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

Monitoring Times

A Publication of Grove Enterprises

Volume 25, No. 11
November 2006

U.S. $5.95
Can. $8.95
Printed in the United States

UN Radio: Propaganda *for* Peace

Also in this issue:

DRM Broadcasts in Europe
Dallas - A City Shaken

MT Reviews:

Ramsey Aircraft Monitor
Grundig Mini-300PE

11
0 74470 74654 6

NOW AVAILABLE

AR-ONE
Communications Receiver

The AR-ONE gives law enforcement and government professionals total command of frequencies, modes, tuning steps and more. It is possible to tune in increments of *one* Hz.

FOR PROFESSIONAL USE ONLY

Monitor Any Frequency from 10 KHz to 3.3 GHz

Ultra-stable reference frequency oscillator (0.1ppm)

The AR-ONE is a new beginning for wide-range monitors.

The AR-ONE is designed to support computer controlled operation. Link up to 99 receivers for control by a single PC. The AR-ONE can be used for mobile or fixed monitoring operations.

Surveillance operations are enhanced. Monitoring multiple frequencies is easier and faster. Computer control gives you maximum flexibility and unleashes the many features found in this advanced technology receiver.

The AR-ONE is the right choice for the new world we now monitor.

- Super wide coverage: 10 KHz – 3.3 GHz
- 1000 memory channels
- 10 VFOs
- Monitor AM, NFM, WFM, USB, LSB, CW, Data
- Ultra-stable reference frequency oscillator
- Two RS-232C ports
- Control up to 99 AR-ONE Units with one PC
- Triple conversion superheterodyne front end
- Antenna input level readout
- Adjustable BFO
- High intercept +2dBm (-1 dBM above 2.5 GHz)
- Multi IF signal output (10.7 MHz or 455 KHz)
- Excellent sensitivity

The AR-ONE is designed for use by the monitoring professional. The AR-ONE is so advanced, you'll be thinking of new applications for its powerful capabilities.

AOR
Authority on Radio Communications

The Serious Choice in Advanced Technology Receivers™

AOR U.S.A., Inc.
20655 S. Western Ave., Suite 112, Torrance, CA 90501, USA
Tel: 310-787-8615 Fax: 310-787-8619
info@aorusa.com • www.aorusa.com

Available only to authorized users in the USA. Documentation required.

The choice is yours at WiNRADiO.

Whether you want internal PCI-card based receivers or external USB-based models, optimized for best shortwave reception, or wide-band coverage "DC to daylight" scanning, WiNRADiO has it all:

WiNRADiO PCI-based receiver

WiNRADiO USB-based receiver

Model	Frequency range	Type	Usage
WR-G303i	9 kHz - 30 MHz	PCI	Low-cost HF receiver
WR-G303e	9 kHz - 30 MHz	USB	Low-cost HF receiver
WR-G313i	9 kHz - 30 MHz (180 MHz)	PCI	Professional-grade HF/VHF receiver
WR-G313e	9 kHz - 30 MHz (180 MHz)	USB	Professional-grade HF/VHF receiver
WR-G305i	9 kHz - 1.8 GHz (3.5 GHz)	PCI	Low-cost VHF/UHF scanner
WR-G305e	9 kHz - 1.8 GHz (3.5 GHz)	USB	Low-cost VHF/UHF scanner
WR-G315i	9 kHz - 1.8 GHz (3.5 GHz)	PCI	Professional-grade VHF/UHF scanner
WR-G315e	9 kHz - 1.8 GHz (3.5 GHz)	USB	Professional-grade VHF/UHF scanner

Visit our website for a complete summary of WiNRADiO leading-edge software-defined PC-based receivers, antennas and accessories

www.winradio.com

...the future of radio.™

E1XM
World's First and Only

Etón E1XM AM/FM/Shortwave/XM Satellite Ready Radio | $500*

- Reception Modes: AM, FM-stereo, Single Sideband (selectable USB/LSB) and CW
- Programmable Memories: 500 user programmable with alpha labeling plus 1200 user definable country memories, for a total of 1700
- Superior Audio Quality via a bridged type audio amplifier, providing high output power with battery operation
- Direct Shortwave Band Entry, allows instant access to the shortwave band of choice

G5
Designed Without Compromise

GRUNDIG G5 AM/FM/Shortwave Radio I $150*

- FM-stereo, AM and Full-Shortwave coverage (1711-29999 KHz)
- 700 programmable memory presets with memory scan and auto tuning storage
- Clock, sleep timer and alarm functions with world zone settings
- Tunes via auto-scan, manual-scan, direct key-in entry and tuning knob
- Internally recharges Ni-MH batteries
- Station name input

ease visit www.etoncorp.com.

eton®
RE_INVENTING RADIO

Monitoring Times

Vol. 25, No. 11 November, 2006

Cover Story

UN Peacekeeping Stations

By Jeffry Heyman

The United Nations has mounted 60 peacekeeping operations since its inception. Public information has played a role in each, but a relatively new aspect of complex peacekeeping missions has been the advent of UN radio stations. Heyman likes to call it "propaganda for peace."

Ten of 18 the UN's current peace missions make use of radio transmissions in varying degrees. This article describes several representative installations, showing how each adapts to the particular political situation and geography. Story starts on page 9.

On our cover:
The antenna system at a regional UN base in Guiglo, Ivory Coast. UN radio often operates in difficult and remote locations.

C O N T E N T S

Reviews

Travelers who enjoy listening to aircraft communications no longer have to choose between their hobby and their conscience when flying: Ramsey Electronics offers a Passive Aircraft Monitor which contains no oscillator to cause potential interference to navigation signals. Check out Bob Grove's review on page 71.

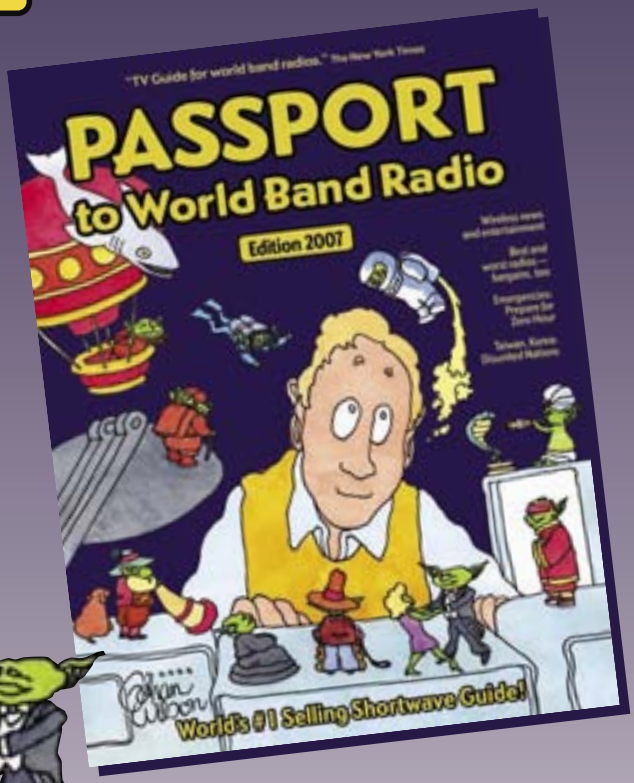
In his continuing search for the poor man's portable shortwave, Eric Bryan tries out the little Tecsun R-919 (aka the Grundig Mini 300PE) and finds a lot to like (page 68).

DX Monitor is a program written for hams, but it's of benefit to any radio monitor who is having a hard time keeping track of all the details of this hobby. Plus, it has an interactive worldwide community and really cool graphics. (See page 72.)

World's #1 Selling Shortwave Guide!

PASSPORT to World Band Radio

Edition 2007



If you need it, PASSPORT TO WORLD BAND RADIO has it within 20 helpful chapters in almost 600 pages.

PASSPORT'S frequency-by-frequency Blue Pages section is almost a book by itself. This quick-access schedule guide offers details for each of the world's stations — frequencies, times, days, locations and powers. Also, target zones, network affiliations, languages and even if there's jamming.

TRUSTED BY OVER A MILLION READERS SINCE 1984.
WWW.PASSBAND.COM

PASSPORT'S program guide, "What's On Tonight," builds on this with hour-by-hour descriptions of news, music and entertainment shows in English. Station contacts and web simulcasts?

PASSPORT'S "Addresses PLUS" chapter is the industry bible, crammed with juicy tips. Other chapters include on-the-spot reports from the armed facedown zones of Korea and Taiwan.

PASSPORT REPORTS tests, evaluates and rates dozens of the latest portable, 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."

PASSPORT TO WORLD BAND RADIO is the world's #1 selling guide to shortwave listening.
Available from major dealers and bookstores, or by fast, free Priority Mail direct from the publisher:

PASSPORT to World Band Radio Edition 2007

Box 300
Penn's Park, PA 18943

$22.95, ISBN 978-0-914941-63-7 (0-914941-63-1)
24/7 automatic ordering (215) 598-9018
Fax (215) 598 3794

mktg@passband.com
www.passband.com

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

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

Subscription Rates: $28.95 in US; $39.50 Canada; and $58.50 foreign elsewhere, US funds. Label indicates number of issues left. Renewal notice is cover sheet 3 months before expiration. ***See page 76 for subscription information.***

Postmaster:
Send address changes to *Monitoring Times*, 7540 Highway 64 West, Brasstown, NC 28902-0098.

Owners
Bob and Judy Grove
judy@grove-ent.com

Publisher
Bob Grove, W8JHD
bobgrove@monitoringtimes.com

Managing Editor
Rachel Baughn, KE4OPD
editor@monitoringtimes.com

Assistant Editor
Larry Van Horn, N5FPW

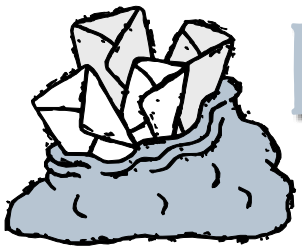
Art Director
Bill Grove

Advertising Svcs.
Beth Leinbach
(828) 389-4007
bethleinbach@monitoringtimes.com

Table Of Contents

EDITORIAL STAFF Email firstlast@monitoringtimes.com

TJ "Skip" Arey.....	On the Ham Bands
Rachel Baughn	Communications
.....	Letters to the Editor
.....	What's New?
Kevin Carey	Below 500 kHz
John Catalano	Computers & Radio
Mike Chace.....	Digital Digest
Jim Clarke	First Look
Marc Ellis	Radio Restorations
Bob Grove	Ask Bob
Glenn Hauser	Global Forum
Chris Parris	Fed Files
Ken Reitz.....	Beginners Corner
Lee Reynolds	First Look
Iden Rogers.....	Planes
Clem Small	Antenna Topics
Doug Smith.....	American Bandscan
Hugh Stegman.....	Utility World
Ernest Robl.....	Trains
Gayle Van Horn	Frequency Manager
.....	Broadcast Logs
.....	QSL Corner
Larry Van Horn.....	Milcom
.....	First Look
.....	MT Help Desk
Dan Veeneman	Scanning Report
Ron Walsh.....	Boats
Fred Waterer.....	Programming Spotlight
George Zeller.....	Outer Limits



LETTERS TO THE EDITOR

Thanks and Thanks Again

As we have a changing of the guard at the *Programming Spotlight* column, here's a letter of thanks to out-going columnist John Figliozzi, and a letter of thanks to new columnist Fred Waterer.

Dear John,

"As a two year subscriber I just wanted to relay a thank you for a great column, and let you know what life is like with your thoughtful contributions. I enjoy sitting on my patio with a Kenwood R-2000 running into a 30watt amp, which in turn lets me hear Radio Sohl just fine. Nothing like a little Sohl music to go with lunch!

"My big rig is an R390, with matching speaker in the Radio-room. My wife is Persian, our circle of friends are from the same region, Turkey, Armenia, and Syria included. Shortwave is a great way for me to relate to their background. We also travel frequently, having just returned from Tehran this past month.

"For the fun of it, I tossed in a pic of the bigrig, and a field day photo. Good luck in your endeavors,"

– Ed Moore KA1TUE

Dear Fred,

"I really enjoyed your first Programming Spotlight column, 'A Trip to the Balkans.' It was very well-written. You set the table with some historical background of broadcasting in the region, leading into how broadcasting is done there today. It was an easy and enjoyable read. Nice job and keep up the great work. I look forward to your next column."

– Don Young, N2DY

A Capitol Mistake

"September 2006 issue is just great. Although there is one major mistake in 'Buffalo Scanning' on pages 18-19. John Mayson has stirred up a hornets nest here. Problem: although there are two county buildings here in Niagara Falls, we are NOT the county seat, LOCKPORT is. It sits in the middle of the county on the Erie Canal."

Dave Martin also provides some additional frequencies for Niagara Falls:

Call back frequencies for Niagara Falls PD: 465.375 & 465.125
Call back frequencies for Niagara Falls FD: 465.525 & 465.575
New York State Police, Lockport Base: 155.505
Niagara County Sheriff: 154.755
NY State Park Police: 155.685
Niagara County Fire Base: 46.060
Air Traffic over the Falls: 121.050

"Realizing that your reporter likes the winter in this region so much, we do offer Spring, Summer & Fall views without any snow or ice.

"As far as Niagara County Fire is concerned, they may eventually go to trunk frequencies; they have one handicap to that, *money*. If FEMA or some other agency will give them the money, they are ready to go for it.

"We also have Mutual Aid here for all departments, Police & Fire. Most river rescues are done by the various professional and volunteer fire deptartments in the river area, with assistance from the USCG & Erie County Police Chopper. There is a Border Patrol Chopper also available."

– Dave Martin, Niagara Falls, NY

Says John Mayson, in his defense, "Thanks for the feedback and for the added frequency information. I unfortunately do not make it to that part of the country often (it was my first visit to western NY). My atlas is apparently wrong. It marks county seats with a unique symbol and it showed Niagara Falls to be the county seat. I didn't question this since it's such a well known city. But I know from places like Polk County, FL, and Hinds County, MS, the largest city isn't always the county seat."

Eton E5 Feedback

Dear Jim Clarke,

"Jim, thanks for the nice review of the e5 in *MT*. I have a question, though: You mention that the up/down step buttons change the frequency by 3kHz from 150-520. I thought this radio didn't have longwave. If it does, I'd consider buying one, but it's not listed as having LW in any descriptions. What's the story? Thanks!"

– Todd Van Gelder

Todd,

"Boy, you had me going for a minute, or two, or three. When I did some quick checking online, I, too, couldn't find anything supporting what I wrote. Needless to say I was starting to wonder if I had written the review in a dream.

"Anyway, I had to go back to the owner's manual, which you can download for yourself from **www.etoncorp.com/US/support/download_manuals.aspx?index=1**

"If you scroll down to 'manual page' 20, or 'PDF page' 11, you will see a paragraph stating the E5 covers 150 kHz to 29999 kHz continuously.

"It's a nice radio; if you get one I hope you enjoy using it as much as I did playing with it."

– Jim

Harold Resnick called with a tip on how to access the mute function on the Eton E5 Radio, since information is sketchy in the manual and reviewer Jim Clarke hadn't figured it out. Harold discovered it when the audio kept muting by accident, and he would have to figure out what happened.

"OK, here goes. First, turn on the radio, and adjust the volume to what you want. Second, tap the lock button until the key symbol appears in the display. Third, once the key symbol is displayed in the LCD display, then pressing the Sleep button mutes and unmutes the volume. Simple, eh?" (*Yeah, once you figure it out... ed.*)

– Harold Resnick, Calgary, Alberta, Canada

Well, the rest of the mail will have to wait until next month. Meanwhile, in this season of giving thanks, let us express our gratitude to our readers and subscribers who have kept *Monitoring Times* in business for 25 years, as of next month. You are our reason for being, and you make it possible. *THANKS!*

This page is open to your considered comments. Opinions expressed here are not necessarily those of Monitoring Times. Your letters may be rephrased or shortened for length and clarity. Please mail to Letters to the Editor, 7540 Hwy 64 West, Brasstown, NC 28902, or email editor@monitoringtimes.com

Happy monitoring!

- Rachel Baughn, KE4OPD, Editor

COMMUNICATIONS

"Communications" is compiled by Rachel Baughn KE4OPD from newsclippings submitted by our readers. Thanks to this month's fine reporters: Anonymous, Tom Baker, Bob Grove, Jerry None, Doug Robertson, Doug Smith, Robert Thomas, Larry Van Horn, Ed Yeary, George Zeller.

ON THE WILD SIDE

Arrest Raises First Amendment Questions

U.S. Attorney Michael Garcia alleges that Javed Iqbal, a Pakistani who has lived in the US for more than 20 years, conspired to violate the International Emergency Economic Powers Act, a law that bars direct financial aid to terrorist groups and the sales of products or services that could help such groups.

The charges accuse Iqbal of providing broadcasts of Al Manar – purportedly a media outlet for Hezbollah – through his Brooklyn-based satellite company, HDTV Limited. Both Al Manar and Hezbollah have been classified as terrorist entities by the U.S. government.

Iqbal's defenders claim he may have promised a service he may not have to the capability to deliver. Even if he did, "This is a prosecution for importing information, basically," said Donna Lieberman, executive director of the New York Civil Liberties Union.

Hezbollah Eavesdrops on Israeli Comms

During the 34 days of fighting between Israel and Hezbollah troops in south Lebanon, which ended Aug. 14 under a cease-fire brokered by the United Nations, Hezbollah repeatedly surprised Israel in its level of weaponry and battlefield tactics.

Israeli troops primarily use the same communications system relied on for years by the U.S. – the Single Channel Ground and Airborne Radio System (SINCGARS) – equipped with frequency-hopping and encryption capabilities. However, according to a *Newsday* report, Hezbollah claims to have intercepted and decoded enough Israeli transmissions to give them a picture of troop movements, casualty reports, supply routes, and tank movements.

In the intervening years since Israel withdrew from Lebanon in 2000, Hezbollah has invested a lot of resources into eavesdropping and signals interception, including trained Hebrew speakers who can quickly translate the intercepts. Hezbollah's intelligence-gathering also garnered detailed maps and photographs, troop lists, and cell phone numbers, although Israeli forces had strict instructions not to divulge information over the phone.

Much of Hezbollah's eavesdropping equipment and military capability is believed to have come from its two main backers, Iran and Syria.

Pirate Goes Legit

In 1998, Scott Willoughby and Alex Markels started a 100 watt pirate radio station called Radio Free Minturn, just outside Vail, Colorado. The station operated out of Willoughby's living room until November 2000, when Federal Communication Commission agents knocked on the door of Willoughby's home and ordered that Minturn Free Radio stop broadcasting immediately.

Radio Free Minturn went back on the air – again at 100 watts – on June 23, 2006, this time as a legal station licensed by the FCC. The station filed for a low-power FM license in 2000, but it wasn't until the spring of 2004 that the group learned its application had been accepted. By that time, most of the original crew was gone and it took nearly a year to create a new board. By then, Radio Free Minturn had six months to get on the air with little money and little expertise to do it.

So, Liz Campbell, the driving force on the board, held a wake for Radio Free Minturn on May 7, 2005, as a final gesture for a great idea whose time had come too late. Instead, more than 100 people showed up. Ken Laughlin came and donated engineering expertise. Mark Gordon, the Vail Town Councilman, got involved. (He now deejays a show.) An extension from the FCC gave them more time to get on the air.

"Great radio is also part of the quality of life of a great community," Gordon said. "I'm not taking away anything from the commercial stations, but there's no comparison. It's just one more piece of that community puzzle."

Across the country, an estimated 3,000 groups have tried to get a low-power FM license, but only around one hundred have been granted. And when years have passed, it's often too late. Radio Free Minturn is one success story.

AMATEUR RADIO

FCC Affirms BPL Rules

In August the Federal Communications Commission generally reaffirmed its rules for Access Broadband over Power Line (Access BPL) systems while maintaining safeguards against harmful interference to existing radio services. If harmful interference does occur, the Commission says it will take appropriate action to remedy the situation.

The FCC denied petitions from amateur radio and the television and aeronautical industries to exclude portions of their spectrum from BPL operations. It also denied the request by the gas and petroleum industries to be considered as public safety entities.

It did adopt changes regarding protection of radio astronomy stations by requiring a new exclusion zone and changes to provide for continuing protection for aeronautical stations that are relocated.

Hams Experiment with Marine Band

On September 13 the FCC's Office of Engineering and Technology granted Part 5 experimental license WD2XSH to the ARRL on behalf of a group of radio amateurs interested in investigating spectrum in the vicinity of 500 kHz.

The two-year authorization permits experimentation and research between 505 and 510 kHz (600 meters) using narrowband modes at power levels of up to 20 W effective radiated power (ERP). ARRL Member Fritz Raab, W1FR, of Vermont, will serve as experimental project manager for "The 500 KC Experimental Group for Amateur Radio" **www.500kc.com** The group eventually will be seeking reports from non-participants.

The group envisions eventual use of the spectrum to provide Amateur Radio emergency communication via groundwave, without having to deal with the vagaries of the ionosphere or causing interference to other services.

500 kHz remains designated as an official maritime emergency CW frequency, although the vast majority of maritime users have shifted to satellite-based systems.

Space Adventuress

Born in Iran in 1966, Anousheh Ansari moved with her family to the United States when she was 16 and became an American citizen. In September 2006 she was the first female space tourist to visit to the International Space Station.

"I want to reach women and girls in remote parts of the world where women are not encouraged to go into science and technology jobs," she said, "They should believe in what they want and pursue it." The 40-year-old practices what she preaches: She has degrees in business and science (and is working toward a degree in astronomy) and has filed patents in the field of telecommunications. The business Anousheh helped found was a major contributor to the Ansari X Prize for the first private company to build a rocket capable of two manned suborbital flights in two weeks (won by Burt Rutan in 2004).

Anousheh was a last-minute backup as the next space tourist, which didn't allow her time to obtain her amateur radio license. However, she was trained to use the amateur radio onboard the ISS and hoped to make some third-party contacts. See Space Adventures Ltd www.spaceadventures.com/

United Nations Peacekeeping Radio Stations – Propaganda *For* Peace

By Jeffrey Heyman KG6SVK

Radio ONUB interviews villagers from Kinama, Burundi.

Few realize the complexity and the extent of United Nations peacekeeping operations. These missions have grown extensively since the organization began peacekeeping in 1948 from simply patrolling ceasefire lines to multi-dimensional operations that combine military and civilian facets, humanitarian relief, political affairs and public information.

The United Nations has mounted 60 peacekeeping operations since its inception. To one degree or another, public information has played a role in each, but a relatively new aspect of the UN's public information capacity in the field has been the advent of UN radio stations as part of complex peacekeeping missions. The first major effort was in Cambodia in 1993 with Radio UNTAC, still a model for UN peacekeeping radio stations today (see *Monitoring Times*, Vol. 13, No. 10, October 1994).

UN peacekeeping radio differs in operation from its cousin, UN Radio run out of the Secretariat in New York. UN field radio broadcasts in local languages are aimed at the public within peacekeeping areas of operation, such as former Yugoslavia, Rwanda, Somalia, Angola, and other peacekeeping missions.

There are 18 current "peace operations," as they are called, run by the United Nations Department of Peacekeeping Operations. Fifteen of those missions are actual peacekeeping operations, and three (Afghanistan, Sierra Leone and East Timor) are political "peace building" operations.

UN Peacekeeping Operations

Current UN peacekeeping operations consist of 72,724 uniformed personnel serving worldwide. These include some 62,811 troops, 7,242 police officers and 2671 military observers, contributed by 109 countries. (The UN has no standing army, contrary to the widely held misconception in the US; all military personnel come through troop contributions by the UN's 192 member countries.) The approved budget for peacekeeping operations for this fiscal year is some $4.75 billion.

In addition, there are 4,517 international civilian personnel (of which I was one during the 1990s) and 8,654 local staff working on UN peacekeeping missions. Sadly, according to UN records 2,272 military and civilian personnel have lost their lives in peacekeeping operations since 1948.

United Nations Radio in the Field

The UN has varying degrees of radio capabilities in 10 of its 18 peace missions: Afghanistan, Burundi, Congo, Cote d'Ivoire (Ivory Coast), East Timor, Haiti, Kosovo, Liberia, Sierra Leone, and Sudan. This is an explosive growth since Cambodia in 1992-93 when UN Headquarters in those days was skeptical about the use of radio within traditional peacekeeping operations.

The opening of Radio Miraya (Mirror) in June 2006, the UN's Radio station in Sudan. Leon Willems, Chief of UN Radio in Sudan assists Salva Kiir (in hat), Vice President of all Sudan, as well as the President of Southern Sudan, in cutting the ribbon.

Today, the UN has fully operational broadcast operations in Burundi, Congo, Ivory Coast, Liberia, and Sierra Leone. Missions in Haiti and Sudan are planning to broadcast shortly. And Kosovo, Afghanistan, and East Timor have radio production capabilities that are used to produce programs broadcast through third parties – local stations on other media outlets in those countries.

These radio stations and production efforts are different from military morale operations to entertain troops or psychological operations run by special units run to influence warring factions. United Nations peacekeeping radio attempts to seek peace and reconciliation and to build confidence as a means to settle conflict and further the peace process. While some may call these propaganda broadcasts plain and simple, I call UN radio efforts "propaganda for peace."

Working with Governments

To most governments, the establishment of broadcasting to reach the general population, without restriction, is a very sensitive issue. It doesn't matter if it's a United Nations-backed effort or not; governments are nearly always suspicious of such intentions.

The use of actual broadcast operations in UN missions has always been controversial for this reason. Many countries, even if they have signed a "Status of Forces Agreement" for the deployment of a UN operation and have agreed to UN Security Council resolutions mandating a mission, still do not welcome unfettered broadcasting by the United Nations – or anyone else – on their territory. Government officials cannot, of course, control the UN's message if it goes out over transmitters that are not controlled by the government, and this has always been a stumbling block to the establishment of UN radio stations in the field.

Governments try to work with the UN to provide broadcasts by offering timeslots on their own national radio networks. And, traditionally, the UN has accepted these offers. To some extent this benefits both parties: The UN can get its message out easily and without going through the expense and difficulties of establishing a full broadcast station, and the government can closely monitor – and ultimately control – the United Nations' programming.

For example, in August 1995 after the genocide in Rwanda, cooperation between the United Nations and the Government of Rwanda was fairly good and the UN wanted to use radio to help ease the refugee crisis facing the country with more than a million people in camps in neighboring Congo (then Zaire). I recommended setting up an independent radio

station as opposed to placing United Nations programming on the government radio station in Kigali, pointing out that the good will of the Rwandan authorities towards the UN could change at any moment.

Unfortunately, I was right. Shortly thereafter, the Secretary General's special representative in Rwanda expressed particular concern about "persistent hostile propaganda by the Government, primarily through radio, against [the United Nations]." If the UN had not deployed small transmitters in key locations, such as the capital, Kigali, it would have had no way to counter the Government's hateful accusations.

