand, Radio NZ Intl	15720pa		
2100	2200	DRM	New Zealand, Radio NZ Intl	13595pa		
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do	
2100	2200		Nigeria, Radio/Lagos	3326do	4990do	
2100	2200		North Korea, Voice of	7570eu	12015eu	
2100	2200		Papua New Guinea, Catholic Radio		4960do	
2100	2200		Papua New Guinea, NBC	4890do		
2100	2200	vi	Papua New Guinea, Wantok R.Light		7120va	
2100	2200		Russia, Voice of	7330eu	15735ca	
2100	2200	vi	Rwanda, Radio	6055do		
2100	2200		Sierra Leone, Radio UNAMSIL	6137do		
2100	2200	irreg/ vi	Sierra Leone, SLBS	3316do		
2100	2200	vi	South Africa, Channel Africa	3345af		
2100	2200		Syria, Radio Damascus	9330eu	12085eu	
			13610al			
2100	2200		UK, BBC World Service	3255af	3915as	
			5965as	6005af	6110as	6190af
			6195eu	9410eu	9605af	11675ca
			15400af			
2100	2200		USA, AFRTS	4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb	12579usb
			12133usb	12579usb	13362usb	13855usb
2100	2200		USA, KAIJ Dallas TX	13815na		
2100	2200		USA, KTBN Salt Lake City UT	15590na		
2100	2200		USA, Voice of America	4930af	6035af	
			11975af	13710af	15240af	15580af
2100	2200		USA, WBCQ Kennebunk ME	7415na	9330na	
			18910na			
2100	2200		USA, WBOH Newport NC	5920am		
2100	2200		USA, WEWN Birmingham AL	11645va	13615va	
			15745va	15785va		
2100	2200		USA, WHRA Greenbush ME	11530na	15665na	
2100	2200		USA, WHRI Noblesville IN	9840am	11885am	
			11885am	15665am		
2100	2200		USA, WINB Red Lion PA	9740am		
2100	2200		USA, WMLK Bethel PA	9265eu	15265eu	
2100	2200		USA, WRMI Miami FL	9955am		
2100	2200		USA, WTJC Newport NC	9370na		
2100	2200		USA, WWCR Nashville TN	9975na	9985na	
			12160na	13845na	15825na	
2100	2200		USA, WWRB Manchester TN	9320na	11915na	
			15250na			
2100	2200		USA, WYFR Okeechobee FL	3230af	6020af	
			7360va	13800am	15195af	17725va
			17750va	17795am	17845af	18980va
2100	2200		Zambia, Christian Voice	4965af		
2100	2200	vi	Zimbabwe, ZBC Corp	5975do		
2115	2130	vi	Libya, Voice of Africa		11635af	
2115	2200		Egypt, Radio Cairo	9990eu		
2130	2200		Australia, ABC NT Katherine	5025do		
2130	2200		Australia, ABC NT Tennant Creek		4910do	

2130	2200	mtwhfa	Canada, CBC NQ SW Service	9625na	
2130	2200		Guam, AWR/KSDA	11960as	
2130	2200	DRM	Netherlands, Radio	9800na	
2130	2200		Romania, Radio Romania Intl	7145eu	9650eu
			9755na	11940na	
2130	2200		Turkey, Voice of	9525va	
2130	2200	f	UK, BBC World Service	11680ca	
2130	2200		USA, Voice of America	6235as	
2130	2200		Uzbekistan, Radio Tashkent	7185as	

2230	2300	as	Australia, HCJB	15530as	
2230	2300		Guam, AWR/KSDA	11655as	
2230	2300		Sweden, Radio	6065va	
2230	2300		USA, Voice of America	13755va	7230va 9780va
2236	2300		New Zealand, Radio NZ Intl	17675pa	
2236	2300	DRM	New Zealand, Radio NZ Intl	15720pa	
2245	2300		India, All India Radio	9705as	9950as
			11620as	11645as	13605as

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

2200	2210		Syria, Radio Damascus	9330eu	12085eu
2200	2228		Hungary, Radio Budapest	6025eu	9735eu
2200	2229		Canada, Radio Canada Intl	11990sa	
2200	2230	s	Belarus, Radio	7125eu	7440eu
2200	2230		India, All India Radio	7410eu	9445eu
			9910oc	9950eu	11620va 11715oc
2200	2230		Papua New Guinea, NBC	9675do	
2200	2230		Turkey, Voice of	9525va	
2200	2235		New Zealand, Radio NZ Intl	15720pa	
2200	2235	DRM	New Zealand, Radio NZ Intl	13595pa	
2200	2245		Egypt, Radio Cairo	9990eu	
2200	2257		Czech Rep, Radio Prague Intl	5930na	7345af
2200	2300		Anguilla, Caribbean Beacon	6090am	
2200	2300		Australia, ABC NT Alice Springs	4835sirr	2310do
2200	2300		Australia, ABC NT Katherine	5025do	
2200	2300		Australia, ABC NT Tennant Creek		4910do
2200	2300		Australia, Radio	12010va	13620as 13630pa
			15230pa	15240os	15515pa 17785po
			17795pa		
2200	2300		Bulgaria, Radio	5800eu	7500eu
2200	2300	smtwhf	Canada, CBC NQ SW Service	9625na	
2200	2300		Canada, CFRX Toronto ON	6070do	
2200	2300		Canada, CFVP Calgary AB	6030do	
2200	2300		Canada, CKZN St John's NF	6160do	
2200	2300		Canada, CKZU Vancouver BC	6160do	
2200	2300	DRM	Canada, Radio Canada Intl	9800na	
2200	2300		China, China Radio Intl	7170eu	
2200	2300		Costa Rica, University Network	13750vo	
2200	2300		Egypt, Radio Cairo	9990eu	
2200	2300	vi	Germany, Deutsche Welle	6180as	6225os
2200	2300		Ghana, Ghana BC Corp	3366do	4915do
2200	2300	vi/fs	Guyana, Voice of	3291do	
2200	2300		Italy, IRRS	5775va	
2200	2300		Malaysia, Radio	7295as	
2200	2300	vi	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
2200	2300		Nigeria, Radio/Ibadan	6050do	
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do
2200	2300		Nigeria, Radio/Lagos	3326do	4990do
2200	2300		Papua New Guinea, Catholic Radio	4960do	
2200	2300	vi	Papua New Guinea, Wantok R.Light	7120va	
2200	2300		Sierra Leone, Radio UNAMSIL	6137do	
2200	2300	irreg/vl	Sierra Leone, SLBS 3316do		
2200	2300	vi	Solomon Islands, SIBC	5020do	9545do
2200	2300	as	Spain, Radio Exterior Espana	6125eu	9595of
2200	2300		Taiwan, Radio Taiwan Intl	9355eu	
2200	2300		UK, BBC World Service	5975os	5990as 5965as
			9740os	15400of	6195as 9605af
2200	2300		Ukraine, Radio Ukraine Intl	5840eu	
2200	2300		USA, AFRTS	4319usb	5765usb
			7590usb	7812usb	12133usb 12579usb
			12133usb	12579usb	13855usb
2200	2300		USA, KAIJ Dallas TX	13815na	
2200	2300		USA, KTBN Salt Lake City UT	15590na	
2200	2300		USA, Voice of America	6235as	7120va
			9890va	15185va	15290vo 15305vo
			17740va		
2200	2300		USA, WBCQ Kennebunk ME	5110na	7415na
			9330na	18910na	
2200	2300		USA, WBOH Newport NC	5920am	
2200	2300		USA, WEWN Birmingham AL	7560va	9975va
			11645va	15745va	
2200	2300		USA, WHRA Greenbush ME	5850na	6195na
			15665na		
2200	2300		USA, WHRI Noblesville IN	7315am	7490am
			11885am	15665am	
2200	2300		USA, WINB Red Lion PA	13570am	
2200	2300		USA, WRMI Miami FL	7385am	
2200	2300		USA, WRMI Miami FL	7385am	
2200	2300		USA, WTJC Newport NC	9370na	
2200	2300		USA, WWCR Nashville TN	7465na	9985no
			12160na	13845na	
2200	2300		USA, WWRB Manchester TN	9320no	11915na
			15250na		
2200	2300		USA, WYFR Okeechobee FL	11740am	15770af
2200	2300		Zambia, Christian Voice	4965af	
2205	2230		Italy, RAI Intl	6090as	
2215	2230	vi	Croatia, Croatian Radio	9925na	
2230	2259		Canada, Radio Canada Intl	6160as	7195as
			9730as		
2230	2300	mtwhfa	Albania, Radio Tirana	7110eu	

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

2300	0000		Anguilla, Caribbean Beacon	6090am	
2300	0000		Australia, ABC NT Alice Springs	4835sirr	2310do
2300	0000		Australia, ABC NT Katherine	5025do	
2300	0000		Australia, ABC NT Tennant Creek		4910do
2300	0000		Australia, Radio	9660pa	12010va 12080pa
			13620as	13630pa	13670vo 15230pa
			17785pa	17795pa	21740pa
2300	0000	smtwhf	Canada, CBC NQ SW Service	9625na	
2300	0000		Canada, CFRX Toronto ON	6070do	
2300	0000		Canada, CFVP Calgary AB	6030do	
2300	0000		Canada, CKZN St John's NF	6160do	
2300	0000		Canada, CKZU Vancouver BC	6160do	
2300	0000		China, China Radio Intl	5915as	5990am
			6040na	7180as	11970na
2300	0000		Costa Rica, University Network	13750vo	
2300	0000		Cuba, Radio Havana	9550om	
2300	0000		Egypt, Radio Cairo	11885na	
2300	0000		Germany, Deutsche Welle	6070as	9555af
			9815as		
2300	0000	DRM	Germany, Deutsche Welle	9800na	
2300	0000	vi	Ghana, Ghana BC Corp	3366do	4915do
2300	0000		Guyana, Voice of	3291do	
2300	0000		India, All India Radio	9705as	9950os
			11620os	11645as	13605as
2300	0000		Malaysia, Radio	7295as	
2300	0000	vi	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
2300	0000		New Zealand, Radio NZ Intl	17675pa	
2300	0000	DRM	New Zealand, Radio NZ Intl	15720pa	
2300	0000		Papua New Guinea, Catholic Radio	4960do	
2300	0000		Papua New Guinea, NBC	9675do	
2300	0000	vi	Papua New Guinea, Wantok R.Light	7120va	
2300	0000		Romania, Radio Romania Intl	7105eu	9610na
			9640eu	11730na	
2300	0000		Sierra Leone, Radio UNAMSIL	6137do	
2300	0000	irreg/vl	Sierra Leone, SLBS 3316do		
2300	0000		Singapore, Mediacorp Radio	6150do	
2300	0000	vi	Solomon Islands, SIBC	5020do	9545do
2300	0000		Turkey, Voice of	5960va	
2300	0000		UK, BBC World Service	3915as	5965os
			6195os	9605as	9740as 11945as
			11955as		
2300	0000		USA, AFRTS	4319usb	5446usb 5765usb
			7590usb	7812usb	12133usb 12579usb
			12133usb	12579usb	13362usb 13855usb
2300	0000		USA, KAIJ Dallas TX	13815na	
2300	0000		USA, KTBN Salt Lake City UT	15590na	
2300	0000		USA, Voice of America	6180va	6235os
			7205va	9780va	11655va 13640va
			15150va		
2300	0000		USA, WBCQ Kennebunk ME	5110na	7415na
			9330na		
2300	0000		USA, WBOH Newport NC	5920am	
2300	0000		USA, WEWN Birmingham AL	7540va	9975va
			9975va	11830va	
2300	0000		USA, WHRA Greenbush ME	5850na	6195na
2300	0000		USA, WHRI Noblesville IN	7315om	7490am
			15665am		
2300	0000		USA, WINB Red Lion PA	9320am	
2300	0000	mtwhf	USA, WRMI Miami FL	7385am	
2300	0000	as	USA, WRMI Miami FL	9955om	
2300	0000		USA, WTJC Newport NC	9370na	
2300	0000		USA, WWCR Nashville TN	5070na	7465na
			9985na	13845na	
2300	0000		USA, WWRB Manchester TN	6890na	
2300	0000		USA, WYFR Okeechobee FL	11740am	15255va
			17750va		
2300	2315		Nigeria, Radio/Kaduna	4770do	6090do
2300	2315		Nigeria, Radio/Logos	3326do	
2300	2330		Australia, Radio	15240as	
2300	2359		Canada, Radio Canada Intl	6100am	
2330	0000		Australia, Radio	15415as	
2330	0000		Burma, Dem Voice of Burma	5955eu	
2330	0000		Lithuania, Radio Vilnius	7325na	
2330	0000		UK, BBC World Service	3915os	5965as
			6035os	6170as	6195as 9605as
			9740as	11945as	11955as
2330	2357		Czech Rep, Radio Prague Intl	5930na	7345af
2330	2358		Vietnam, Voice of	9840as	12020vo
2335	0000	sm	Austria, Radio Austria Intl	9870sa	
2345	2358	twhfa	Austria, Radio Austria Intl	9870sa	

SHORTWAVE GUIDE

New Year, New Frequencies

This has been a year of change in the 225-400 MHz military aircraft band. We have documented the major change in this band, the new Department of Defense (DoD) 380-400 MHz land mobile sub-band. Because these frequencies are now being used as a Land Mobile Radio (LMR) band, many of the older aeronautical mobile services are moving to new frequencies. The major change we saw this year was the U.S. Coast Guard moving their long time air-to-ground frequencies to new assignments.

Gone are the age-old Coast Guard frequencies like 381.700, 381.800, and 383.900. They have been replaced by the following nationwide assignments:

237.900 Air Operations <Secondary>
326.150 Air-Ground Working <Primary>
345.000 Air Operations <Primary>
379.050 Air-Ground Working <Secondary>

We have seen the official DoD publications slow to pick up these new frequencies, but reports from monitors around the country confirm these new frequencies are in use. We would like to hear from you on the subject as well. If you are within earshot of Coast Guard air facilities, plug these new frequencies in and let us know what you hear.

❖ What is moving into 380-400 MHz?

What is moving into the 380-400 MHz spectrum? DoD trunk systems. And the exciting part is, if you have one of the new digital trunk trackers, you can listen to the action.

Just as with the Coast Guard frequencies above, we invite you to take a swing through this sub-band and see if there is any new activity in your area. Program your scanner for a 12.5 kHz step in the FM mode and look for any trunk system control channels in the 380-390 MHz range.

Mike Riffle did just that and discovered a trunk system at one of the U.S. Army's largest bases in the southeast United States. Fort Benning in Georgia now has an operational trunk system in this frequency range. Here are the details at presstime from Mike.

FORT BENNING TRUNK SYSTEM

Site 101 386.0750 386.2250 388.0000
Site 202 386.1375 386.2875 386.4375 386.5875
386.7375 386.9500 388.1125 388.2625
388.4125 388.5625
Site 303 388.2500 388.5500 388.7000 388.8500
389.4875

Talkgroups:

1050 Unknown user/usage

1053 Unknown user/usage
1056 Unknown user/usage
1057 Foxtrot Base
1060 Rock Force Base
3202 Unknown user/usage
3205 Unknown user/usage
3220 Unknown user/usage
3222 Unknown user/usage
3224 Unknown user/usage
3225 Unknown user/usage
3227 Unknown user/usage
3247 Unknown user/usage
3248 Unknown user/usage
3249 Unknown user/usage
3251 Unknown user/usage
3253 Rock Steady Base
3254 Comanche calling any station this net/Comanche calling Guardian 6
3257 Charlie Sierra calling Patriot Sierra/Charlie 2 calling Rock Force Sierra
3260 Charlie 4 calling Rock Force Sierra
3327 Squad leaders (tentative) calling TOC
3442 Unknown user/usage
3456 Unknown user/usage
3476 Unknown user/usage
3482 Unknown user/usage
3701 Military Police
3703 Range Control
3704 Unknown user/usage
3705 Unknown user/usage

Mike says, with the exception of Site 101, all of the above was culled from the UniTrunker program available at RadioReference.com: <http://www.radioreference.com/wiki/index.php/UniTrunker>. Site 101 is too weak for UniTrunker to decode and barely works on the Uniden 396.

He concludes that, based purely upon signal strength, site 101 is located in the southern part of the base, site 102 in the northern part, and site 103 in between. He has noticed some interoperability between this new P25 system and the old EDACS system. For instance, units in the field have called Range Control on the P25 system, but Control has answered back on the EDACS system.

Thanks, Mike, for sharing this list with our MT readers.

❖ More 380-400 MHz Info

And now *MT's Fed File* columnist, Chris Parris, checks in with some 380-400 MHz action he has compiled.

First off, Chris noticed a thread on the Radio Reference website about a trunk control channel in the 390 MHz area showing up in Ottawa, Ontario, Canada. Reports placed it somewhere near a lot of Canadian government buildings, but it is also near the United States Canadian embassy.

News reports on the Canadian Broadcasting Company (CBC) mentioned that this signal was causing garage door openers in the area not to function and that after the news item aired, the mysterious signal disappeared.