And in January 2006, there was a similar situation in Ivory Coast where, according to a UN spokesman, anti-UN broadcasts supported by the government in Ivory Coast included "complaints [about the UN] of a rather extreme sort, rape, prostitution ... it's fairly ugly stuff that's coming out over the official radio."

Anti-UN riots ensued, spurred on by the Government's propaganda and four UN staff were killed by rioters. The UN has a full broadcast station in Ivory Coast, which was attacked by hostile crowds. This situation illustrates the difficulties of working in hostile environments and how a government that once welcomed the UN can turn against its presence. As in Rwanda, at least the UN had a radio station in Ivory Coast to counter as best it could the government's propaganda.

But had UN radio programs been broadcast over government radio stations in Rwanda and Ivory Coast – as was the more usual model in previous years – these programs would have certainly been canceled and United Nations would have been left with no means by which to counter the hostile propaganda being put out by these angry governments.

Local Radio Stations

The UN traditionally has gotten over this hurdle by using "existing media outlets," as local or national radio broadcasters are often called. Often, in the past, this consisted of the UN being allowed a few hours on a "friendly" local radio station or airtime on the government's network, which, as noted above, is far from ideal.

Most local radio stations, especially those that are "independent," welcome UN programs and enjoy the benefits of cooperating with international broadcasters – especially if there is a financial incentive to carry the programming. But, to be realistic, many of these so-called independent stations are hardly independent at all; most are somehow affiliated with a political party or ethnic group, and the subtlety of the bias in the station's programming might not be immediately apparent to a UN official not familiar with the local media environment.

After the breakup of former Yugoslavia in the 1990s, there were scores of so-called "independent" radio stations throughout the various former republics – this was in addition to the extensive national broadcasting network the republican authorities controlled. UN Radio in Former Yugoslavia, which I headed, was able to negotiate the placement of programming on 94 radio stations in Bosnia, Croatia, Serbia and Macedonia (and these were only a portion of the 200 or more stations on the air at the time). We tried to get the UN's message out through these "existing media outlets," but we were less than successful in doing so. Some stations edited the UN programs we sent them to skew our message for their own propaganda purposes.

When tensions increase, programming will often be censored. Even more likely, the UN local broadcast will take on an unintended political consequence: The listening public assumes that the UN condones the policies of the station on which its programs are transmitted! The effect of this can completely compromise the UN's message in the highly charged political environments of most peacekeeping operations.

When I was on a tour of local radio stations in former Yugoslavia that had agreed to carry UN programs during the war in 1995, I learned firsthand the pitfalls of working with local radio stations during wartime.

Driving along the Croatian coast one afternoon, I heard a series of numbers being read out over dance music on a radio station transmitting from the island Hvar. This was one of the radio stations that carried UN radio programs, so I listened carefully, wondering what the announcer was doing reading numbers to a disco beat. Only knowing Croatian slightly, I asked my driver what exactly the announcer was saying. He listened closely and explained that the announcer was reading out technical characteristics of newly acquired Croatian rocket launchers.

As I continued to listen, the song "Imagine" by John Lennon, perhaps the ultimate peace song, was played. The music faded and the announcer, taking on a menacing tone, said, "Imagine what these weapons could do to the Serbs in our occupied villages." This was followed by Paul McCartney's song "Live and Let Die." The ominous implications were clear.

In a cable back to UN Headquarters in New York later that week, I wrote, "While not all radio stations in Croatia are so extreme in their militancy, I would ask whether this is the kind of station on which the United Nations wishes to air its radio programs?"

Over the years, the UN has begun (wisely, in my opinion) to use its own transmitters to broadcast within peacekeeping missions and move away – wherever possible – from relying on local broadcasters or government stations to get its message out.

What is the UN's Message?

Each peacekeeping operation is different, of course, and the UN's message in each country – or region – must be different, tailored to the local situation and the intended audience.

Programs can range from straight-forward, unbiased news broadcasts – a rarity in most countries in conflict – to talk programs, health awareness, women's issues, development, and cultural programs, all aimed at explaining the peace process in the country, building confidence between warring factions, furthering reconciliation and, hopefully, shaping democratic institutions and human rights.

United Nations Radio also attempts to counter "hate media," a not-so-new form of spreading hatred that has seen a rise in recent years as ethnic conflicts, like the genocide in Rwanda, have spread. More easily available technology and cheap radios have, sadly, allowed those seeking to use radio to further mass murder, rape and ethnic cleansing the means to do so.

The UN largely uses locally-hired radio announcers, reporters and technicians – this also helps in "capacity building," so when the UN's mission is completed, these folks, now trained in democratic media values, can continue to work independently. Nonetheless, editorial review, program format and content must be very tightly controlled to ensure unbiased and fair programming – a daunting task.

Logistics: Station Building During Wartime

If all the political problems associated with UN radio broadcasts weren't enough of a challenge, there are the logistics of setting up a UN radio station during active conflicts.

Whether during or following a conflict, the areas in which the UN operates are logistical nightmares. There are a host of obstacles, both seen and unforeseen, such as crumbling infrastructure, inaccessible terrain, lack of power or food and water, weak government institutions – or their opposite, overly authoritarian regimes. In addition, there are often landmines and, sadly, a completely traumatized and demoralized population, the civilian victims of war awaiting a UN mission.

Add to this the unique characteristics of setting up broadcast operations: the need for transmitter sites, often on strategic, contested high land features. I recall waiting for hours, when surveying possible UN transmitter sites

The containerized studio at Burundi – a concept first developed by the author.

A young would-be journalist adds to a feature for UNICEF being produced at the UN's Burundi station.

in Angola, for local leaders to grant permission to enter "rebel" territory, as one mountaintop was labeled. Even then, my safety "could not be guaranteed" by the local authorities.

How do you power transmitters in a war-torn country? In Cambodia we used giant diesel fuel bladders, holding thousands of gallons, to power generators that fed the MW transmitters, all of which had to be guarded 24 hours a day. Also, imagine clearing acres and acres of landmines so that radials for these MW transmitters could be laid.

Currently, FM transmitters are the most often used for UN field operations. While these are much easier to set up (I designed some of the first deployable mini- and micro-transmitters used by the UN), they are not without their logistical problems as well. Power is always an issue in conflict areas, as is getting to the often remote locations where the transmitters need to be deployed. And, for obvious reasons, radio transmitters are always targets – either by militia groups opposed to the UN's mission or by ordinary thieves and looters.

Current or Planned UN Broadcast Operations

The UN has robust radio operations in Ivory Coast, Liberia, and Sierra Leone, but let's take a closer look at four other major UN radio operations: Burundi, Democratic Republic of Congo, Haiti and Sudan. These are good examples of what the UN faces in the field as it uses radio for peacekeeping.

UN Radio in Burundi

The Security Council initially authorized the deployment of the United Nations Operation in Burundi (ONUB) in May 2004. The operation was to help implement the efforts by Burundians to restore peace and bring national reconciliation to the central African nation.

The UN set a maximum of 5,650 military personnel, including 200 observers and 125 staff officers, up to 120 UN police personnel, as well as the appropriate civilian personnel for the mission. It also authorized ONUB to use "all necessary means," which allows the use of force under Chapter VII of the UN's Charter, to ensure that ceasefire agreements would remain in place.

The operation's mandate was to carry out disarmament and demobilization of combatants and to monitor the illegal flow of arms. ONUB, which is the French acronym used as the mission's name, was also tasked with "contributing to the creation of the necessary security conditions" that would allow for humanitarian assistance, the return of refugees, and ensuring a secure environment for "free, transparent and peaceful elections," according to the United Nations.

A UN radio tech checks operation of the containerized studio in Burundi.

To this end, especially to aid in the country's move towards democracy, the Security Council authorized the establishment of a UN radio station, **Radio ONUB**.

The UN radio station in Burundi consists of several FM transmitters that provide radio broadcasts in French and the locally spoken Kirundi. Radio ONUB consists of morning, midday and evening schedules for about three to four hours each period. The transmissions begin with a bulletin of news and then programs that alternate between French and Kirundi. The programs, which revolve around current events and information topics, are generally 30-minutes each.

If you find yourself in Burundi, you can listen to Radio ONUB on 89.7, 92.9, 96.8 and 101.4 MHz. Other frequencies may be used as well. UN Radio transmitters are reported located at sites such as Isanganiro, Bonesha, and Renaissance in Bujumbura, and, apparently, at National Radio and Television Burundi (RTNB) transmission sites as well.

Radio ONUB seems to be doing its job: Respondents to a public opinion survey conducted by the City College of New York and Yale University in March 2005 gave high marks to Radio ONUB. According to the survey, a total of 70.5 percent of those surveyed in the country said that Radio ONUB had done a good or very good job at getting information out to the people. The respondents said that the UN radio station had been an important point of communication particularly on the 2005 elections and informing people on how to vote.

The survey's final report noted, "The radio regularly informed on national and international opinions. It has collaborated with the security forces and the administration of the voting offices on the voting days during elections… [a] positive role of Radio ONUB in informing the population."

Democratic Republic of Congo

In her excellent paper, "Radio as Peacebuilder: A case study of Radio Okapi in the Democratic Republic of Congo," media consultant Michelle Betz laid out very nicely the situation in the Democratic Republic of Congo (DRC) and the establishment of the UN's joint radio effort to establish a radio station in that troubled region.

Much of this account is taken from her paper, and according to Betz, who is currently based in Accra, Ghana, the DRC has faced civil war since the influx in 1994 of refugees from fighting in neighboring Rwanda and Burundi. More than three million Congolese have been killed in the conflict.

In August 1999, the Security Council authorized the deployment of up to 90 United Nations military liaison personnel, along with necessary civilian staff, to the capitals of the signatory States. By February 2000, the Security Council expanded the United Nations Mission in the Democratic Republic of Congo (MONUC) to consist of up to 5,537 military personnel, including up to 500 observers. In September 2002, 23,400 Rwandan troops withdrew from DRC, along with troops from

Uganda, Zimbabwe and Angola. By December 2002, MONUC was expanded to a level of up to 8,700 UN troops.

In 2001, Metz points out, the government of the DRC had banned foreign broadcasts. Privately owned radio and television stations in DRC were ordered to cease transmissions of foreign broadcasts, such as a Catholic station that rebroadcast Radio Vatican, and Raga FM, which broadcast Voice of America, BBC World Service and Deutsche Welle. But by early 2002, both VOA and BBC had resumed broadcasts in Kinshasa. According to US Department of State figures from 2002, 10 radio stations operated in Kinshasa, the capital.

Metz notes that radio in DRC is "the most popular medium due to the high cost of print publications and low literacy rates."

Radio Okapi

Set up in February 2002, the UN's radio station in Congo, Radio Okapi, is a joint project between MONUC and Foundation Hirondelle, a Swiss non-governmental organization. This is the first time the UN has teamed up with a non-governmental organization in its radio operations.

The station is named after a legendary African animal related to the giraffe. The name "okapi" is the same in all of the languages of the DRC, and the creature is considered to be a symbol of peace.

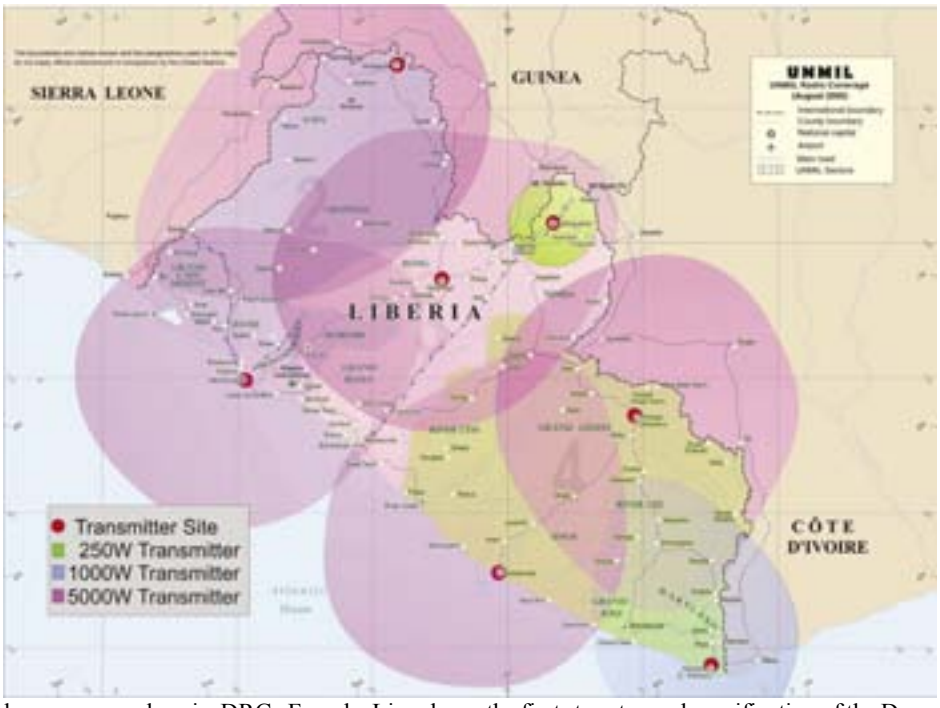
With a staff made up of mostly native Congolese journalists and broadcasters, according to Metz, Radio Okapi produces news, music, and information on the UN's activities in the country, with the goal of becoming the first media outlet to provide national coverage regardless of political affiliation and reaching both government- and rebel-held territories on FM and shortwave.

Radio Okapi broadcasts in the five major languages spoken in DRC: French, Lingala, Swahili, Tshiluba and Kikongo. Its programming, says Metz, is dedicated to health, education, human rights, culture and music, the last of which is crucial in gaining the interest of Congolese radio listeners.

Prior to the launch of Radio Okapi in 2002, the station that reached the largest numbers of Congolese was La Voix du Congo, the state-controlled broadcaster, Metz notes. Now, however, Radio Okapi is the most listened-to station in the country. With such popularity, the station also plans to collaborate with other media in DRC, particularly with Congolese radio stations, assisting in production and training.

According to Metz, Radio Okapi marks the first steps toward reunification of the Democratic Republic of Congo by being the first program to broadcast on FM and shortwave across the frontlines in both government- and rebel-held territories.

Radio Okapi can be heard on FM throughout the country (see map) and on shortwave – aimed mostly at domestic audiences – on 6030, 9550, 11690 kHz via a 10kW transmitter in Kinshasa.



With ten stations operating in the Democratic Republic of Congo, Radio Okapi, the joint United Nations-Foundation Hirondelle project, is one of the largest UN radio operations within the organization's peacekeeping missions worldwide, as this map illustrates.

Liberia: Technical Advances

The UN doesn't always rely on crisis management tactics and less than modern equipment in its operations. One example of how advanced UN peacekeeping radio operations have become can be found in Liberia.

The United Nations Mission in Liberia (UNMIL) has established an extremely effective, state-of-the-art radio station. UNMIL Radio currently broadcasts at seven FM transmitter sites in the country using Eddystone 7605 transmitters operating at 4.2 kW, a RVR Electronic PJ 1000 operating at 960 watts and one SBS PA 250 operating at 250 watts.

The five Eddystones are deployed to the five major population centers (see map). The site at the capital, Monrovia, uses a four-bay array at a height of about 1200 feet and transmits on 91.5 MHz. The other major sites, all using four-bay arrays, are Gbarnga, on 90.5 MHz, Voinjama, on 97.1MHz, Zwedru on 91.5 MHz and Greenville on 97.1 MHz.

Future plans include the installation of four more 1kW transmitters with four-bay arrays throughout the middle of Liberia and to upgrade the coastal antennas to six-bay arrays.

Production for UNMIL Radio programs takes place in three studios (a fourth is just about to be finished) and three recording booths housed at two locations. The production processes is quite advanced with all studio and regional producers linked via a computer

network of 50 machines with central file storage for easier maintenance and distribution of files.

The actual program, coming from the studio in Monrovia, needs to be distributed to the various locations over satellite and terrestrially. Currently, satellite links are available between major locations in Liberia, but are mainly for UN voice and data transmissions. So, UNMIL Radio programming has been distributed by digitizing and "packetising" the audio. This solution works, but suffers from poor reliability.

To get around this, the UN has decided to set up a special carrier on these satellite links, one dedicated to UNMIL radio. A satellite modem will receive the carrier, make it available on a serial interface, and an audio decoder will convert the serial synchronous data stream into analogue audio. This audio will then be inserted into each of the FM transmitters for broadcast throughout Liberia. A state-of-the-art solution for a war-torn developing country.

Haiti: A Long History of UN Deployment

After years of stormy deployments in the Haiti, UN radio operations in the country are in the final planning stages. In order to support elections this fall, the radio station is expected to deploy 5 to 15 FM transmitters dispersed throughout this tiny Caribbean country.

United Nations involvement in Haiti started in February 1993, and the United Nations Mission in Haiti (UNMIH) was formed later that year. The next year a 20,000-strong multinational force was formed to facilitate the return of "legitimate" Haitian authorities, and maintain security and the rule of law. This force was followed by a number of successive United Nations peacekeeping missions from 1994 to 2001.

In the 2000 presidential elections, President Jean-Bertrand Aristide claimed victory, but the opposition and the international community contested the results and accused the Government of manipulating the election. In 2004, armed conflict broke out and insurgents took control of much of the northern part of the country, threatening the Haitian capital. Aristide left the country and there was general confusion about the situation until an interim president requested assistance, including the authorization for international troops to enter Haiti.

In November 2004, the Security Council extended the mandate of MINUSTAH, as the UN mission was by then known. MINUSTAH (the French acronym for United Nations Stabilization Mission in Haiti) was formed to create a politically stable environment in the country.

A free and fair electoral process was to play a big role in stabilizing Haiti and the UN's Secretary-General, Kofi Annan, encouraged all Haitian citizens to participate fully in the process. (Local elections, as of this writing, were scheduled for this fall with presidential and parliamentary elections set for November 13, 2006.)

To ensure security during the elections, the UN proposed the deployment of an additional infantry battalion of 750 troops to respond quickly to "hot spots" during the pre-election period, thus raising the troop levels in the country to 7,500. There are to be some 1,900 United Nations police officers deployed as well, and the creation of a "rapid reaction force" to provide increased security, particularly in and around the capital, Port-au-Prince.

And, as with previous UN-sponsored elections in such countries as Cambodia, a UN radio station is to play an important role in Haiti's latest attempt at democracy.

The UN's Station in Haiti

According to Al Muick, a UN broadcast technology officer who is currently in Haiti setting up the operation, the UN's station in Haiti will transmit by way of a 5kW Eddystone 7605 transmitter located on a site known as Oublionne. Muick is the Chief Engineer of UN Radio in Sudan and is on loan to the mission in Haiti. He says that the station's 4-bay, circularly polarized omni antenna from VHF Teknik, AB will be mounted on a 180-foot tower and will provide 3dB nominal gain for an ERP of around 9.5-10kW. The site is located at 6,319 feet elevation and should provide "a stomping signal" in the capital, Port-au-Prince, says Muick.

The UN is considering calling the station "**Tap-Tap Stereo**." As is usual for so many UN radio stations, the local authorities are claiming there are no frequencies available in Port-au-Prince on which the station can operate. Negotiations, however, are on-going for the main frequency in the capital as well as for nine other regions in the country, each of which is slated to have 1kW Eddystone transmitters with a 4-Bay SIRA vertically polarized dipole antenna array.

Programming has not yet been finalized, but plans call for only one studio in Port-au-Prince, now under construction. Currently, the UN is using containerized studios – first developed in former Yugoslavia – to produce a weekly one-hour show that, for a fee, is currently being aired on local FM stations. Hopefully, some of the equipment from the containers will be put to use in the constructed studio so the UN will have an independent voice on the air to help quell troubles and build peace in Haiti.

Sudan's UN Mission

The radio station for the United Nations Mission in Sudan, which it is hoped will soon include the troubled Darfur region, is planned to be largest UN radio operation ever attempted. Plans call for perhaps as many as 40 FM transmitters, with MW terrestrial coverage as well as "out of mission" transmissions generating a "shortwave blanket" over the vast African country. But all of these plans are still under scrutiny by Sudanese officials and it has been slow going to set up broadcast operations.

The United Nations Mission in the Sudan (UNMIS) was established by the Security Council in March 2005, after it had determined that the situation in the country continued to constitute a threat to international peace and security. The United States was a lead Member State in establishing a UN mission in Sudan and has been supportive of the UN's role in the country.

UNMIS's mandate is to support a signed peace agreement in the North-South conflict that has stricken the country since 1955. It is also tasked with aiding in the voluntary return of refugees, assisting with landmines, and protecting human rights – especially those of vulnerable groups such as women and children.

Sudan gained independence from British-Egyptian rule in 1956, and since then the Government and the Sudan People's Liberation Movement/Army, the main rebel movement in the south, have fought over resources, power, and the role of religion in the state. Over two million people have died, four million have been uprooted, and some 600,000 people have fled the country as refugees, according to UN figures.

There have been many attempts to bring peace to the troubled country over the years, and in June 2004 a special political mission, the United Nations Advance Mission in the Sudan, was established to prepare for the introduction of a peace support operation in the country. Talks were also held on the conflict in Darfur, a region in the western part of the Sudan where the US says genocide is taking place. Human rights monitors were deployed in Darfur and further peace talks were held.

In January 2005, the Government of the Sudan and the Sudan People's Liberation Movement/Army signed a Comprehensive Peace Agreement, which provided security arrangements, power-sharing, some autonomy for the south, and equitable distribution of economic resources, including oil, a key to the Sudanese economy.

A mission was established by the UN

Staff members at Radio Miraya. Currently, the US can only broadcast in southern Sudan.

shortly after the Peace Agreement was signed, authorizing the deployment of a "multidimensional peace support operation," which is what the United Nations calls complicated missions that are a combination of traditional peacekeeping and newer political missions with humanitarian components. The United Nations Mission in Sudan (UNMIS) consists of up to 10,000 military personnel and an appropriate civilian component including more than 700 police officers.

Although the civil war in the south has concluded, the conflict continues in the Darfur region in the west, where tens of thousands of people have been killed and more than 1.8 million others displaced, according to the UN. A peace agreement concerning Darfur was recently signed, but largely ignored. A UN mission for Darfur is planned, but, as of this writing, remains on hold. Civilians continue to suffer in Sudan in what has been called the worst humanitarian crisis currently facing the international community.

UN Radio in Sudan

Radio is a key part of Sudanese society, stemming from the days of colonial rule and the availability of the BBC World Service in the country. And with Sudan's massive size, radio is one of the few effective means by which one can reach the entire country.

The UN's plans for Sudan are as big as the country. But only the Government in the south has allowed the UN to broadcast. UNMIS's flagship station in that part of the country is up and operational in the city of Juba, named **Radio Miraya** (Mirror).

"The government has been reluctant to allow the UN to broadcast in Khartoum, saying we only have a mandate for the South," said Leon Willems, chief of UN Radio in Sudan. "Even though the Status of Forces Agreement clearly states that the UN can install and operate radio stations."

According to Willems, radio is sorely needed in fulfilling the UN's mandate to educate Sudanese people about the country's peace agreement. Some 85 percent of people in areas of Southern Sudan and over half the country's entire population are illiterate.

The UN began talks with the Government of Sudan about the radio in October 2004, but waited until January of this year to receive a radio frequency for operations in Khartoum and Juba in Southern Sudan. Finally, in February the Government of Southern Sudan allowed UNMIS to begin broadcasting in the South, granting it land and access to facilities. But the Khartoum authorities continued to resist.

The Southern authorities granted the UN the FM frequency of 101 MHz for its entire territory in May, and Radio Miraya was formally launched in Juba on June 30, 2006. Southern Sudanese President Salva Kiir, who was at the ribbon cutting (see photograph on page 9), stressed that the radio would play a crucial role in informing people about the country's peace agreement. "It will also make the UN's role clear so that it is not misunderstood," he said.

UN Secretary-General Kofi Annan's Special Representative in Sudan, Jan Pronk, who attended the opening with several hundred members of the Southern government, non-governmental organizations, and national media, emphasized that all people in Sudan had the right to benefit from the radio. "Not only the people of Southern Sudan, but also people in the North will soon participate in and listen to UN radio," he said.

UN Radio plans to expand its transmission to all of Southern Sudan by the end of 2006, Willems said. "The idea is to eventually cover Sudan with FM relay stations in population centers, with production houses in Khartoum, Juba and Darfur, once the UN has a mandate there."

He admits that broadcasting in Southern Sudan is far from easy. Radio Miraya must build transmission towers all over the south and use generators for power, since cities have inadequate supplies.

In Juba, according to Muick (the UN's Broadcast Technology Officer who is the Chief Technician of the Sudan operation), the transmitter in operation is an Eddystone 7605, with 5kW nominal output. The antenna system is a 2-bay VHF Teknick, AB vertically polarized dipole array with about 4dB gain. This provides an effective ERP of 10.5kW and reports have been received from over 60 miles away. Good signal reception is provided by the array's placement on a 270-foot tower.

Studios for the UN's station consist of two on-site standard containerized studios, one main and one production. UNMIS is in the process of building more studio space and plan to use a DAC700/CM701A codem/modem to uplink to and from the capital, Khartoum, in true duplex for news feeds and special programming, said Muick, who is a member of Society of Broadcast Engineers and seems to enjoy his field work a great deal.

The UN is also using broadcast vans with transmit capability, according to Muick. These vans are currently being dispatched to Sudanese cities of Malakal, Rumbek and Wau in the south with 250-watt transmitters and a single, vertically polarized dipole on a 45-foot pneumatic mast. These locations are smaller towns that should be reasonably well covered until full towers can be constructed, says Muick. The UN's plan calls for two and five kW operation in these towns.

Ready whenever the northern authorities allow transmissions, there is a transmitter installed in the north of the country in a very unique spot: on the roof of the men's toilet at the UN base. This transmitter is a 5 kW Eddystone with a 4-bay VHF TEKNIK AB array on a 40 foot mast which is mounted for a total height of about 100 feet above ground, giving it ERP of 22.5 kW, Muick said. This is plenty of power to cover the cities of Omdurman and Khartoum. A three-hour test was run and everything is ready to be switched on once the Sudanese authorities give the go-ahead.

The UN has radio studios in Khartoum (the same configuration as in Juba), where they produce hourly news broadcasts and special features for transmission in the south. Additional radio studios are being built at a cost of $1 million in the Manshiya district of Khartoum and these are expected to be "almost state-of-the-art," Muick said. Transmission will be via Radio Computing Systems' Master Control/Selector.

The new production facilities in Sudan will use 20 Burli workstations for news production in Arabic. Burli, a Canadian company, makes newsroom computer systems for radio that will allow UN journalists to easily gather, edit and broadcast the news.

Radio Miraya and Foundation Hirondelle

With the success of Radio Okapi (the UN radio station in DRC), UNMIS has again teamed up with Foundation Hirondelle, the Swiss NGO founded by international journalists to promote radio as an agent of peace.

Through Hirondelle and the Dutch government, seven Radio Miraya staff members are provided. Studio and training equipment has also been donated. Hirondelle will eventually take over the radio when the UN's mandate expires in 2011, handing it over completely to national staff (already, some 72 are Sudanese), who will run Radio Miraya as an independent, local public broadcasting body.

Radio Miraya programming, which Hirondelle helps produce, is in Arabic, English and local languages. Programs such as "Maal and Modi in the Morning" (a show with news, information, guests and music) and "Miraya Mix" (a program where listeners call in with greetings from North and South Sudan plus local music) provide popular fare for the local population. There is also "Sudan Tonite," a program that includes health, education, women's issues and debates on political and social topics, with listeners voicing their views through phone calls, a popular format for conflict resolution programming.

UN radio in Sudan – Radio Miraya – is without a doubt the most ambitious broadcast operation yet mounted by the United Nations. Now, if only the Government in the north will grant broadcast authorization...

The Future of UN Peacekeeping Radio

It is clear that the UN will be increasingly called upon to establish peacekeeping operations in the future. In spite of news-making scandals at the organization and the spectre of having to carry out much needed management reform in public view, the United Nations is needed now as much as it was when it was founded at the end of the Second World War.

Lessons have been learned from past peacekeeping missions – both successes and failures – and the UN struggles to steer forward in the face of political battles between Member States to ensure peace and security in our world.

Clearly it doesn't always work. But one thing does seem undeniable: UN peacekeeping radio, when given a chance, is a voice for peace in this troubled world – propaganda for peace – and these stations will continue to grow in number and have an important role to play in turning war to peace and suffering to hope.

...Special Report to MT... DRM Broadcasts in Europe

By Bernd Trutenau

Promoted as the only chance for the survival of shortwave by some – and condemned as "white noise" by others – DRM holds a fixed presence on the European SW dial. However, the starting winter (B06) season does not show a significant increase in the DRM output. With the continuing lack of suitable and moderately priced receivers on the market, interest in DRM continues to stagnate.

Mirroring the crisis of SW broadcasting in general, DRM on SW is at a critical stage in its development. Since the end of the East-West conflict, and with the accelerating globalization, the shortwave audience in Europe is continues to shrink.

Internet and satellite radio/TV, as well as rebroadcasting via local affiliates, have taken over as media for the distribution of international radio programs. On the positive side, local groundwave DRM on high SW frequencies with a power of 0.1 to 1 kW is now seen as a new option to provide high quality audio – for example, in metropolitan areas with a deficit of additional FM frequencies.

The following survey gives a picture of DRM transmissions from transmitting sites in Europe in the winter season 2006/2007.

Please note, this article was written prior to the start of the B06 season. Although many frequencies were known in advance, changes may have occurred since then. The latest DRM schedules can be found online, for example, at **http://baseportal.com/baseportal/drmdx/main**

AUSTRIA

Continuing in B06, Christian Vision appears to be the single DRM customer for the Moosbrunn site, owned by ORS (Österreichische Sender GmbH & CO KG). Christian Vision is targeting the UK on 9760 kHz with 35 kW at 1000-1100 in English.

BELARUS

In early 2006, a correspondent from Belarus reported on a Russian DX mailing list about plans to start test transmission in DRM on 7440 kHz from the Kalodziscy site in Minsk; the start date was not yet announced. The state funding for the development of the national transmitter network has been increased considerably in recent years, with digitalization as one of the main goals.

BULGARIA

The Bulgarian Telecommunication Company (BTC) has upgraded its 100 kW capacities at the Kostinbrod site near Sofia in 2005 for DRM. They have been leased since then by WRN for its English language bouquet for European listeners. However, due to technical problems the future of this service was unclear at press time.

CROATIA

In 2005, the Croatian transmitter manufacturer RIZ was testing its own 1 kW transmitter in Zagreb on 25800 kHz. This transmitter model was delivered to London (see below).

FRANCE

French operator Télédiffusion de France (TDF) has been providing DRM transmission on SW from the start. Apart from 30-35 kW capacities at the main Issoudun site, TDF operates local DRM in Meudon (Paris) on 25765 (0.1 kW) and Rennes on 25775 (0.4 kW).

Also located on French soil is the Fontbonne site, owned by Monte Carlo Radiodiffusion (MCR) from Monaco, a TDF subsidiary. During A06, MCR has been providing relays of RMC Info on 6175 kHz with 10 kW; the use in B06 was unclear at editing time.

GERMANY

There is a variety of DRM SW broadcasts from Germany. Deutsche Telekom is providing capacities between 40 and 200 kW from the Wertachtal site for Deutsche Welle and the Belgian TDP Radio.

On the domestic side, Bayerischer Rundfunk is transmitting its "B5 Aktuell" program from Ismaning (Munich) on 6085 kHz with 10 kW. Local DRM is available at numerous locations: biteXpress in Erlangen on 15896 kHz; Campus Radio in Nuremberg on 26012 and in Neumarkt (Dillberg) on 26000 kHz; and in Hannover various test feeds are carried on 26045 kHz. All transmitters have a power of 0.1 kW.

ITALY

In 2005, Radio Maria in Andrate (Northern Italy) was licensed to broadcast locally in DRM on 26000 kHz with 50 Watts (25 Watts in use). Until the installation of a DRM modulator, the station is authorized to broadcast in AM mode; in summer 2006 it was still not heard in DRM.

LUXEMBOURG

Luxembourg's provider BCE (Broadcast Centre Europe) has fully turned to DRM transmissions. It is carrying RTL programming for audiences in France and Germany around the clock: on 5990 in French and 6095 kHz in German, both with 50 kW. RTL's newly introduced English service is aimed at local listeners in Luxembourg; registered frequencies for the B06 season are 25795 and 25805 kHz, with 1kW.

NETHERLANDS

Radio Netherlands is providing DRM services from the Flevo site (owned by Nozema Services) with 40 kW from 0800-1700 UTC, both with own programming and, on 7240 kHz, relays of Radio Sweden, Vatican Radio, and Radio Canada International for European listeners.

NORWAY

Norkring, Norway's state-owned transmitter operator, has full confidence in the future of DRM. It is running the 500 kW transmitters at its sites in Kvitsøy and Sveio exclusively for DRM transmissions, leased out for relays of BBC World Service to listeners in Europe. Power in DRM mode is between 35 and 65 kW.

PORTUGAL

Deutsche Welle is using one transmitter at its Sines relay station for DRM broadcasts almost around the clock. The power is 90 kW, the targets are Europe and North Africa.

RUSSIA

The Russian Television and Radio Broadcasting Network (RTRN) Taldom site near Moscow which is used for DRM transmissions of the Voice of Russia in various languages to Europe between 0700 and 1900; between 1900 and 2100 it is leased by Deutsche Welle. The earlier announced expansion of DRM capacities on SW is still under preparation; new capacities were planned for sites in Novosibirsk and St.Petersburg. The Russian state-run transmitter operator RTRN has blamed under-funding for these delays.

SWEDEN

In 2004/2005, Sweden's transmitter operator Teracom joined in with DRM tests with a 10 kW modified army transmitter. Soon labeled "Mighty 1000," it was well heard in Europe despite of its 1 kW output in DRM mode. Meanwhile, the tests have ended and the future is uncertain. The Swedish government has requested a survey on the audibility and rentability of frequencies in/from Sweden. The survey results and consequences for the foreign service Radio Sweden will be known in 2007.

UNITED KINGDOM

For several years now, VT Communications has been providing a comprehensive DRM service for the BBC from its SW sites in Rampisham, Woofferton, and Skelton; in B06 Deutsche Welle was added as a new customer. In addition, there are two local DRM services operating in London: a multiple package with relays of commercial stations on 25695 kHz (0.1kW) from Crystal Palace (provided by the National Grid Wireless), and a WRN package on 26000 kHz from Croydon (1.7 kW), provided by Arqiva.

VATICAN CITY STATE

Vatican Radio's Santa Maria di Galeria site includes one DRM-capable SW transmitter, it is used with 60 kW for transmissions to North America: in English on 7370 kHz between 2300 and 2330, and in various languages on 13750 kHz between 1200 and 1300.

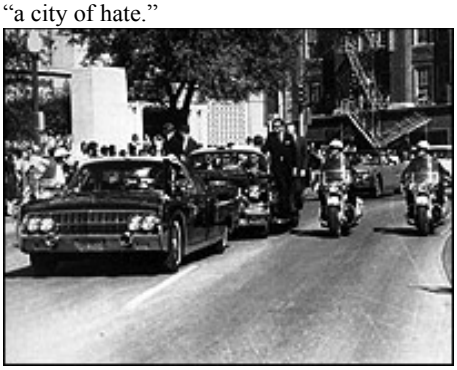
Dallas – A City Shaken

By Gayle Van Horn W4GVH

Friday morning of November 22, 1963, John Fitzgerald Kennedy arose in a Fort Worth hotel. That night, his body lay in state at the White House. No bugler sounded taps, no drum beat its ruffle and no band played *Hail to the Chief*. This time he returned in silence.

The news of his assassination came like a clap of thunder, reverberating around the world. It was the most shocking event of our time. It's hard to say how the world changed on that sunny afternoon in Dealey Plaza, but in an instant nothing was the same. Everything looked different – especially Dallas.

Although the assassination of President John F. Kennedy is rarely mentioned now among the citizens, it lurks just below the surface in their memories. A few say the city will always wrestle with its past. If it had been a natural disaster – a tornado or a summer drought – Dallas would have had a reason and a response. But this was an unnatural disaster, leaving the city grapping with its new label as "a city of hate."



Despite their feeling of hopelessness, the citizens, politicians, and city leaders were determined to prove the critics wrong and rebuild the city's image. But it would take time. Despite their grief, the people returned to work and school with stoic determination to heal the city.

No one claims to know the degree of influence the Kennedy assassination exerted on Dallas, but the city has changed dramatically in 43 years. The Dallas metropolitan area is now known globally as a center for telecommunications, computer technology, banking, and transportation. The skyline, once dominated by a scattering of bank buildings, has emerged as one of massive office towers and hotels.

In the dark days following the assassination, the Dallas Police Department, headed by Chief of Police Jesse Curry, was bombarded with criticism. Theories and speculation regarding the assassination and its aftermath persist to this day. The International Association of Chiefs of Police was implemented to conduct a full survey into the operations of the police department. Many of the I.A.C.P. recommendations were subsequently enforced and the police department was completely reorganized, including a new Southeast Patrol Division and a Freeway Patrol. In 1968, the Public Service Officers were created to augment the police department.

A New Beginning

In this year of 2006 – the department's 125th anniversary – much has changed from the early days of 15 officers patrolling a city of 300 saloons and an influx of desperados.

During the post-assassination period, the department's goal focused on "action" directed against the crime and traffic problems in the city of Dallas. More officers were put on the streets during peak crime hours, community policing was initiated, and the Helicopter Unit was created. When Captain Will Fritz retired in 1970, it marked the end of an era. He would perhaps become best known for his investigation of the J.F.K. assassination and the slaying of his accused killer Lee Harvey Oswald.

Times were changing in the police department as veteran officers either retired or returned to college for degrees in law enforcement. Many of the new recruits fresh out of college had degrees in criminal justice programs. Chief Don Byrd made sure that his officers received the best available training and equipment. The Training and Education Division developed many refinements to the basic training program, using crisis intervention and role playing in simulated situations. By 1974, the 3,000th recruit graduated from the police academy.

The Dallas Police Department was also at the forefront in the application of computer technology. The Direct Entry Field Reporting System provided quick access to information once the officer called in the offense report.

A new administration opened two new police stations: the Central Patrol Station at 334 S. Hall Street, which also housed the Traffic and Special Operations Divisions, and the Southwest Division. In 1981, Dallas Police Department celebrated its centennial, and by the end of the year had 1,959 sworn officers and 571 civilians. The next year Chief Billy King implemented storefront offices and renewed the Mounted Patrol Unit.

Enforcement and High Tech

Acquisition of technology such as the Mobile Digital Terminals (MDTs) in 1987 made the Dallas Police Department one of the best equipped police departments in the country. Officers could now check subjects and property quickly in the field at the push of a few buttons, and send car to car, and car to dispatcher messages over the terminals. Police vehicles were also equipped with car phones.

In 1988, the emergency 9-11 system went operational, and the following year the Automated Fingerprint Identification System (AFIS) was an instant success. The $4.5 million system could compare fingerprints found at a crime scene to prints on file in a matter of minutes.

In January 1989, Chief Mack Vines announced the formation of a Gang Task Force to combat the growing number of gang related crimes in the city, which included drug trafficking, criminal mischief, auto theft, burglary, and drive-by shootings. Intelligence, Narcotics, Vice, Youth, and Patrol officers met on a monthly basis with other area law enforcement agencies to address the problem. The Dallas Police Gang Unit was created shortly thereafter to monitor and identify gang members and activity and began with two detectives and a sergeant.

The Interactive Community Policing concept was introduced in 1994, eventually placing I.C.P. officers at each of the substations. The goal was interaction between the community and the police department through a partnership in such programs as crime watch and neighborhood patrols to address and solve identifiable problems in the neighborhood.

An Asian-American relations unit and a senior citizens liaison program were started in 1996. Road Rage Vehicles – unmarked police squad cars designated to address problems of road rage – were put into service in 1998. In March 2003, the newly completed police head-

quarters was opened at 1400 S. Lamar Street.

Despite such improvements, in 2002 the FBI's Uniform Crime Report listed Dallas as having the highest crime rate in the nation per capita. The department was again reorganized and began initiatives to reduce the crime. The Department expanded its use of the CompStat program, which uses technology and mapping to identify and analyze crime trends across the city. The Auto Theft Bait Car Program was expanded to assist in the capturing of auto thieves. Video cameras were installed in Deep Ellum to monitor crime and crowd control. Operation Disruption was introduced. These and other programs have been developed to assist the officer's ability to fight and reduce crime.

Dallas PD 2006

Today, the city of Dallas is the 9th largest city in the United States with a diverse population of over 1.2 million people covering 384 square miles. Chief David Kunkle heads a police force of 2,961 sworn officers and 512 civilian employees. Sgt. Marshal Furr #1784 of the Auto Theft Unit has the distinction of being the most senior member of the police department with 43 years of service. He and Sgt. Graham Pierce #1851 are the only officers whose careers bridge the time to the Kennedy assassination.

Since the early years, the Dallas Police Department has reorganized many times with units consolidated, responsibilities shifted, and new squads created to meet the needs of the Department and address the latest crime trends. Today detectives also investigate cyber crime and identity theft offenses, crimes that didn't even exist a few years ago.

The attacks on the World Trade Center in New York by terrorists on September 11, 2001, raised new concerns, and the department responded by organizing a new Homeland Security & Special Operations Division. Last year after Hurricane Katrina hit the Gulf Coast, the Dallas Police Department was mobilized to provide security and assistance, when nearly 15,000 evacuees were transported to Dallas and temporary facilities were set up at the Dallas Convention Center and Reunion Arena.

Reading the archives of the Dallas Police Department offers only a glimpse into the department's past. A few artifacts have survived, but some parts of our history are lost forever. While some officers left their mark, others are forgotten names of a bygone era of the Dallas police force.

A Radio System that Works

While certain areas of the police department have modernized, Dallas continues to use a radio system that dates back at least three decades. While other major metropolitan centers and most of the public safety agencies in the Dallas-Fort Worth Metroplex have converted their public safety communication systems over to high tech trunk systems, the Dallas PD continue to use a conventional UHF radio system. When asked why they continue to use this older system instead of a modern trunk radio system, one officer said, "It works just fine for us."

Table One is a list of the currently known Dallas PD radio channels. We have also included in Table Two a list of the known Dallas PD dispatch codes and signals.

Old Tige on the Scene

The city's police department was not the only one with a vision to protect and serve the residents of Dallas. Nine years prior to Dallas organizing their 15 officers to patrol the saloons, volunteers of the city had decided it was time to organize a fire department. The first all-volunteer fire company Dallas Hook and Ladder Company #1 was organized in 1872.

That same year, the Houston and Central Railroad steamed into Dallas, and the next year the Texas and Pacific came. The population exploded and by 1874 had soared to 7,000. Large grand hotels were built, but most of the building boom suffered from shoddy construction.

Despite the city's expansion, outlaws were also common during this period. Belle Starr began her adventures in Dallas, and J.H. "Doc" Holliday came to Dallas to restore his health and practice dentistry. After three years Doc was "invited" to leave Dallas after he killed a man in a local gambling saloon.

In 1874 utilities such as gas and water became available. With water readily available, the fire department could fight the destructive fires which were very commonplace. Six years later, the first telephone line linked the water company to the fire station.

The 1880s brought more growth to the city, and the fire company. 'Old Tige' was added to the force in 1884 – a horse-drawn steam pumper named after then mayor W.L. Cabell. Today, 'Old Tige' sits in the Dallas Firefighters Museum.

Dallas Fire and Rescue

Since its inception, the Dallas Fire Department has seen growth in response to the demands on its services. Today's department has advanced to one of multiple services. Dallas Fire-Rescue provides the city with both fire and emergency protection for a population nearing two million.

In November 1977, the Gamewell Alarm System was replaced with their present computer dispatch system, which was designed to meet the needs of future technological changes. This system automatically selects the correct fire company for each incident according to location. The system also automatically assigns and reallocates resources during multi-alarm incidents.

There are 55 fire stations located strategically throughout the city. These fire stations house 54 fire engines, 21 aerial ladder trucks, five aircraft rescue firefighting apparatus, nine Booster pumpers, one hazardous material unit, as well as 32 front line rescues and nine peak demand rescues.

A standard one alarm assignment today consists of three engines, one truck, one rescue and one battalion chief. A minimum of four firefighters respond on each fire engine and aerial ladder truck. If the incident requires a high rise building response, the assignment includes three engines, two trucks, one rescue and two battalion chiefs. All additional alarm assignments are for three engines and one truck, with an automatic limit of 21 engines and five trucks. The highest alarm level in the system is seven alarms.

Two major enhancements have been the integration of the city's paging system, which notifies on-call personnel of major incidents, and the integration of computer terminals located in the fire stations. In 1989, the Mobile Data Terminals (MDTs) began to allow the real time distribution of information received by the dispatchers to responding companies. The MDT system is a cellular system design with multiple transmitter and receive sites. 1989 saw the beginning of the EMS and Fire automatic status boards added to the computer dispatch.

In 1993, Global Positioning System (GPS) was installed on all the rescue vehicles, and the dispatch system was modified to analyze the vehicle location data. Using this system, units are assigned based on their distance in street miles from the incident. Today, all of the engines, trucks, rescues and battalion chiefs are equipped with GPS.

Automatic Vehicle Locator

With the implementation of the Automatic Vehicle Locator (AVL) in the fire department's fleet, officials saw the need to better incorporate this technology. A new audio/visual rear projection LCD screen display wall allows for multiple images to be broadcast simultaneously. The screen displays can be resized and relocated as needed to assist the dispatchers. The video technology has the capability of displaying eight mediums simultaneously. The current programs include two mapping systems, the fire and EMS status boards, and the AVL maps with zoom-in capability for fire, EMS and police.

The center screen also has the ability to project six displays, including Doppler radar, weather, traffic, and DVD or VCR, computer displays, off air television and prerecorded play backs.

Dallas Emergency Medical Dispatch Program

The Dallas Fire Rescue Department began providing Emergency Medical Service (EMS) in 1972 when 16 ambulances were placed into service. These are staffed by firefighters trained to the basic EMT level one that surpasses so called "paramedic" training.

Rescues (EMS Units) are staffed by two firefighters/paramedics 24 hours per day. Besides responding to all medical emergencies,

they also respond to structure fires to assist with fire suppression, search and rescue, and provide medical help for victims or firefighters.

In 1999, a standardized Emergency Medical Dispatch (EMD) system was placed in service. This ensures that even before the help arrives, uniform pre-arrival instructions and medically scripted protocols are given. In Dallas, EMD certified dispatchers *are* first responders, able to provide CPR instructions immediately.

Fire and Rescue Communications

The Communications Division is under the direction of Assistant Chief Robert Bailey, and includes fire dispatch, the 911/311 communications center, the Office of Emergency Preparedness, and the Public Information Officer.

Fire dispatch is responsible for receiving calls and dispatching the closest emergency equipment to all fire, medical, and rescue emergencies, and hazardous material-related requests for assistance. The 911/311 communication center is a non uniformed division of the city fire department. The 911 system takes incoming emergency requests for police, fire and emergency medical services, while the 311 system handles non-emergency requests for service and information about all city departments.

The Office of Emergency Preparedness is responsible for disaster planning, training, and warning the public. It is also responsible for the maintenance and operation of the city's Emergency Operations Center, for recovery operations following a disaster, and for coordinating public and private agencies engaged in any disaster emergency activity within Dallas. The Public Information Officer has the job of keeping the media informed of the department's public education efforts, special programs, and special public interest issues.

Like the Dallas PD, the Dallas Fire Department runs on a very redundant 453 MHz conventional system. Table Three has the information on that system. Dallas FD uses Motorola Saber radios for their handheld units.

Once a unit gets dispatched to an alarm box, the responding apparatus will always monitor 453.875 Channel 1 – the fire response channel for information from 660, which is the DFD dispatch identifier. In the meantime, firefighters will be turning their Motorola handheld radios to the simplex fireground staging frequency, 465.6125 MHz Channel 11. This frequency is used so only the companies on scene can hear the transmissions from the Battalion Chief.

Once the company has been given an assignment, they then switch their handheld radios to another simplex frequency – fireground operations 465.6375 MHz Channel 12. Only radios within the general area (about a one mile radius) can hear these communications directly. Since the tragic death recently of a Dallas fire fighter, the department now links this frequency to the City Services trunking system for wide area monitoring and recording. The talkgroup is 9968.

Most of the Fire Battalion Chief vehicles have had an 800 MHz radio installed to retransmit from their radios. We have been told by local sources that this new arrangement is not perfect. The bad news is the command technician has to properly configure the system for this retransmission to occur.

We have also been told by local scanner buffs that some Dallas PD units are also using the City Services trunk system. You can get complete details in Table Four below.

The Lifeline of Dallas

Dallas has come a long way in the last 125 years. The Dallas Fire and Rescue and the Police Department have reorganized many times. New units and squads have been created. Computer technology has advanced to meet the needs of both departments. Together, both departments protect and serve the residents of Dallas in a partnership quite unlike other metropolitan cities.

Chief James Carter Arnold and his police force of 1881 could not have foreseen nor comprehended today's age of modern policing with computers, radios, squad cars, and other technologies. Today's fire and rescue is a far cry from the early days of "Old Tige," to one of dedicated firefighters and rescue units. But, both originating departments would have recognized the dedication, integrity, sacrifice and valor that are still the hallmarks of Dallas Police and Fire Department personnel.

The author would like to thank the Dallas Police Media Relations Department, the Dallas Fire Department, Jess Lucio – Dallas Police Museum Coordinator, Detective Don Casey – Dallas PD, and several scanner enthusiasts in the Dallas-Fort Worth area, who wish to remain anonymous, for their assistance in the preparation of this article. For updates to the Dallas-Fort Worth Metroplex scanner scene, we recommend you subscribe to the DFW Scanner group, Don Teague List Moderator, via Yahoogroups.com

TABLE ONE: DALLAS POLICE DEPARTMENT RADIO SYSTEM

Callsign: KKB364, PL tone-173.8 Hz

460.325	Central and East Patrol Dispatch <Channel 1>
460.375	Northeast Patrol Dispatch <Channel 2>
460.500	Southeast Patrol Dispatch <Channel 3>
460.425	Southwest Patrol Dispatch <Channel 4>
460.075	Northwest Patrol Dispatch <Channel 5>
460.175	North Patrol Dispatch <Channel 6>
460.275	Traffic / ANI Dispatch <Channel 7>
460.125	SWAT / Tactical <Channel 8>
460.025	Records/ Training / Tactical <Channel 9>
460.225	Citywide Car to Car <Channel 10>
460.475	Criminal Investigation Division / Gangs / Narcotics <Channel 11>
460.400	Car to Car / Special Operations <Channel 12>
458.975	Simplex Tactical

Dallas PD Unit Numbering Plan
Unit number "DDSN"

DD	Division
S	Supervisor number
N	Individual unit number (Note: if N is a 0, then that unit is a supervisor)

Division Numbers

1	Central and East Patrol
2	Northeast Patrol
3	Southeast Patrol
4	Southwest Patrol
5	Northwest Patrol
6	North Central Patrol
7	Traffic Division
8	Tactical Units (SWAT)
9	Traffic Division
10	Miscellaneous Units
11	Capers Units
12	Auto Theft Division
13	Intelligence Division
15	Aircraft Division
17	Juvenile Division
18	Narcotics Division
19	Park Police
22	Training and Academy
25	City Marshals (Prisoner Transfer)
26	Parade Units
31	Crime Scene Units

TABLE TWO: DALLAS SIGNAL CODES

Dallas Police Department Codes

Code 1	Routine assignment –Normal response
Code 2	Urgent assignment – No longer authorized
Code 3	Emergency assignment – Use red lights and siren
Code 4	Disregard previous instructions or assignment
Code 5	En route
Code 6	Arrived
Code 10	Known offender
Code 10C	Known dangerous offender
Code 10W	Felony warrant
Code 10X	Stolen vehicle

Call Sheet Disposition Codes (N Codes)

N1	Disregard
N2	Duplicate assignment
N3	No complainant
N4	Wrong address
N5	Civil case – Non-police incident
N6	Prisoner transfer
N7	Fire call – Assist fire department

Dallas Police Department Signals

DH	Drug house
2	Witness
3	Hang up call
4	911 Hang up
6	Disturbance
6G	Random gunfire
6X	Major disturbance
7	Minor accident
7X	Major accident
8	Drunk
9	Theft
11	Burglary
12	Burglar alarm
13	Prowler
14	Cutting
15	Assist officer
16	Injured person
17	Kidnapping
18	Fire alarm
19	Shooting
20	Robbery
21	Holdup alarm
22	Animal complaint
23	Parking violation
24	Abandoned property
25	Criminal assault
26	Missing person
27	Dead person
28	Sick person
29	Open building
30	Prisoner
31	Criminal mischief
32	Suspicious person
33	Prostitution
34	Suicide
35	Emergency blood transfer
36	Abandon child
37	Street blockage
38	Meet complainant
39	Racing, speeding
40	Other
41	Felony
42	Pursuit
44	Person in danger
45	SWAT Team call-up
46	Disturbed person
50	Eat
51	Coffee
52	City court
53	County court
54	Escort
55	Traffic violation
56	Out to station
57	Out to garage
58	Routine investigation
59	Follow-up investigation
60	Special assignment
61	Foot patrol
62	Public service
63	Cover element
64	Radio shop
65	Use telephone
66	End duty tour
67	Monitor radio