Chris also has a report from a friend in Seattle, Washington, of a new nearby system. Chris says, "At first we thought it might be aboard a ship at Everett Naval Station, but now he's thinking it might be a land-based system at Bremerton or Bangor." Following is the information compiled so far.

UNKNOWN SEATTLE-AREA SYSTEM

System ID: 014
Site 102 385.3125
Site 104 386.1875
Site 105 385.3500
Site 108 385.8875
Site 110 386.6750
Site 111 386.0750
Site 112 386.1625
Other control channels (no site ID yet):
386.1250 386.0625 386.4125 386.3500

Lastly, the 380 MHz system in southern California is still there, but he has yet to see any activity on it. Reports still talk about it being at Pendleton, but their UHF trunked system is still as busy as ever.

Here is the Los Angeles area DoD trunk system details as we know them right now. If you live in the southland, we would appreciate additional reports on talkgroups and additional frequencies.

Site 501 385.0125 385.2125 385.8875
386.6125
Site 502 386.1000 386.2500 386.4000
386.5500
Site 503 386.0375 386.3375

Finally, an anonymous source has sent along trunk system frequencies monitored from a new DoD system in the Fort Meade, Maryland, area.

Site 202 380.1750 380.4125 380.6875 380.7375
381.1125 381.1625 381.4250 381.5625
381.7500 381.8750
Site 303 385.0625 385.9250
Site 404 380.4375 380.8625
Site 505 380.4625 380.9125
Site 707 380.6625
Site 808 380.7125
Site 909 385.7750 387.3375
Site 1010 380.8875

Again, thanks to all our reporters who sent in their contributions this month and we look forward to seeing yours in the months to come, here in the pages of *MT's Milcom* column.

❖ FAA ARTCC Frequency List

Finally, in this month's Federal Aviation Administration Air Route Traffic Control Center report, we are going to take a look at the Denver and Kansas City centers in Table One. For the

background on the Air Route Traffic Control Centers, check out our *Milcom* column in the June 2005 issue of *MT*.

So, until next month, 73 and good hunting.

Table One: Denver and Kansas City ARTCC

DENVER ARTCC

Ainsworth, NE	127.950/338.200	Low: Approach/Departure Services/Aerial refueling route discrete
	132.700/397.850	Low Discrete: Approach/Departure Services/Aerial refueling route discrete
Alamosa, NM	128.375/379.950	Low Discrete: Approach/Departure Services
	354.150	High Discrete
	377.050	High Discrete
Aspen, CO	119.850/363.150	Low: Approach/Departure Services
	125.350/354.050	Low
	132.850/306.900	High
	134.500/327.800	Low Discrete: Approach/Departure Services
Brush-A, CO	133.950/317.350	Low Discrete
Brush-B, CO	118.475/225.400	Low Discrete: Approach/Departure Services
Casper, WY	118.925/257.725	High
	135.600/385.600	Low Discrete: Approach/Departure Services/Aerial refueling route discrete
	296.700	High: Special Use TSU <Amber-04>
Cherokee, WY	132.100/254.350	Low Discrete: Approach/Departure Services
Cheyenne, WY	125.900/284.700	Low Discrete: Approach/Departure Services
	132.100/319.800	Low
	133.175	High
	134.575	High
	307.100	High: Aerial refueling route discrete
	350.300	High: Aerial refueling route discrete
Colby, KS	127.650/360.650	High: Aerial refueling route discrete
	132.175/288.050	High
Cortez, CO	118.575/363.050	Low Discrete: Approach/Departure Services
	134.700/348.700	Low Discrete: Approach/Departure Services
Crawford, NE	127.950/338.200	Low Discrete: Approach/Departure Services
	135.025/239.050	High
	296.700	High: Special Use TSU <Amber-04>
Denver, CO	121.500/243.000	Low/High: Civilian/Military Aero Emergency/Distress/Calling
	125.900/284.700	Low
	125.950	Low
	126.875/353.650	High
	128.650/282.200	Low
	132.850/306.900	High
	133.400	Low
	296.700	High: Special Use TSU <Amber-04>
	387.150	Low: Kit Carson MOA
Denver-A, CO	126.500/371.850	Low Discrete
Denver-B, CO	119.850/363.150	Low Discrete
Durango, CO	118.575/348.700	Low Discrete: Approach/Departure Services
Eastonville, CO	134.875/263.000	High
Farmington, NM	118.575/348.700	Low Discrete: Approach/Departure Services
	125.675	High
	128.125/386.800	High: Aerial refueling route discrete
	290.400	High: Aerial refueling route discrete
	380.150	High: Instrument/Visual Route
Goodland, KS	132.500/379.150	Low Discrete: Approach/Departure Services
Grand Island West, NE	132.700/397.850	Low Discrete: Approach/Departure Services
	296.700	High: Special Use TSU <Amber-04>
Grand Mesa, CO	125.675	High
	126.725	High
	134.275/275.300	High
	135.125	High
	296.700	High: Special Use TSU <Amber-04>
	316.125	High
	323.250	High
	380.150	High: Instrument/Visual Route
Grand Mesa-A, CO	125.350/354.050	Low Discrete: Approach/Departure Services
Grand Mesa-B, CO		

134.500/327.800	Low Discrete: Approach/Departure Services
Gunnison, CO	
125.350/354.050	Low Discrete: Approach/Departure Services
133.525/319.000	High
Hanksville, UT	
127.500/343.950	Low
Hayden, CO	
128.325/397.875	High
134.500/327.800	Low Discrete: Approach/Departure Services
Hayes Center, NE	
127.025/288.350	High: Aerial refueling route discrete
Hill City, KS	
132.500/379.150	Low Discrete: Approach/Departure Services
Kremmling, CO	
128.650/282.200	Low: Approach/Departure Services
132.850/306.900	High
La Junta, CO	
128.375/379.950	Low Discrete
132.225	High
133.400/387.150	Low Discrete: Approach/Departure Services
134.125	High
243.000	High: Military Aero Emergency/Distress/Calling
296.700	High: Special Use TSU <Amber-04>
346.250	High
354.150	High
381.400	High: Two Betties MOA
Laramie, WY	
125.900/284.700	Low
Loveland, CO	
121.500/243.000	Low/High: Civilian/Military Aero Emergency/Distress/Calling
Lusk, WY	
135.600/385.600	Low Discrete: Approach/Departure Services
Medicine Bow, WY	
126.500/285.500	Low Discrete
132.100/254.350	High
133.175/350.300	High
Montrose, CO	
125.350/354.050	Low
North Platte, NE	
124.225/282.225	Ultra High Discrete
132.700/397.850	Low Discrete: Approach/Departure Services
O'Neill, NE	
132.700/397.850	Low Discrete: Approach/Departure Services
135.025/239.050	High
Ogallala, NE	
126.325/381.550	High
132.700/397.850	Low Discrete: Approach/Departure Services
Pueblo, CO	
128.375/379.950	Low Discrete: Approach/Departure Services/Fort Carson and Pueblo Bombing Range
132.225/354.150	High
135.400/377.050	Ultra High
Rapid City, SD	
127.950/338.200	Low Discrete: Approach/Departure Services
Scottsbluff, NE	
127.950	Low Discrete: Approach/Departure Services
Sundance, WY	
133.675/322.500	High: Aerial refueling route discrete
135.600/385.600	Low Discrete: Approach/Departure Services
Tuba City, AZ	
118.225	High
127.550/343.950	Low Discrete: Approach/Departure Services
132.875	High
256.875	Low Discrete
296.700	High: Special Use TSU <Amber-04>
353.950	High
386.800	High: Aerial refueling route discrete
Walton Peak, CO	
126.500/371.850	Low Discrete: Approach/Departure Services

KANSAS CITY ARTCC

Anthony, KS	
118.350/344.800	Low Discrete: Approach/Departure Services
133.200/257.000	High
263.100	Low
Burler, MO	
125.550/327.000	Low Discrete: Approach/Departure Services/Aerial refueling route discrete
Chanute, KS	
132.900/279.500	Low Discrete: Approach/Departure Services
Chillicothe, MO	
125.250/381.500	Low Discrete: Approach/Departure Services
Columbia, MO	
118.400/299.200	Low Discrete: Approach/Departure Services
119.475/279.600	High
134.500/350.200	Low/High
Decatur, IL	
124.300/335.600	Low Discrete: Approach/Departure Services
269.150	Low Discrete: Approach/Departure Services
Edna, KS	
128.600/282.325	Low: Approach/Departure Services
Efingham, IL	
133.225/346.400	High: Aerial refueling route discrete
135.050/290.400	High Discrete

Emporia, KS	
120.200/323.200	Low: Approach/Departure Services
127.725/270.250	Low Discrete: Approach/Departure Services
132.250/285.400	High
294.900	Low
Fairview, OK	
260.600	High
378.100	Low
Farmington, MO	
120.825/307.800	High
127.475	Low Discrete
128.400/291.700	Low Discrete
319.000	Ultra High: Aerial refueling route discrete
Gage, OK	
126.950/379.200	Low Discrete: Approach/Departure Services
324.100	High
Garden City, KS	
125.200/269.400	Low Discrete: Approach/Departure Services/Aerial refueling route discrete
133.450/281.400	High: Aerial refueling route discrete
387.100	Low: Aerial refueling route discrete
Hutchinson, KS	
118.800/337.400	Low Discrete: Approach/Departure Services/Aerial refueling route discrete
134.300/273.600	High
135.900/269.500	Ultra High
353.900	High: Bison MOA
Jacksonville, IL	
127.275/327.500	Low Discrete: Approach/Departure Services
Kirksville, MO	
132.600/370.900	Low Discrete: Approach/Departure Services/Aerial refueling route discrete
134.625/269.300	High
Liberal, KS	
134.000/290.800	Low Discrete: Approach/Departure Services
134.675	High
Manhattan, KS	
127.350/288.800	Low Discrete: Approach/Departure Services
Maples, KS	
133.400/323.100	Low Discrete: Approach/Departure Services
Marion, IL	
125.300/269.500	Low Discrete: Approach/Departure Services
Mt Vernon, IL	
127.700/317.700	Low Discrete: Approach/Departure Services
Natome, KS	
124.400/322.400	Low Discrete: Approach/Departure Services
307.800	High
Oklahoma City, OK	
128.300/291.700	Low Discrete: Approach/Departure Services
Olathe, KS	
132.325/352.000	High
Ponca City, OK	
127.800/319.100	Low Discrete: Approach/Departure Services
317.600	High
Quincy, IL	
133.725/290.700	Ultra High
135.525/319.900	Low Discrete: Approach/Departure Services
Richland, MO	
124.100/353.700	Low: Approach/Departure Services/Aerial refueling route discrete
133.800/317.500	Low: Approach/Departure Services/Aerial refueling route discrete
Saint Charles, MO	
121.250/269.600	Low Discrete
125.900/327.100	Low
323.100	Low: Salem MOA
Saint Joseph, MO	
127.900/251.100	Low Discrete: Approach/Departure Services
Saint Louis, MO	
125.500/380.200	Low Discrete: Approach/Departure Services
127.225	High
128.100/351.900	Low Discrete: Approach/Departure Services
Salina, KS	
134.900/363.200	Low Discrete: Approach/Departure Services/Aerial refueling route discrete
Sedalia, MO	
135.575/323.150	Low Discrete: Approach/Departure Services
Springfield, MO	
127.500/269.400	Low Discrete: Approach/Departure Services/Aerial refueling route discrete
132.900/290.500	High Discrete: Approach/Departure Services
135.175/277.400	Ultra High: Aerial refueling route discrete
Topeka, KS	
123.800/343.700	Low Discrete: Approach/Departure Services/Aerial refueling route discrete
134.700/279.500	High
Tulsa, OK	
128.800/354.100	Low Discrete: Approach/Departure Services
135.550/281.450	High: Aerial refueling route discrete
Vandalia, IL	
125.725/338.200	High Discrete: Approach/Departure Services
Unknown RCAG	
127.125 133.925 257.750 273.450 325.150 360.850	

2005 Hurricanes and Federal Communications

The 2005 hurricane season left a permanent mark on the southeastern United States, with storms named Katrina, Rita and Wilma causing death and destruction. The aftermath of the storms brought rescue and recovery units from all areas of the country, including many federal agencies and military units.

The November 2005 issue of *Monitoring Times* had an excellent list of frequencies compiled by Larry Van Horn that were active during Hurricane Katrina. Much of the activity involved both military and Department of Homeland Security agencies in operation all over the Gulf coast. The Coast Guard as well as the Customs and Border Protection division of DHS were extremely active in rescue operations and controlling the airspace around New Orleans after the hurricane struck.

After major disasters such as hurricanes you can expect to find all sorts of federal agency support, and some listeners have reported frequencies becoming active that have never been heard before. Military and federal agencies may appear on local public safety frequencies. National Guard units used the Louisiana statewide 800 MHz trunked radio system extensively after Katrina, and listeners reported possible federal and National Guard units on the State of Florida trunked system in the Miami area.

Here are a few interesting federal frequencies that were monitored and reported active during the aftermath of Katrina, Rita and Wilma:

Freq MHz	Use
123.4500	New Orleans airspace Temporary Flight Restriction (TFR) backup frequency
126.8750	Mississippi coast airspace TFR
134.9000	New Orleans airspace TFR
136.3750	DHS Customs and Coast Guard air operations
163.6250	DHS Border Patrols security operations
168.3500	Federal agency interoperability frequency, active in South Florida following Wilma
169.4500	DHS Customs air assets working with ground units
170.6750	DHS Border Patrol hurricane operations in South Florida after Wilma
171.0750	DHS Customs (input to 169.4500 MHz)
237.9000	DHS Coast Guard air operations
262.3750	FEMA SATCOM operations
282.4000	DHS Coast Guard air operations
282.4250	DHS Customs working New Orleans area airspace, with HAMMER, the Customs Air and Marine Operations Center at March JARB in California
290.8000	DHS Customs and Coast Guard air operations
326.1500	DHS Coast Guard operations
327.0500	DHS Customs working Mississippi coast airspace TFR
345.0000	DHS Coast Guard operations
351.2000	DHS Coast Guard operations
379.0500	DHS Coast Guard operations
408.4000	FEMA operations in the Houston area, regarding Katrina survivors.

419.3750 Justice Department hurricane operations after Wilma in South Florida

❖ Finding FEMA

Of course we can't talk about federal disaster communications without talking about FEMA. Now part of the Department of Homeland Security, the Federal Emergency Management Agency was originally conceived as a COG or Continuity of Government agency. Its original purpose was to help insure that the federal government continued to operate in the event of a nuclear attack upon the United States.

Since the end of the Cold War, the mission of FEMA evolved into more of a federal disaster relief coordinator. However, its shortcomings in that area have made the front pages after the hurricanes of 2005.

FEMA has the ability to utilize communications systems in almost every frequency band. The mobile communications vans that FEMA operates have the ability to set up communications with any local or state agency, and even interface with trunked radio systems and set up satellite phone service to any location needed. These vans are often referred to as MERS (Mobile Emergency Response Support) or MATTS (Mobile Air Transportable Telecommunications System). Their capabilities include Ku-band satellite access for telephones and data, International Maritime Satellite (INMARSAT) and

American Mobile Satellite Corporation (AMSC) satellite terminals. They also have microwave transmission to connect to the public telephone network or provide connection to other facilities. Radio communications include HF (short wave), VHF, and UHF for local radio communications. You can find out more about the MERS and MATTS at the FEMA web site, <http://www.fema.gov/rrrr/mers03.shtm>.

As far as "normal" FEMA communications, the agency appears often on HF frequencies, as well as the low end of the VHF military land mobile band, between 138.0000 and 144.000 MHz. They also use short-range UHF frequencies for on-location operations as well as the DMAT (Disaster Medical Assistance Team) and USAR (Urban Search and Rescue) operations. As with many federal agencies, FEMA has recently contracted to purchase new narrow-band radios with APCO P-25 digital capability.

Here are some confirmed FEMA net frequencies in the HF bands. You should be able to monitor these channels from many areas of the country. All frequencies are in kilohertz (kHz): 2658.0, 3341.0, 5402.0, 6049.0, 6809.0, 7348.0, 8050.0, 9462.0, 10194.0, 10588.0, 11108.0, 11130.0, 12216.0, 13446.0, 13935.0, 14776.0, 14885.0, 15708.0, 16201.0, 17519.0, 19969.0, 21866.0, 21866.0, 22983.0, 24526.0

Here are some known FEMA VHF and UHF frequencies, courtesy of the Grove *Federal*



Customs and Border Protection UH-60 landing in downtown New Orleans following Hurricane Katrina (photo courtesy of the CBP).