TABLE THREE: DALLAS FIRE AND RESCUE

Freq (MHz)	Description	Tone	Callsign
154.2800 sim	Mutual Aid (Area wide)	CSQ	
460.5750 rptr	Dispatch Ch 0	CSQ	KKN 377
453.8750 rptr	Fire Response Ch 1	DPL131	KTQ 245
453.9000 rptr	Rescue Response Ch 2	DPL131	WPDY802
451.1500 rptr	Major Incident Ch 3	DPL131	KKO 224
453.6500 rptr	Backup Rptr (Forest/Preston)		WNAE 384
453.6750 rptr	Fireground Rptr/Admin Ch 4	DPL131	WPDY802
453.7000 rptr	Backup Rptr (Garland/NW Hwy)		KJV288
453.8500 rptr	Backup rptr (DPD SW Substation)		KJV 288
463.0000 rptr	Rescue Amb-Hospital Ch 5	173.8 PL	KS8879
463.0250 rptr	MICU Amb-Hospital Ch 6	173.8 PL	KS8879
463.0750 rptr	MICU Amb-Hospital Ch 7	173.8 PL	KS8879
463.1250 rptr	MICU Amb-Hospital Ch 8	173.8 PL	KS8879
460.6125 sim	Training Ch 9	173.8 PL	WPLX 264
460.6375 sim	Special Events Ch 10	173.8 PL	WPLX 264
465.6125 sim	Fireground Staging Ch 11	173.8 PL	WPLX 264
465.6375 sim	Fireground Ops Ch 12	173.8 PL	WPLX 264

Fire Department Station List

Legend:
E=Engine T=Truck R=Rescue B=Booster

Station	Address
1	1901 Irving Boulevard E1/Div II Dep Chief 807/Command Van 825/Mass Casuality Veh 788
2	4211 Northaven Road E2/Paramedic Supervisor 782
3	500 North Oakland Ave E3/T3/R3
4	816 South Akard Street E4/T4/HM 4/CH 1
5	2039 N. St. Augustine Dr E5/Peak Demand R5
6	2808 South Harwood St E6/R6
7	6010 Davenport Road E7/T7/B7/R7
8	1904 North Garrett Ave E8/Peak Demand R8/Battalion 3
9	2002 Cool Mist Lane E9 also answers as R9/B9
10	4451 Frankford Road E10/R10
11	3828 Cedar Springs Rd E11/T11/R11
12	7520 Wheatland Road E12 also answers as R12
13	6902 Frankford Road E13
14	1005 West 12th Street E14/Battalion 6
15	111 East 8th Street E15/T15/R15/Technical R15
16	2616 Chalk Hill Road E16
17	6045 Belmont Avenue E17/T17/R17
18	660 North Griffin Blvd E18/R18/Peak Demand R70
19	5600 East Grand Ave E19/T19/R19
20	12727 Montfort Drive E20/T20
21	3210 Love Field Drive Red 1/Red 2/Red 3
22	12200 Coit Road E22/R22
23	1660 Corinth Street Rd E23/T23/R23
24	2426 Hatcher Street E24/T24/R24
25	2112 56th Street E25/T25/R25/Battalion 5
26	3303 Sheldon Avenue E26/T26/R26
27	8401 Douglas Avenue E27
28	8701 Greenville Avenue E28/R28/896 (Box 4)
29	9830 Shadow Way E29
30	11381 Zodiac Lane E30
31	9365 Garland Road E31/R31
32	7007 Benning Avenue E32/R32
33	754 West Illinois Avenue E33/R33
34	1234 Carbona Drive E34/T34/R34/Peak Demand R771/
	@ Lake June Road Battalion 8
35	3822 Walnut Hill Lane E35/R35/Battalion 7
36	3241 North Hampton Rd E36/T36
37	6742 Greenville Avenue E37/T37/R37
38	2816 East Illinois Ave E38/R38
39	2850 Ruidosa @Ferguson Road E39/T39/Boat 39
41	5920 Royal Lane E41/T41/R41
42	3333 West Mockingbird Ln E42/Boat 42
43	2844 Lombardy Lane E43/T43/Peak Demand R43
44	4114 Frank Street E44/R44
45	716 West Commerce St E45/R45
46	331 East Camp Wisdom Rd E46/R46
47	7161 Envoy Court E47/R47/Battalion 9
48	10480 E. Northwest Hwy E48/Peak Demand R48/Boat 48
49	4901 South Hampton Rd E49/T49/R49/Red 49
51	200 South St. Augustine Dr E51/R51/Boat 51
52	2504 Cockrell Hill Road E52/Peak Demand R52/Boat 52/B52
53	1407 John West Road E53/T53/R53
54	6238 Bonnie View Road E54/Boat 54
55	6600 Trammel Drive E55/Div 1 Deputy Chief 806
56	7040 Belt Line Road E56/Battalion 2
57	10801 Audelia Road E57/T57/R57/Battalion 4
**	5000 Dolphin Road Maintenance and Training

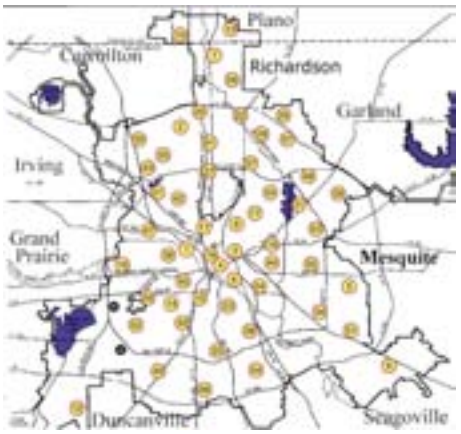


TABLE FOUR: DALLAS CITY SERVICES TRUNK SYSTEM

Motorola Type IIi Hybrid (Analog/ID 0b1f)
Trunk Tracker Fleetmap:

Type	B0	B1	B2	B3	B4	B5	B6	B7
TT	S8	S10	S0	S0	S0	S0	S11	S11

Frequencies:
856.7375 856.9875 857.7375 857.9875c 858.7375 858.9875c 859.7375c 859.9875c 860.7375 860.9875c 866.4125 866.4375 866.9125 866.9375 867.4125 867.4375 867.9125 867.9375 868.1625 868.1875

Talkgroups:
003-01 Fair Park
003-02 Fair Park
003-03 Fair Park
006-01 Aviation Irrigation
006-02 Aviation Irrigation
006-03 Aviation Irrigation
600-01 Public Works and Transportation (PBWT) <Channel A>
600-02 Public Works and Transportation (PBWT) <Channel B>
600-03 Public Works and Transportation (PBWT) <Channel C>
600-04 Public Works and Transportation (PBWT) <Channel D>
600-05 Public Works and Transportation (PBWT) <Channel E>
600-06 Public Works and Transportation (PBWT) <Channel F>
600-07 Public Works and Transportation (PBWT) <Channel G>
600-08 Public Works and Transportation (PBWT) <Channel H>
600-09 Public Works and Transportation (PBWT) <Channel I>
600-10 Public Works and Transportation (PBWT) <Channel J>
600-11 Public Works and Transportation (PBWT) <Channel K>
600-12 Public Works and Transportation (PBWT) <Channel L>
600-13 Public Works and Transportation (PBWT) <Channel M>
600-14 Public Works and Transportation (PBWT) <Channel N>
600-15 Public Works and Transportation (PBWT) <Channel O>

1680 Water Utilities Irrigation Department
8192 Water Utilities/City Hall-EDATS Main – Data
8208 Water Utilities-EDATS Eastside – Data
8240 Communication and Information Test Group <Ch 2>
8256 Aviation Dallas PD <Channel 2>
8272 Aviation Operations <Channel 1>
8288 Aviation Field Maintenance <Channel 4>
8304 Aviation Building Maintenance <Channel 5>
8320 Aviation Redbird <Channel 6>
8336 Aviation Special Operations <Channel 7>
8352 Aviation Managers <Channel 8>
8368 Aviation All Call <Channel 1>
8384 Police Patrol Deployment North Division
8400 City Security <Channel 1>
8416 City Security <Channel 2>
8432 City Security <Channel 3>
8448 City Security <Channel 4>
8464 Communication and Information Lease Fleet
8480 Communication and Information Lease Fleet
8496 Communication and Information Lease Fleet
8512 Communication and Information Lease Fleet
8528 Communication and Information Lease Fleet
8544 Street Services Managers
8560 Street Services – Street Dispatch
8576 Street Services Secondary
8592 Street Services Secondary
8608 Street Services pecial Operations
8624 Sanitation Department Dispatch
8640 Sanitation Department Secondary
8656 Sanitation Department Disposal/Recycle
8672 Sanitation Department Special Operations
8688 Animal Control Dispatch
8704 Animal Control Secondary <Channel 10>
8720 Animal Control Special Operations
8736 Code Enforcement
8752 Street Services Mow/Clean
8768 Addison Police Backup
8784 Addison Fire Backup
8912 Communication and Information Radio
8928 Communication and Information Data
8944 Communication and Information Telephone
8960 Communication and Information Special Test
8976 Police Patrol Deployment Southeast Division
8992 Unknown user/usage – Data
9024 Office of Emergency Preparedness <Channel 1>
9040 Office of Emergency Preparedness Staff <Channel 2>
9056 Mobile Data Terminals – Date
9072 Police Patrol Deployment Northeast Division
9088 Police Patrol Deployment Citywide
9104 Police Patrol Deployment Northwest Division
9120 Police Patrol Deployment Central Division
9136 Zoo Main <Channel 1>
9152 Zoo Operations <Channel 2>
9168 Zoo Animal Services <Channel 3>
9184 Zoo Veterinarian <Channel 4>
9200 Zoo Monorail 1 <Channel 5>
9216 Zoo Monorail 2 <Channel 6>
9232 Zoo DZS <Channel 7>
9248 Zoo Aquarium <Channel 8>
9264 Zoo All Call <Channel 11>
9280 Meyerson Symphony Center Administration <Channel1>
9296 Meyerson Symphony Center Maintenance <Channel 2>
9312 Equipment and Building Services – <Channel 1>
9328 Equipment and Building Services – <Channel 2>
9344 Equipment and Building Services – Building Services
9360 Equipment and Building Services – Building Services
9376 Meyerson Symphony Center Ushers <Channel 3>
9392 Convention Center Event <Channel 1>
9408 Convention Center Cleaning <Channel 2>
9424 Convention Center Stage Manager <Channel 3>
9440 Convention Center Building Security <Channel 4>
9456 Convention Center Maintenance 1 <Channel 5>
9472 Convention Center Electricians 1 <Channel 6>
9488 Convention Center Electricians 2 <Channel 7>
9504 Convention Center Medics <Channel 8>
9520 Convention Center DCVB <Channel 9>
9536 Convention Center Maintenance 2 <Channel 10>
9552 Convention Center Telecom <Channel 11>
9568 Convention Center Event Security <Channel 12>
9584 Convention Center All-Call <Channel 13>
9600 Farmers Market Property Management <Channel 1>
9616 Farmers Market Security <Channel 2>
9632 Farmers Market Operations <Channel 3>
9648 Cockrell Hill Police Primary
9664 Cockrell Hill Police Secondary
9904 City Security <Channel 5> [Tentative]
9968 Fire Fireground (Rebroadcast of 465.6375)
10064 Cockrell Hill Fire Primary
10080 Cockrell Hill Fire <Channel 2>
10496 Parks and Recreation <Channel 1>
10752 Water Utilites
11008 Parks and Recreation
11264 Water Utilities Irrigation Department
11488 Parks and Recreation
11776 Parks and Recreation <Channel 6>
58368 Code Enforcement
59392 Code Enforcement
60416 Code Enforcement
62464 Code Enforcement Dispatch

Ken Reitz, KS4ZR
kenreitz@monitoringtimes.com

The Unintentional Philatelist

While many DXers have jumped on the E-QSL band wagon, many old timers and newcomers still like the look and feel of an old fashioned paper QSL card. There's nothing like touching a QSL card signed by a ham in a distant land and put through the rigors of the international postal system. Most hams and SWLs know exactly what I mean.

Today, most rare DXpeditions do their QSLing through managers (there aren't any post offices on Peter I or Aves Island). Still, for many of us, countries such as Mongolia, the Cook Islands, Uganda and St. Helena are "rare DX," even if there is a substantial permanent ham population present.

I started a serious pursuit of DXCC (100 or more ITU countries confirmed) three years ago, and that required sending a fair number of QSL cards directly to the operators' home address. Shortly after the first dozen or so came back, I realized each returning QSL card came with a bonus: a canceled stamp from the DXCC country!

❖ Stamp Collecting Beginner

Now, the only thing I knew about stamp collecting is that it's called *philately*, and that stamp collectors are known as *philatelists,* but I also knew that the stamps were beautiful. So, I started saving all the foreign stamps that came through the mail box and put them in their own envelope. What a neat way to combine two different hobbies! I've assembled a few of the more interesting stamps in two sets which are shown on these pages.

The stamps are wonderful little billboards for each country. Check out the interesting graphics on the St. Helena stamp celebrating "Arts & Crafts." Look at the subjects on the stamps from Honduras: one celebrating the birthday of Abraham Lincoln and the other showing Santa Claus on a Christmas tree ornament. And from Greenland there's a beautiful tall ship braving the icy waters of the North Atlantic with a huge iceberg looming right behind it. I never imagined QSLing would have this extra dimension.

Of course, I could have sent many of these QSL requests through the bureau or through a stateside QSL manager at virtually no cost. But, many countries do not have QSL bureaus and many DX operators don't have stateside managers. So, if you want a QSL direct, you'll have to send your card along with $2 (U.S.) to the operators' home address.*

Stamps from the Cook Islands, Greenland, Mongolia, Kuwait, Greece (during the Olypmics) and others. (Courtesy: Author)

Sending direct is chancy. The letter could be intercepted and the contents pocketed. To help avoid this problem, use plain envelopes, a "nested" return addressed envelope inside with the money tucked in that. Don't put any call signs on either address. Then sit back and wait. The return QSL could take many weeks or months, but then, QSLing through the bureau can take months or even years! Think of it this way: If you are an avid DXer and want to start collecting stamps, QSLing direct is a great idea.

In most cases QSL cards have virtually no value, though I've actually found one web site where QSL cards are being offered in batches. They have a value because of the stamps affixed to the front of the QSL cards from the 1930s, '40s and '50s. But, for the most part, QSLs are collected by individual radio enthusiasts for whom they have the most value. Few are saved following the collector's death. Radio museums are awash with QSL cards. Stamps, however, do have collectible value. I can't imagine most families tossing a lifetime of stamp collecting in the dumpster after the collector has passed away. And, even if you don't have any interest in stamps, there will be someone in your family who will cherish them. I give mine to my son-in-law who has collected them since childhood.

There are innumerable books on stamp collecting and nearly as many web sites. But, I've found one place which is really great for beginners who don't want to develop a serious stamp portfolio as a retirement investing alternative. It's called "Stamp Collecting: doing it for enjoyment, not for profit." You can check it out here: **http://members.aol.com/shobansen**

I like the attitude of this site. You'll find some great tips on assembling your QSL stamp collection; how to soak the stamps off the envelopes; trimming, drying and mounting them.

❖ Radio Stamps Galore!

Throughout the history of radio, there have been many stamps issued by a wide variety of countries celebrating this remarkable device. Typically, they're issued to commemorate the anniversary of an important radio date such as the VOA stamps issued in the 1960s (back when 1st Class postage was 5 cents). Other stamps celebrate the personalities of the radio industry. Marconi is a big favorite with many countries. There's a nice, short treatise on the subject from the California Historical Radio Society (CHRS) which you may read here:

www.antiqueradios.com/chrs/journal/stamps.html

It mentions a book on the subject published in 1956 called "Radio Philatelia."

The CHRS article mentions the "EKKO" stamps, which are interesting because they weren't postage stamps but a kind of early QSL. In a program begun in the early 1920s, listeners would send for the stamps and collect them from all the stations in a special stamp book. There's more information on these stamps and some beautiful examples at

Stamps from the Principality of Andorra, Indonesia, Mauritius, Uganda, St. Helena among others. (Courtesy: Author)

the Antique Radio Classified (ARC) web site here: **www.antiqueradio.com/gilbertcombs_ekko_6-97.html**

According to the article in ARC by Wayne Gilbert and Charles R. Combs, there were no fewer than 700 radio stations across the country participating in this promotion. Other stations not affiliated with the program rushed their own stamps into circulation to a radio-crazed public. There is no way to know how many hundreds of thousands of people collected these, but the program lasted about 10 years. These stamps actually have a monetary value today.

This stamp, issued by WSB Atlanta, was considerably bigger than those from the EKKO program. (Courtesy: Antique Radio Classified)

There were some two dozen amateur radio satellite stamps issued on the OSCAR/RS series ham satellites by at least 13 countries in the last few decades and some beautiful examples are found at this web site: **www.cira.colostate.edu/ramm/hillger/OSCAR.htm**

This valuable resource in combined radio/philatelia was put together by Don Hilger at Colorado State University. It covers no fewer than 56 series of stamps issued on as many different satellites. It represents hundreds of individual stamps on the subject and it's the mother lode of radio stamps. Among the satellites featured are AMSATS, WXSATS, polar orbiters, geostationary WX satellites, military WX, communications satellites, astronomical, planetary, cometary and navigation satellites, just to name a few. You can spend hours checking them out at this incredible web site: **www.cira.colostate.edu/ramm/hillger/satellites.htm**

❖ And, Finally

Just as I was finishing this column I received the new Universal Radio catalog in the mail and there on the cover in full, glossy, color are 14 beautiful radio-related stamps enlarged to show the details. Check out one of Universal's ads in this issue of *MT* to get your copy of this catalog. And, next time the post office issues a radio-related stamp I'll be buying as many as I can to send with my outgoing QSLs!

*Virtually all ham call signs in the world are listed on **www.qrz.com** which gives either the operators' direct mailing address or his/her manager's address.

ASK BOB

GENERAL QUESTIONS RELATED TO RADIO

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

Q. *If I were to stack two Grove Scanner Beams side by side, would I add the individual gains for the total gain? (Rush Lashbrook, email)*

A. While this seems logical, decibels are logarithms – they indicate *multiplied* increases, not *added* increases. A second identical antenna would double your intercepted signal voltage; this is a 3 dB increase over what a single antenna would provide.

Q. *Within the next few decades, is it likely that the shortwave spectrum will no longer be desirable or even useful for emerging technology? (email)*

A. The basic task is to provide a reliable, wireless medium for propagating information from one place to another. Emerging technology is moving upwards in frequency, but only for short-range applications – with the singular exception of those long-distance repeaters we call satellites.

Still, satellites are vulnerable, and terrestrial links are often required for backup. For instant, wireless, international telecommunications, shortwave is still the best standby solution.

Military networks worldwide still depend upon the 2-30 MHz high frequency spectrum and, if you take a listen to the 20-100 kHz range, you'll find encrypted, digital, military communications in constant operation in the basement band of VLF.

I suspect that the lower frequencies, right up through shortwave, will remain a dependable mode of informational propagation for quite some time to come.

Q. *How do I measure an audio tone on my oscilloscope? (Peter Semenik, Coeur d'Alene, ID)*

A. Since the oscilloscope is calibrated in units of time, it will sample a portion of the number of cycles per second (hertz). Set the oscilloscope sweep so you can easily count the horizontal divisions covered by one cycle of the tone. You simply divide 1000 by the number of milliseconds the single cycle measures to get the audio frequency in hertz.

For example, if one cycle covers five horizontal divisions when the scope is set for a 10 millisecond (ms) sweep; that would be 5 ms (half of a full 10 ms sweep). Since 2 ms is 1/500 of a second, the tone is actually 500 cycle per second (500 Hz). If it were 8 ms, that would be 125 Hz (1000 divided by 8).

Q. *I thought RG6-U coax was not good to use as antenna cable for scanners. Is it also not a good choice for transmitters in the 158.00MHz range? (Jim Miossi, email)*

A. This common misconception originated in the early days of scanner listening. Many misguided folks use long lengths of lossy RG-58/U coax for scanner reception (and VHF transmission) just because it has 50 ohm impedance, convinced that coax of any other impedance simply won't work.

The fact is that, while a proper impedance match is desirable to avoid resistive losses in the inner dielectric (insulation) from high voltages which develop during a mismatch (especially during transmission), very few antenna systems exactly match 50 ohms anyway, especially over the wide frequency excursions of scanner reception.

RG-6/U is 70 ohms, not 50 ohms, but its low-loss characteristics more than make up for the impedance mismatch; in fact, as you tune that scanner or ham radio over wide bands, the antenna impedance changes, often becoming around 70 ohms. If you substitute 100 feet of RG-6/U for RG-58/U in scanner monitoring above 30 MHz, I can guarantee you better reception, and the higher in frequency, the more the improvement.

I use RG-6/U exclusively for my VHF/UHF monitoring, and use RG-58/U only for shortwave where its losses are not so severe.

Q. *What is the maximum distance for APCO 25 frequencies? Can the NASA/KSC talk group frequencies be received in my hometown by repeater? How well are NASA Shuttle and International Space Station transmissions copied in the U.S.? (Tim Collins, Gainesville, GA)*

A. First, APCO P-25 is the digitization scheme for audio, not a frequency band. The distance reached by an APCO P25 trunk system is roughly the same as with a conventional system, generally line of sight. You won't be able to hear the trunk system from your location in Georgia.

Ham radio repeaters frequently rebroadcast shuttle communications direct from NASA Mission Control, but they don't rebroadcast the day-to-day comms that are heard on the NASA/KSC trunk system.

The only direct signals from the shuttle that are conventional analog are UHF AM at 259.7 and alternately 296.8 MHz. Space suit comms are on 279.0 MHz. NASA also still uses the global HF SSB (USB) backup system, primarily on 10,780 kHz just before launch. Shuttle and ISS frequencies in the VHF/UHF band are receivable with simple outdoor antennas anywhere in the path of the orbit. Hams regularly talk with the astronauts during overhead passes.

For all these frequencies and more, check our NASA frequency guide at: **www.monitoringtimes.com/html/Monitoring_NASA_and_Space_Communications.pdf**

Q. *Is it okay to run coax cable alongside the satellite TV coax outside my house without causing reception problems? The total run will be between 100 to 150 feet. (Jim Miossi, email)*

A. It sure is, provided it's well-shielded coax like RG-6/U. You can run it underground through metal piping alongside household wiring, as well as alongside other transmission lines. Its shielding keeps outside signals from coming in and inside signals from leaking out. Always use low-loss coax (foam dielectric) for VHF/UHF applications, and keep runs as short as practical; a few feet won't matter, but tens of feet will.

Q. *Are the spectrum displays in wideband receivers like the ICOM, AOR and ALINCO handhelds and mobiles real time so you can see it instantly, or do they slowly sweep so that you can only catch a signal that has been on for a while? (Doug Anderson, KG4QCR)*

A. They are reasonably fast if it's a narrow spectrum they are sweeping, but they can't keep up with the fast sweet of a cathode ray tube (CRT) spectrum display. The little displays in the receivers paint the spectrum a pixel at a time, a slow procedure unless the rig has a fast (i.e., expensive) processor.

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.)

MT HELP DESK

SPECIFIC FREQUENCY AND EQUIPMENT QUESTIONS

Larry Van Horn, N5FPW
larryvanhorn@monitoringtimes.com

Q. *York County, Pennsylvania, has approved a new multiple (Smartzone) system. It was a contract with M/A-COM to install a P25 Standard with IP addressable system. My question is would I be able to scan the new system with a BCD396T scanner? Also would that be using EDACS? (Stuart Moyer via email)*

A. This is a very common question for radio monitors. The short answer is that no one can determine that any particular scanner can monitor any trunk radio system under construction and guarantee performance until that system is operational, and a scanner can be fully tested against the on air transmissions. Stuart, I have seen the same press release on this system as you and based on what I have read, a Uniden BC-396/996 should work fine on this system, but no guarantees.

Q. *If I am willing to spend the $7,000.00 for one of these Wavecom decoder units, is there any way around removing all of the "restricted" modes? I am especially interested in Inmarsat digital communications. Do I have to work for the NSA ? (Daniel via email)*

A. The short answer is no. First, this item is not FCC type accepted. If an electronic device is not type accepted by the FCC, under law you are not allowed to import it into this country. Non-certified devices are subject to seizure by the U.S. Customs Service, and you would be out the money you have spent to bring it into the U.S.

A second more important fact with the Wavecom units is that they will decode POCSAG and GOLAY digital pager messaging. Longtime *MT* readers will remember the legal saga of the late Bill Cheek with the U.S. Government regarding the monitoring of these proprietary digital transmissions. Bottom line: while that case never made it to court due to Bill's untimely death, the government has thrown down the gauntlet that they consider these modes and equipment that can monitor them illegal, and they are subject to seizure and legal action. To the best of our knowledge, Wavecom does not manufacture a model specifically for US consumers with these modes blocked.

Q. *I am a worker at the W2 Amateur Radio Incoming QSL Bureau. We handle SWL cards, most of which are from European SWLs to U.S. hams. Once in a while we run across a card from a European ham responding to a U.S. SWL, which raises the question of what to do with it. While this is not a pressing problem due to the small number involved, we hate destroying any QSL, but there does not appear to be any directory or central organization – such as the UK has – that can supply e-mail or postal addresses for U.S. SWLs. I would appreciate any thoughts you might have on this subject. (Bud Weisberg, K2YOF via email)*

A. You can find the answer to your question on the ARRL website. Check out the incoming QSL bureau webpage. The SWL bureau is set up to handle SWL cards via the address below: SWL QSL Bureau, Mike Witkowski, WDX9JFT, 4206 Nebel Street, Stevens Point, WI 54481

Also, I want to remind my ham radio friends to please verify all correct SWL cards they receive. In some countries, SWLs are QSLing to receive a card from you as part of the process to become a ham. These folks need your cards to get that license, so please do not ignore any valid QSL request. Be a 100% SWL verifier, I am.

Q. *I am interested in DXing DGPS, but don't know the first thing about how to get started, how to tune radio, software, etc. (Chris Black via email)*

A. The U.S. Coast Guard website (**www.navcen.uscg.gov/dgps/default.htm**) has lots of info about Differential GPS (DGPS) transmissions including a full listing of all the transmitters at **www.navcen.uscg.gov/ado/DgpsCompleteConfiguration_tabular.asp**. You can use either the Radioraft or Sky Sweeper software packages to decode DGPS, but you might be able to find some other software or dedicated receivers if you have need for one. Just Google it! Also check out the September issue's Utility World column for more information.

Q. *What exactly is going to happen to the UHF aero band besides losing 380-400 MHz? I guess the big question I have is, will my PRO-2045s still work after they do whatever they are going to do? (Steve – Memphis, Tennessee)*

A. *MT*'s *Milcom* column has covered the implementation and growth of the new 380-399.9 MHz land mobile band since the first sites were put on the air over two years ago. This has been a result, in part, to narrowband policies being implemented by the entire federal government in all of their land mobile frequency ranges.

It should be noted that not all frequencies in the 380-399.9 MHz band will be converted to Land Mobile Radio (LMR) assignments. Based on recent monitoring, we believe that some of the frequencies in this spectrum will probably continue to be used for aeronautical communications using the AM mode. But it does appear at this point that a majority of the frequencies in this new sub-band will be used for narrowband FM LMR use.

Based on our analysis, here is what we think we know about some of the frequencies in this new band. There are 800 possible frequency assignments in this 20 MHz of spectrum space (based on 12.5 kHz spacing). We have now been able to identify 42 percent of these assignments as to possible frequency usage. Obviously, information is still incomplete and changes in frequency usage we have identified are possible since there is no way to nail down every frequency in this band this early in the game. You can see our last report on this band in my August 2006 *MT Milcom* column.

As for your Pro-2045 scanners in this band, they will still be able to hear milair traffic throughout the band as before. But since it does not decode digital signals, any of the new LMR trunk and conventional traffic in the new 380-400 MHz band will not be heard on a Pro-2045.

Bottom line: The frequencies in all the military bands are changing. So what you hear today may not be there tomorrow.

Until next time, 73 and good hunting.

Dan Veeneman
danveeneman@monitoringtimes.com

And Three Chose M/A-COM

The push for interoperability continues to drive much of the decision-making process in public safety radio systems. More than five years after the terrorist attacks of September 11, many agencies continue to struggle with the challenges inherent in getting everyone to work together. Some of the most significant work is being done at the state level, with large and expensive technological solutions being implemented through long-term contracts.

❖ State of New York

Last year the State of New York contracted with M/A-COM to deploy a digital radio network across the state. The 20-year contract, valued at just over $2 billion, is estimated to be about half of what the only other bidder, Motorola, offered during the bidding process. The New York State Wireless Network (SWN) will combine three mobile radio technologies onto an Internet Protocol-based backbone that M/A-COM refers to as VIDA ("voice, interoperability, data and access").

The first technology is *OpenSky*, the proprietary and unmonitorable radio system currently being installed in Pennsylvania and part of Michigan. In New York, OpenSky is expected to operate in the 700 and 800 MHz bands, primarily in urban areas.

The second VIDA technology is *P25*, the M/A-COM flavor of the APCO Project 25 standard used in hundreds of other radio systems across the country. SWN will use P25 in the VHF band in less populated areas, such as the Adirondacks and Catskills. All other things being equal, the ability of VHF signals to travel further than 800 MHz signals make it a better choice for rural areas as well as requiring fewer repeater sites.

NetworkFirst gateways are the third VIDA technology to allow local agencies to link up with the SWN without having to change their existing radio equipment.

The roll out is expected to be complete by 2010, at which point all state public safety and public service agencies will be on the system. Local agencies will be given the option of either purchasing new equipment and using the system directly, or linking their existing equipment to the SWN via a "gateway."

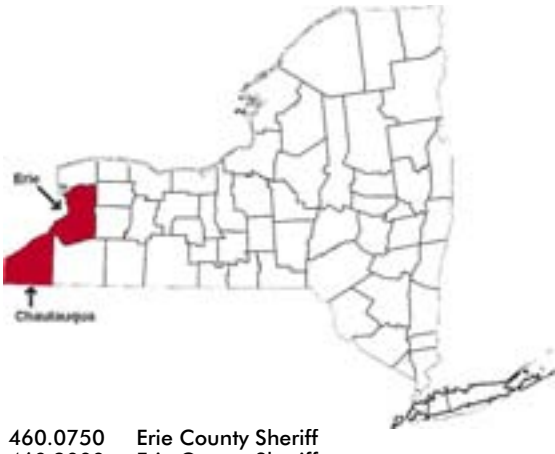
The roll out is scheduled to occur in regions, adding users gradually as the system comes online. The first tests will take place in 2007 in Erie and Chautauqua Counties, as well as New York City.

❖ Erie County, New York

Erie County is in the western part of New York State, home to the city of Buffalo and Niagara Falls. *Reader's Digest* magazine rated Buffalo as the nation's third cleanest city, although if they visited during the winter they may have only been able to see the famous "lake effect" blizzards. Despite losing population for the past thirty years, the greater Buffalo metropolitan area has a population of more than one million residents.

Eric County and the City of Buffalo currently operate a number of conventional radio frequencies across low band, VHF and UHF. These frequencies will eventually be replaced by OpenSky equipment operating on the New York State Wireless Network system.

Frequency	Description
46.20	Erie County Fire (Dispatch)
46.22	Erie County Fire (Mutual Aid)
46.24	Erie County Fire (East Aurora and West Seneca)
46.26	Erie County Fire (Amherst)
46.28	Erie County Fire (Cheektowaga and Depew)
46.32	Erie County Fire (Springville)
46.38	Erie County Fire (Mutual Aid)
153.830	Buffalo Fire (Hazardous Materials)
154.280	Buffalo Fire
154.295	Buffalo Fire
154.340	Buffalo Hazmat Team
154.370	Erie County Fire
155.340	Buffalo EMS
155.370	Police Intersystem (Statewide)
155.760	Buffalo EMS/Hazmat
156.120	State Office of Parks and Recreation (Rangers)
159.195	State Office of Parks and Recreation (Rangers)
423.8250	Buffalo Fire - Service
423.8750	Buffalo Police
423.9000	Buffalo Fire
423.9250	Buffalo Police
424.0500	Buffalo Public Works Engineering
424.2250	Buffalo Fire Dispatch
424.3500	Buffalo Fireground
424.3750	Buffalo EMS
424.8750	Buffalo Detectives
425.2500	Buffalo Fire
453.5125	Erie County Sheriff
453.6000	Buffalo Parking Enforcement
453.7000	Buffalo Parks/Sewer
453.7500	Buffalo Streets/Solid Waste
453.9250	Buffalo Municipal Housing Authority
453.9750	Erie County Holding Center
460.0250	Buffalo Police Information and Warrant Checks
460.0500	Erie County Correctional Facility



460.0750	Erie County Sheriff
460.2000	Erie County Sheriff
460.2750	Buffalo Police (Central)
460.3250	Buffalo Municipal Housing Authority
460.3500	Buffalo Police South Dispatch (Districts B and D)
460.4000	Erie County Sheriff
460.4250	Buffalo Police North Dispatch (Districts A, C and E)
460.4500	Erie County Sheriff Dispatch
460.4750	Buffalo Police Car-to-Car
465.0125	Erie County Holding Center
465.5375	Erie County Holding Center

Buffalo Police Mobile Computer Terminals are on 868.1375 and 868.6625 MHz.

❖ Chautauqua County, New York

The second county to host the SWN pilot program will be Chautauqua County, just southwest of Erie County on the shores of Lake Erie. It is a rural county with less than 150,000 residents, providing an excellent counterpoint to the urban area of Buffalo.

The county has a few conventional frequencies to monitor before SWN takes over.

Frequency	Description
45.24	Chautauqua County Public Works
46.10	Chautauqua County Fire
46.14	Chautauqua County Fire (Dispatch)
46.22	Chautauqua County Fireground
156.210	Chautauqua County Sheriff (Dispatch)

❖ Westchester County, New York

Westchester County, just north of NYC, has a trunked UHF from Motorola and will most likely choose to be a "gateway partner" on the SWN rather than purchase all new equipment. The county system is a Motorola Type II with

analog voice operating in two zones in the UHF band:

North Zone:
470.3250, 470.3500, 470.3750, 470.5250, 470.5500, 470.5750 MHz
South Zone:
470.0750, 470.1000, 476.0750, 476.1125, 476.2125, 476.2375 MHz

Depending on your scanner, tracking these zones will probably require the entry of the following base, offset and spacing information:

Base	Offset	Spacing
470.300	380	12.5 kHz
476.000	570	12.5 kHz

You may have noticed that the frequencies listed here are actually in the UHF television band. Severe overcrowding of public safety frequencies in many metropolitan areas led the Federal Communications Commission to license unused television channels, and Westchester County was granted the use of frequencies ordinarily used by television channel 14. However, even with those frequencies, the county expects to also "piggyback" on the SWN and use it to coordinate activities with state agencies.

Westchester County also has an interesting program called Community Emergency Notification Systems (CENS). In case of a "large-scale emergency," such as a major storm or other disaster, the county will contact residents via electronic mail, text messaging, or telephone messages. Sign-up for such notification can be done via the county web page at **www.westchestergov.com/cens/**

Frequency	Description
33.96	Westchester County Fire (Alert)
46.14	Westchester County Fire
46.26	Westchester County Fire Dispatch
46.42	Westchester County Fireground
45.88	Westchester County Fire (Statewide)
155.310	Westchester County Police
155.370	Westchester County Interagency (Statewide)
155.550	Westchester County Police
154.995	Westchester County Corrections
453.0375	Westchester County Fireground 1
453.8875	Westchester County Fireground 3
453.9625	Westchester County Fireground 5
453.9875	Westchester County Fireground 7
458.0375	Westchester County Fireground 2
458.8875	Westchester County Fireground 4
458.9625	Westchester County Fireground 6
458.9875	Westchester County Fireground 8

Frequency	Description
45.76	Yonkers Public Works
46.00	Yonkers Emergency Management
46.50	Yonkers Fire Dispatch
453.2750	Yonkers Police [P25]
453.4750	Yonkers Police [P25]
453.5000	White Plains Fire
453.5500	White Plains Fireground
453.6625	Yonkers Fireground 2
453.9250	Yonkers Police [P25]
460.4000	White Plains Police
460.4250	White Plains Police
465.6000	Yonkers Fireground 1
484.7125	Yonkers Fire

After Pennsylvania, New York will be the second state to have a M/A-COM OpenSky radio system operating from border to border. It will be interesting to see if the performance meets expectations and how it compares to the competing Motorola statewide systems.

❖ Oakland County, Michigan

Oakland County, located just west of Detroit in southeastern Michigan, decided to buy a M/A-COM radio system rather than join the Motorola-built Michigan Public Safety Communications System (MPSCS). The county identified a number of reasons for their choice, including poor in-building MPSCS coverage without additional repeater sites, the loss of their FCC-licensed frequencies to the MPSCS, and the payment of on-going user fees to the state. M/A-COM also promised that the OpenSky technology would allow the county's original 32 frequencies to carry 128 simultaneous conversations rather than the maximum of 31 with the Motorola equipment.

The system construction cost has totaled just over $42 million for the 36 repeater sites across the 910 square miles of the county. The project began in May of 2002 and was originally scheduled for completion in October 2004. A number of delays, many related to repeater site construction, have pushed the completion date into 2007. The County has also experienced interference on some of their original 32 frequencies, 14 of which are in the 806 MHz range and the remaining 18 in the 821 MHz band. After a series of coordination meetings and negotiating sessions, the county acquired ten additional frequencies. Although the interference and frequency issues were ultimately resolved, it resulted in further delays.

Oakland County addresses interoperability with MPSCS through the use of the *NetworkFirst* technology planned for New York. The City of Warren received a grant to provide interoperability between Detroit-area counties. Oakland County is lined up to use a portion of that money to operate a Network First switch, thereby allowing users on the MPSCS to communicate directly with county agencies.

As with New York, it will be interesting to see if the interoperability plans and decisions being made now will actually operate as expected during a crisis.

❖ Radio Shack PRO-96 Upgrade

One of the advantages of new scanner technology is the ability to add features and fix problems without having to buy new hardware. Because so much of the work done by these scanners is performed in software, upgrading the software will make new features and fixes immediately available.

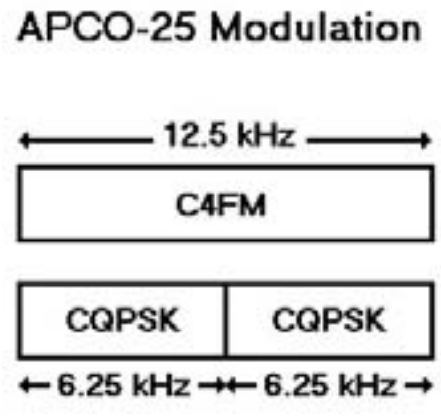
The Radio PRO-96 handheld and PRO-2096 base/mobile scanners use a Digital Signal Processor (DSP) to track trunked signals and monitor digital voice transmissions. The DSP is controlled by software stored in electronic memory (where it is called *firmware*). By delivering new firmware into scanner memory, new features and corrections can be made to the DSP activities.

In August, Radio Shack released a firmware

upgrade for the PRO-96 and PRO-2096 scanners. This upgrade, version 1.3, is intended to improve decoding of digital audio on the Detroit, Michigan, Project 25 radio system. The firmware also contains enhancements for the monitoring of weak or distorted digital radio signals.

The APCO (Association of Public Safety Communications Officials) Project 25 standards identify two phases for radio transmissions. Phase I specifies a modulation type of C4FM (Compatible 4-Level Frequency Modulation), which was defined to use a radio frequency that is 12.5 kHz wide. This was the first modulation method put into operation and implemented in the first generation of digital scanners.

Phase II of the P-25 standards specifies a different type of modulation called CQPSK (Compatible Quadrature Phase Shift Keying), which was intended to take up only half of the space required by C4FM. This would allow two active conversations in the same amount of radio bandwidth. Because C4FM was easier (and therefore less expensive) to implement than CQPSK, it was fielded first and is now quite common.



However, the Detroit system uses CQPSK, as do several other more recent P-25 systems. This created a challenge for scanner manufacturers, who did not have a real live CQPSK system to test against when they were developing their products. In fact, the previous upgrade to the original PRO-96, identified as version 1.2, added the ability to decode CQPSK transmissions. This upgrade was possible only *after* an actual CQPSK system came on-line.

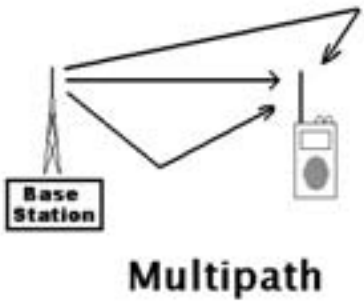
The Detroit system is actually part of the Michigan Public Safety Communications System (MPSCS). Transmissions are sent out simultaneously (simulcast) from ten sites located in various parts of the city. Frequencies in use by the system are:

866.6750, 866.7375, 867.0750, 867.0875, 867.1000, 867.1750, 867.3250, 867.3375, 867.3625, 867.4250, 867.4375, 867.6000, 867.7000, 867.7125, 868.2250, 868.2375, 868.3625, 868.4125, 868.4375, 868.5250, 868.5375, 868.6250, 868.6750, 868.6875, 868.7000, 868.7125, 868.7250, 868.8625, 868.9125 and 868.9375 MHz

The talkgroups for Detroit appear to be laid out in a rather straightforward manner. Below is a table containing the talkgroup type along with a starting and ending talkgroup identifier (with hexadecimal values in parentheses). For instance, Detroit Police Detectives can be heard on talkgroup identifiers 8095, 8096, 8097 and so on up to 8112.

Talkgroup Type	Talkgroup Identifier Range
Emergency Management	2296 (8F8) to 2297 (8F9)
Mutual Aid	8022 (1F56) to 8036 (1F64)
Police	8040 (1F68) to 8079 (1F8F)
Police (Command)	8085 (1F95) to 8094 (1F9E)
Police (Detectives)	8095 (1F9F) to 8112 (1FB0)
Police (Tactical)	8123 (1FBB) to 8132 (1FC4)
Emergency Medical Svcs	8219 (201B) to 8237 (202D)
Fire	8239 (202F) to 8253 (203D)

Radio signals are also subject to a phenomenon called *multipath*. Signals bounce off the surfaces of buildings, billboards, and other obstructions. Because each of these multiple paths has a different distance to travel, it takes a slightly different amount of time for each reflection to reach the receiver. What the receiver ends up hearing is multiple copies of the same signal, slightly offset from each other in time. This can make it difficult for a receiver to sort out the proper signal, and the problem gets worse at higher frequencies (800 MHz is worse than VHF, for instance).



The version 1.3 upgrade includes changes to the firmware to improve the ability of the DSP to monitor signals suffering from multipath.

Upgrade Process

Besides the scanner and a personal computer, the actual upgrade process requires the following items:

1. The upgrade program from the Radio Shack web site, identified as 2000526_UPG_13.exe. This program is designed to run on a PC under the Windows operating system. Note that there is also a program called dsp_v13.exe on the Radio Shack web site. This is a "self-extracting" archive and contains the same upgrade program along with an explanatory document.
   You can find these programs by going to **www.radioshack.com** and entering "pro-96" or "pro-2096" into the search window. This will bring you to a product selection page. Select the scanner and then click on the "Product support" tab. From there you can choose the v1.3 upgrade.
2. A programming cable, either a PC interface cable (Radio Shack part number 20-289) or a USB interface cable (Radio Shack part number 20-047). Your PC will determine which cable you need, depending upon whether you have a nine-pin serial port or a USB connector.

Running the program will bring up a window containing seven steps to be performed for the upgrade. Most reported problems seem to be related to choosing the proper serial port selection, so please be sure you're clear about your PC hardware before running the upgrade program.

The upgrade process may take more than 30 seconds, so please be patient. Once the process completes, the TEST button may be used to confirm the upgrade finished successfully.

If the upgrade process fails or you eventually determine that version 1.3 doesn't help your monitoring, you can go back to the previous firmware version. The version that originally came with your scanner – either 1.1 or 1.2 depending on the age of your scanner – is permanently stored in the scanner. You can restore this original version by performing the following steps:

1. Turn off the scanner.
2. Turn on the scanner and confirm the "WELCOME" screen appears.
3. While the "WELCOME" message is still on the screen, press 0, then PGM, then CLEAR, then ENTER.

This will remove the upgrade from the scanner. After this you can perform the upgrade again, should you decide to do so.

That's all for this month. More information is available on my web site at **www.signalharbor.com**, including detailed APCO-25 information and links to Radio Shack for scanner firmware updates. Please send your questions, comments and frequency lists to me at *danveeneman@monitoringtimes.com* . Until next time, happy scanning!

Big Savings on Radio Scanners

Uniden® SCANNERS

Bearcat® 796DGV Trunk Tracker IV with free scanner headset

Manufacturers suggested list price $799.95

CEI Special Price $519.95

1,000 Channels • 10 banks • CTCSS/DCS • S Meter

Size: 6 15/16" Wide x 6 9/16" Deep x 2 3/8" High

Frequency Coverage: 25.000-512.000 MHz., 806.000-956.000 MHz (excluding the cellular & UHF TV band), 1,240.000-1,300.000 MHz.

When you buy your Bearcat 796DGV Trunktracker package deal from Communications Electronics, you get more. The GV means "Great Value." With your BC796DGV scanner purchase, you also get a **free deluxe scanner headphone** designed for home or race track use. Headset features independent volume controls and 3.5 mm gold right angle plug. The 1,000 channel Bearcat 796DGV is packed with features to track Motorola Type I/II/IIi Hybrid, EDACS, LTR Analog Trunk Systems and Motorola APCO 25 Phase I digital scanner including 9,600 Baud C4FM and CQPSK. Also features control channel only mode to allow you to automatically trunk many systems by simply programming the control channel. S.A.M.E. weather alert, full-frequency display and backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control and programming with RS232C 9 pin port (cable not supplied), Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMMBNC for $29.95. For complete details, download the owners manual from the **www.usascan.com** web site. For fastest delivery, order on-line at www.usascan.com.

Bearcat® BCT8 Trunk Tracker III

Manufacturer suggested list price $299.95

CEI Special Price $169.95

250 Channels • 5 banks • PC Programmable

Size: 7.06" Wide x 6.10" Deep x 2.44" High

Frequency Coverage: 25.0000-54.0000 MHz., 108.0000-174.0000 MHz., 400.0000-512.000 MHz., 806.0000-823.9950 MHz., 849.0125-868.9950 MHz., 894.0125-956.0000 MHz.

The Bearcat BCT8 scanner, licensed by NASCAR, is a superb preprogrammed 800 MHz trunked highway patrol system scanner. Featuring TrunkTracker III, PC Programming, 250 Channels with unique BearTracker warning system to alert you to activity on highway patrol link frequencies. Preprogrammed service searches makes finding interesting active frequencies even easier and include preprogrammed police, fire and emergency medical, news agency, weather, CB band, air band, railroad, marine band and department of transportation service searches. The BCT8 also has preprogrammed highway patrol alert frequencies by state to help you quickly find frequencies likely to be active when you are driving. The BCT8 includes AC adapter, DC power cable, cigarette lighter adapter plug, telescopic antenna, window mount antenna, owner's manual, one year limited Uniden warranty, frequency guide and free mobile mounting bracket. For maximum scanning enjoyment, also order the following optional accessories: External speaker **ESP20** with mounting bracket & 10 feet of cable with plug attached $19.95. Magnetic Mount mobile antenna **ANTMMBNC** for $29.95.

Bearcat® BCD396T Trunk Tracker IV

Suggested list price $799.95/**CEI price $519.95**

APCO 25 9,600 baud compact digital ready handheld TrunkTracker IV scanner featuring Fire Tone Out Paging, Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.40" Wide x 1.22" Deep x 5.35" High

Frequency Coverage:
25.0000-512.0000 MHz., 764.0000-775.9875 MHz., 794.0000-823.9875 MHz., 849.0125-868.8765 MHz., 894.0125-956.000 MHz., 1240.0000 MHz.-1300.0000 MHz.

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as **Fire Tone Out Decoder**. This feature lets you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning.

Close Call Radio Frequency Capture – Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Useful for intelligence agencies for use at events where you don't have advance notice or knowledge of the radio communications systems and assets you need to intercept. The BCD396T scanner is designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS, LTR and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. **Dynamically Allocated Channel Memory** - The BCD396T scanner's memory is organized so that it more closely matches how radio systems actually work. Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 3,000 channels are typical but **over 6,000 channels are possible** depending on the scanner features used. You can also easily determine how much memory you have used and how much memory you have left. **Preprogrammed Systems** - The BCD396T is preprogrammed with over 400 channels covering police, fire and ambulance operations in the 25 most populated counties in the United States, plus the most popular digital systems. **3 AA NiMH or Alkaline battery operation and Charger** – 3 AA battery operation - The BCD396T includes 3 premium 2,300 mAH Nickel Metal Hydride AA batteries to give you the most economical power option available. You may also operate the BCD396D using 3 AA alkaline batteries. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in the BCD396T scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - A blue LCD light remains on when the back light key is pressed. Autolight - Automatically turns the blue LCD backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BCD396T automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BCD396T also works as a conventional scanner to continuously monitor many radio conversations even though the message is switching frequencies. The BCD396T comes with AC adapter, 3 AA nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, SMA/BNC adapter, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. Order on-line at www.usascan.com or call 1-800-USA-SCAN.

More Radio Products

Save even more on radio scanners when purchased directly from CEI. Price includes delivery in the continental USA excluding Alaska.

Bearcat 898T 500 channel Trunktracker III base/mobile	$209.95
Bearcat 796DGV 1,000 channel Trunktracker III base/mobile	$519.95
Bearcat BCD396T APCO 25 Digital scanner with Fire Tone Out	$519.95
Bearcat 246T up to 2,500 ch. Trunktracker III handheld scanner	$214.95
Bearcat Sportcat 230 alpha display handheld sports scanner	$184.95
Bearcat 278CLT 100 channel AM/FM/SAME WX alert scanner	$129.95
Bearcat 248CLT 50 channel base AM/FM/weather alert scanner	$104.95
Bearcat 92XLT 200 channel handheld scanner	$109.95
Bearcat 72XLT 100 channel handheld scanner	$99.95
Bearcat BR330T up to 2,500 ch. Trunktracker III with Tone out	$274.95
Bearcat BCT8 250 channel information mobile scanner	$169.95
Bearcat 350C 50 channel desktop/mobile scanner	$104.95
AOR AR16BQ Wide Band scanner with quick charger	$199.95
AOR AR3000A® Wide Band base/mobile receiver	$1,079.95
AOR AR5000A+3B Wide Band 10 KHz to 3 GHz receiver	$2,599.95
AOR AR8200 Mark IIIB Wide Band handheld scanner	$594.95
AOR AR8600 Mark II Wide Band receiver	$899.95
AOR AR-ONE Goverment/Export sales only 10 KHz-3 GHz	$4,489.95
Scancat Gold For Windows Software	$99.95
Scancat Gold for Windows Surveillance Edition	$159.95

Bearcat® BC246T Trunk Tracker III

Suggested list price $399.95/**CEI price $214.95**

Compact professional handheld TrunkTracker III scanner featuring Close Call and Dynamically Allocated Channel Memory (up to 2,500 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.72" Wide x 1.26" Deep x 4.6" High

Frequency Coverage:
25.0000-54.0000 MHz., 108.0000-174.0000 MHz., 216.0000-224.9800 MHz., 400.0000-512.0000 MHz., 806.0000-823.9875 MHz., 849.0125-868.9875 MHz., 894.0125-956.000 MHz., 1240.0000 MHz.-1300.0000 MHz.

The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at www.usascan.com and download the free owner's manual. Popular features include **Close Call Radio Frequency Capture** – Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. **Dynamically Allocated Channel Memory** - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but **over 2,500 channels are possible** depending on the scanner features used. You can also easily determine how much memory is used. **Preprogrammed Service Search (10)** - Makes it easy to find interesting frequencies used by public safety, news media TV broadcast audio, Amateur (ham) radio, CB radio, Family Radio Service, special low power, railroad, aircraft, marine, racing and weather frequencies. **Quick Keys** - allow you to select systems and groups by pressing a single key. **Text Tagging** - Name each system, group, channel, talk group ID, custom search range, and S.A.M.E. group using 16 characters per name. **Memory Backup** - When power is lost or disconnected, your BC246T retains the frequencies that were programmed in memory. **Unique Data Skip** - Allows the BC246T to skip over unwanted data transmissions and birdies. **Attenuator** - You can set the BC246T attenuator to reduce the input strength of strong signals by about 18 dB. **Duplicate Frequency Alert** - Alerts you if you try to enter a duplicate name or frequency already stored in the scanner. **22 Bands** - with aircraft and 800 MHz. The BC246T comes with AC adapter, 2 AA 1,800 mAH nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. For more fun, order our optional deluxe racing headset part **#HF24RS** for $29.95. Order now at www.usascan.com or call 1-800-USA-SCAN.

Buy with Confidence

Order on-line and get big savings

For over 36 years, millions of communications specialists and enthusiasts worldwide have trusted Communications Electronics for their mission critical communications needs. It's easy to order. For fastest delivery, order on-line at www.usascan.com. Mail orders to: Communications Electronics Inc., P.O. Box 1045, Ann Arbor, Michigan 48106 USA. Price includes $30.00 UPS Ground shipping/handling/insurance per scanner to a street address in the continental USA excluding Alaska. Add $20.00 shipping for all accessories. For shipments to Canada, Puerto Rico, Hawaii, Alaska, Guam, P.O. Box, APO/FPO, USPS Priority Mail or UPS 2 business day delivery, add $30.00. Michigan residents add sales tax. No COD's. For Bearcat scanners your satisfaction is guaranteed or return item in unused condition in original packaging within 61 days for refund, less shipping charges. 10% surcharge for net 10 billing to qualified accounts. All sales are subject to availability, acceptance and verification. Prices, terms and specifications are subject to change without notice. We welcome your Discover, Visa, American Express, MasterCard, IMPAC or Eurocard. Order toll free, call 1-800-USA-SCAN or 1-734-996-8888 if outside Canada or the USA. FAX anytime, dial 1-734-663-8888. Dealer and international inquiries invited. Order your radio scanners from Communications Electronics today.