Frequency Directory Second Edition, as well as my own sources. These frequencies would be used on location where FEMA was operating and these frequencies are also used by FEMA in normal, day-to-day use at their permanent facilities around the country:

041.5000	142.4000	406.1500
046.9000	142.4250	406.8250
138.2250 ¹	142.9250	408.6000
138.4500	142.9500	408.7000
138.5750 ²	142.9750	408.7250
138.8750	143.0000	408.7750
139.4500 ³	143.0500	409.1250
139.7750 ⁴	143.0750	411.1500
139.8250 ⁵	143.2500	411.3750
139.9250 ⁶	143.4750	411.4750
139.9500 ⁷	143.5000	411.9750
139.9625	143.5250	412.3500
140.0250	143.6000	412.4750
140.9000	143.6250	415.1500
140.9250	143.8500	415.8250
141.0000	163.5375	417.6000
141.3000	164.8625 ⁸	417.7000
141.7250 ⁸	165.4375	417.7250
141.8500	165.6625 ⁸	417.7750
141.8750 ⁹	169.8750	418.0500
141.9500	173.0250	418.0750
142.3500	173.6125	418.1250
142.3750	173.7875 ⁸	418.5750

¹Nationwide allocation (repeater out - input = 141.875, 118.8pl)

²(repeater out - input = 141.950)

³(repeater out - input = 142.425)

⁴(repeater out - input = 143.475)

⁵(repeater out - input = 143.000)

⁶(repeater out - input = 143.000)

⁷(repeater out - input = 143.250 or 142.975)

⁸Nationwide allocation

❖ Some Fed Files Follow-Ups

I have received some reports from listeners out there that despite its apparent demise, the frequencies used by the Federal Aviation Administration NARACS (National Radio Communications System) VHF radio system are still in use. From our anonymous source: "I can tell you that the FAA was using some of the NARACS frequencies at Oshkosh, WI, during EAA (Experimental Aircraft Association) fly-in this summer. Channels used include 1, 3, 4, 9, 10, and 11. All used a PL tone of 136.5 Hz. This may not actually be part of (what was) the NARACS system."

Another source indicated that the FAA has a program in place to update and replace the NARACS VHF radios with new narrowband digital equipment. I can confirm that at JFK airport in New York, the FAA is using P-25 digital radios on 172.8250 MHz for operations and systems maintenance.

Here are the known FAA NARACS VHF radio frequencies:

CH	Receive	Transmit
F-1	172.9250	169.3250
F-2	172.9500	169.3500
F-3	172.9750	169.3750
F-4	172.8500	169.2500
F-5	172.8750	169.2750
F-6	172.9000	169.3000
F-7	172.8250	169.2250
F-8	172.1250	172.1250
F-9	172.1500	172.1500
F-10	172.1750	172.1750
F-11	166.1750	166.1750

I also had an inquiry about the frequency list from the New York City area that was in the September 2005 *Fed Files* column. A reader asked about one frequency (171.2375 MHz) that was listed as being used by the "HEW NYC Office"

and wondered what HEW stood for.

I realized that there had been a small goof, as HEW was an agency that no longer exists. HEW stood for the Department of Health, Education and Welfare and in 1979 it was changed in to two separate agencies, the Department of Education (<http://www.ed.gov/index.jhtml>) and the Department of Health and Human Services or HHS (<http://www.hhs.gov/>). Most likely one or both of these federal agencies maintain offices in the New York City area, but from what I monitored, it would be hard to decide who is actually using 171.2375 MHz. Can anyone in the NYC area help?

❖ Miami Federal Frequencies

I happened to be working in the Miami area when Katrina first hit the US. Most of the post-storm recovery frequencies were power and utility related, but I did have a chance to search the federal spectrum for a few days. Some of what I picked up is still not identified, so if there are any South Florida readers that want to take a guess, let us know at the Fed Files.

162.2375	Unknown
164.4000	US Secret Service PAPA
164.5000	US Postal Service General Mail Facility
164.9625	Unknown
165.2375	DHS Customs NET 1
166.2250	US Postal Service General Mail Facility
166.2500	US Postal Service
166.3000	DHS Customs NET 26
166.3500	US Postal Service
166.4375	DHS Customs NET 1 input
166.4625	DHS Common
167.2625	FBI
167.4375	FBI
167.6125	Unknown
167.6625	FBI
167.7625	FBI
167.8625	Paging
168.1625	Unknown
168.7500	FBI - appeared linked to 167.7625 MHz
168.8500	DHS Border Patrol @ MIA
169.2500	Unknown
169.4375	Unknown
169.4500	DHS Customs NET 2
169.6125	Unknown
170.6750	US Marshals - Federal Courthouse
170.7750	US Marshals - Federal Courthouse
171.6250	Everglades National Park
171.8500	Unknown
172.9000	TSA @ MIA
173.6000	Unknown
173.8000	Unknown
173.9125	Unknown
406.6625	US Postal Service
407.7750	US Postal Inspector (encrypted)
411.1000	Unknown
413.6000	Data (FAA?)
413.9250	US Postal Service
415.2000	DHS Federal Protective Service
415.2250	Unknown

❖ Federal Trunking in South Florida

As we have noted in past Fed Files columns, the US Bureau of Prisons is moving towards installing UHF trunked radio systems in all the BOP facilities around the country. Miami was actually one of the first areas to have a federal UHF trunked system, and when it first came on the air there was much speculation as to who it was going to be used by. Many believed this was going to be a system for all federal agencies in the Miami area, but after a few years on the air, it appeared that the federal prison was the only user. Here is the original trunked system information:

System ID - 3d2c

406.5500 MHz
408.9500 MHz
409.3500 MHz
409.7500 MHz

It now appears that this system is no longer on the air and has been replaced. Miami-area listeners have noted a new P-25 digital trunked system has appeared which is being used by the Federal Bureau of Prisons at their downtown Miami Federal Detention Center. Here is the new system information:

System ID - b136

407.0125 MHz
407.4125 MHz
409.6750 MHz
410.0000 MHz
410.8125 MHz

Base 407.0125 MHz
Offset 380
Step 12.5 kHz

Also active in South Dade County, officially known as the Federal Correctional Institution Miami, is this system:

System ID - 5936

406.9500 MHz
408.1500 MHz
408.5500 MHz
409.9500 MHz
Base 406.0000 MHz
Offset 380
Step 12.5 kHz

That's all for the first *Fed Files* of 2006, but don't worry, we'll be back with more in March. Keep those e-mails coming!

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Old and New on the Marine Bands

In November I observed my sixtieth birthday, and I found myself thinking back on the changes in marine communications as I was monitoring. As a retired schoolteacher, I had been asked to accompany the Cross Country Running Team of a local elementary school to the district championships event. The event took place on Fort Henry Hill, east of Kingston Harbour. As I watched the students run, I suddenly realized I was standing on the site of the former Kingston Marine radio Station, VBH. When I was their age in the 1960s, I was listening to the 2 MHz AM traffic from this station as well as many others on the Great Lakes. I could almost visualize the building, the towers which stood there, and my old S-38 Halicrafters receiver.

It was ironic that I had just received notice that another famous marine station had closed forever. IAR, Rome Radio Morse service closed down on October 31st. This station served for years, handling Morse and voice traffic for the ships at sea. Their last message, sent on 8670 kHz, was as follows.

"Cq cq cq de IAR IAR This is the final transmission from Roma Radio Morse service. We conclude our watch keeping after many years of continuous service with pride and sadness on October 31st. Telecom Italia Coast stations wishes all seafarers fair winds and following seas. We salute all who have served our profession with skill and dedication through the years de IAR IAR ar sk."

Anyone desiring a QSL from Roma Radio can send a report to: Centro Radio Costiero - Roma Radio; All, attenzione Mr. Michele IACONO; Via della Cesaarina, 282; Roma, Italia

However, just as we have a famous marine Morse station closing down, another has come on the air and successfully passed traffic. The Maritime Radio Historical Society's Morse station KSM has been on the air for several months. They have passed traffic with several

ships, particularly the *SS Matsonia*, on the San Francisco - Honolulu run. KSM can be heard on 500 kHz, 426 kHz, 6467 kHz and 12993 kHz. The station is on the air weekends and starts transmitting around 1700 UTC. The amateur station K6KPH is also on the air at this location and listens for reports on 7050 kHz. On Sept. 24, I was pleased to hear the following signal, on 12993 kHz, from 2316 to 2330 UTC: "Cq cq cq de KSM / Qsx 500/6/12 ch 3 obs? QRU?"

Another famous marine station, WLO, in Mobile, Alabama, suffered considerable damage from Hurricane Katrina. On Sept. 21, I contacted K4EDX, Rene, on the Maritime Mobile Service Net. He is the owner of WLO and he said the staff worked hard to repair the station. He mentioned they were handling emergency traffic and would have the station back to its full capability soon.

I was also told the Battleship *Missouri* was on the amateur bands to commemorate the end of World War II. The signals on 14.063 MHz cw were sent with the actual key that sent the original surrender message. This is one contact I am sorry I missed.

❖ West Coast Information

I was again able to travel from Seattle to Whittier, Alaska, and then back via the inside passage. We visited Juneau, Ketchikan, and Prince Rupert along the way. I was able to do a little monitoring and gather some information. I also received a letter from John Musgrave in Oona River BC., who contributed very useful information.

John monitored some Canadian Search and Rescue (SAR) traffic from Vancouver Military. 5717 kHz USB was the primary frequency used, while 6694 kHz and 6715 kHz were secondary frequencies. 5717 is also used on the East Coast for SAR traffic. The US Coast Guard frequencies of 5696 and 8983 kHz are also active. I monitored CAMSPAC Point Reyes, California, here in Kingston on 8983.

John also mentioned 2182 and 2054 kHz from VAJ Prince Rupert Coast Guard radio. 2054 kHz is their weather broadcast channel and they broadcast every four hours. 4125 kHz USB is a very active channel according to John. Navtex can be copied from Prince Rupert on 518 kHz.

He also mentioned two amateur radio marine nets. The North West Boaters Net is on 3865 LSB at 0830 PDT while the British Columbia Boater Net is on 2855 at 0100 UTC. For the low frequency listeners, ZP, 368 kHz, at Sandspit,



US Coast Guard Auxiliary Station Whittier, Alaska, and the author

Queen Charlotte Islands, would be a great catch. You can bet I will be trying this winter.

As for VHF radio, the listening can be quite good in the area. Vessel traffic control is always interesting and there is lots of traffic in the area. Channel 5A is used for Puget Sound Traffic. In the Prince Rupert area, channel 71 is used and channel 11 is used in the Comox, BC, area. John also mentioned channel 21 for listening. The USCG uses 22A for their broadcasts and traffic. I did hear traffic on channels 6,7,8,9 10,78A and 69A. The Prince Rupert Yacht Club is on channel 73A. Apparently there is quite a lot of local traffic on channel 6.

The NOAA/Environment Canada weather channels and the Canadian Marine weather channels are also active in the area. Even the small town of Whittier, Alaska, has its own weather radio. KX129 broadcasts on 162.400 MHz and gives the weather for Prince William Sound, Ketchikan and Juneau, Alaska, also have excellent weather radios. Weather from VAR Prince Rupert is on 161.65 MHz, channel 21B. I was able to monitor it for quite a range with just a handheld VHF radio. They also give notices to mariners, etc. on this frequency. As a Coast Guard Auxiliary member, I was interested in the broadcast for a 38 foot long cabin cruiser aground east of Kelda Island.

BC Lighthouse frequencies		
148.060	143.295	148.615
525.525	143.525	148.975
525.526	143.655	148.990

John also mentioned the lighthouse radio frequencies, listed in the attached table. These may provide some interesting listening and I would like to know which are active frequencies. Years ago, when we had a manned light station at Main Duck Islands, I made a real radio monitoring catch. We had a 415 MHz UHF channel between the Coast Guard radio station



Catamaran excursion boat Whittier, Alaska



Ship cleaning business in Whittier, Alaska, monitors VHF channel 17

and the Lighthouse. I heard an excited call from the lighthouse keeper to Cardinal radio. He said "You will never guess who dropped in here for a picnic!" It took him a while to convince the radio operator that Queen Elizabeth II and Prince Phillip had decided to take a break from a state tour, on the Royal Yacht Britannia, to have a picnic on the Main Ducks. It sure made a good story for the next day's local paper.

A useful publication for pleasure boaters is the *Boaters Blue Pages Marina Guide*, published by Pacific Yachting. I picked this booklet up for free in Prince Rupert, BC. It lists the marinas in the Puget Sound as well as those of the BC coast and coastal islands. It also gives which VHF channel the marinas monitor. You are not supposed to call Canadian marinas on channel 16, so they will monitor one of the ship to ship simplex channels. 66A and 73 were the most commonly used channels for Canadian West Coast marinas. Canadian marinas on the Great Lakes are supposed to use channel 68.

❖ AIS

I received several replies from my last column in regards to the Automatic Information System (AIS). Neil Schultheiss reported success with the AIS from Vantage Point. He installed a true AIS receiver, as opposed to a modified scanner, and was picking up information from 60 miles away. The receiver he bought came from the UK and was about \$220 US shipped. All that was needed was a 12 volt power supply and an antenna. This was fed into a computer with the appropriate software. He gave the following web site for information: <http://www.allgadgets.co.uk/ag/product.asp?dept-id=1&pf-id=AG3933>.

Neil also noted that from his base in Goderich, Ontario, the setup was able to monitor the Welland Canal when atmospheric conditions were right. That was a distance of 206 nautical miles. Neil is the main person responsible for the Boatnerd website at <http://www.boatnerd.com>. This site is well known among Great Lakes marine enthusiasts. In fact, you can even access live radio traffic from the Detroit River through this site. Yours truly contributes what news I can as well as a traffic list for the Seaway.

I received a very interesting email from Kim N. Faulkner at Katech Electronic Designs of Dartford, Kent, England. This company has been designing AIS receivers and their AIS-1 receiver will be available when this column reaches print. Their web site was not public when they wrote to me so I cannot include it now. However, when this information is read,

I am sure any search engine will bring up their web site. They also produce software for this communication mode.

I am hoping to obtain a receiver and do a test for future column. The data I was sent sure makes this look like a receiver worth investigating.

❖ DSC (Digital Selective Calling)

Channel 70 on the VHF marine band has been set aside as the channel for DSC. Although it has not been implemented in the Great Lakes yet, several commercial vessels here are buying DSC capable radio sets as their equipment needs replacing. I would appreciate hearing if this service is available in your area or information as to when it may be available. Since my course for a marine radio license covers DSC, I have been looking for one to use for demonstrations. The price of this equipment has been surprisingly less than I would have expected.

❖ Reader Mail

I have begun to receive some replies from readers about the marine radio traffic in their area. Garie Halstead, K8KFJ, from West Virginia, writes that he relies on HF for marine listening in his landlocked area. He mentions WPE Jacksonville, Florida, on 4149 kHz USB particularly around 0100 local time (0500 UTC). They are also on 12.353 kHz during the daytime.

This is the 30th anniversary of the tragic loss of the *Edmund Fitzgerald* on Lake Superior. Again there will be an amateur radio station acting as a memorial to this tragic loss. N8F will have operated from Whitefish Point in early November. I will again try and work the station. As a result of my April column, Joe Olig, a noted radio enthusiast, wrote me about his involvement with the "Big Fitz." He has actually been asked to ring the bell they raised from the wreck on behalf of a family that could not attend the annual Nov. 10 memorial service.

I welcome any information on the marine monitoring in your area or country. Details or suggestions for equipment, software etc. would also be useful to our readers, as I am not personally able to collect all the information to make this column useful to marine enthusiasts.

❖ Great Lakes End of Season

When this column reaches the reader the Great Lakes will be shutting down for the season. The Welland Canal and the Seaway close for navigation in late December while the American locks at Sault Ste. Marie usually close January 15th. The vessel traffic stations and the ship to ship channels often provide interesting listening. Depending on your area, channels 11, 12, 13 or 14 are used for vessel traffic control. Channel 13 is also the bridge to bridge channel for commercial vessels. Channels 6, 8 and 10 are the most common ship to ship channels. Of course, channel 16 is still the distress and calling channel.

Also, a reliable source told me that the icebreakers on the Great Lakes sometimes use

HF radio during the winter. They are out of VHF range sometimes and thus use USB radio for communications. I have no frequencies at this time but would certainly like to know if anyone catches one of these vessels on HF. Hopefully, my investigations will turn up some information on this.

❖ Closing Thoughts

Although winter is approaching outside, the longer nights and improved HF propagation does brighten up the thought of the cold months ahead. The closing of the Seaway season is already bringing increased VHF activity. The latest activity includes reports of a car being driven into the Welland Canal and a vessel fire in the Brockville Narrows. Hopefully the marine communications in your area will be as interesting. I must end now as CAMSLANT Chesapeake is calling CG 6041 and the medical evacuation helicopter is landing at the Kingston Hospital.

73s to all! Ron, VE3GO

Marine VHF channels mentioned in this article (in MHz)

5A	156.250	16	156.800
6	156.300	21A	157.050
7	156.350	22A	157.100
8	156.400	66A	156.325
9	156.450	68	156.425
10	156.500	69	156.475
11	156.550	70	156.525
12	156.600	71	156.575
13	156.650	73	156.675
14	156.700	21B	161.650

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New Tricks in '06

What do you think of when it comes to longwave? Static? A few local beacons? Repetitive IDs? If so, you are among the majority of shortwave listeners. When I tell fellow radio hobbyists of my interest in the low frequencies, they often respond with blank stares or questions like: "Can you really hear anything down there besides static?"