For credit card orders call 1-800-USA-SCAN

e-mail: cei@usascan.com

www.usascan.com

PO Box 1045, Ann Arbor, Michigan 48106-1045 USA

For information call 734-996-8888 or FAX 734-663-8888

COMMUNICATIONS ELECTRONICS INC.

Emergency Operations Center

Visit WWW.USASCAN.COM • 1-800-USA-SCAN

Hugh Stegman, NV6H
hughstegman@monitoringtimes.com
www.ominous-valve.com/uteworld.html

Telephone "Numbers" Mystery Solved!

The August 2006 *Utility World* contained considerable speculation concerning the mysterious appearance of a "numbers" broadcast exactly like the ones on high-frequency (HF) radio, but sent over the telephone. This mystery has now been solved, thanks to e-mails and Web postings from the people responsible. The real story was good enough for last month's spook special, but it was revealed hours after the column went to press. Therefore, we waited another month.

OK, let's cut right to the chase: The telephone "numbers" broadcasts were another of those Internet hoaxes. This should not come as a major surprise. What is surprising is that the whole thing, which attracted the interest of thousands of people, was basically conceptual fan art by any other name. It was done as a cryptography and social engineering exercise, with very definite links to the online HF numbers mailing list called "Spooks." In fact, your editor was extremely surprised by how close to home this one came. I think I might know some of these people!

❖ In the Beginning

In the beginning was the question every numbers fan has asked at one time or another: "What would they write about me if I just started my own station?" This is exactly what happened here. It all began after a discussion of radio numbers stations at the May meeting of "Los Angeles 2600."

2600 referred to the idle tone that would make tandem switches in long-lines offices disconnect and await further instructions. Pictured is Steve Wozniak's original 'blue box,' now in a computer museum.

While LA2600 shares an interest in hacking and phone phreaking, as denoted by the 2600-Hz long-line idle tone of early "blue box" infamy, it is not connected to the national magazine or web site using this name. It's just a fun get-together at a couple of well known downtown restaurants for technically inclined people. In any event, a small group of friends quickly went to work on what they called "Project Evil," which unleashed the "Mein Fraulein" hoax on an unsuspecting world.

In the end, there were ten messages, planted as recordings in perfect numbers station format, each one at a different Voice over Internet Protocol (VoIP) phone number. These numbers were prepaid, and since no one expected any of this to get so big, the later ones ran out almost instantly. Something like 6100 calls were logged, and probably thousands more never got through. Several copycat hoaxes ensued, including a ticket promotion for the 6th HOPE (Hackers On Planet Earth) convention. (See last month's *On the Ham Bands* column - ed.) That's the one in New York with amateur call N6H. That means "Number 6 HOPE," but it's close to another ham call I can think of – *mine*!

The original idea was for the first and last message to use the same key from a one-time pad. As dedicated numbers fans know, the one-time pad is used to encrypt and decrypt most of the messages we hear. Such a system is unbreakable as long as everyone follows the rules, one of which is to never, ever, reuse a key. Project Evil intended to reuse a key, and see if anyone got it. As they admit, no one did. They probably set the cryptographic bar a little too high.

❖ Going Viral

Nobody had the slightest idea it would get this big. Internet viral marketers spend millions trying to start net fads. This one cost around $200, plus another couple hundred for the T-shirts. It got as big as the "Snakes on a Plane" hype. The net likes weirdness.

The first VoIP number, with its musical theme and encrypted message, as read by a weird voice that was concocted deliberately to parody shortwave numbers, was planted in late May. It was advertised by the now-famous "Mein Fraulein" message in the "Missed Connections" section of Craigslist, an enormous Internet classified ad site.

Now, your editor found out about this from a guy named "John" who posted a typical request for information to the Spooks list. It began, "Hi folks... Been following numbers stations for a few years now and have run into something that I need help identifying. My apologies if this isn't the right place to be asking, and if someone could point me in the right direction I'd definitely appreciate it..."

Was this the initial discovery? I thought so at the time. But it was all part of the plan. "John" was one of the perpetrators, and the post was to plant speculation in hope someone would ultimately decrypt the last message. While my own speculations in the August column were pretty good, I totally missed the idea of an unreliable narrator. I like a good joke, and "John" certainly had me going on that one.

In August, Project Evil let the cat out of the bag at DEFCON, yet another hacker convention. Soon after, an LA2600 member whose screen name is "skroo" spilled the beans on Spooks. Since his handle on the list is J. Random Entity, aka John, it's likely the same guy who started it all.

The subsequent discussion on Spooks was hilarious. Several other members came out of the closet as having been to L.A. 2600 meetings. Now we're discussing HF pirate beacons. I never dreamed.

❖ Messages

As is undoubtedly the case with real intelligence "numbers," the messages, when decrypted, weren't as compelling as their means of transmission. The first followed a greeting to "Three-Letter Agencies" with a web link, and the second was a similar link. The third was not revealed, as it mentions the sex life of an unknown celebrity. The fourth, fifth, and sixth were shout-outs to other hacker conventions and web sites. Number seven, my favorite, is, "Spooks List – Apologies for leading you on; thanks for being good sports." Eight and nine are more shout-outs. Number ten, the punch line, was changed from the key-collision idea to simply employ a much less robust encryption system. Indeed, it was broken. It goes, "Project Evil thanks everyone who participated in the challenge. Without you, the world would be a much less interesting place, and we wouldn't have any fun."

Amen to that.

Web links:

Spooks: **mailman.qth.net/mailman/listinfo/spooks**
Project Evil: **http://www.projectevil.org/**
L.A. 2600: **http://la2600.org/**

UTILITY WORLD

UTILITY LOGS

Hugh Stegman

ABBREVIATIONS USED IN THIS COLUMN

AFB.....Air Force Base
ALE.....Automatic Link Establishment
AM .....Amplitude Modulation
ARQ.....Automatic Repeat Request
CAMSLANT .....Communication Area Master Station, Atlantic
COTHEN.....Customs Over-The-Horizon Enforcement Network
CW .....“Continuous Wave” Morse telegraphy
DEA .....US Drug Enforcement Administration
DSC.....Digital Selective Calling
E3.....Lincolnshire Poacher, Cyprus, with musical tune
E7.....Russian “English Man” computer voice
E10.....Israeli phonetic station (xxx2=null message)
EAM.....Emergency Action Message
FAX.....Radiofacsimile
FEC.....Forward Error Correction
FEMA.....US Federal Emergency Management Agency
G6 .....Russian “German Lady” computer voice
HFDL .....High-Frequency Data Link
HF-GCS .....High-Frequency Global Communication System
JSTARS .....Joint Surveillance Target Attack Radar System
LSB .....Lower Sideband
M8a.....Cuban 3-msg CW/MCW, ANDUWRIGMT = 1-0
M18.....Russian military time groups, possibly Kazakhstan
MARS.....Military Affiliate Radio System
Meteo .....Meteorological
MCW .....Modulated CW or AM tone Morse
MX.....All Russian single-letter beacons and markers
Navtex.....Navigational Telex
PACTOR .....Packet Teleprinting Over Radio
PR.....Puerto Rico
RSA.....Republic of South Africa
RTTY .....Radio Teletype
SECURE .....State Emergency Capability Using Radio Effectively
S28.....Buzzy Russian marker for UZB76, occasional voice
Selcal.....Selective Calling
SITOR-A .....Simplex Telex Over Radio, ARQ mode
SITOR-B .....Simplex Telex Over Radio, FEC mode
Unid .....Unidentified
US .....United States
USCG .....United States Coast Guard
UK.....United Kingdom
V2a.....“Atencion” Spanish numbers 3-msg format
Volmet .....From French, loosely “Flying Weather”

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 ( ).

518.0 ZSC-Capetown Radio, RSA, SITOR-B Navtex at 1655. (Bob Hall-RSA)

4028.0 Unid-Cuban Spanish AM “numbers” (V2a), parallel 8010 kHz, plus a weak harmonic on 8056, at 0600. (Clint Davidson-TX)

4041.0 NNN0XEX-US Navy/Marine Corps MARS, MI, net control at 2303. (Mark Cleary-SC)

4209.5 TAH-Istanbul Radio, Turkey, SITOR-B Navtex in Turkish, at 2204. (Patrice Privat-France)

4270.0 PCD-Israeli Intelligence (E10), “female” with phonetic callup and short 5-letter group “numbers” message, at 1930. (Mike L-West Sussex, UK)

4372.0 “Charlie-2-Papa”-US Navy, calling “0-Hotel-Zulu” and “Yankee-9-Oscar,” at 1316. (Cleary-SC)

4442.0 001CDCNHQ-US Centers for Disease Control, ALE sounding at 1507. (Jack Metcalfe-KY)

4446.5 R00082-US Army Chinook helicopter, calling T2Z3, 2-3rd Aviation, ALE at 0352. (Cleary-SC)

4461.0 FTJ-Israeli Intelligence (E10), callup and message at 1830. (Mike L-UK)

4503.0 Russian time station (M18), continuous CW 4-figure time strings of UTC+4, at 2000. (Ary Boender-Netherlands)

4561.0 ZSC-Globe Wireless, Capetown, RSA, working unknown vessel on 4274.0, in GW-PACTOR at 1105. (Hall-RSA)

4625.0 “The Buzzer”-Russian military channel marker (S28), buzzy noises at 0200. (Eric Christensen-NC)

4681.0 ZS-SFJ-South African Airways flight 422, an A319, position for Johannesburg at 1643. ZS-SFG-South African flight 479, an A319, HFDL position for Johannesburg ground station at 1645. (Hall-RSA)

4721.0 280054-US Air Force C-17A, calling Croughton, ALE at 0233. (Cleary-SC)

4790.0 R26604-US Army or National Guard UH-60D Black Hawk, calling B1Z171, 1-171st Aviation, in ALE, also on 5778.5 and 6911.5, at 0127. (Cleary-SC)

4880.0 ULX2-Israeli Intelligence (E10), “female” with phonetic callup only, at 0230. (Christensen-NC)

5063.5 DLA291-US Defense Logistics Agency, Richmond, VA, voice and ALE with DLA297, Philadelphia PA, at 1325. (Metcalfe-KY)

5088.5 “Hotel 1 Kilo”-US Army, calling “Yankee 7 Uniform” in voice and ALE, at 1445. (Metcalfe-KY)

5135.0 CL1AR-New Hampshire SECURE net, Clarendon, ALE sounding at 0020. LA1NC-NH net, Lancaster, calling NLJ (unknown), at 0025. SEMO05-FEMA/State Emergency Net, probably MO, ALE sounding at 0029. SEMOHQ-FEMA, MO, ALE sounding at 0050. SEMO02-FEMA, MO, sound at 0056. (Larry Weiler-ON, Canada)

5153.8 “P”-Russian Navy, Kaliningrad, CW cluster beacon (MX), simulcasting on 7039.8, 8494.8, 10871.8, 13527.8, and 16331.8, at 0727. (Boender-Netherlands)

5320.0 Sector San Juan-USCG, PR, radio check with CAMSLANT at 0153. (Cleary-SC)

5541.0 Reach 635-US Air Mobility Command charter of Atlas Air 747 N526MC, selcal MR-EP, working Stockholm at 2030. (Privat-France)

5634.0 A6-EMW-Emirates Boeing 777, responding to selcal AP-BC from oceanic air traffic control, at 2215. (Privat-France)

5652.0 UAE0203-Emirates Airbus A345, HFDL position for Riverhead, NY, at 1039. CO1039-Continental Airlines Boeing 757, position for Riverhead at 1123. FX0653-FedEx MD10F freighter, position at 1138. UP0219-United Parcel Service 767 freighter, position at 1138. VS0026-Virgin Atlantic A340, position at 1139. (Weiler-Canada)

5696.0 CAMSLANT-USCG, Portsmouth, VA, working Coast Guard 2117 at 0046. CAMSLANT, ops-normal from “Romeo-1-Kilo,” then went to 8983 for a check, at 0054. (Tom Sevart-KS) Air Station Cape Cod-USCG, MA, advising CAMSLANT that Coast Guard 2131 has landed safely, at 0114. (Cleary-SC)

5820.0 001CDCNHQ-US Centers for Disease Control, ALE sounding at 1617. (Metcalfe-KY)

5833.5 G23730-US Army National Guard UH-60A, calling STPOPS, St. Paul, MN, ALE at 0240. (Cleary-SC)

6314.0 Unid-Coast station with Maritime Safety Information and Navarea warnings in SITOR-B, at 0214. (Sevart-KS)

6529.0 EY0609-Mayan World Airways, Guatemala, HFDL position for Telde, Grand Canary Island, at 0603 and 0607. CO0032-Continental Airlines, HFDL position for Telde, at 0609 and 0615. SU0111-Aeroflot, HFDL position for Telde, also at 0609. VS0006-Virgin Atlantic, HFDL position for Telde, at 0612. LH8461-Lufthansa Airlines, HFDL position for Telde, at 0614. (Privat-France)

6535..0 EC-HGU-Iberia A340, selcal ES-DH with Dakar, Senegal, at 2220. (Privat-France)

6676.0 Bangkok Volmet-Thailand, with flight weather at 2240. (Privat-France)

6679.0 Hong Kong Volmet, with flight weather at 2245. (Privat-France)

6809.0 WGY9014-FEMA mobile, calling WGY954, Alabama Emergency Operations Center, at 1404. (Metcalfe-KY)

6855.0 Cuban Spanish AM “numbers” (V2a), callup 49321 35771 39081, at 2101. Callup 49322 35772 39082, next day at 2101. Unid-AM station with Radio Nacional Venezuela audio at 2104, cut to V2a callup 37221 46651 21491, at 2106. (Cam Castillo-Panama)

6913.0 AAA9USA-US Army MARS Western Area Gateway Station, Ft. Huachuca, AZ, net control in LSB, at 0228. (Sevart-KS)

7313.6 AFA2CV-US Air Force MARS, working AFA2AJ, at 1348. (Metcalfe-KY)

7527.0 52A-US joint task force, position for Panther, DEA, Bahamas, on COTHEN net at 2313. (Cleary-SC)

7535.0 Norfolk SESEF-US Navy Ship Electronic Systems Evaluation Facility, VA, voice coordination with Bronze Warrior while testing all modes, at 1325. (Metcalfe-KY)

7585.7 RFVITT-French Forces, Mayotte, ARQ idler at 1725. (Hall-RSA)

7644.0 RFVICS-French Forces, Le Port, Reunion Island, ARQ idler at 1614. (Hall-RSA)

7650.0 R23313-US Army UH-60A, calling T1Z137, Ohio Army National Guard 1-137th Aviation, ALE at 0136. (Cleary-SC) Unid-two military stations, brief voice checks at 2020. (Metcalfe-KY)

7710.0 VFF-Canadian Coast Guard, Iqualuit, NUN, weak weather FAX at 2140. (Privat-France)

7887.0 Cuban Spanish AM "numbers" (V2a), simulcasting 6855 kHz 3 days at 2101. V2a, simulcasting callup 14941 36511 15691 on 6855, but with M8a going simultaneously on the same transmitter until 2004. V2a, in progress at 2011. (Castillo-Panama)

7974.0 Cuban CW cut numbers (M8a), callup MTGRN IIRMN UGIGD, at 2102. (Castillo-Panama)

7975.0 Cuban Spanish AM "numbers" (V2a), callup 28641 52021 93481, at 1601. V2a, callup 16411 49521 36921, mixing with M8a in MCW on the same transmitter, at 1602. V2a, callup 83542 94682 46192, cut abruptly and moved to 8010 kHz, at 1702. (Castillo-Panama) *[Oops, wrong frequency! -Hugh]*

7993.6 NNN0MRQ-US Navy/Marine Corps MARS, PACTOR messages at 1413. (Metcalfe-KY)

8010.0 Cuban Spanish AM "numbers" (V2a), no parallel found, weak at 0600. (Davidson-TX) V2a, callup 04043 56443 63433, at 1701. V2a, in progress at 1718 and 1814. (Castillo-Panama)

8023.0 087CDCS51-US Centers for Disease Control, calling 006CDCNHQ, ALE at 1534. (Metcalfe-KY)

8097.0 Cuban Spanish AM "numbers" (V2a), 5-figure groups at 0600. (Davidson-TX). Cuban MCW cut numbers (M8a), callup WWRMA WTRGA UNGDA, at 1801. M8a, callup IUUDN GATMN GDUAN, at 1802 and 1901. M8a, callup DNWRA RGGUA GMNRA, at 1802 and 1902. M8a, callup DDWUA MIGMA RAMDA at 1802, but audio mixing with another M8a transmission in the repeat, at 1900. (Castillo-Panama)

8125.0 KIT88-US Federal Aviation Administration, MD, controlling Eastern Region monthly net, at 1445. (Metcalfe-KY)

8184.5 R23313-US Army UH-60A, calling helicopter R26049, ALE at 0154. (Cleary-SC)

8461.7 9MR-Malaysian Navy, Johor Baharu, coded RTTY message in 5-letter groups, at 1550. (Hall-RSA)

8776.0 Homespun-US military, probably Nightwatch net, EAM at 2113. (Cleary-SC)

8912.0 Coast Guard 1503-USCG HC-130, ops-normal for CAMSLANT on COTHEN, at 2330. (Cleary-SC)

8930.0 SDJ-Stockholm Radio, Sweden, air traffic control with turboprop Islander aircraft Watchdog 65 and Watchdog 71, probable UK Ministry of Agriculture, Fisheries, and Food fishery protection, at 2136. (Privat-France)

8971.0 Cardfile 711-US Navy P-3C, calling Fiddle, USN, Jacksonville, FL, along with P-3s Quartet 714 and Cardfile 71B, all no joy at 2003. (Cleary-SC)

8992.0 Bumstead-US military, probably Nightwatch net, patch via Offutt HF-GCS to Stanwix *[Stanwick? -Hugh]*, at 2303. (Cleary-SC)

9007.0 Rescue 339-Canadian Forces CC-130, getting traffic from the Rescue Coordination Centre via Trenton Military, at 2336. (Cleary-SC)

9022.0 Nightstar-Back end of US Air Force E-8C JSTARS, radio checks with Stargate, another E-8C, clear and secure voice at 1333. (Metcalfe-KY)

9025.0 Coast Guard 2139-USCG helicopter, ALE-initiated patch to Cape Air at 0041. (Cleary-SC)

9062.4 Cuban CW cut numbers (M8a), 5-letter groups at 0500. (Davidson-TX)

9079.7 RFQP-French Forces, Djibouti, ARQ idler at 0114. (Hall-RSA)

9081.5 R26049-US Army or National Guard UH-60A, calling T1Z137, Ohio National Guard 1-137th Aviation, ALE at 1816. (Cleary-SC)

9121.0 291-ALE address of Defense Logistics Agency DLA291, VA, calling 302, DLA302, Stockton, CA, in ALE at 1343. (Metcalfe-KY)

9130.0 EZI-Israeli Intelligence (E10), callup and message at 1701. (Mike L-UK)

9344.0 Russian Intelligence (E7), in AM, with English preamble 213-1 915/42, 5-figure group "numbers" message ending "000 000," parallel 11163 and 12218, at 2040. (Mike L-UK)

10116.0 Russian Intelligence (E7), AM, preamble 201 1 819/76 and message at 1740. (Mike L-UK)

10234.0 Cuban CW cut numbers (M8a), 5-letter groups at 0400. (Davidson-TX)

10540.0 Russian Intelligence (G6), AM, German preamble 304 279/154, then a long 5-figure "numbers" message ending with "00000," at 1900. (Mike L-UK)

10871.9 "S"-Russian Navy, Archangelsk, CW cluster beacon (MX), at 0727. (Boender-Netherlands)

10872.0 "C"-Russian Navy, Moscow, CW cluster beacon (MX), at 0727. (Boender-Netherlands)

11137.0 Russian Intelligence (E7), AM, preamble 233 and message, at 2010. (Mike L-UK)

11175.0 Guard 23620-US Army National Guard, patches via Offutt and Andrews HF-GCS to Guard Ops, MN, at 0104. (Cleary-SC)

11205.0 Shark 12-US Joint Task Force, calling Smasher, Key West, FL, at 1942. (Cleary-SC)

11232.0 Akela 30-US Air Force MC-130, patch via Trenton Military to Elmendorf Meteo, at 1536. (Cleary-SC)

11421.7 FJY5-French Forces, Crozet Island, ARQ idler at 1030. (Hall-RSA)

12164.0 FL4FMA-FEMA Region 4, FL, calling FC4FMA on the National Public Health net, also using 10202, ALE at 2001. (Metcalfe-KY)

12226.0 Russian Intelligence (E7), AM, same message as 11137, at 2030. (Mike L-UK)

12577.0 239751000-Maritime Mobile Service Identity number of SWPM, Greek fishing vessel *Majestic*, DSC safety test with USCG Portsmouth at 2020. (Weiler-Canada)

12603.5 SVO-Olympia Radio, Greece, SITOR-B news broadcast in Greek, at 0600. (Privat-France)

12736.7 RFFTJD-French Air Force, Vilacoublay, ARQ idler at 1735. (Hall-RSA)

13321.0 LH8296-Lufthansa MF-11F, HFDL position for Johannesburg at 1200. (Hall-RSA)

13375.0 Lincolnshire Poacher (E3)-UK Intelligence, female voice with 5-number groups at 1545. (Hall-RSA)

13510.0 CFH-Canadian Forces Meteo, Halifax, NS, coded aviation weather observations in RTTY at 2155. (Privat-France)

13528.0 "C"-Russian Navy, Moscow, CW cluster beacon (MX), signal stopped briefly and came back louder (antenna change?) at 0745. (Boender-Netherlands)

13886.3 Unid-Moscow Meteo, weak FAX chart at 1000. (Hall-RSA)

13927.1 Peach 26-US Air Force E-8 JSTARS off Georgia, patch via US Air Force MARS AFA1EN to Peachtree, Robins AFB, GA, at 1600. Teal 70-US Air Force Reserve WC-130J "Hurricane Hunter" on Ernesto recon, with a MARS patch to Teal Ops, Keesler AFB, MS, at 2234. (Cleary-SC) Reach 215-US Air Force Air Mobility Command, MARS patch at 1545. Peach 33-JSTARS, formatted traffic via MARS patch to Peachtree Ops, Robins AFB, at 1719. (Allan Stern-FL)

14360.0 ATTCNYRPORT130-Probable mobile/portable in the US phone company National Security/ Emergency Preparedness net, calling ATTRENOBASE175, Reno, NV, ALE at 2233. (Metcalfe-KY)

16014.0 RFQP-French Forces, Djibouti, ARQ idler at 1729. (Hall-RSA)

16332.0 "C"-Russian Navy, Moscow, CW cluster beacon (MX), at 0753. (Boender-Netherlands)

16814.5 CBV-Valparaiso/Playa Ancha Radio, Chile, SITOR-B weather for Chilean coastal zones in English and Spanish, at 0122. (Hugh Stegman-CA)

17144.5 CBV-Valparaiso/ Playa Ancha Radio, Chile, with official Chilean local time pips announced in Spanish, above unid Spanish voices on the same heavily compressed/ limited circuit, for at least an hour until start of scheduled FAX surface chart at 2200. (Stegman-CA)

18012.0 Circus Orange-French Air Force, Dakar, Senegal, working transport Cotam 1021, at 1530. (Privat-France)

18264.0 NPHRN-US National Public Health Radio Network headquarters, Atlanta, GA, calling 001CDCS36, NY State Health Department, Albany, ALE at 1920. (Metcalfe-KY)

Mike Chace
mikechace@monitoringtimes.com

What's That Sound?

This month we concentrate on answering one of the most frequently asked questions by digital listeners. Barely a day goes by on the UDXF mailing list without someone asking our feature question – but fortunately, there is a great resource on the web to help.

❖ Monitoring Utility Signals

Without a shadow of a doubt, the best website available to answer our question is the "Digital Modes Section" of a website run by long-time digital monitor Leif Dehio in Germany (see **Resources** below). On his site, Leif has carefully recorded and classified just about any digital signal you are likely to come across on the HF bands today. As a memento of times past, there are also clips of many of the older modes that are largely gone today, but sometimes pop up again for various reasons.

With hundreds of samples of signals available, despite being a veritable treasure trove, it can be difficult to troll through these sounds and zero-in on your mystery culprit. To help with this task, it's probably worth reviewing some of the basic characteristics of signals that you will need to identify in order to make this process less painful, especially as Leif classifies signals in this way, too.

Let's look at the most common qualities of a signal that you'll need to identify by ear:

Continuous vs burst:

This is usually the simplest decision to make: Does the signal stay on continuously while sending a message or does it send data in bursts? If propagation is just right and you are listening to a burst signal, you may be able to identify the other end answering the bursts – a good indication of a further class of signals that use ARQ (Automatic Repeat Request) to ensure that the message gets from source to destination. That's worth noting, too.

FSK vs MFSK vs PSK:

Deciding the difference here can be a little tricky, as it can sometimes be confusing judging just by ear. But generally, by listening carefully you can distinguish between a signal using two tone FSK (like Baudot RTTY or NAVTEX, for example), something more complex with multiple tones (like MIL-188-141 ALE, for example), and the "white noise" or rushing sound that usually accompanies a PSK signal (like a MIL-188-110A high speed modem, for example).

These are the two major pieces of information that you need to provide to anyone you are asking for help in an identification or before delving more deeply into Leif's audio clips. Check out the clips on Leif's site for the examples I mention above to hear what I mean.

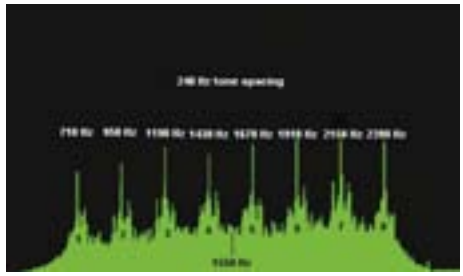
❖ There's More to Hear?

What other information can you extract with your ears? You can probably distinguish single from multichannel signals, too. Even to the relatively untrained ear, it's pretty obvious that a BR6028 or Barrie VFT signal or a Russian MS5 modem is carrying more than one channel of information.

Similarly, selective calls or selcals like the Tadiran Autocall or the burst that precedes the Sailor CRY2000-series voice encryptors are another class of signals that are relatively easy to detect by ear. They are generally very short bursts of signal that are usually replaced by different and much longer traffic on the same frequency some time later or directly after the selcal.

❖ And Spectra?

Even when you've narrowed down your signal with these tips above, often you need a little more help. Sometimes, for example, the difference between two similar-sounding signals is all a matter of where each tone is placed. To help, Leif's site offers an audio spectrum of most signals, often annotated to show tone placement and spacing when it's important.



F7B 240 baud Multi-Frequency Shift Keying (MFSK) Spectrum Graph, courtesy of Leif Dehio and his www.signals.taunus.de website.

If you're on a PC, the free DigiPan panoramic display provides a great way to view signal spectra, do a little measurement to determine tone spacing and placement. On the Mac, MultiMode can be used to the same effect.

Actually, I'm doing just that right now. There's a burst, probably PSK signal with very short bursts that I'm not sure of on 10392 kHz USB. The bursts are regular and short, about 20 of them every few minutes. Sounds like a selcal for one of the more modern PSK modems to me. In a few moments, using the classification on Leif's site, I've found my signal – the ALE call of a 2400bd EADS MAHRS ARCOTEL modem.

❖ Back to Leif's Site

So, now that we have a few pointers with which to narrow down our mystery signal, let's look at how Leif's site breaks it down:

- FSK (Frequency Shift Keyed) signals: samples of all the simple two tone FSK signals arranged in two groups – continuous and burst signals
- MFSK (Multi-Frequency Shift Keyed) signals: again broken down by continuous vs burst
- MCVFT (Multi Channel Variable Frequency Telegraphy) signals: again broken down into the two main categories
- PSK (Phase Shift Keyed) and QAM (Quadrature Amplitude Modulated) signals: again broken down in the two main categories
- ALE, secals, tonecalls, OTHR (Over The Horizon Radar) and ionospheric sounder signals
- and finally, a section devoted to the miscellany of voice encoders and compressors

That's all for this month, so 73 and good digital DX, and thanks to Leif for the spectrum shot.

RESOURCES

Leif's Digital Modes Site - **www.signals.taunus.de**
DigiPan - **www.digipan.net**
MultiMode - **www.blackcatsystems.com/software/multimode.html**

Glenn Hauser
P.O. Box 1684-MT, Enid, OK 73702
glennhauser@monitoringtimes.com
www.worldofradio.com

DX Meeting in Perú

How about combining your winter vacation south of the Equator with a DX gathering in Perú, billed as the first one there? It's planned for the weekend of Feb 20-22, 2007, in Tarma, Junín. Connections with Lima are part of the deal; more details on the program and how to participate can be had from César Pérez Dioses, in Chimbote, *Cpds1@hotmail.com* or cell phone 043-9662832. Thanks to another Peruvian DXer, Pablo Alfredo Albornoz Rojas, and Dario Monferini for this news.

Earthview

Here's a neat website with a world map showing the current areas of day and night, or on any date and time you may input. It's great for SW propagational studies, especially just where the grayline (terminator) lies at any given time. That's really a Great Circle even though on this projection it is anything but a straight line. With this you don't really need a DX Edge or a Geoclock. Terry Krueger drew our attention to **www.fourmilab.ch/earthview/vplanet.html** and click on "Map Of the Earth". Or as Steve Lare, suggests, directly at **www.fourmilab.ch/cgi-bin/uncgi/Earth/action?opt=-p**

ALASKA KNLS B-06 shows new frequencies in the 6.9 MHz area, which ought to be free of co-channel, including English at 12-13 on 6915. That and all the other English hours are on 6150, at 08, 10, 12 and 14 (via Joe Hanlon, *DX LISTENING DIGEST*)

ALBANIA Tentative R. Tirana B-06 in English, daily exc. Sun/UT Mon: Eu 1945-2000 6130 7465, 2100-2130 7530; NAm 0245-0300 & 0330-0400 6115, 7465 (gh)

ALGERIA [non] VT Communications signed a one-year contract in June with TéléDiffusion d'Algérie (TDA), the state-funded public broadcaster. VTC is providing 12 hours a day of SW transmissions into the Sahel Region covering Mauritania, Mali, Niger and Chad (VT via Mike Barraclough, *DXLD*) So far only via UK sites with Kor'an service only; then not strictly an internal service back into Algeria (gh)

ANTARCTICA R. Nacional Arcángel San Gabriel, Base Esperanza, 15476, was being heard again in August, but who knows if it will be active now? Always a tough catch, Belgium seemed to be a hot spot for reception, reported there by Guido Schotmans and Maurits van Driessche in the M-F 19-21 period when frequency is in the clear; listen to Maurits' clip at **http://tinyurl.com/puuak**

But Americans succeeded too, Steve Lare in MI, and John Cobb in GA (reporting originally to us in Georgia font). It's USB plus reduced carrier, but the signal may be too weak to detect a carrier. It also breaks down frequently, so if you don't hear it at first, stay on the frequency a while and keep checking day after day. In B-06 there may be some problem from Chile on 15485, but CVC can also serve as a propagation beacon.

AUSTRALIA ARDS, 5049.93, at 1032-1101, interview in heavily-accented English, religious-like choral song, several Aboriginal vocal songs accompanied only by a drum. Was surprised to get a quick reply from Dale Chesson, Radio Service Manager, Nhulunbuy Language & Media Centre. Says they're using 400 watts full AM into a wire dipole fed by a balun, a quarter wave above ground and they'll be upgrading to a 1 kW LPB Omni transmitter. Says programs can be heard at **http://www.ards.com.au/hear_programs.htm** (Dave Valko, PA, *HCDX*)

BOLIVIA 6025, R. Illimani, in Aymara at 1100 with Radio Patria Nueva ID, national news in Spanish (Arnaldo Slaen, Argentina, *HCDX*) Excellent sound and beautiful music on their streaming audio, using both IDs, via **http://abi.bo/index.php?i=patria-nueva** (Henrik Klemetz, Sweden, *ibid*.) Also heard at 2340 on 6025 mentioning "Red Satelital Illimani" (Célio Romais, Brasil, *radioescutas*)

Radio Santa Cruz, 6134.80, sudden sign-on at 0908, mentioning Santa Cruz, 0910 music, excellent to 0930 (Chuck Bolland, FL, *DXLD*) Exactly same frequency at 0020-0028 with talk of natural health food (José Bueno, Spain, *Noticias DX*)

BRAZIL unID on 11750 at 2245-2300 // 11780, 11815, 11830 with Voz do Brasil program, QRM from China, and not // other Brazilians after 2300. Any idea what this one is? (Alex Vranes, Jr., WV, *DXLD*)

That would be R. Marumby, Florianópolis, which has been inactive, not in *WRTH*, but in *EiBi* as 24 hours: *PWBR* had it on 11749.8, irregular, 10 kW, only at 08-21, or rather 09-22 at midyear when DST is not on (gh) Also at 2100 with missionary program on 11749.8 (Carlos Gonçalves, Portugal, *DXLD*) Domingos Alfredo Loss reports that Anatel authorized a change in city for R. Marumby on 11750, 9665, moved from Florianópolis to an address in Balneário Camboriú, both in Santa Catarina state (Célio Romais, *Panorama, @tividade DX*) Did the transmitter really move? (gh)

For several days in September, R. Nacional da Amazônia was being heard on 11783.1 instead of 11780, then back to 11780 (Gilles Létourneau, QC; Alex Vranes, WV; Carlos Gonçalves, Portugal, *DXLD*) Maybe trying to avoid QRM from Martí and Anguilla on 11775? (Raúl Saavedra, Costa Rica, *ibid*.) But even more QRM to another Brazilian, R. Guaíba on 11785, literally covering it up (Célio Romais, Brazil, *radioescutas*) The two should never have been assigned adjacent frequencies (gh)

From July thru September, Brazilian stations had to carry election campaign programming at 1000-1050 and 1500-1550, with all parties and candidates sharing time based on their percentages of support. However, 11783 had been heard playing loop announcements about the free service instead of actual campaign commercials, because certain recordings had not been received, or opting out of carrying regional campaign material since it has national coverage (Huelbe Garcia, *DXLD*) An RNA operator told me they were only carrying election propaganda for the president. That may be contrary to the law, which makes no distinction for SW stations (Lúcio Haeser, *radioescutas*)

BULGARIA IRRS, Milano, Italy, tentative B-06 schedule (which never admits the transmissions are actually from Bulgaria):

5775	20 kW	2000-2130 Mon-Thu
		2000-2300 Fri-Sun
9310	20 kW	0800-1300 Sat-Sun
	100 kW	1500-1600 Sun
		1700-1900 Fri & Sun
		1900-2000 Sat
	250 kW	1900-2000 Sun-Fri
13840	20 kW	0800-1300 Sat & Sun
15750	100 kW	1200-1300 Fri to WAf
		1300-1330 Sun to India

Other 20 kW transmissions are for Eu; 100 and 250 kW for Eu/ME (IRRS via Alokesh Gupta, *DXLD*) This confusing sked is to satisfy coverage needs of individual clients, mostly religious (gh)

BURKINA FASO R. Burkina had been missing for weeks from 5030, or only with open carrier, but audible again in French September 10 at 1848, and also on 7230 at 1040-1225 (Carlos Gonçalves, Portugal, *WORLD OF RADIO*) Seems the technicians are working on modulator (Jari Savolainen, Finland, ibid.) Just before 2400 heard on 5030 with poor signal. Welcome back! (Raúl Saavedra, Costa Rica, *ibid*.) See NIGER

CHINA [and non] CRI changes in B06 season via the new RHC SW site at Quivicán, Cuba, 22 49 39 N, 82 17 34 W:

9580 to be replaced by 7220 0100-0300, 250 kW 10 degrees, to zone 8.

15120 to be replaced by 9475 0000-0100, 250 kW 160 degrees, to zones 12, 14, 16 (CRI via BCDX)

7220?! Despite all its other faults, Cuba has never been known to run a non-jamming transmitter in the 40m hamband, in order to preserve a semblance of adherence to international norms. Surely that will not come to pass. China had previously registered 40m frequencies from Canada, and those did not happen. Are the Chinese ignorant of Region 2 band limitations or just pushing the envelope? (gh)

As of mid-September, instead of 14050, 14260 and other frequencies inside the 20m hamband, Firedrake jamming was being heard on 13970 and weaker 14600 when checked daily around 1330. This indicated that Sound of

*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-06=winter season; [non] = Broadcast* to *or* for *the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

Hope had responded to intruder watch demands made by Uli Bihlmayer, DJ9KR, to stay out of the hambands. SOH at first defended the transmissions as only low-power from countries near China by SOH supporters to help get its message through. Meanwhile, SOH also appeared on the KWHR Hawaii 9930 schedule, M-F 14-17, and that was thoroughly Firedraked (gh)

Another Falun Gong clandestine is Ming Hui Radio, also via Taiwan, 11700 at *1500-1600*. After numerous tries, it came in over the jammer at times with ID heard, long talks with short clips of orchestral music. See **http://minghui.net** and **http://media.minghui.org/** leading to **http://www.clearwisdom.net/emh/index.html** (Edward Kusalik, Alberta, *DXLD*)

Sichuan PBS, Chengdu, reactivated on 7225.00, in the clear between 1400 (BBC Thailand off) and 1514 (DW Sri Lanka on). (Martien Groot, Netherlands, *DXLD*) Also with their Life, Travel and City Service program in Chinese, but with ID in English at 1045 and 1100, ''*This is the Voice of Golden Bridge*'', fair, // 6060.

PBS Nei Menggu, 7270.04v, at 1120-1201, conversation in assumed Mongolian, local chanting music, // 7210. Another day on 7270.08, 1014-1048 (Ron Howard, CA, *ibid*.) see GABON; MALAYSIA

CONGO Surprised and pleased after 20 months to receive a partial data QSL card and letter from Radio Congo, 5985, after 1 followup report and 1 IRC. Verification signer is Jean Médard Bokatola (Steve Lare, MI, *DXLD*)

CONGO DR Radio Kahuzi, Bukavu, 6209.66 at 1653 on a Monday with choral religious music, off at 1706, in Swahili or similar. E-mail reply soon received from Richard & Kathy McDonald giving sked as 07-11, 12-14, 16-17 Mon and Fri, but sign-off times vary (Jari Savolainen, Finland, DXLD) Thanks to Ethiopia vacating 6210, *q.v.*

CUBA By mid-August, Arnie Coro had been pressed into service to announce more RHC programs than his *DXers Unlimited* and weekly science report, such as news on the half-hour, and also heard more in Spanish (Terry L Krueger, FL, *DXLD*) Also reading a hurricane update script written by someone else (gh)

R. Rebelde, 9505, heard on a Sunday 1259 wrapping up a 3-hour *Música de su Vida* starting at 1000 (gh)

[non] *Radio Cuba Libre*, in August went on WRMI 9955 Mon-Sat 0700-0900. This is actually a new program (although the name has been used by other Cuban exile broadcasters in the past), sponsored by the Municipios de Cuba en el Exilio (Jeff White, *CRW*) Post DST: 0800-0900

Anticipated B-06 *Radio República* on WRMI 9955: daily 06-08, 16-22; M-F 11-13, Sun, Mon 03-05 (Jeff White, WRMI) see also CHINA

CZECH REPUBLIC [non] R. Prague via Canada heard on 5990 at 0345 (Kevin Redding, AZ, *ABDX*) That relay resumed in August, English at 0330, though they switched to Czech at 0357 for transmission schedule. RP website also showed Spanish via Canada at 2330 on 9685 (gh) Continuing in B-06 on 5990, 2330 moving to 6000 (Wolfgang Büschel, *BCDX*) Prague via WRMI in B-06: English daily 1000 on 9955, 1500 on 7385; Spanish 0530 & 1030 on 9955 (Jeff White, *DXLD*)

DIEGO GARCIA AFRTS heard at 1348-1457* on new 12759 instead of 12579, by mistake? Nice signal in France (Franck Baste, *DXLD*) They stayed on 12759, a nice change since there's no ute interference (Walt Salmaniw, BC, *ibid*.) And **http://myafn.dodmedia.osd.mil/radio/shortwave/** showed 12759 too; only USB sites remaining are this, Guam, Hawaii and Florida Key (gh)

ETHIOPIA Looking for Azerbaijan, heard R. Fana on 6110 at 1600-1630, ex-6210 (Zacharias Liangas, Greece, *DXLD*) Their other frequency, 6940, also changed, heard on 7210 and 6110 at 1811 ID (Jari Savolainen, Finland, *ibid*.) 7210 and 6110 also heard at 0310-0350, both with QRM (Anker Petersen, Denmark, *BCDX*) 7210 from *0255 but under BBC Swahili 0258-0329, then clear; 6110 under BBC Spanish via WHRI (Brian Alexander, PA, *DXLD*) 6210 was heard once again at 1610, // 6110 (Roberto Pavanello, Italy, *playdx*) But then at 1803 on 7210 // 6110 and nothing heard on 6210, maybe mistake (Jari Savolainen, Finland, *WORLD OF RADIO*)

Ethiopian Broadcasting Agency issued a commercial license to Radio Fana, almost two years after it was requested. See **http://www.radiofana.com** (*Media Network* blog) I strongly suspect that this move to proper in-band frequencies is related to the official license they just got (Kai Ludwig, *DXLD*) Website presented in English, but no English to be heard; archive of one-hour music shows (gh)

GABON [and non] On 7270, RTV Gabonaise at 1455 in French, QRM from Beijing in Chinese (Kevin Redding, AZ, *ABDX*) Unusual long-path catch, two+ hours of daytime on each end. Malaysia, India, and Iran are also scheduled on 7270. Gabon 7270 does not appear in all listings; I heard Firedrake 1430 past 1500 on 7270, which would be against V. of China clandestine (gh) RTG transmitter is most likely not at Moyabi, but near Libreville, and not 250 kW. Tony Rogers, BDXC, gives site as Melen and power as 100 kW (Thorsten Hallmann, Germany, *ibid*.) It's a confusing situation on 7270; see also CHINA, MALAYSIA. China seems to be as high as 7270.08 and Malaysia on 7270.16.

GERMANY [and non] Information from reliable sources indicates that Deutsche Welle will be on air via the Wertachtal transmitters for the last time on New Year's Eve. Albanian, Bulgarian, Croatian, Macedonian, Polish, Serbian and Turkish (including Romany from RBB) will be entirely taken off SW. DW will continue to use Nauen, at least for the time being (remember that their contract with VT includes an option to substantially increase airtime beyond the initial 90 frequency hours). Some Wertachtal transmissions will move to Nauen, the remainder will go to the VT facilities in the UK, including 6075 (Kai Ludwig, *DXLD*)

The mailbag show of DW's German program referred to an abolition of SW for North America as of November, in favor of internet, podcasting and satellite (Paul Gager, *A-DX* via Ludwig) *Deutsche Bundestag* newspaper reported already last March that Wertachtal would be abandoned, while DRM and FM relays would be extended. Cost-benefit analysis results in SW in German to USA being switched off (Kai Ludwig, Germany, *DXLD*) Hmmm, maybe they have figured out that their German-speaking SW audience in NAm could only be a tiny fraction of the abandoned English-speaking audience (gh)

Still plan some relays in German to ENAm in B-06: 1000-1200 via Sackville 6040, 0000-0200 Sines 9545 and Kigali 9655 (Kai Ludwig, Germany, *DXLD*)

INDIA AIR stations sometimes show up on the wrong frequency, perhaps for only one day. 4765.8 at 1415 was probably Leh from 4760 or Jammu from 4830. Another day Lucknow was on 4900 instead of 4880 at 1430 (Jose Jacob, Hyderabad, *dx_india*)

IRAN [non] Radio Zamaneh is a new station based at the Royal Tropical Institute in Amsterdam, with assistance from The Netherlands government. This independent non-partisan station aims to be a medium for the unheard voice of the young; in Farsi with news, analysis, educational programs, music and entertainment. SW was added to internet and satellite on Sept 11, 1700-2100 on 6245. See **http://www.radiozamaneh.com/** (Pressnow.org via Ron Howard, DXLD)

Site? FSU probably. R. Farda certainly doesn't ignore the youthful audience! (gh) 6245, booming signal from 1701, audio cutting off (Jari Savolainen, Finland, *WORLD OF RADIO*) Wooly audio, ute QRM at 1830 (Noel Green, UK, *ibid*.) So much for clearing broadcasters out of marine band. Should be audible in ENAm before 2100* (gh) Stayed on past 2115, excellent here (José Miguel Romero Spain, *DXLD*) No jamming initially; will they consider it worth jamming? Could be more dangerous than Farda (Jari Savolainen, Finland, *ibid*.)

IRELAND Laser Hot Hits, pirate believed to be from here, says it was raided on August 22, off the air after 12 years of operation on SW frequencies including 6220 (Ed Insinger, NJ, *DXLD*)

KOREA NORTH [non] Shiokaze, 9485 via Taiwan, 1300-1330 about Japanese abducted by North Korea, was consistently in English on Fri in Aug & Sept, and usually also on Wed, sometimes reading a roster of the kidnapped, others with news about North Korea; reception quality varied widely (gh)

LIBYA [non] V. of Africa, 17610 ex-17725, via France, in Swahili at 1355 with big motorboating noise overriding audio, abruptly off at 1357:14. English at 1400-1557 still heard with similar noises on 17850, but no longer on 17725, which was supposed to have been replaced Sept 3 by 21695, also used in the spring. Talks about a ''United States of Africa'' and the ''leader of the revolution''. ''News'' headlines on half-hour interrupted every few seconds by musical stingers in a vain attempt to make them less boring (gh)

MALAYSIA RTM was thought to have moved the 6050 frequency from Sibu, Sarawak to Kajang near Kuala Lumpur, as the latter's Info FM is there at 0200-0500, Asyik FM 0500-1500, then Suara Islam for Indonesia until 1700. However, visiting Kuching, I found Sibu is still active on 6050 but schedule reduced to 2200-0100 and 0400-0700, the latter unintelligible with QRM from Kajang on 6049.64.

Kuching on 7270.15 carries various Wai FM services, 2200-1600. 5030.02, Sarawak FM is still heard 2200-1600 in Malay, also on 7130.

5964.94 from Kajang carries the 24 h network renamed Klasik Nasional FM with news, info and Malay oldies (Alan Davies via Ron Howard, *DXLD*)

RTM stations on 7295 and 5965 now also have audio streaming via **http://www.rtm.net.my/radio/html_bi/index.html** (Ron Howard, CA, *DXLD*) And also on drop-down are vom1 and vom2 for the external service, English starting at 0300 with V. of Islam, but includes travelog, rock music (gh)

NEW ZEALAND RNZI tentative B-06 in analog: 1645-1800 9440 or 9870; 1745-1900 11675; 1945-2245 17675; 2245-0400 15720; 0745-1100 9885; 1100-1300 13840; 1300-1700 5950. Unclear whether there will really be gaps in analog at 1900-1945, 0400-0745 and exact frequency change times will vary (gh)

NIGER LV du Sahel, as reported last month, continued to be widely heard on 9705, but on one occasion, Aug 22 at 0500-0730, was on 9000.0 instead (Luca Botto Fiora, Italy, *bclnews.it*) Could be default tuning by mistake to 9000 due to mispunching the frequency, which could also account for occasional landings on 9704 as well (gh) On a Thursday at 0615, 9704 heard with a program from RTV Burkina Faso (Ignacio Sotomayor, Spain, *Noticias DX*) *q.v.*

NIGERIA I monitored the programming on V. of Nigeria, 15120 at 1700-2000 in English, announced for NAf, Eu. Those listed on website were not up to date.

M-F 1700-1800 *Sixty Minutes*, 1805-1815 *Broad Street*, 1830-1845 *Insight*, 1845-1900 *Newsfile*, 1905-1915 *Landmarks*, 2000-2100 *Sixty Minutes*.

Mon 1815 *Impressions*, 1915 *Musical Heritage*, 1930 *Diplomatic Suite*, 1945 *Beyond Poverty Line*.

Tue 1815 *Issues*, 1915 *News Maker*, 1930 *The Villa*, 1945 *African Integration*.

Wed 1815 *Kiddies Voices*, 1915 *Grassroots*, 1930 *Round-Table*, 1945 *West Africa Today*.

Thu 1815 *Talking Agriculture*, 1915 *Investment Profile*, 1930 *Development Initiatives*, 1945 *Women and Developments*.

Fri 1815 *Echoes*(?), 1915 *People & Places*(?), 1930 *Nigerian Popular Music*.

Sat 1700 *Africa Hour*, 1805 *African Safari*, 1830 *Weekend Magazine*, 1845 *National Assembly*, 1905 *Landmarks*, 1915 *Showbiz News*, 1930 *Nigerian Popular Music*, 2000 *Africa Hour*.

Sun 1705 *Weekly Analysis*, 1715 *Business Weekly*, 1730 *Periscope*, 1745 *Showbiz News*, 1805 *VON Link Up* [mailbag], 1830 *Talking Sports*, 1905 *This Week on VON*, 1930 *The Week in Review*, 1945 *Our Environment*, 2015 *Sports Roundup*, 2030 *The Villa*(?), 2045 *Nigeria and Politics*(?). Also news on the hour not otherwise specified (Tony Rogers, BDXC-UK *Communication*)

PERÚ R. Wilkamayu, Cuzco, heard at 1930 on 10354 with huaynos, notices, ID (César Pérez Dioses, Chimbote, Perú, *DXLD*) It's very low power, variable frequency, hardly ever reported elsewhere, but worth a try, certainly while visiting Perú; see top (gh)

R. San Antonio, Atalaya, 4940 at 2330-2350 with sports show.

R. Libertad, Junín, 5039.1, reactivated in September after almost 4 years; at 1124-1205 folk music, ads mentioning Junín, but no IDs; recorded timechecks every dekaminute. Not heard at other times of day.

R. Santa Rosa, Lima, 6047.1, at 1030 relaying R. Vaticano (Rafael Rodríguez R., Colombia, *condig* list)

Carlos Gamarra Moscoso says license of R. Universal has been reinstated in Cusco, on 6090, with new 1.5 kW, operating 11-14 UT Mon-Sat only. Reception reports to him at Av. Garcilaso 4ll, Distrito de Wanchaq, Cusco. Gamarra is with another friendly station, R. La Hora, 4855, which has a new pennant and QSL card (via José Elías Díaz Gómez, Venezuela, *condig* list) I got Universal's QSL #1; manager Luis Villasante points out their webpage **http://www.radiouniversalcusco.com** (Alfredo Cañote, Perú, *DXLD*) Heard on 6089.1 at 1103 with news, in the absence of R. Esperanza, Chile (Miguel Castellino, Argentina, *Conexión Digital*) Might propagate to NAm, but WYFR 6085 is a problem (gh)

ST. HELENA Remember the R. Saint Helena special reviving SW broadcast, Sat Nov 4 from 1800 until 0100 UT Sun Nov 5 on 11092.5 USB, as detailed in last month's column! (gh)

SLOVAKIA In a cabinet meeting Aug 31, the Minister of Culture proposed that external SW broadcasts of RSI be resumed Oct 31 (RSI Spanish news via José Miguel Romero, *DXLD*) Another version says its resumption is ''guaranteed'' (Luigi Cobisi, via Roberto Scaglione, *bclnews.it*) A briefer report in English and German pointed out that RSI still needed 921 kiloeuro to pay for resuming SW (gh) An article in SME, in Slovak, only mentions Slovaks abroad, so would it just be in the Slovak language? (Ted Schuerzinger, *Swprograms* list) RSI website in German said the State had ensured its finances. But a few days later the same website announced that future broadcasts will not be using SW! Just Internet and WRN satellites (Luigi Cobisi, Italy, DSWCI *DX Window*) Many of the former RSI frequencies were coördinated with HFCC for the B-06 season, at least on a contingency basis, so that is not an obstacle (gh)

SRI LANKA SLBC, 15745 at 0215 in English with morning service to the subcontinent, including Bible shows (Jerry Lenamon, TX, *DXLD*)

Also added 15745 to evening service to Asia in Indian languages, 0800-1530 (Jose Jacob, India, *DXLD*) Presumed Tamil at 1225. Good signal and a carrier noted also on 7301.5 but nothing on 11905, so replacing that? (Mauno Ritola, Finland, *dx_india*)

TURKEY V. of Turkey has two transmitter sites, Emirler and Çakirlar. Some of the Çakirlar transmitters have suffered many years from low modulation, even just a trace. Years ago weak tubes were mentioned as cause. *E.g.*, Serbo-Croatioan at 1600 on 9605, so all editorial work put into it gets lost this way (Kai Ludwig, Germany, *DXLD*) For the last three years, I have been constantly told that the engineers will try to correct the problem, but this never happens. Now a solution depends on "the available budget." I reckon the site will eventually be closed, with just the newer transmitters at Emirler left on the air. Turkish at 0700-1400 on 15350 has been moved to Emirler with much improved modulation, though with the familiar "squeal" of maladjusted ABB transmitters. 9460 cannot be broadcast from Emirler, as ABB units are only programmed to operate in the "official" broadcasting bands (Alan Holder, Isle of Wight, *DXLD*)

VOT B-06 in English:

1330-1430	11735 As
	12035 WEu
1930-2030	6055 WEu
2130-2230	9525 As
2300-2400	5960 NAm
0400-0500	6020 NAm
	7240 SAs

Some Turkish frequencies toward Eu/Am: 0500-0800 9460, 0800-1500 15350; 1800-2300 9840, 2300-0200 7300.