For the few who've given the band a try, the reactions are usually quite different. They know the variety of signals that can be heard there and the exciting propagation styles of the band. My goal in this column is to encourage newcomers to check out the band for the first time. My timing is not based solely on this being a New Year, but also on the fact that mid-winter is a great time to dip below 500 kHz. Atmospheric static is at its lowest in most areas, and the long periods of darkness promote DX from late afternoon on.

❖ Tips & Resources

If you're just starting out, you'll want to get a listing of longwave beacons before getting too far into your journey. While you can identify some of the beacons by looking through back issues of *MT*, this becomes more difficult as your list begins to grow. There are some Internet sites that can help you identify beacons – <http://www.navaids.com> is a good place to start – but I've yet to find a comprehensive site that lists *all* U.S. and Canadian beacons. In some cases, the crucial two-letter "compass locator" beacons are omitted, or the site focuses on just one country or the other.

Another excellent site that lists stations heard by DXers is available at <http://www.classaxe.com/dx/ndb/rna/>. Acting as an "online logbook" for serious DXers, this site has an array of features and statistics too extensive to describe here. It will give you an excellent idea of whether or not a signal is possible to hear, and you can also see how far away your local beacons have been heard. I highly recommend this site.

While websites can be helpful, I prefer to have a *printed* booklet handy for serious DXing. After all, who wants to have a noisy computer running next to their receiver when trying for that elusive 25-watt beacon 1,000 miles away? Also, a computer may not be a practical option for a DXpedition. If you are interested in such a guide, I encourage you to check out the *Beacon-Finder II*, which I began publishing for hobbyists in 1998. It lists the majority of longwave utility stations that can be heard in North America (not just beacons), from 0 to 535 kHz. You'll find the

guide listed elsewhere in this issue of *MT*.

Here are some additional tips I can offer for success on longwave. They are listed in no particular order:

1. Tune slowly to avoid missing signals! Beacons are usually assigned to 1 kHz channel spacings, and if you tune too fast, you could skip right over some good DX.
2. When trying for distant beacons, use your receiver's BFO or CW/SSB setting. You'll find it much easier to sort through weak signals by "zero beating" their carriers and listening to the keyed Morse ID.
3. Use a narrow bandwidth setting. A narrow filter (500 Hz or less) will go a long way toward blocking out adjacent "pest" signals.
4. Use a good set of headphones. They will help you focus on extremely weak signals, and will ensure you won't disturb those around you.
5. Use a loop or active antenna designed for longwave operation. Despite their small size, these antennas often out-perform "longwire" type antennas, and almost always provide quieter reception.
6. If possible, turn off static-producing appliances such as TV sets, computers, dimmer switches, electric motors, fluorescent lights, etc.

I hope this inspires many readers to check out the longwave band over the winter months. You never know what you'll hear, and a nighttime session can net you some surprisingly distant catches. Cuba, South America, and the far north of Canada are all reasonable targets at this time of the year. Many beacons in these areas run high power and stand out from the crowd.

❖ What I Use

Every now and then, readers ask me what I use for longwave DXing. The answer depends on what part of the spectrum I'm listening to, and what my goals are for a particular session. For general purpose work from 100 to 535 kHz I use a Drake R8 receiver. The audio quality, adjustable notch filter, and narrow bandwidth setting make the R8 ideal for all around DXing. If I need 5-100 kHz reception, I insert an LF Engineering L-101 converter in front of the R8.

If I'm feeling nostalgic, I'll fire up my old National RBL-5, a WWII vintage receiver weighing in at 80 pounds. This set is a regenerative type, so it takes a bit of fiddling to get a station tuned in. Once you get the hang of it, though, it can hold its own against many of today's newer rigs. It covers 15 to 600 kHz.

For DXpeditions, I frequently use a Sony ICF-2010. A friend encouraged me to invest in one of these years ago, and I'm glad I did. The

'2010 provides about 90% of the features I could ask for in a longwave receiver, and you can't beat the convenience of a portable set for on-the-road listening.

As for antennas, I typically use two types at home – a 250 foot random wire and an LF Engineering L-400B active antenna. I switch between them for the best signal-to-noise ratio. When I'm interested in direction finding, I use a homebrew tabletop loop that tunes from about 175 to 600 kHz. This antenna was described in the September 1992 edition of *Below 500 kHz*. Finally, for portable work, I sometimes use a Radio Plus+ Q-Stick antenna, which can be tuned across the LF/MF bands. It works by coupling to the '2010's internal antenna. No hardware connections are required.

As you can see, my lineup does not include anything truly exotic. I believe the best tools for monitoring success are a good antenna, research, and persistence. As I always say, knowing when and where to look for a signal is worth at least 10 dB.

❖ Mailbag

From time to time, readers ask about the A/N Range systems that were once commonplace on longwave. Although they were discontinued in the 1970s, many folks still remember them and are interested in the details of their operation. Pilots relied on these systems for accurate navigation and could determine their positions based on whether they heard the Morse letter A or N from their receivers.

Two types of antenna systems were commonly used at A/N Range stations. The tower type included four antennas in a square, with a fifth antenna at the center of the array that was fed with an offset signal to produce the 1020 Hz modulation. In addition, there was another antenna style that used two rectangular, vertical loops placed at right angles to each other and a separate symmetrical "T" vertical antenna.

Another interesting tidbit involves the so-called "twilight zone." When an aircraft was flying near the center of a course, the "A" and "N" modulation percentages were nearly equal. Apparently, there was a bit of "slop" involved in determining one's position from listening to the signal, and the pilot could not tell if his location was exactly in the center of the course. This area was dubbed "the twilight zone." I am not sure if this was the origin of the title for the TV show by the same name, but it seems quite appropriate.

See you next month, and enjoy the New Year!

FM and Shortwave Pirate Updates

Given the demise of the monthly *The ACE* bulletin of the Association of Clandestine radio Enthusiasts, after two decades as the definitive information source in North American hobby pirate radio, many *MT* readers wonder where they can now go to get the information that *The ACE* formerly provided. *ACE* always concentrated on shortwave pirate broadcasting, but North America has a large movement in pirate broadcasting on FM as well. The shortwave and FM pirate scenes have never really had much in common with each other. But, there remain information resources for both.

Of course, the *Monitoring Times* Outer Limits column that you are reading remains a good source of news on developments in pirate radio DXing. Chris Lobdell's monthly column in *The Journal* of the North American Shortwave Association (45 Wildflower Road, Levittown, PA 19057) also continues its monthly coverage of pirate DXing.

The Sterling Times internet site has some interesting archived European pirate radio broadcasts, and it is worth a look. It is found at <http://www.sterlingtimes.co.uk/pirate.html>

The Black Cat Systems pirate web site includes a database of scores of pirate stations that have been logged during the last couple of years. It also includes a large database of numbers station loggings. <http://www.blackcatsystems.com/radio/pirate.html>

Another technical web site concentrates on how to acquire transmitters that are suitable for pirate radio broadcasting. Of course, pirate operators should be aware of the radio laws in their country of proposed operation. <http://members.tripod.com/~transmitters/>

The Micropower and Pirate Radio Kiosk is a coordinating web site for FM pirates across the USA. This one features a lengthy list of USA FM pirates, some of which operate their own web sites. http://www.infoshop.org/pirate_kiosk.html

The Radio 4 All web site coordinates both FM pirates and legal low power FM broadcasts in the United States. This one has another useful list of many dozens of low power broadcasters in both North America and Europe, with links to their web sites. Some of those stations are actually legal podcasts over the internet, but some worldwide pirate operations are also included. <http://www.radio4all.org/>

Another interesting site, the WWITV list, is a fairly comprehensive catalog of stations that currently stream their regular broadcasting via the internet, particularly via television. Most of these are licensed broadcasters, but there is

a pirate mixed in here and there. <http://wwitv.com/portal.htm>

Your computer can be a source of new information about pirate radio. The Free Radio Network web site and the Free Radio Weekly newsletter, which we once again list in our "QSLing Pirates" section this month, remain prime resources for North American pirate radio DX information.

Veteran DXer Terry Kreuger maintains another very interesting web site that covers pirate radio activity in Florida on a specialized basis. His data are copyrighted, but they are available on the internet at his Tocobaga DX web site at <http://home.earthlink.net/~tocobagadx/flor-tis.html>. Anybody interested in Florida pirate radio activity will find this list to be invaluable.

❖ British Pirate Crackdown

During early November, British authorities conducted major raids against local FM pirates in the UK, particularly in London. Both the Reuters and BBC news services reported that British government officials blamed inflammatory programming on some pirates for riots in late October in Birmingham, which killed at least three persons. Ofcom, the UK equivalent of the FCC, announced that they shut down 53 pirate transmitters. Ofcom claimed that the stations interfere with legitimate broadcasting and even the London Fire Brigade.

❖ Dutch Pirate

Many North American DXers were pleasantly surprised to hear the Dutch pirate **Black Arrow** on 15069 kHz during the late fall around 1600 UTC. With winter conditions returning, this area below the 19 meter shortwave band and the usual Europirate band between 6300 and 6300 kHz are worth a check on weekends, often around your local sunset. If you were among the lucky ones who heard **Black Arrow**, you can send them a reception report via **Black Arrow**, PO Box 128, 9410 AC Beilen, The Netherlands.

British pirate **Alpha Lima International** has been on 15070 kHz on some weekends under similar circumstances. If you hear them, they solicit reports either via postal mail at **Alfa Lima International**, PO Box 663, 7900AR, Hoogeveen, the Netherlands, e-mail at info@alfalima.net or via links from their web site at <http://www.alfalima.net>.

❖ What We Are Hearing

Monitoring Times readers heard two dozen

different North American pirates this month. You can hear them too, if you use some simple techniques. Pirate radio stations never use regularly announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays such as New Years. The primary North American pirate frequency is 6925 kHz, plus or minus 30 or 40 kHz.

Captain Morgan- The Captain mixes rock music with Twilight Zone TV audio clips from "The Pirate Zone." (None, says to send loggings to the Free Radio Network web site, and has QSLed lately)

KCBM- The Ken and Barry use an unusual frequency of 6990 kHz and an unusual western USA transmitter for their rock music and comedy fare. (Asks for reports via the Free Radio Network web site)

KIPM- Alan Maxwell's existential drama shows are unlike anything else found on shortwave radio today. (Elkhorn)

KSUR- They still play rock music, but it is always possible that some NFL football from Detroit will be mixed in at times. (Uses radioksur@yahoo.com e-mail)

Old Vampire Radio- This one surfaced well before Halloween this year, with tales of haunted houses and comedy material including ads for a cheap casket company. (None announced)

Partial India Radio- This pirate ID is one of the best puns in history. They do parody the actual international broadcaster from India, but most of the comedy is pirate humor. (Stoneham)

Pirate Radio Boston- Their rock music playlist normally includes some obscure New England groups. As we see here this month, they have attractive laminated QSLs. (Uses pirateradioboston@yahoo.com e-mail)



Radio Bosques- This one is a relatively new entry into the South American pirate radio scene. During the fall they operated from Argentina on 6189 kHz and other frequencies such as 6290 and 6460 kHz. Their Spanish slogan of "Radio Bosques la unica emisora libre en Argentina," almost makes them a semi-clandestine station. (Uses radio_bosques@yahoo.com e-mail)

Radio Free Whatever- This station name sets some kind of new standard for ambiguity, but their rock music and random fooling around is familiar fare. (None copied by DXers yet)

Radio Moshiah and Redemption- Better known among DXers by their inaccurate ID Lubavitcher Radio, their broadcasts of orthodox Jewish programming on 1710 kHz above the medium wave X Band are similar to their internet feed available on their <http://www.radiomoshiah.org/> web site. (Brooklyn and uses radiomoshiah@erols.com e-mail)

Continued on page 61

Don't Just Sit There, Build Something!

Happy 2006. Once again it is time for my annual tradition of amateur radio resolutions. Don't skip down because at least one ALWAYS applies.

- 1) If I do not have an Amateur Radio license I will get licensed this year.
- 2) If I do have a license I will upgrade it to the next highest license until I am an Extra class.
- 3) If I am an Extra class I will find somebody who isn't licensed and help them get licensed.
- 4) I will repeat number 3 until the F.C.C has to expand the Amateur Radio Frequency allotment on all bands.

And now... This year's special challenge:

5) This year I will construct something for use in my shack.

There was a time in the world when all radio was amateur radio. And for a long time after that, most equipment used in amateur radio was constructed by the hams themselves. Then came the era when hams were able to take advantage of modifying military surplus gear into high performance amateur radio stations.

I had the privilege of coming up in the hobby when there were still Heathkit stores. It was very easy to build a great ham station all with your own hands with the help and guidance of the engineers from Benton Harbor, Michigan. If you ran into real trouble, the techs at the aforementioned Heathkit stores were always there to set you straight.

As Heathkit began to fade from the kit market, I was lucky enough to be a regular reader of the *QST* columns of Doug Demaw W1FB (He also wrote for *MT* before becoming a Silent Key). Through Doug's writings I learned how to build receivers, transmitters and station accessories from scratch.

In the modern world, a ham can purchase every piece of equipment needed to get on the air from a store, catalog or the Internet, and, if they so choose, never find out what is going on behind the front panel of his or her rig. Further, while modern commercial construction techniques may enable additional features at very reasonable prices, they make it very difficult to dig into the gear. Multilayer printed circuit boards and surface mount construction turn many boards into "unplug and replace" items with no room for modification or even simple repair.

Maybe it was because I came up through the Heathkit era, or maybe it was learning from

folks like Doug W1FB, but throughout most of my ham career I have more or less split my time between operating and melting solder in my basement. Many hams still do.

What I want from you, dear reader, as your ham radio resolution for 2006, is for you to join in the fun. I want you to build something and use it to get on the air. There is no greater thrill in ham radio than being able to say on the air, "Rig here is homebrew." So let's take this one step at a time and get you to a place where you can make that claim from your shack.

❖ Start with the Tools

Nothing can sour a person to the electronic construction experience faster than trying to build something without the proper tools. You don't need a lot of stuff to get started but you will always benefit from having good equipment from the start. That screwdriver you picked up at the local dollar store might get the job done for a while, but you won't be able to pass it on to your kids like a quality Klein, Xcelite, Husky or Craftsman tool. I believe that, once to get involved in this building thing, you are going to get hooked on it, so you will want good tools because they will be getting a lot of use.

A good start would be a small assortment of regular flat and Phillips head screwdrivers. You will also want a set of small nutdrivers and regular and metric Allen head wrenches. With these tools you should be able to do the mechanical assembly of most kits and projects you will encounter.

For populating the circuit board you will want a pair of diagonal cutters and needle nosed pliers with straight and bend tips.

In addition to the above, many recommended tool lists add what I call the "standard household tools," meaning a hammer and a

large pliers. While there have been times in my ham radio career when I have wanted to hold a circuit board with a large pliers and then beat it into submission with a hammer, I really don't find myself doing much electronics work with "household" or even "automotive" type tools. I have both but they are in other tool boxes in other parts of my house.

❖ Melting Metal

I can trace my ham radio life history through the soldering irons I have owned. When I was a pup, most of us ruined our first project or two by trying to use our father's 125 watt soldering gun, along with its acid core solder, designed for household work and not electronics. Between the heat and the acid's destructive power on plastics, the lesson was quickly learned that you had to do things differently if you were going to play with radios. (Sad story: I know of one poor soul who built a multi hundred dollar Elecraft K2 using acid core solder because "it was what he had around." Remember...Radio means *rosin core* solder.)

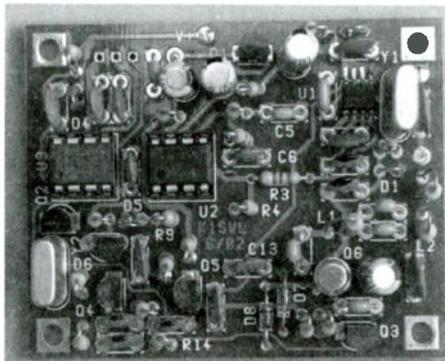
I've gone through about a dozen 25 to 35 watt soldering pencils and now, as part of my meager midlife crisis, I have treated myself to a professional Weller temperature-controlled soldering station. For most applications the standard Radio Shack Model 64-2802 basic soldering kit at \$7.99 is a fine place to start. If you want something that is a touch more professional, you may want to look at the Weller WE-SP23LK unit that retails in the neighborhood of \$20.00.

The important things to remember are, solder only on a heat-resistant surface, use only rosin core solder designed for electronics work, and, most importantly, never leave your soldering iron plugged in and unattended. Nobody wants to hear your address coming over their scanner's fire frequencies.

And, while we are touching on safety, add to your tool collection a set of safety goggles. You will be cutting wires that will send bits of metal flying through the air and solder can bubble and splash, usually when your eyes are closest to your work. Captain Murphy rules. Be safe.

❖ To DMM or not to DMM, that is the Question

At this basic stage of kit building development you can probably get along without a digital multimeter. However, very basic DMM's can be found for as little as \$10 these days. While they may not be the most accurate



The Small Wonder Labs "Rock Mite" is a great first kit for any ham.

devices in the world at that price, they are certainly good enough for checking continuity and simple voltages within a basic circuit. Go easy on yourself until you understand a bit more about kits and building before buying a more expensive unit.

Okay, with tools in hand, it's time to begin to think a bit about what you might want to build. We'll stick with kits at this point. By building a well designed and supported kit you will develop the skills and savvy to take you to the place where you can take a schematic out of a magazine or book and figure out how to bring it to life on your own terms. There are a few favorite kits that I have enjoyed building over the years that I can recommend to you to get the home building ball rolling.

VEC-201K CW Keyer Kit
\$24.95
Vectronics
300 Industrial Park Road
Starkville, MS 39759
(800) 363-2922
<http://www.vectronics.com>

Vectronics is a subsidiary of MFJ Electronics, a company well known in ham radio circles. They have a whole line of ham radio related kits. Their basic CW keyer is inexpensive and can be built with very basic tools such as those mentioned above. It doesn't require any test equipment for construction, so it is a great place to start. You can build it into any suitably sized case for its 2 x 3 x 3 1/2 inch footprint.

If you want to take things a bit further, Vectronic's VEC-221K kit is a bit more expensive at \$69.95, but it includes more features and a 128 character memory. A basic keyer kit can be a great place to start your building career, AND you can use it as a code practice oscillator to develop your CW skills to come hang out with me on 40 meters.

PR100 High Performance 2 Meter Preamp Kit
\$34.95
Ramsey Electronics
590 Fishers Station Dr.
Victor, NY 14564 USA
800-446-2295
<http://www.ramseyelectronics.com>

The folks at Ramsey Electronics have been making all manner of kits available to the electronics hobbyist. They have quite a line of ham radio related kits. An example of their work is their 2 Meter Preamp kit. This simple project amplifies weak signals and cuts intermod using helical filtering and a 3 pole L-C tank circuit. It can be sealed into a piece of PVC pipe and mounted at the antenna for maximum performance. It can even be powered by a DC voltage that you run right up the coax. If your interests run toward VHF weak signal activity, this is a great first kit.

Rock Mite Transceiver
\$27
Small Wonder Labs
32 Mountain Road
Colchester, CT 06415
<http://smallwonderlabs.com>

How about a complete one band transceiver kit for less than \$30? Dave Benson

KISWL is the undisputed king of one board transceiver kits going back to his now famous NN1G 40-40, up through his current high end line of digital shortwave transceivers. The Rock Mite is a QRP ultra low power rig running 1/2 watt.

Don't be distressed by the low power; lots of fun can be had even at peanut whistle power levels. But when you realize that you can get a fully functioning transceiver with a built-in keyer for less than the cost of a night on the town, it is hard to pass up. The Rock Mite can be built in 20, 30, 40 or 80 meter configurations. When I built the 40 meter version of this diminutive rig, the rest of my radios collected dust while I had a blast with half a watt.

Never one to sit on his laurels, Dave has added another kit to the RockMite line called the HiMite. At \$32 it brings improved performance to the RockMite design for the higher (20 Meters and up) bands. See the Small Wonder Labs website for more details.

So, for 2006 I expect you loyal *MT* readers to cause a minor surge in solder production. Build something for your shack, and then come down to the bottom of 40 meters and tell me

Outer Limits continued from Page 59

Radio Pigmeat International- Pigmeat Martin has resurfaced with a new antenna and a "Grendade" AM transmitter. One test broadcast featured blues music. (Belfast)

Ragnar Radio- They have been supplementing their rock music with segments of pirate radio news lately from a variety of sources. A podcast is available via their <http://piratesweek.tripod.com/> web site. (Uses rangarradio@yahoo.com e-mail)

Take it Easy Radio- This veteran station is back. They feature rock by the Eagles and other groups, along with parody tunes. (Merlin)

The Backdoor Show- Little is known about this one yet. It features crude humor. (None)

The Crystal Ship- The Poet operates on various frequencies, sometimes apparently selected at random such as 6854, 6875, 6925, 7545, 7825, 8000, and 9057 kHz. Rock music and left wing political commentary are heard on the broadcasts. (Belfast and uses tcshortwave@yahoo.com e-mail)

Undercover Radio- Dr. Benway's rock music and drama are said to come "from the middle of nowhere." Sometimes he claims to test a mobile transmitter. (Merlin and uses undercoverradio@mail.com e-mail)

Voice of the Purple Pumpkin- This ID has been used many times for decades by pirates around Halloween. They were back again this year, also with a call letter ID of WCPL. (Announced wcplsw@netscape.net as an e-mail address; but it may not be valid)

WDVL- They specialize in the tale of Damon Rector, a ham who allegedly came back as Satan to haunt pirate radio with a "Prince of Darkness" slogan. (Uses wvdlsw@netscape.net e-mail)

Weather Radio Relay- Somebody is still relaying National Weather service VHF local forecasts for various regions on the pirate bands. The weather channel it isn't, but it certainly is unusual and interesting. (Uses weatherradiodude@hotmail.com e-mail)

WHGW- Their eclectic mix of rock music, dromos, and occasional non-voice transmitter modes makes them an unusual station. (Uses whgw@yahoo.com e-mail)

WHYP- North East, PA is still the alleged location for the James Brownard memorial station. Their comedy, rock music, and ancient Lake Erie weather reports are legendary in pirate radio. (Belfast and uses whypadio@gmail.com e-mail)

WMPR- Their "dance party" techno rock format is well known to all pirate DXers. (None, has QSLed only at the Winter SWL Festival)

WSVR- This one showed up with an elaborate Halloween drama show, only giving IDs in Morse Code. (Announced a Cherokeeental@yahoo.com e-mail address, but it is not yet known if it is valid)

UNCLE SKIP'S CONTEST CALENDAR

ARRL RTTY Roundup

Jan 7 1800 UTC - Jan 8 2400 UTC

North American QSO Party (CW)
Jan 7 1800 UTC - Jan 7 0600 UTC

Hunting Lions in the Air
Jan 14 0000 UTC - Jan 15 2400 UTC

MI QRP January Contest (CW)
Jan 14 1200UTC - Jan 15 2359 UTC

North American QSO Party (SSB)
Jan 14 1800 UTC - Jan 15 0600 UTC

CQ 160-Meter Contest (CW)
Jan 28 2200 UTC - Jan 39 1600 UTC

ARRL January VHF Sweepstakes
Jan 28 1900 UTC - Jan 30 0400 UTC

all about it. Have fun.

(Ed. Note: See also Nov-Dec "On the Bench" column on building Ten-Tec's 1254 receiver kit.)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations, especially in Europe where the value of the US dollar is plunging rapidly. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 69, Elkhorn, NE 68022; 383 Kingston Avenue, Suite 54, Brooklyn NY 11213; and PO Box 293, Merlin, Ontario N0P 1W0. Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for submitting pirate loggings with a hope that pirates might QSL are now the e-mailed Free Radio Weekly newsletter, still free to contributors via niel@icun.net. A few pirates will sometimes QSL reports left on the Free Radio Network web site, at <http://www.frn.net> on the internet.

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: John T. Arthur, Belfast, NY; Dave Balint, Wooster, OH; Kirk Baxter, North Canton, OH; Dave Balint, Wooster, OH; Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; Ralph Brandi, Middletown, NJ; Richard Cuff, Allentown, Pennsylvania; Rich D'Angelo, Wyomissing, PA; Gerry Dexter, Lake Geneva, WI; Rudy Elsen, Castro Valley, CA; Nicolas Eramo, Buenos Aires, Argentina; Harold Frodge, Midland, MI; William T. Hassig, Mt. Prospect, IL; Harry Helms, Wimberly, TX; Stanley Huxley, Belfast, NY; Terry Krueger, Clearwater, FL; Charlie Loudenboomer, Stoneham, MA; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; Pigmeat Martin, QTH Unknown; Lee Reynolds, Lempster, NH; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Bob Wilkner, Pompano Beach, FL; Niel Wolfish, Toronto, Ontario; and Joe Wood, Greenback, TN.

Factors Useful in Antenna Selection

As we begin discussing factors in antenna selection, let's review the principle of antenna reciprocity. That principle tells us that an antenna has the same basic characteristics – such as feed-point impedance, efficiency, radiation and reception patterns, etc. – whether it is transmitting or receiving. So keep in mind that statements about these antenna factors can be applied equally to both transmitting antennas and receiving antennas. By the way, because an antenna's radiation and reception patterns are identical, either pattern is often referred to simply as the "radiation pattern," or just "pattern" for short.

❖ Horizontally-Directional Patterns

If you want to communicate with or listen to stations in many different directions from your location, then an antenna with a non-directional, horizontal radiation pattern may be a good choice (fig. 1A). Antennas that might be considered here include verticals, such as the various ground plane designs and vertical dipoles. And, although horizontal dipoles have some directivity in their horizontal patterns (especially in their nulls), in practical installations these nulls are diminished. Thus, they are usually relatively non-directional.

Another choice can be a beam antenna, which allows you to direct the main lobe in the directions in which you want to communicate (fig. 1B). This choice requires that you have

time to allow the beam antenna to rotate to the desired direction between contacts with different stations. Beam rotation takes time and can slow communications down. For instance, if you are acting as a net control, this delay between "contacts" may present a problem when communicating with net members located in different directions from you. On the other hand, if you plan to work or listen in only one direction at a time and have ample time between contacts to rotate a beam antenna, then a beam with a rotator is a good choice. Beams such as the Yagi-Uda, a log periodic dipole antenna (LPDA), or one of the quads are often used in these applications.

❖ Vertically-Directional Patterns

Antennas can be designed to emphasize the vertical angle at which they radiate their waves, ranging from high, straight up angles (fig. 1C), down to low angles pointing toward the horizon (fig. 1D). For example, a quarter wavelength, vertical, ground-mounted ground plane antenna has lots of relatively low-angle and moderately high angle radiation, but essentially none directly overhead. In contrast, a half-wavelength, horizontally-mounted dipole will have relatively abundant radiation at higher angles, even directly overhead, when mounted a quarter wavelength above earth.

If this same antenna is mounted a half wavelength above earth, then its vertical radiation pattern changes to emphasize lower-angle

radiation. Beam antennas, ground plane antennas, and vertical dipoles are frequently used to obtain low-angle radiation.

On HF and lower frequencies, low-angle radiation tends to send signals skimming out over the horizon. This sends the signals on toward the ionosphere at angles which, depending on the condition of the ionosphere, can lead to the signal's reflection back to earth. This is known as "skip" propagation of signals. Multiple skips can lead to contacts with stations as distant as the other side of the world. However, if the same signal is radiated almost straight upward (as opposed to low-angle) under similar ionospheric conditions, then the signal returns to earth closer to the antenna. This facilitates HF communication within a few hundred miles of the antenna.

With VHF and higher frequencies, a low vertical angle of radiation also sends signals toward the horizon, but these high frequencies seldom produce ionospheric skip. Nevertheless, low-angle radiation is usually desirable, because it gets signals out completely to the horizon, and even a bit beyond. Higher-angle radiation at these frequencies can help a lower elevation station communicate with a station which is at a higher elevation, and for terrestrial stations working with aircraft or spacecraft.

❖ Gain and Directivity

Directivity can improve weak-signal reception at any frequency by reducing the signal strength of off-beam noise and interference.

High gain can be quite useful for weak-signal work at VHF and higher frequencies where received-noise levels are low. However, due to the higher noise levels on HF and lower frequencies, high gain by itself is not particularly useful for improving reception. On the other hand, higher gain in a transmitting antenna, at any frequency, allows sending higher levels of signal strength in the direction of the antenna's main lobe.

❖ Antenna Bandwidth

For our purposes let's say that an antenna's bandwidth is the frequency range over which it operates acceptably. Transmitted signals consist of not just one frequency, but a range of frequencies called their "bandwidth." The bandwidth of most antenna designs is adequate to handle the bandwidth of signals being sent. There are exceptions to this rule, however. For example, the bandwidth of TV signals can easily exceed the bandwidth of many common antenna designs

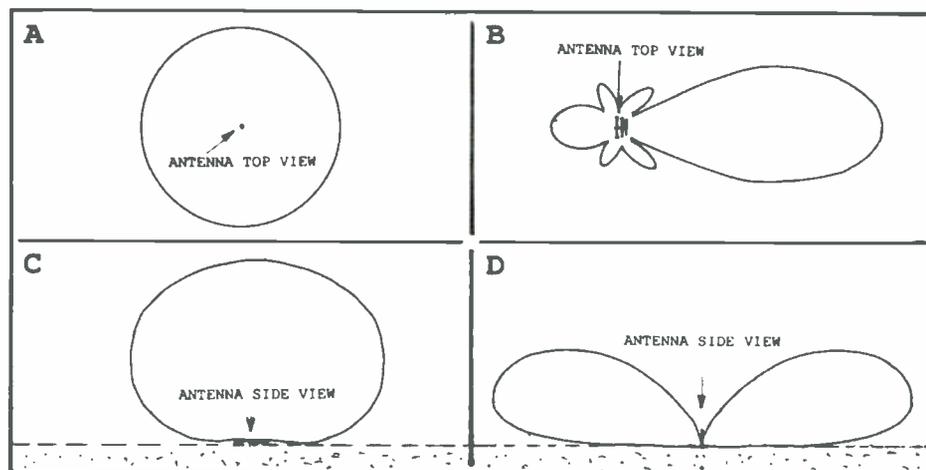


Fig. 1. Non-directional horizontal pattern of a quarter wave, vertical ground plane antenna (A), highly-directive horizontal pattern of a beam antenna (B), vertical pattern of a horizontally-mounted antenna showing abundant high-angle radiation (C), vertical pattern of a vertically-mounted antenna showing abundant low-angle radiation (D).

This Month's Interesting Antenna-Related Web site:

Through the generous efforts of Dave Platt, AE6EO, Laport's classic "Radio Antenna Engineering" is available as a free download at: <http://snulbug.mtview.ca.us/books/RadioAntennaEngineering/>.

in transmitting.

Some antennas, such as the folded dipole, function maximally over a relatively wide bandwidth. There are also antenna designs that cover very wide portions of the RF spectrum; some even cover several different bands with one antenna. Examples of the latter type include LPDAs and non-resonant rhombics. For covering multiple frequencies, with each frequency located on a different band, there are antennas such as traps and multi-element antennas.

For receiving, often the bandwidth of an antenna is not as important as it is for transmitting - particularly on HF and lower frequencies, where received-noise level, rather than signal strength, is usually the primary determiner of quality of reception. For general monitoring, bandwidth is seldom a critical consideration. Indeed, a simple wire from, say 30 to 100 feet long, will often produce decent receiving results on many HF different bands, and a simple wire a foot or more long will often work satisfactorily on VHF and UHF for many simple monitoring or scanning applications.

❖ **For More Information**

Many practical antenna designs can be

found in sources such as the *ARRL Antenna Book*, Joe Carr's *Practical Antenna Book*, Bill Orr's *Antenna Handbook*, and my own *The Antenna Handbook*. Good discussions of practical antenna utilization can be found in the antenna engineering handbooks of Jasie, revisions of that book by Johnson, and in chapters 1, 18, and 19 of my *Antenna Handbook*. Also in the free antenna engineering book featured in this month's "Antenna Related Web Site." If you're not an engineer, don't worry, because the engineering books mentioned aren't all math; they also contain some very readable, practical information.

RADIO RIDDLES

Last Month:

Last month's riddle was: "Trees are what we might call 'natural radio antennas. Are there any natural radio transmitters and/or natural radio receivers?" If you didn't read last month's column, let me say that we discussed, among other things, some reports of living trees being successfully utilized as antennas.

As to natural radio transmitters, the most well-known are the lightning bolts that generate very wide-band radio noise that is frequently referred to as "static." There are also other sources of natural, radio-noise signals such as the sun's

activity, and even some events in outer space!

As to natural radio receivers, I've read on several occasions that some people claim to pick up local radio broadcasts with the fillings in their teeth! And there are many reports of the successful use of the human body as an antenna. I've never experienced reception by my teeth, but I can't say it doesn't happen to some folks. Any of you readers out there got musical teeth?

This Month:

Above, I mentioned signals propagating a bit beyond the horizon. Wouldn't they have to bend to do that? And, no, they aren't reflecting as skip signals do. Text books tell us that radio waves travel in straight lines. What's going on here?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

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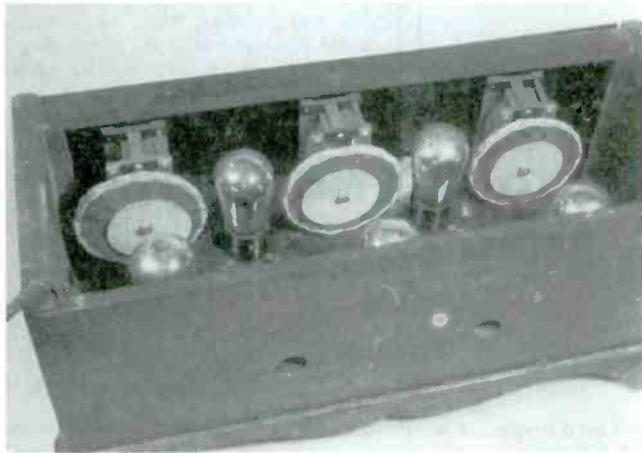
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The TRF circuitry required the use of three r.f. coils, each tuned by a separate variable capacitor.

interfere with reception all over the neighborhood.

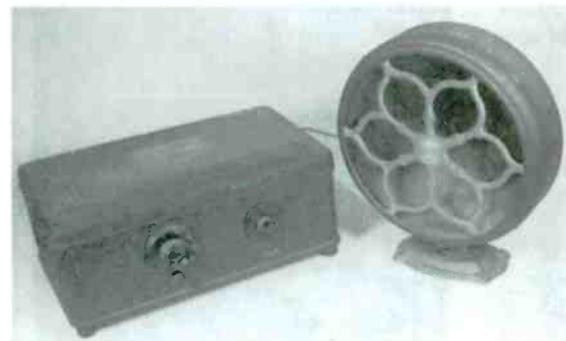
Another advantage of the TRF over the regen turned out to be those extra tuned circuits that were needed to bring in the signal. They happened to provide extra selectivity that became very desirable as the broadcasting industry expanded and the radio dial became more crowded.

But, while the one-tube regenerative sets could be operated from a few dry batteries, the five-tube (or sometimes more!) three-dialers required much more power – particularly to light their filaments. Power to light the row of glaringly bright 01-A tubes usually came from a rechargeable auto-type 6-volt battery. Plate and grid bias (as necessary) voltages generally came from dry batteries as before – though more and larger ones were required.

And so, the coffin-shaped three-dialer with its horn speaker, external batteries, and tangle of interconnecting wires began to dominate the living rooms of comfortable middle-class homes. For awhile, the equipment was enough of a status symbol to overcome the disadvantages of its “Frankenstein’s Laboratory” appearance and the damage to carpets and floorboards from accidentally spilled battery acid. But towards the end of the decade, this approach to radio reception had become obsolete.

The First Plug-In sets

The expense and inconvenience of dealing with multiple heavy batteries stimulated radio



Towards the end of the 1920s, plug-in TRF receivers with simplified front panels replaced the three-dialers. Cone-type speakers replaced the horn models.

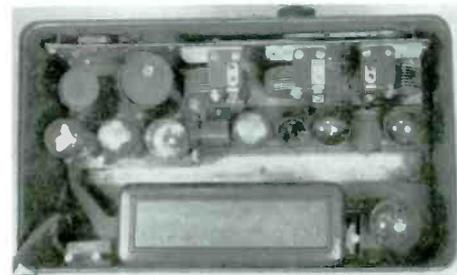
inventors and manufacturers to come up with alternatives. The first response was the development of “battery eliminators.” These were plug-in units that took the place of batteries in battery sets.

Most common were the “B eliminators” that replaced the dry batteries that supplied the various plate voltages.

Also available were the more bulky and expensive units that replaced the storage “A” batteries that lit the tube filaments.

Though this equipment eliminated the necessity for replacing and/or charging batteries, it didn’t improve the aesthetics of the parlor radio corner. They sat under the table in place of the batteries and were connected to the radio by the original tangle of wires.

But by the end of the 1920s, significant electrical and mechanical innovations had dramatically upgraded the convenience and appearance of the living-room radio. The development of vacuum tubes that could be lit by alternating current made it possible to power radios directly from the a.c. line, using compact circuitry that could be built right into the radio cabinet. And methods of ganging tuning capacitors via belts and pulleys made it possible to replace the three tuning dials with a single one.

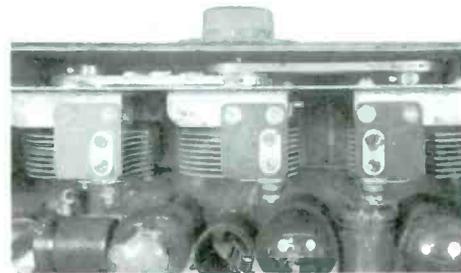


The power supply (bottom of picture) for one of the new plug-in sets was compact enough to be mounted within the receiver cabinet.

Gone, too, were the control knobs used to keep filament voltage constant as the “A” battery slowly became discharged. The filaments were now operated from constant voltages derived from the city mains. The radio panel which formerly bristled with tuning knobs and rheostats now required only three controls: on-off, tuning and volume.

The old three-dialers were relegated to the attic or basement, replaced by new sets with a squarer footprint to accommodate the built-in power supply and (usually) a metal cabinet instead of wood. The latter change was probably prompted by the need to better dissipate the heat from the internal power supply circuitry.

When we next return to this subject,



Single-knob tuning was accomplished by having the knob drive all three variable capacitors through a system of belts and pulleys.

we’ll take a look at the changes that transformed the appearance of the household radio from that of a piece of laboratory equipment to something much more at home in the family living room.

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Take Your Scanner Recording to the Next Level The iRiver H300 Series MP3 Recorders

By Bill Prudhomme, KF5PQ

Recently, one of my clients contacted me with a challenging project: he needed a way to store over 50 hours of audio on a standard 80 minute CD. As the owner of a recording business, he travels around the country taping presentations at industry conferences and then sells copies of the audio cassette tapes to attendees. Although sales are good, it's a labor-intensive process to duplicate the 40 to 50 cassette tapes from each conference. And to make matters worse, many of his customers are now asking for CDs instead of tapes. This adds yet another step in the duplication process.

Desiring to keep his customers happy, he contacted me to help him set up a system to convert his analog audio tapes to a CD format. Not a difficult task to accomplish. I thought to myself. However, the ringer was that he wanted to offer an entire conference on one CD! Now he had my attention.

Taking temporary leave of my senses, I accepted the challenge and we went to work on finding a solution to his dilemma. The only two storage methods we considered at the time were: an audio CD (similar to music CDs that can be played in CD players and computers) and a data CD (sometimes referred to as a CDRom) that can be played only on a computer. As you will see, each format has its own advantages and disadvantages.

Audio CD Format – The audio CD format has several advantages: it's been around for a while, it is universally accepted, and it can be played in both CD players and computers. However, it does have a downside. Since it was originally designed for high quality, uncompressed audio, it requires lots of storage space. For this reason, only 70 – 80 minutes of CD quality audio can be stored on a typical audio CD. Using this format would require multiple CDs when conference sessions or audio streams lasted longer than 80 minutes. Also, since the application only required voice grade quality, we rejected the audio CD format and moved on to the next available choice – a data CD.

Data CD Format – The advantage of data CDs

is that more audio can be stored on a single CD using a compressed format such as the popular MP3 format (see the definition in the Sidebar). After a little research and some experimentation with compression settings, we discovered we could actually store over 50 hours of voice grade audio on a standard CD (see the chart in Fig. 1). Using this format, it is possible to store an entire 3-5 day conference on a single CD. On the downside, however, data CDs (CDROMs) can be played only on a computer – not too portable, some would say. However, this is no longer an issue if you consider that MP3 files can be downloaded and played on portable MP3 players. In fact, MP3 players are gaining in popularity and are steadily replacing tape and portable CD players as the audio player of choice.

❖ Going Digital All the Way

The next phase of the project was to determine the best way to record the conferences directly to a digital format and eliminate the labor and time required to convert each analog tape to digital format.

At most conferences, it is necessary to record several sessions simultaneously. For this reason and for traveling light, we concluded that it would not be practical to record the sessions with multiple computers in the field. Instead, we took advantage of technology made popular by the music industry in which MP3 music files are stored and played on portable MP3 players like the Apple iPod.

Although most of the products on the market today are players only, we were able to locate several MP3 devices that also have recording capabilities. After reviewing a few, we finally settled on the iRiver H320 recorder based on its features, storage capacity, and price. This little unit (see fig. 2) is about the size of a pack of playing cards and features an internal 20 GB hard drive, line in/out connections, and an easy to read color display.

Now, instead of traveling around with a trunk full of analog tape recorders and blank cassette tapes, my client can carry half a dozen portable MP3 recorders in his brief case with

enough capacity to record 10-15 conferences before running out of storage space. The bonus is that his profits are up and his labor costs are down. He has replaced the labor intensive cassette duplication and shipping process with an all digital, efficient operation. With this system, he is able to store an entire conference on one MP3 CD rather than the 40-50 cassette tapes it required previously.

❖ MP3 Applications

After this project was completed, the thought occurred to me that the MP3 recorder would be a great replacement for cassette recorders currently used to record shortwave broadcasts and scanner audio. In fact, I liked the iRiver H320 unit so much that I purchased one for my own use. As you will see in this article, the iRiver H300 Series units have a voice activated mode which is great for scanner recording, and they can even double as backup storage for your computer.

In the H300 Series, iRiver offers two models: the H320 (20GB) and the H340 (40 GB). Both have the same operating features – the only difference being the capacity of the internal hard drive. Since both models have similar operating features, this article will be a basic review of the H300 series. We will cover potential appli-



Fig. 1 - MP3 COMPRESSION COMPARISON TABLE

SAMPLE RATE	DATA RATE	NO. OF CHANNELS*	COMPRESSION RATIO	HOURS/ CD	STORAGE per HOUR
44.1 kHz	80 kbps	Mono	6:1	20 hrs	34.8 MB
44.1 kHz	56 kbps	Mono	9.1:1	29 hrs	24.0 MB
44.1 kHz	48 kbps	Mono	10.7:1	32 hrs	21.6 MB
44.1 kHz	32 kbps	Mono	15:1	49 hrs	14.1 MB
44.1 kHz	8 kbps	Mono	64:1	195 hrs	3.6 MB

* Stereo will require twice the data rate (i.e. twice the storage) as mono recording. The sample rate does not affect storage requirements, so 44.1 kHz is recommended for compatibility.

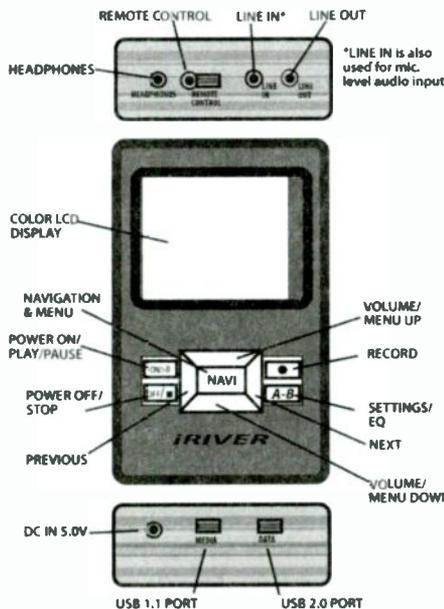
MP3 Definition

The name is derived from the Motion Picture Experts Group: MPEG-1 – Audio Layer 3, more formally known as “MPEG-1 Part 3 Layer 3”. MP3 is a popular digital audio **encoding** and **lossy compression** format. It was designed to greatly reduce the amount of data (10:1 compression is common) required to represent **audio**, yet still sound like a faithful reproduction of the original uncompressed audio to most listeners. In popular usage, MP3 also refers to **files** of sound or music recordings stored in the MP3 format on **computers**. (Ref: wikipedia, the online encyclopedia).

cations, initial setup considerations, and how to use the H300 to record your favorite radio program.

(Note: After this article was written, iRiver replaced the H320 model with the H10 which, unfortunately, is a player only and does not record audio. However, iRiver still supplies the higher capacity 40 GB H340 model recorder “as long as supplies last.” In this article, ‘H300’ refers to either the H320 or the H340).

If you are not familiar with MP3 recorders, here are some possible applications to consider: data storage and backup, program time shifting (See the excellent article “Time Shift Your Listening” by Richard Cuff – MT September 2004), conference recording, and scanner recording. In addition, you could take it to an air show and with your scanner and MP3 recorder clipped to your belt, record the air traffic conversations. The same goes for auto racing events. Although I could accomplish the same with a bulky tape



recorder, I now prefer the smaller, lighter, MP3 recorder. If you are an audio book fan, you could transfer your audio book files to your MP3 player/recorder and listen to your favorite book while you work around the house or yard.

As an added feature, some MP3 portable recorders (including the iRiver H300 series) can be used to store and view images, text: files, and even video. It is so versatile, I am sure more applications will become apparent in the future.

❖ iRiver H300 Series

The iRiver H300 series delivers good sound

and advanced features in a fairly small package. It features an easy to read LCD color display, fast USB 2.0 data transfers, multiple audio formats, and a built-in FM tuner. This last feature, although originally designed for music lovers, can be used in conjunction with a small FM transmitter to allow you to record audio without a physical connection to the source. Additional features include a rechargeable lithium polymer battery providing up to 16 hours of operation per charge, and you can keep the unit's operating system up-to-date through firmware upgrades.

Although a more complete list of features and specifications may be found in Fig. 3, here are some features unique to the H300 that make it ideal for scanner recording applications:

- Line In For Line Level audio input (also used for Mic. Level audio input)
- Line Out Allows Line Level monitoring of audio while it is being recorded
- Audio Tracking Voice activation (pauses recording when audio is not present)
- Internal Mic..... Built-in microphone for recording conversations, personal notes, etc.
- Ext Mic. Uses the Line In connection for Mic Level audio input
- Built-in FM Receiver... May be used for recording audio without a physical connection
- Hold Switch..... A slide switch on the side of the unit that locks front panel buttons to prevent accidental changes to settings

AOR LA380

Wideband Active Loop Antenna

The LA380 is a compact active (1 foot diameter) loop antenna specifically designed to provide good reception when away from the main monitoring location or when large external antennas are not practical. Compact, but achieving high performance, it features an internal high-gain amplifier (20dB for 10kHz-250MHz) and excellent overall strong signal handling (high IP3 + 10dBm).



LA380 vs. its predecessor LA350

With similar performances, the LA380 has the following advantages:

- Wider frequency coverage (10kHz-500MHz). The LA350 only covered 200kHz-30MHz.
- Full frequency coverage (10kHz-500MHz) with a single receiving element! The LA350 needed 4 different elements.

Specifications:

Supplied Accessories: 120 V AC power supply, BNC-BNC coaxial cable, Instruction manual
 Frequency range: 10kHz - 500MHz
 Impedance: 50 Ohms
 Power requirements: External 12V DC (9-15V), approx. 50mA.
 Connector: BNC
 Weight: Approx. 1.2lbs without accessories
 Cable: 3.3 feet RG58A/U (BNC connectors)

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Fig. 3 - H320 SPECIFICATIONS

HDD Capacity: 20 GB (H320), 40 GB (H340), FAT32 (Up to 600 hours at lower bit rates on H320) (Up to 1200 hours at lower bit rates on H340)

PC Operating Sys: Windows 98SE/ME/2000/XP

Audio Specs

Frequency: 20Hz - 20 kHz, +/- 2 dB
Headphone: Left/Right 20mW into 16 ohms
SN Ratio: Left/Right 90 dB (MP3)

Audio Formats

File: MP3, OGG, WMA, ASF
Bit Rate: Playback: 8kbps to 320 kbps
Record: 40 kbps to 320kbps
OGG: 32kbps to 500 kbps

File Formats

Audio: MP3, OGG, WMA, ASF,
Graphics: JPG, BMP

FM radio

Channels: Two (stereo)
Frequency: 87.5 to 108 MHz
SNR: 50 dB

Earphone/Antenna

Power Supply

AC Adapter: DC, 5.0 V @ 2A
Int Battery: Lithium Polymer

Battery Playback Time

MP3: 16 hours (44kHz/128kbps/Volume 20/Normal EQ)

External Connections (Top)

Line In (Is also used for Ext Mic Input)
Line Out
Remote Control Jack
Headphones

External Connections (Bottom)

DC power Input
USB 1.1 (media)
USB 2.0 (data)

Warranty Period

One Year

When the unit is connected to a PC's USB port, the unit functions only as an external hard drive and consequently, the front panel controls are disabled).

Connecting External Devices - The next step is to physically connect the H300 to an audio or data source. There are five connectors for getting audio and data in and out of the H300: three 1/8" stereo jacks (Line In, Line Out, and Headphones) for analog audio and two USB connectors for data (USB 1.1 and USB 2.0). The USB 1.1 port is labeled "media" and the USB 2.0 port is labeled "data".

Audio In/Out - In order to record from either a line level or mike level audio source, connect the audio source to the Line In jack using the supplied cable. This is a stereo connection, so if your source is mono, you will need an adapter to convert the mono signal to a stereo connection. Level adjustments are handled through the display and front panel buttons. To monitor the audio being recorded, connect powered speakers to the Line out jack or listen with headphones connected to the Headphone jack.

Data In/Out - It's also possible to transfer audio files (or any type computer file for that matter) in and out of the H300 using the USB connections. To transfer data files in or out of the H300, it is necessary to connect it to a computer through the USB port. Except for data transfer speed, both USB ports on the H300 operate identically. Since most computers now have USB 2.0 ports, this is the preferred connection. Once connected to the computer, the H300 display will indicate "Data Connection" and on the computer, it will appear as an additional hard drive when the "My Computer" icon is clicked. You can move files back and forth, rename files, or delete them just as you would with a standard hard drive in Windows. Except for Windows 98SE, there is no software to install - just plug and play.

Recording - The H300 can record audio from one of four sources: the internal microphone, an external microphone (connected to Line In jack), an external line level audio source, or the built-in FM tuner. Although the FM tuner was originally included for listening and recording FM broadcast stations, it's possible to use it for recording from any source without a physical connection. Just connect your audio source to any local FM transmitter (the type used to listen to MP3 players on car audio systems) and set it to a clear channel. Then tune the FM receiver in the H300 to the same frequency. You can then record on the H300 without a direct connection.

With a little thought, you will probably come up with all sorts of applications for this feature.

Settings - Since there are a limited number of front panel controls, the designers of the H300 employed some creative techniques to make each button serve multiple purposes. One technique is the length of time each button is pressed. A brief press may result in one function, while pressing and holding a button will produce an entirely different result. This takes a little getting used to, but once you learn the functions, it's fairly easy to navigate around the H300.

Playback - Listening to recorded audio is fairly easy with the H300. For portable operation, just plug in a set of headphones, use the front panel buttons to select the files you want to listen to and enjoy. Alternately, at a fixed location, you could connect a set of powered speakers to the Line Out connector and listen at room volume. Audio quality is very good and depends on the sample and bit rate of the recording.

Conclusion

The iRiver H300 series MP3 recorder/player is loaded with features and is a quality unit that will find many applications. It should be apparent to everyone by now that the days of the audio cassette tape recorder/player are numbered, just like the DVD units are replacing video cassette recorders (VCRs).

In spite of its many features, there are still a couple of features I would like to see in future models. It would be nice if it displayed record levels to facilitate setting the audio levels before and during recording. Second, I wish the designers had included an audio buffer to capture the incoming audio stream while the hard drive gets up to speed in the voice activated mode. Although you can set the length of time (from 1 to 10 seconds) it continues to record after the audio ends, it still misses the first 1-2 seconds of audio upon initial voice activation.

However, even with these minor deficiencies, the iRiver H300 Series MP3 recorders are still a great addition to your audio toolkit when you consider all the features packed into these small recorders.

Where to Find Additional Information

iRiver:

support@iRiver.com

1.800.399.1799

www.iRiverAmerica.com

Fraunhofer (MP3 format originator):

<http://www.iis.fraunhofer.de/amm/te-chinf/layer3/index.html>

Wikipedia (Online Encyclopedia Info on MP3):

<http://en.wikipedia.org/wiki/MP3>

❖ Getting Started

The following is a brief description of how to use the H300 to record and play back audio from any source: scanner, shortwave receiver, etc.

Powering Up - To use the H300, it will be necessary to power up from one of three sources: the internal battery, a powered USB port on a desktop or laptop computer, or an external ac adapter. The internal battery may be charged by the powered USB port or by plugging in the ac adapter. When power is initially supplied, either from the ac adapter or the powered USB port, the H300 goes directly into its charging mode and indicates this on the display. To postpone charging the battery and switch to record/playback mode, briefly press the ON/▶ button on the front panel. (Note:

MT

REVIEW

Hot and Cold Radio Appliances

By Ken Reitz

You only thought program content on America's radio stations couldn't get any more crummy. Behold: Toaster Radio. Yes, it's a rage sweeping the country, well, at least the mail order catalogs. "...features include multiple toast settings, including bagel, and thaw, built-in cord storage, slide-out crumb tray and antenna." The Radio Toaster is available in FM only from Cooking Enthusiast (<http://www.CookingEnthusiast.com>) for only \$59.99. But, wait! You want FM *and* AM *and* a CD player? Got it! Check out Target's RCA "Vintage" Toaster Radio, but, you'll have to pay for all the extras: \$129.99!

morning with a bagel in one hand and a CD in the other. Which goes in which slot? And, which will last longer: the radio part or the toaster part? If the radio part lasts longer, won't you have to get another toaster? If so, will you spring for another toaster radio? I didn't think so.

Now, this is not the first time that radio manufacturers have teamed up with appliance makers for a potential sales combo. Anyone remember the Radio Lamp? Circa 1930s, the Radio Lamp Company of America was knocking out these art deco beauties (see photo). They featured a very decorative table lamp in gold and ivory and at the base a beautiful, modern, AM radio. There was also a floor model! But, this concept didn't make much of a splash and the Radio Lamp

Company of America seems to have quietly disappeared, leaving very few of their products to change hands at the auction block.

Finally, here's something which might actually have a future: the cooler radio. An AM/FM radio with jack for an MP3 or iPod player built into a cooler. Radio clubs and radio related companies might enjoy the chance to create their own "radio collectible." Branders.com is a company which will put your radio club or company logo on a 17" x 20" nylon cooler (see photo). The radio part features front fired speakers and jack for your MP3, iPod or CD player. Prices start at \$53.31 for a minimum order of 12, but, if you think you can sell 94 of these little gems, the price drops to \$37.49 each! For more information call 877-272-6337 or visit <http://www.branders.com>.



The Cooking Enthusiast catalog offers this no-frills Toaster Radio for just \$59.95. Sorry, no CD player, however, there are six thermostat settings and toast slots wide enough for bagels. (Courtesy: CookingEnthusiast.com)

It's hard to imagine the inspiration which led to the toaster radio, but it's easy to imagine some sleepy-eyed consumer staggering around in the kitchen early in the



This "Vintage" RCA radio is Target's Toaster Radio features a new-fangled LCD display. It tunes AM, FM and has a full functioning CD player built-in. It's pricey (\$129.99) but the DX is hot! (Courtesy: Target.com)



Radio Lamp Company of America built this beautiful art deco lamp in the 1930s. It featured a radio built into the base. (Courtesy: Museum of Radio and Technology).



Your own radio club logo could be on this 17" x 20" drink cooler which features an AM/FM radio with MP3 and CD plug. It's perfect for your next DXpedition! (Courtesy: Branders.com)

(MT Reviews continued on page 71)

LOOP ANTENNA



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Alinco's DJ-X7T: Big Radio in a Tiny Package

By Jim Clarke NR2G

jimclarke@monitoringtimes.com

The Alinco DJ-X7T is a hand-held wide-band communications receiver. It's about the size of a pack of cigarettes – 100's, that is – but only half as thick. Frequency coverage for the US 'T' version is 0.100-1299.995 MHz, with cellular blocked, of course. The modes of reception are AM, NFM, and WFM.

Ergonomics

Five buttons on the front-panel, two on the left side, and one multi-function knob on the top, referred to as the "dial," facilitate listener input to the X7T. Settings are changed using the buttons and/or dial directly, executing function-key sequences, or scrolling through a parameters-menu using the dial. Don't be fooled by the quantity of controls: there are plenty of features built into this little radio.

Small size and weight – less than four ounces – makes it easy to carry in your shirt-pocket without feeling or looking like you're walking around with a brick in your pocket.

The display measures about 0.5" X 1.5" and is backlit from the bottom by three green LEDs.

A front-panel speaker that is approximately 1" provides sound on the X7T. Acceptable audio levels can be achieved without any appreciable distortion as long as you are in a fairly quiet area. If the background noise is moderate or higher, using the earphones would be a better choice.

Tuning

The X7T has three frequency modes, selected by using the front-panel V/P/M button: VFO mode, factory-preset mode, and user-programmed memory mode.

In VFO mode, the dial changes frequency according to the user-specified, or automatically selected, step-size. Pressing the 10M/1M button scrolls through 10 MHz steps, 1 MHz steps, and the manually/automatically selected step size. The 10 MHz and 1 MHz steps are not persistent; after a few seconds it returns to the previously selected step size.

In factory-preset mode, the dial selects frequencies, or channels, based on the band in use. The three bands for the factory-preset mode are: AM radio (0.531-1.620 MHz), FM radio (88.1-107.9 MHz*), and TV (channels 1-62). The operator changes bands by pressing the BAND button repeatedly until they have selected the desired band. I didn't find anything in the manual specifying the ranges for each of the bands, nor did I find a frequency list to correspond to the TV channels.

In user-programmed memory mode,

the dial selects channels within a bank. The X7T features 1000 memory channels divided into 10 banks of 100 channels. Banks 0-9 are selected by repeatedly pressing the BANK button until the desired bank is selected. By using the free software available from Alinco, the number of banks can be increased to 50, but that will reduce the number of channels per bank to 20, since channels are limited to 1000. Settings (other than frequency and mode) that are stored to a memory channel are shift frequency, shift direction, CTCSS tone frequency, tone squelch setting, scrambling frequency, and scrambling decode number. A Write-Protect function allows the user to protect the contents of memory against accidental deletion or over-write.

Another feature that, technically, tunes the radio, is Priority Monitoring. There are 10 channels specifically set aside for priority frequencies. When the Priority Monitoring function is enabled, every 5 seconds the receiver switches to the selected priority channel for 0.5 seconds and, if no signal is detected, returns to the original frequency. If a signal is detected, the receiver will stay tuned to that channel for 5 seconds, then return to the original frequency.

Scanning

Other frequency selection methods include four scanning options: VFO Scan, Programmed Scan, Preset Scan, and Memory Scan. Scanning stops upon detection of a signal and can be set to resume with either a timer or loss of signal. The direction of scan can be changed at any time during scanning, by rotating the dial in the opposite direction.

The VFO Scan steps through channels using the currently selected step size, in the direction corresponding to dial rotation.

Programmed Scan sweeps between two user-programmed frequencies; the X7T has memory allocated for 50 such pairs of start-stop frequencies.

To aid VFO and Programmed Scan, Alinco has provided a bank of 100 "skip-search" channels that the user can populate with frequencies they want to avoid while scanning.

Memory Scan mode checks each user-programmed memory channel in a selected bank, banks that the user has linked beforehand, or all banks.

Tone Modes

The X7T can be set to open the squelch only when a received signal contains one of the CTCSS sub-audible tones. And, if you don't know the CTCSS tone frequency of a received signal, you can use the Tone Scan function to determine what tone is being used.

Descrambler?

Sorry, not in the 'T' version, but for those able to get the 'E' version, there is a built-in analog-inversion voice descrambler.

Frequency Shift

Frequency Shift is a feature found mainly on amateur radio transceivers. Once a shift has been entered, whenever the user presses the SHIFT key, the receive frequency is changed according to the shift and remains there as long as the button is held down. If the receive frequency was the output of a VHF repeater and the shift frequency set for the input shift for the repeater, the operator can quickly check the signal at the input of the repeater with the press of a button.

Antenna Flexibility

The X7T has an interesting selection of antenna options. There are three antennas available: the antenna you connect to the SMA connector, an internal bar antenna, and the headphone cord. Both AM and shortwave have the internal bar antenna available. This setting is changed in the parameters-menu and allows the bar to be enabled or disabled for either AM or shortwave independently. If the bar is disabled, the radio uses one of the two remaining antennas, which is also set using the parameters-menu. In this case, the choice is enabling or disabling the SMA antenna jack. When the SMA is disabled, the radio uses the headphone cable for an antenna.

Other Miscellaneous Features

In addition to items previously described, the parameters-menu allows the user to set backlight brightness, automatic power-off, battery-save, key-touch beep, received-signal bell, monitor/mute mode, 'MONI' button mode, and modulation mode.

Cloning functionality is also built-in to the X7T.

Power

Power is provided to the X7T by a small, removable, 3.7 Vdc, 600 mAh lithium-ion battery. There is provision for external power, by plugging 3.7-6.0 Vdc into the power/charger socket on the right-hand side of the radio.



What's in the Box?

The X7T comes with the Li-Ion battery, an AC adapter for power and simultaneous charging, a 4-inch SMA "ducky" style antenna, a curly-cable earphone, an SMA jack-cap, and the instruction manual.

How does it play?

I normally don't get my hopes too high when I use radios in this class, so I tried to approach this one with an open mind. Hopefully, as time goes by, that stereotype will diminish as the physical limitations that affect performance are overcome.

I started my "field testing" with some casual listening on the AM broadcast band. Using the built-in bar antenna, reception was very good as I tuned into some local radio stations, where the bar's bi-directional characteristics were quite noticeable. Audio was acceptable, given the mainly talk-radio station formats.

Next I tried some afternoon shortwave reception. At first, I used the built-in bar antenna, but that yielded virtually no reception. I then tried the earphone antenna, which did provide some signals, but their signal level was poor; see Table 1 for sensitivity measurements. Then, just for grins, I hooked up my 500-foot loop-skywire to the SMA jack. Let me tell you, that certainly made things come alive, but, unfortunately, it also overloaded the front-end. Numerous "phantom" signals were heard on 15 MHz while tuned to WWV, and the only way to make them go away, aside from changing to a smaller antenna, was to enable the X7T's 20 dB attenuator. That fixed the overload problem, but didn't leave a whole lot of signal to

Table 1. Receive Sensitivity

AM 10dB (S+N)/N, FM 12 dB SINAD			
Freq (MHz)	Mode	Level (uV)	Specs(uV)
1 AM	2.65	1.0	
5 AM	1.4	1.0	
10	AM	0.9	1.0
15	AM	0.8	1.0
20	AM	0.8	1.0
25	AM	0.8	1.0
54	NFM	0.2	0.25
179	NFM	0.23	0.25
449	NFM	0.14	0.25
900	NFM	0.12	0.5

be detected.

Tuning around, it sounded like the selectivity was a little on the wide side, exhibiting a fair amount of adjacent channel interference in the shortwave broadcast bands. So, looking to try another antenna, I connected my roof-mounted 26-1300 MHz discone. Well, overload was less, but still required the attenuator, and, once again, the desired signals took a pretty good whack with it enabled. An antenna preselector or smaller antenna would fix this problem.

Reception in the VHF/UHF range was average, typical for a radio in this class. Continuing to use the discone, I was able to receive more than one NOAA weather radio station, which, by the way, not every radio I hook up is capable of. Another good check is the county sheriff's dispatch - which isn't always a given at my location - with the results being about average.

FM sounded reasonable, with the audio favoring the high side, even with a set of headphones.

Final Thoughts

The quest for smaller and smaller handhelds that do more and more, for less and less, continues with Alinco's new DJ-X7T. Unfortunately, small size, high-performance, and low-cost are attributes of a receiver that are always in contention. I don't know about you, but I can't wait until we get the performance of a DSP tabletop receiver in a package the size and price of the X7T. While the X7T is not a high-end performer, it does fair job, with a decent collection of features in a very small package, and for a reasonable price.

I found many websites advertising the DJ-X7T, with prices ranging anywhere from \$170 to \$200, so shop around before you buy.

For more information, visit the Alinco website at <http://www.alinco.com/usa.html>.

**In our review model, the FM radio range matched the Japanese FM broadcast range of 76.1-89.9 MHz, not the US range. I verified that I was, in fact, holding a USA 'T' model, and also checked the manual for a key sequence to change FM radio frequency ranges, but found none. Apparently this is an error which appears in the first runs of the X7T.*

The error was corrected in later manufacturing runs, but if you find you have a model with the incorrect presets, it can be corrected by cloning it from an X7T with the correct US bandplan, and your dealer should be able to help you.

The DJ-X7T is also available from Grove Enterprises (<http://www.grove-ent.com>; 1-800-438-8155; 7540 Hwy 64 West, Brasstown, NC 28902) for \$179.95 plus shipping

MT



REVIEW

AOR LA380 Active Loop Antenna

By Bob Grove W8JHD

Loop receiving antennas have the advantage of providing highly-directional signal response, useful for both determining bearings of arriving signals and nulling interference from specific directions. They are not capable of handling transmitter power.

Active antennas are electrically-small elements attached to preamplifiers to provide gain in lieu of capture area. They are usually confined to lower frequencies, below 30 MHz or so, and are useful alternatives to much larger, passive antennas like dipoles and verticals.

AOR has erased that limit with their release of the LA380, a compact, active loop antenna with unusually wideband performance - 10 kHz-500 MHz.

Its internal preamplifier provides 20 dB gain and offers excellent overload immunity from strong signals; it has a very respectable third-order intermodulation (IP3) figure of +10 dBm.

Where competitive loop antennas require separate plug-in antennas for different frequency ranges, the LA380 uses just one permanent ele-

ment, the 12" loop with a BNC connector at its base.

A five-position band switch is used to select specific frequency ranges, fine-tuned by a variable capacitor. A 60 kHz setting is for WWVB standard time/frequency reception; 3-10 MHz for nighttime shortwave monitoring; 9-40 MHz daytime shortwave and low-band FM communications; a single position for both 60 kHz-3 MHz and 40-500 MHz; and lastly, a 40 kHz position intended for Japanese time signals.

Power is provided by the supplied AC wall adaptor (12 VDC @ 50 mA); while no provision is made for internal battery operation, an external supply of 9-15 volts may be substituted by the user if minimum power-line interference is an issue.

The LA380 is intended for indoor use only; it is ruggedly built, but without weatherproofing, and its controls must be manually operated with band changes. If desired,

the loop may be removed from the control box and suspended in a window frame, connected by a 3.33' length of BNC-fitted coaxial cable (included). For longer separations, the user may provide another length of cable.

❖ Our Test

The LA380 was connected to a wideband receiver and tested through all its frequency ranges. It provided crisp, hum-free reception. Tuning was sharp and gain was excellent, equally the response of a much larger passive antenna.

Construction is very professional, not the familiar home-brew look of many loops made for the hobby.

The AOR LA380 is available from Grove Enterprises for \$369.95 plus shipping. For orders, call toll-free (800) 438-8155, or email order@grove-ent.com.



Using Bandmaster with your Icom Receiver

This month in *MT* a revolutionary program, Bandmaster, is reviewed in our feature section. This program allows the user to "see," in *real time*, exactly what shortwave ham stations are being monitored around the world. As they are reported to your computer via the Internet, the active frequencies scroll down your PC's screen. Bandmaster can sort the reporting stations by relative distance to your monitoring location. Then with just a click on any of these active frequencies, Bandmaster tunes the user's radio to that station. Very cool. That is, if your radio is supported by Bandmaster.

Unfortunately, since Bandmaster's target audience is hams, it supports ham transceivers. This month we'll show you how you can enjoy Bandmaster with your Icom receiver. Don't fret. We'll do it with the least possible math and programming jargon. Don't expect rigorous analysis, just simple basics.

❖ Omni Who?

Bandmaster is composed of a number of separate programs. The receiver control part of Bandmaster is actually performed by a program named OmniRig. You can download OmniRig and all of the support programs we will use from <http://www.dxatlas.com/OmniRig/OmniRig-Setup.exe>

The key to controlling a radio is the ".ini" file. Each supported radio has its own named ".ini" file. So our goal will be to write an ".ini" file for our Icom R75. We need to understand the structure of OmniRig's ".ini" file. The full details of these files can be found in a file included with the OmniRig package called, "Rig Decrip File Structure.txt".

Let's cheat a little and look at an existing Icom radio ".ini" file. These files can be read, edited and saved using Windows Notepad.

❖ Learning From the IC-7800

Opening IC-7800.ini with Notepad, five distinct sections are easily recognizable. Now, remember that OmniRig is designed for transceivers, with both receiver and transmitter functions. Therefore, for our receive-only receivers we will not need all of the sections.

If we look at the second section "set frequency," Figure 1, we can see that each group within the sections starts with a cryptic word in square brackets. These are radio parameters that OmniRig can control. A list of these parameters found in the "Rig Decrip File Structure.txt" file is shown in Figure 2. Many of these parameters we will not use for the R75, since they refer to

transmitter commands. Other parameters are for functions not found in the R75, such as two VFOs, A and B.

❖ Look Closer

Notice that some lines in Figure 1 start with a semicolon. These are comment lines and are ignored by OmniRig. The programmer can add, delete, or edit these lines without worry. They are very useful for describing what each line is doing in plain English for later analysis.

Also note in Figure 1 that if a parameter is used, it is usually followed by four non-semicolon lines: Command, Value, ReplyLength and Validate. We'll take them one at a time.

```
[pmFreq]
Command=FEFE6AE0.05.0000000000.FD
Value=5|5|v|BcdLU|1|0
ReplyLength=17
Validate=FEFE6AE0050000000000FD.FEFE06AFBFD
```

Radio Parameter:

Using Figure 2 we can see that [pmFreq] controls the operating frequency.

Command:

Here is where we get into the Icom C1-V programming protocol, but not too deep.

If we study Icom's data format, available on their website or in the R75's *User's Manual*, we can make sense of this line. Let's look at the Command line a few characters at a time.

The first four characters, FEFE, tell the radio that data is about to be sent. Every Command line must start with FEFE.

The next two characters in position five and six give the address code of the receiver. Each Icom radio has a factory-set unique address. As can be seen from this line, the IC-7800's address is 6A. The R75's default address is 5A. The combination of a number and a letter indicates that this is expressed in hexadecimal, base 12. You don't need to worry about any bases.

The next two characters occupying positions seven and eight are the default address of the controller. In Icom talk, this is always E0. Decimal point separators are used for convenient reading.

Edit, Don't Create

Remember, we are going to cheat. As someone said, "You don't have to know how a watch works to tell the time." Therefore, let's go light on the details and define a step-by-step procedure for modifying an existing rig file to give your Icom receiver *basic* control functions.

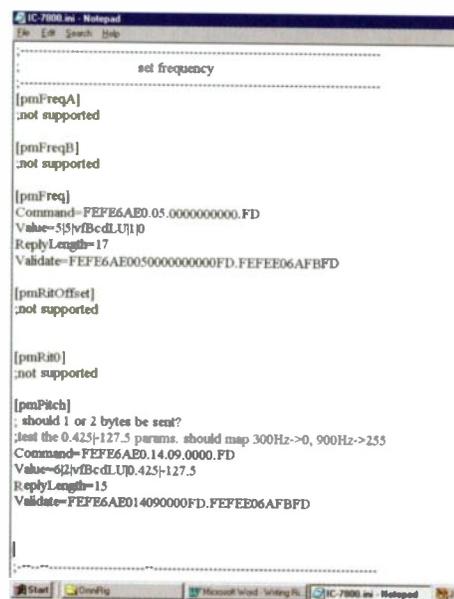


Figure 1 – The "set frequency" section of OmniRig's IC-7800.ini Control File. Note the square bracket "Commands"

1. Go to the "OmniRig\Rigs" subfolder and click on the IC-7800.ini file.
2. Look through the IC-7800.ini file using your Notepad.
3. Completely delete any section(s) not totally applicable to your receiver. Or put semicolons in front of all lines in the sections not required. For the R75, we inserted semi-colons in front of the "initialize" and "set rit/xit/split/rx/tx" sections.
4. Look through remaining sections and determine any parameter lines which do not apply to your receiver.
5. Place semicolons in front of each of these lines and their corresponding Command, Value, ReplyLength and Validate lines. Make sure you don't miss any Command lines that should not be used with your receiver.

That cleans out the parameters we don't need for our receiver.

Next, we need to get our receiver's "attention" by putting its address into the Command line.

6. Find the Icom address of your receiver from your manual or the Icom website. For the R75 it's 5A.
7. Go to the first remaining Command line.
8. Go to characters in positions five and six.
9. Replace them with your receiver's address. For the R75 that's 5A. See example below.

Example:

Before Command=FEFE6AE0.05.0000000000.FD
FD

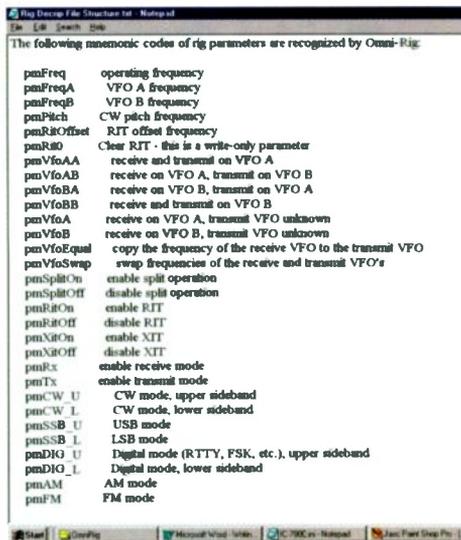


Figure 2 - Translation of the "Square Bracket" into radio control parameters

After Command=FEFE5AE0.05.000000000.0.FD

- Go to each Command line and repeat steps 7 and 8.

Now we need to modify the Validate lines. This is a two-step process.

- Go to each Validate line, which does **not** have a semicolon in front of it.
- Go to characters in positions five and six of the Validate line.
- Replace them with your receiver's address. For the R75 that's 5A. See below.

Example:
 Before Validate=FEFE6AE0050000000000FD.
 FEFE06AFBFD
 After Validate=FEFE5AE0050000000000FD.
 FEFE06AFBFD

- Go back to each Validate line, which does **not** have a semicolon in front of it and repeat steps 11 & 12.

Keep going; we're almost there

- Go to two characters near the right end of the line and after FEFE0
- Replace them with your receiver's address. For the R75 that's 5A. See example

Example:
 Before Validate=FEFE5AE0050000000000FD.
 FEFE06AFBFD
 After Validate=FEFE5AE0050000000000FD.
 FEFE05AFBFD

❖ BandMaster's "Needs"

Although what we have produced so far will work with OmniRig, Bandmaster demands a command be included even if our radio does not support it. If you tried using our new Rig file with Bandmaster, you would find that everything works fine, except transferring of frequencies to the radio. Upon checking with the author, it was determined that the [pmVfoEqual] command must be included in the Rig file. Since our R75 does not recognize this command, a "dummy" is used just to appease Bandmaster.

Therefore, go back to our Rig file and find the [pmVfoEqual] command under the "set rit/xit/split/rx/tx" section. Delete the four lines after the [pmVfoEqual] line. Now replace them with the following two lines:

```
Command=FEFE5AE0.07.FD
ReplyLength=12
```

Now we are really done.

❖ Save Your Work

Using "Save file as" in the File Menu, name it with your receiver's name. For the R75, I named it IC-R75. Then save it in the "OmniRig\Rigs" subfolder.

❖ Testing Your Efforts

Included in the full OmniRig package is a folder named "Rig Description Validator." Run the Verify.exe program and select your newly saved file. If you have made the modifications correctly, this program will give your file a clean bill of health with a "No Errors" message. See Figure 3.

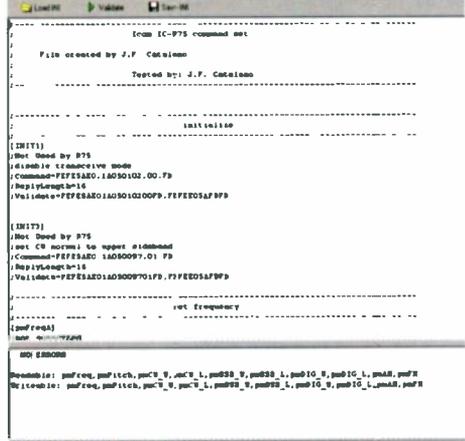


Figure 3 - Good to go! Our IC-R75 rig file gets a "no errors" from the verify program.

If you want to do some further testing, run Client.exe. This program lets you see and exercise each implemented function. For more testing details, look in the file "BetaTest.txt."

Start OmniRig and you will now find your receiver in the list of "controllable" rigs and you're good to go with Bandmaster.

❖ Want More Detail?

If you're reading this, you want to know more. So let's keep going. Character positions nine

What's NEW

Tell them you saw it in *Monitoring Times*

Passport 2006

Now that we're in the midst of the DX season, International Broadcasting Services has released its annual listening companion for radio hobbyists. *Passport to World Band Radio*, entering its twenty-second year in print, continues to appeal to the program listener and advanced DXer.

The opening features, continuing last year's focus on Asia, has articles on *China's Radio: Size Matters* and *Tibet: Making Waves Atop the World*. Both features are interesting and will appeal to even the casual listener.

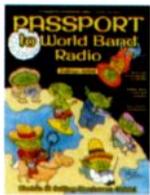
For the beginner, *Compleat Idiot's Guide to Getting Started* continues last year's lead with more tips to enhance your radio knowledge. For the program listener, *Ten of the Best 2006 Top Shows* and *What's On Tonight* will guide you through the best rated shows to hear.

A large section covers *How to Choose a World Band Radio*. Equipment covered includes shortwave portables, table tops, and antennas in many price ranges. Trust me, you will find a plethora of receivers to add to your "want list" and antennas to pull in your favorites.

The *Addresses Plus* sections contain by-country listings of addresses, key contact personnel, website addresses, and verification policies.

Passport's quick reference "blue pages" list stations in by-frequency order, a plus for bandscanning. The graphic format provides a lot of information at a glance, such as on-off times, language, jamming, and potential timeshifts. Because of routine seasonal frequency adjustments, no reference guide will remain a definitive source for the whole year. To compensate, *Passport* also includes frequencies that contributors have previously observed to be active. This should assist the listener as seasonal schedules adjust.

Passport continues to be an excellent reference to hobbyists for advice, programming, receivers and seasonal frequencies. *Passport to World Band Radio 2006* (BK-1806)

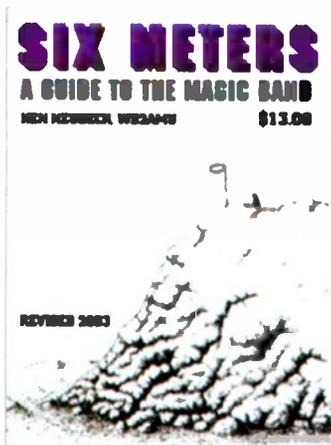


is available through Grove Enterprises at <http://www.grove-ent.com> or call 1-800-438-8155 for \$22.95.

— Gayle Van Horn W4GVH

Six Meters - A Guide to the Magic Band

As I write this, I've just finished making a flurry of DX contacts on the six-meter (50 MHz) amateur band. My contacts were made during a "sporadic-E" opening that brought strong signals to Western NY from both Florida and Nebraska. This is a band that holds many of the same attractions for me as longwave. It has history, underdog status, varied propagation modes, beacons, and a group of devoted followers who just happen to be some of the friendliest operators you'll find.



Now in its 3rd edition, Ken Neubeck's book, *Six Meters - a Guide to the Magic Band*, captures the lore of six meters from its inception (actually beginning on 5 meters in the early days) to the esoteric modes that are being pursued today with compact do-it-all rigs. Many radio books treat their subject from just one angle, such as circuit design, DX, antennas, etc., but this book covers an array of 6-meter topics. The author gives you a feel for how things got started on six, describes the propagation modes you can work, gives an overview of equipment available (both modern and classic rigs), discusses mobile operation, and provides a host of resources for further study.

One section I especially like is the one dealing with classic 6-meter gear. There was a time, from about

1950 to 1962, when six meters was an extremely popular band, used heavily for both local rag chewing and civil defense preparedness. The book gives ample coverage to this "golden era" and includes numerous advertisements for key manufacturers.

The book goes beyond history to show you how to get started today, with either new or secondhand gear. It also gives practical advice for working the many propagation modes found on six meters. If you've tuned to this band in the past, but have only heard silence, then this book is for you. Knowing when to look for propagation conditions and what makes them "tick" can help you get in on the fun with minimal frustration.

You'll also find lists of beacon stations, band plans, simple antenna projects, and ideas for working the rare "grids" that VHF operators go after. There's even a discussion on radio control applications of six for model boats and airplanes. Mr. Neubeck covers all of these topics with a down-to-earth writing style, and a twist of humor thrown in every now and then. Have you discovered the Magic Band yet? See you on six!

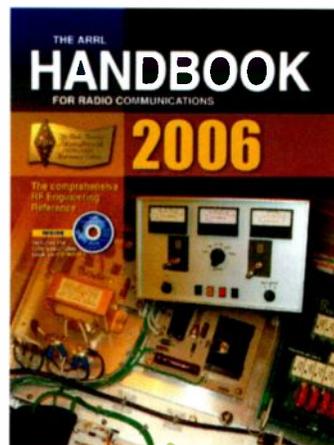
This book is available from Universal Radio, Inc. 6830 Americana Pkwy., Reynoldsburg, OH 43068-4113. Tel. orders: 1-800-431-3939 Web: <http://www.universal-radio.com>. Price: \$13.00 + shipping.

— Kevin Carey, WB2QMY

The Radio Amateur's Handbook

I remember as a small boy poring through a library copy of an ancient *Radio Amateur's Handbook*, marveling at the dials and knobs on the equipment, dreaming how I could put together such wondrous devices enabling me to communicate with the world. With the help of a ham who watched over my shoulder, just a few years later, I had my amateur radio license.

Now, the American Radio Relay League (ARRL) has issued a limited reprint of the 1926 edition of the *Handbook*. Filled with memorable photos, diagrams and advertisements, this 200+ page of radio history is a must for every antique radio enthusiast and proud ham radio operator.



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This bonus package is available from selected amateur radio dealers and from the ARRL directly by calling toll-free (888) 277-5289 or visiting their website: <http://www.arrl.org/catalog>.

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— Bob Grove, W8JHD

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- _ Weight: 1 lb. 1oz.

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Features

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- _ 200 programmable memories
- _ Memory page customization
- _ Manual and auto scan, direct keypad frequency entry
- _ Earphones
- _ Power Source: 2 AA Batteries (included) or AC Adapter (not included)
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