TRT revamps its schedule annually on January 1. Many European and Asian languages are retimed, reduced, but there is an additional broadcast in Spanish at 0200-0300 on 9865 at 290 degrees for Caribbean, Mexico, CAm, NW SAm (via Wolfgang Büschel, *BCDX*) This was met with great anticipation by Latin Americans who can barely pull in the existing Spanish broadcast to Europe (gh) Then the Spanish section of VOT denied there would be such a new broadcast, although it had been coördinated (Jorge García, Venezuela, *Noticias DX*)

UKRAINE RUI changed its NAm frequency in September from 7440 to 5820 (instead of planned 5810, occupied by WEWN), with English at 0000 and 0300. 5820 was clear but weak by comparison, even though nominally 1000 kW (gh, OK) 5820 at 0300 loud and clear (Joe Hanlon, NJ, *DXLD*) Booming in (Raul Saavedra, Costa Rica, *ibid.*) Other English hours to Eu moved at 1100 to 9950, 2100 to 5840 (Alex Yegorov, RUI, DXLD) All one hour later for B-06, but plans to stay on 5820 to NAm (gh)

Celebrating its 55th birthday in Sept, RUI Dir. Olexander Dykyi wrote that RUI plans to add more languages, Russian, Polish, French, Spanish and Arabic to the present Ukrainian, English, German and Romanian (Andy Sennitt, *Media Network* blog)

U K [non] BBCWS plans to use WHRI relay in B-06, 250 kW, 173 degrees: 5875 at 1100-1200, 9660 1200-1300 & 2100-2300; 6110 [Spanish] at 0300-0400 (Wolfgang Büschel, *BCDX*)

U S A State Department investigators concluded that Kenneth Y. Tomlinson, head of the Broadcasting Board of Governors, improperly hired a friend on the public payroll for nearly $250,000 over two and a half years, according to a summary of their report. They also said that Tomlinson, in charge of VOA and RFE, used his government office for personal business, including running a ''horse racing operation'' in which he supervised a stable of thoroughbreds he named after leaders from Afghanistan, that he repeatedly used government employees to do his personal errands and that he billed the government for more days of work than the rules permit.

Tomlinson's ouster last November from the Corporation for Public Broadcasting was prompted by a separate investigation by that organization's inspector general. That inquiry found evidence that Mr. Tomlinson had violated rules as he sought more conservative programs. (*NY Times* Aug 29 via Larry Nebron) There was much more press about this, including a *Times* editorial two days later calling for Tomlinson not to be reappointed, as was pending. Check **http://www.kimandrewelliott.com** archives for links starting August 31 (gh) This depends on how the election goes; more than likely because of the Rove connection this will be a recess appointment like the UN ambassador (Lou Josephs, *Media Network* blog)

A few days later there was another flap as the *Miami Herald* fired some of its journalists for having also worked for R. Martí, even though this had not been any secret: not appropriate for its journalists to be paid by the US government, a conflict of interest. The controversy also spread to the VOA itself, which also employs private media journalists on some of its programs. More about this, too, via Kim's website.

WBCQ resumed webcasting its 7415 service in mid-September, at **http://johnlightning.com:8020/listen.pls** (Larry Will, *WORLD OF RADIO*)

Including *WORLD OF RADIO*, after DST ends, expected: Wed 2300, Mon 0515; also on WBCQ 18910-CLSB Thu 0000, 9330-CLSB Mon 0400. On WWCR, Fri 2130 15825 but probably moving to 9985 or 7465 in Dec; Sat 1700 12160; Sun 0330 5070, 0730 3215; Wed 1030 9985. For latest schedule see **http://www.worldofradio.com/radioskd.html**

KAIJ, near Dallas, which used to be 100% Dr. Gene Scott relay, heard on 13815 at 1700 in Spanish religion (Alex Vranes, WV, *NASWA Flashsheet*) As early as Jan 2005, KAIJ website **http://www.kaij.org** said they would start broadcasting in Spanish, especially to Cuba; but their antenna is aimed NW, 320 degrees, both on 13815 and 5755 at night (gh)

UZBEKISTAN [and non] Contrary to last month's fears, Tashkent is not closing down relays of foreign stations. There was a temporary business dispute between Tashkent and the Russians, with whom we deal (Andy Sennitt, Radio Netherlands, *DXLD*)

VENEZUELA R. Amazonas made another of its rare appearances on SW, 4939, Sept 9 at 0215-0242+ with lively Latin pops, probable ID (Roger Chambers, NY, *WORLD OF RADIO*) When on, always seems to be low, around 4939 and two thirds, and modulation may be bad. Be aware of another Latin sometimes on 4940, R. San Antonio; see PERÚ

[non] In mid-August, R. Nacional de Venezuela, Canal Internacional began to show up at new times and frequencies via Cuba: 1000-1057 on 6180, and then 1100-1157 on 6060 (Joe Karthaus, Ont., *DXLD*) These two were then heard by many other listeners (gh) Also at 2200 on new 11670 (José Turnes Núñez, *Panorama, @tividade DX*) That one apparently replaces 2000 on 13680, no longer heard; still at 2300 on 13680 and newish 15250. There may well be other new times we can only find by running across them (gh)

WESTERN SAHARA [non] After a few months' absence, Radio Nacional de la República Árabe Saharaui Democrática revived its SW outlet 7460, first reported August 19: good signal at 1900 (Dave Kenny, *BDXC-UK*) And at 2315-0002*, fair to decent in Arabic (Mark Schiefelbein, MO, *DXLD*) Also at 0800 the next morning (Luca Botto Fiora, Italy, *playdx* yg) Signed on at *0602 (DSWCI *DX Window*) It's the only SW station operating from Algeria (Liz (Cameron, MI, *DXLD*) Castilian is at 1700-1800, announcing 7470 instead of 7460 and MW 1550, also heard here (Carlos Gonçalves, Portugal, *WORLD OF RADIO*)

ZIMBABWE [and non] SW Radio Africa returned to SW in July, on 4880 at 1700-1900 via South Africa, but did not publicize it in order to discourage jamming. This worked until jamming finally started in September. Meanwhile, reports of 4880 were appearing in numerous DX publications. Once jamming resumed, SW Radio Africa said it would have to start changing frequencies and times again. SWRA relies on word of mouth in Zimbabwe to spread news about its frequency (gh)

There are times when DXers/SWLs can be of help in a desperate situation. IMHO this is one of them. It could just be *your* logging that is discovered by the person working for Robert Mugabe who runs the jamming operation. So why take the risk, however small? Because it's your "hobby"? You probably haven't met journalists who have been tortured by the Mugabe regime. I have (Andy Sennitt, *DXLD*)

Gerry Jackson of SWRA forwarded a reception report from Harare that describes the jamming: ''4880 is jammed from 1800 UT with a new type of jammer, extremely severe, a siren/car horn sound, cycles within 5 seconds. At 1830 this jammer goes off and is replaced by the jammer that was on VOA MW's 909, less effective but still wipes you out, unmodulated signal'' (*Media Network* blog)

The Government of Zimbabwe has released funds for opening a new radio station, Studio 24/7, in Gweru, the acting Minister of Information and Publicity, Cde. Munyaradzi Paul Mangwana, said. It would be operational before the end of the year (*The Herald* via *Media Network*) Earlier reports said this station would use SW to cover the whole of Zimbabwe. Other reports said it would be a de facto external service. If there are SW transmitters at Gweru being readied for use, this could explain the apparent new source of jamming to SW Radio Africa (Andy Sennitt, *ibid.*)

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

BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com

0043 UTC on 4845
MAURITANIA: Radio Mauritaine. French. Local pop music and announcer's chat. Koran recitations 0050 to brief announcement by woman and abrupt end of transmission. Poor signal SINPO 22222. Observed no Africans and very little else on the tropical bands for the previous ten days. (Jim Evans, Germantown, TN)

0417 UTC on 15515
AUSTRALIA: Radio. Good signal for *Australian Rules* football game (Eagles vs. West Coast); 9580, 1312 fair signal. (Joe Wood, Greenback, TN) Radio Australia 13630, 2205 news on Aussie goods going to the Middle East. Station ID 2210 //12080 (SIO 232), 15240 (SIO 333) via Taiwan, 15515 (SIO 444) Shepparton 17785 (SIO 444); . (Stewart MacKenzie WDX6AA, Huntington Beach, CA) 2226-2235+ *Radio National Saturday Extra*. SIO 3+33. (Frodge, MI) **VL8A-Alice Springs** 2310, 1006-1015; **VL8T-Tennant Creek** 2325, 0940-1000+ Tigers vs Bombers sports match. (Scott Barbour, Intervale, NH)

0440 UTC on 3185
USA: WWRB. Bro. Stair with his views on the current events in the Middle East. WHRI 4960, 0456-0516 news and mentions of the New World Order. Station ID at 0458 and address for reception reports //5860 good; 5050, 0457. **AFR/AFRTS** 5446, 0521-0526 with *Overnight America* segment.5546 (Key West) 0500 (Wood, TN) **Taiwan Radio Int'l** via Okeechobee, Florida 15600, 2216 with Air Force One news and item on Taiwan. (MacKenzie, CA)

0603 UTC on 9615
NEW ZEALAND: News on medical care for children. Mentions of *Media Watch Program* and an interview with Planned Parenthood leader. Several IDs as "National Radio," followed by weather forecast. (Wood, TN) R. NZ Int'l 9870, 1245 aboriginal music program (fair-poor signal). (Bob Fraser, Belfast, ME) New Zealand's **Radio Reading Service** 3935, 0815+. SINPO 25332. (Slaen, ARG) R. NZ Intl 13730, 0323. (MacKenzie, CA)

1015 UTC on 7295
MALAYSIA: Traxx FM. DJ banter and pop music poking through the static. Poor but first signs of audio here at my location since early spring. **Voice of Malaysia** 9750, 1036-1105. Vernacular text to tentative "Saura Malaysia." Time pips at 1100 to music and chat. Fair signal amid WYFR interference at 1100. (Barbour, NH)

1130 UTC on 3320.11
NORTH KOREA: KCBS Pyongyang. Korean text to classical string music at 1138. Patriotic choral for fair signal quality. French service ID as "La Voix de la Corée" 9335, *1400-1425 with opening ID then "nouvelles et paroles en français" until 1424, then a bit of music. (Wilkins, CO)

1145 UTC on 13640
FRANCE: Radio France Int'l. French weather forecast during excellent signal quality. *International Newsflash* on 17605 at 1720. (Fraser, ME) RFI 17605 at 1640. (Gerald Brookman, Kenai, AK)

1204 UTC on 3280
CHINA: Voice of Pujiang (tentative). Seemed to be a few commercials to male/female's lively Chinese chat session. Vocal music at 1209, followed by same format to tune-out at 1235 as signal was deteriorating. China's **Nei Menggu PBS** 4000 kHz still missing and absent for a week. China's **Gannan PBS** 3990 (tentative) 1225-1235 in presumed Tibetan from GPBS. Signal fair around 1230 and hard to copy. (John Wilkins, Wheat Ridge, CO) **China Radio Int'l** 9745, 1930-1940 in Esperanto language. (Slaen, ARG) **CRI** 9570, 1648 with music amid SIO 233. (Brookman, AK)

1218 UTC 3987.04
INDONESIA: RRI-Manokwari (tentative). Speech segments before live audience followed by announer's comment or analysis to 1238. Eighteen minutes of Arabic sounding music style to SCI (*Song of the Coconut Island*) interval signal to Jakarta program at 1300. Good signal. Additional Indo's observed as: **RRI-Ternate** 3345.03, 1244-1305. **RRI-Kendari** (tent) 3995.04, 1222-1300. Signal much better than usual. **RRI- Manokwari** 3987.04, 1249-1303. **RRI-Pontianak** 3976.04 audible for two days, noted silent recently. September 6, 2006 (Wilkins, CO)

1500 UTC on 15650
CLANDESTINE: Voice of Oromiya Independence via Jülich in presumed Oromo language. Brief Radio Miami Int'l announcement at 1500. Many mentions of "Oromiya" during program segment to theme music at 1525. Transmitter off at 1530 for fair signal throughout broadcast. (Wendel Craighead, Prairie Village, KS)

1500 UTC on 11700
TAIWAN: Ming Hui Radio. Sign-on heard with opening orchestral melody and male's announcements in standard Chinese. Several mentions of "ming hui...ming hui...taiwan." Jammer present and usually appears at 1458. Last attempt to log *1500-1600* observed male/female speakers with slogans and promotional items. (Ed Kusalik, Alberta, Canada)

1630 UTC on 6170
SRI LANKA: Deutsche Welle. News and magazine format for SIO 344. Deutsche Welle from various locations 1658 on 15705. (Brookman, AK) **Voice of Croatia** via Germany 9925, 2220 (MacKenzie, CA)

1730 UTC on 13675
ISRAEL: Kol Israel. Item on strained Israeli/Lebanon relations // 11590 (tent). (Fraser, ME) Israel's Radio Galei Zahal 6973, 2110-2115.Hebrew news from male/female duo. (Slaen, ARG)

2006 UTC on 11940
ROMANIA: Radio Romania Int'l. *Radio Newsreel, Focus* and *All That Jazz* programs SIO 352. Same programs monitored 9645, 2300-2332. SIO 453. (Kraig Krist KG4LAC, Manassas, VA; Brookman, AK) 7265, 2311-2316 w/news to ID at 2315 into poetry feature. (Frodge, MI)

2054 UTC on 11640
MALI: China Radio Int'l relay. Pop music segments to ID spot and *Chinese Studio* Chinese/English lessons. SIO 333 and intermittent buzz QRM. **RTV du Mali** 4835.4, 2312-2322. Afro tunes to ID, "RTV du Mali" //5995. SIO 2+32+ only audible in USB but much better than 4835. (Frodge, MI) 5995, 0616-0637 w/ drops in audio levels. (Barbour, NH) **CRI** via Mali relay 13630, 2051-2103 with *Chinese Studio*. (Wood, TN)

2110 UTC on 11675
UK: BBC World Service. News items on ancient Thracian grave found. (Fraser, ME) BBC WS 6196, 1643 sports news; 12095, 1650. (Brookman, AK)

2152 UTC on 9705
NIGER: La Voix de Sahel. West African pop/high life music to French announcements. Talk and music noted at 2200 followed by Koran recitations at 2255. Closing comments to interval signal and national anthem and 2301*. Anthem is distinctive with fanfare followed by women/children singing. Very poor signal, marginally above/below noise level at 2152, gradually improving to peak SINPO 22222 from 2255-2301*. First log of Niger since 2001. (Evans, TN) 9705, 1940-1944 French. (Slaen, ARG)

2300 UTC on 11950
EGYPT: Radio Cairo. Sign-on into news of fair signal quality. (Fraser, ME) 11950, 2352-0006. Arabic and French music vocals. Announcer's English IDs, frequencies and schedule to Arabic language lesson for good signal quality. (Wood, TN)

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

Fred Waterer
fredwaterer@monitoringtimes.com

Broadcasting from China – Blurred Distinctions

China and Taiwan are not only divided by the Formosa Strait, but by history, politics, and culture. Most people are aware of the history of these two entities. Following the Second World War, China plunged into a bitter civil war between the Communists under Mao Tse-tung and the Nationalists under Chiang Kai-shek. With the Communist victory in 1949, Chiang continued his resistance from Taiwan, which he continued to maintain was the legitimate Republic of China.

Chiang's government continued to hold China's seat at the UN until 1971, when the People's Republic assumed that seat. The consequences of all of these events are felt to this day. China maintains that Taiwan is a rebel province. Taiwan maintains an uncomfortable status quo, neither declaring independence nor embracing re-unification.

These distinctions show up in the English broadcasts of these two nations. Oddly enough, the English transmissions of both China and Taiwan tend to also blur the distinctions and may not be what you might expect. The bellicose broadcasts of the '50s and '60s by the then Radio Peking are long forgotten.

Here's one listener's recollection of those days: *"The Lafayette KT-135 was nothing short of a dream come true for a me when in my teenage years trying to reach beyond the walls of my childhood bedroom to distance places far away…Then the turbulent times as the Vietnam war raged on (1969) right there all on my desktop from this little amazing box! I'll never forget Radio Peking saying one night 'People of the world unite! ~ Defeat the US aggressors and their running dogs!' Good God almighty, I thought at a youthful age, someone out there hates us! I wonder how many of you received the little red book with the teachings of Chairman Mao from Radio Peking like I did?"* (Carol L. Maher W4CLM)

Today, China Radio International and Radio Taiwan International are two of the easiest stations to hear in North America, thanks to the use of powerful relay stations. Every night you can hear CRI via a number of frequencies, such as 6020 kHz at midnight UTC. (Frequencies may change with the start of a new broadcast season this month.) Each night you can also hear Taiwan via the transmitters of WYFR in Florida on 5950 kHz from 0200-0300 UTC and repeated an hour later.

❖ What can you hear?

You will not hear hysterical rants. Each program of both CRI and RTI opens with news and current affairs. In the case of CRI, this consists of *News*, followed by *News and Reports*. "News from China, in an international language, world reports with a Chinese perspective. This is News and Reports in CRI."

Listening to CRI's News Department, one could be forgiven for forgetting the United States exists. This may have just been a fluke during the period in which I was listening (Sept 1-7) and I should point out they did discuss the United States extensively during their UTC Sept 12 broadcast.

Otherwise, news coverage was exclusively about China, Asia, Iran, and the Lebanon-Israel crisis. The European Moon mission also got coverage a few times. Most of the topics covered were economic in nature as well. Foreign investment. The booming economy. Anti-Money Laundering legislation. Trade with Japan and Uruguay.

Taiwan on the other hand, while also focussed on domestic and Asian issues, makes no bones about its ties to the United States.

The latter part of the hour in each broadcast is devoted to rotating features as follows (hosts' names in brackets).

China Radio International

Sunday - In The Spotlight (host unclear)

CRI's spotlight on culture. The program looks at developments in Chinese film, literature and music. A recent episode featured the film "Tokyo Trial" about the Asian war crimes trial following World War II (which persuaded me to want to see it), a rather maudlin novel, and a Singaporean singer who is (reportedly) quite popular in the Chinese music world. A very worthwhile listen.

Monday - Front Line (Wu Jia)

"Stories from Modern China and the people behind them" is the tagline for this show. Interesting views on modern China, from intellectual property fights to the changing nature of marriage.

Tuesday - Biz-China (Tu Yun)

Listening to this show, one imagines Chairman Mao spinning in his grave. The program discusses the booming Chinese economy, foreign investment in and by China, job opportunities in China for Chinese overseas, and other largely capitalist notions.

Wednesday - China Horizons (Wu Jia or Wang Lu)

China Horizons provides an in-depth look at various regions of China and her people. Recent episodes have included an examination of homelessness in China, and the movie industry (which like every other industry in China, is of course, booming). It also includes tours of the Chinese regions and ethnic groups. A very interesting presentation.

Thursday - Voices From Other Lands (Su Sha-Wei)

A weekly program which interviews people from abroad who are visiting China, on any number of subjects. Recent programs have included an Indian artist with an exhibition in Beijing, a German scientist attending a conference in Beijing on containing a world flu pandemic, and "Chef Dan," an American chef currently working in Hong Kong.

Friday - Life in China (Various)

"See China, meet its people, share the experience. *Life in China*" So opens CRI's weekly look at, well, life in China.

They explore many areas of life in this program, including ethnic minorities, Salsa dancing, Blog fever, and Tangshan 30 years after the devastating earthquake. From World Cup Fever to rural health care clinics, from the frivolous to the vital – the program explores all aspects of the people of China.

Saturday - Listener's Garden (Li Peichun and Xiaohua)

Listeners Garden is CRI's mailbag program. It is more formal than RTI's program,

This is a photo of me taken in 1987 at the ANARC convention in Mississauga, Ontario, with Joan Chao Mei-Yee from (I believe) the audience research department of the (then) Voice of Free China.

but has its own charm. Li Peichun and Xiaohua are pleasant, and there is a cool jazz riff playing under them. They acknowledge listeners letters and answer their questions.

But it is more than just a mailbag show. Also included in the program is the "Get to Know CRI" quiz (which wrapped up recently). Grand prize was a trip to China in the New Year. This is followed by "Topic of the Week," usually suggested by a listener, and a short feature about selected Chinese idioms. Finally, a review of what is coming up in the feature programs for the next week. It's a great way to finish up the week.

Each daily CRI program ends with *Chinese Studio*, a brief 5 minute Chinese language lesson.

Radio Taiwan International

Sunday - Taipei Magazine (Carlson Wong)

Taipei Magazine is a program discussing political, economic and social developments in Taiwan. The most recent edition (as this was written), discussed Taiwan's diplomatic relations (13 countries still recognize Taiwan, none of which is a significant player), and Taiwan's investments in petroleum projects abroad.

Stage, Screen and Studio (Craig Quintero)

The program provides background to what's current in the arts in Taiwan, from galleries to theatres. Not as comprehensive or as entertaining as CRI's "In The Spotlight."

Monday - Asia Review (Radio Australia)

The program is an Asia newsmagazine produced by Radio Australia. Good background coverage of events in Asia, but it would have been more interesting to hear a Taiwanese perspective on these things. Still, it's another example of co-operation between international broadcasters.

Let's Learn Chinese (Carlson Wong)

Weekly Chinese language lesson. Carlson still invites people to consult the website for lesson details, but as I pointed out in last month's *Programming Spotlight*, this page is still blank.

Tuesday - We've Got Mail! (Natalie Tso & Shirley Lin)

Natalie and Shirley have a good chemistry, which makes this program very enjoyable to listen to. Listeners letters are interspersed with chat and some really good Taiwan/Chinese pop music.

Other features include "Global Exchange" which encourages listeners to respond on a given topic. In September the topic was "The Dumbest Thing I Have Ever Done." Apparently response was under whelming. Finally, "Your Questions, Our Answers" responds to listener's specific questions about Taiwan.

Wednesday - Speak Out (Caroline Gluck)

Human rights and democracy news from Asia plus interviews with activists.

Listed as being on Tuesday UTC broadcasts, I recently heard *Strait Talk* on a *Wednesday* UTC broadcast. It's a discussion program about Taiwan and its place in the world. The topic was the 14th attempt by Taiwan for recognition at the UN (which later failed, vetoed by China).

Jade Bells & Bamboo Pipes (Carlson Wong)

Perhaps (in my opinion as well as others') the best program on either station. An excellent presentation of Chinese and Taiwanese traditional music and, in one recent episode, some Latin flavored music that wouldn't have been out of place on Radio Habana Cuba. The program leaves one wanting to learn and know more about the music of Taiwan and Asia in general. ... That's part of the beauty of shortwave and the internet: listeners are exposed to so many different musical genres. But that's a discussion for another day (I smell a future column).

Thursday - People (Natalie Tso)

Natalie interviews people from all walks of life, discussing their lifestyles, careers and perspectives.

Instant Noodles (Andrew Ryan)

Andrew Ryan presents the weird, the silly, and the wacky from the Asia-Pacific region. For example, a Vietnamese man who once appeared on national television to demonstrate his ability to resist electric shocks has been electrocuted while repairing a generator. A fun program. Andrew, who is quite a character, will be back on the Saturday broadcast.

Friday - Mando Pop 101 (Lily C)

While the website lists other programs, what was actually heard was "Mando Pop 101," which follows gossip and news from the Manadarin Pop Scene. Hosted by Lily C, it's a high-energy show featuring some really great Mandarin pop music. Lily indicated in a recent show that it was a new program and that she wanted feedback on what the listeners liked and disliked about it. I liked it, for the same reason I found *Jade Bells* so enjoyable.

Saturday - Groove Zone (Ellen Chu & Andrew Ryan)

This is perhaps the most entertaining and light-hearted program on either station. Appealing to a youthful audience, Ellen and Andrew engage in friendly banter (in the most recent episode, about different candies from the past) and play some really good Chinese-language pop music. This music would not be out of place on any North American station if it were in English. The interaction between Ellen and Andrew reminds me of the fun and frivolity of HCJB's *Musical Mailbag* in years past (without the mail of course).

❖ Blurred distinctions.

I found it interesting (after almost 30 years of listening to the Cold War posturing between the two countries) that, whereas at one time Mao's Radio Peking might have thundered about "Imperialist Running Dogs" and the like, nowadays, almost all of the political discussion comes from the capitalist Taiwan side, and all of the economic discussion comes from Communist Beijing programming.

In fact, in a week of listening I heard no references at all to the Communist Party of China. But I heard many political discussions from Taiwan. It's all very subtle. Taiwan never attacks China, but promotes "democracy and human rights in Asia." A number of reports on intellectual property rights on CRI showed, in a clever way, that they are addressing piracy issues, and other reports about the economy left little doubt that China was open for business, within limits.

30 years ago, Beijing's talks would still be dominated by discussion of Chairman Mao. During the week I listened, the only Chairman heard on any CRI broadcast was the "Chairman of the Board," Frank Sinatra singing "Fly Me to the Moon."

Music heard on both stations could, for the most part, have been heard on either station. Almost all of it was western sounding, pop, and jazz – even hip-hop in Chinese. As mentioned already, some of the Latin Jazz heard on RTI could just as easily have come from Havana.

RTI comes off as a friendlier, more laid back broadcaster and very listener friendly.

Thanks to Carol L. Maher W4CLM, Webmaster for **www.foxtango.org** – an international Yaesu users group – for permission to use the excerpt from his listening experiences in 1969.

See you all here again next month. 73!

THE QSL REPORT

VERIFICATIONS RECEIVED BY OUR READERS

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com

F/D, N/D, P/D

In case you're wondering what code we're trying to break ... you're on the wrong track. If you follow this column regularly, you've observed verification card or letters noted as "full data." (F/D) That is what every collector strives for: a card that includes the station name, frequency, time and date. If they include a transmitter site, that's even better! This is the ideal kind of reply, but not always what we receive.

A partial data (P/D) QSL, lists only part of the verification information; for instance, the frequency is listed but the date or time is not. A "no-data" (N/D) card is just as it implies – the data is blank, and the card may only be signed or stamped. Every DXer has these in their collection, and they are the least favorite to receive. I suppose if it's the only way to have a station reply it might suffice; however, I've known of several DXers returning their cards, enclosing a note with their original report to "please fill in the details."

What is considered a confirmation can be left to the individual to decide. Enclosed items such as bumper stickers, pennants, or holiday cards should not be counted as a verification. However, any response which does not indicate that you did NOT hear the station you are reporting should be considered an intent by the station to verify your report. DXers who are counting countries to qualify for an awards program should consult the awards program qualifications; many have waited until a letter or card is verified properly before they check off a station or country as complete.

AMATEUR RADIO

Vatican City, HV5PUL, 20 meters SSB. Amateur radio station for Pontificia Universita Lateranense Vatican City. Original contact 2003 with no reply. Relog of twice annual broadcast, received in two and a half months, complete with two first class stamps issued by the Vatican City State, for two US dollars and a SAE. QRZ indicates, "This station is activated during the special events at the University like the Acadmic Year Opening Day (Dies Accademicus) in November or the Lateran Journey at the end of April." Mailing address: HV5PUL c/o Luca Della Giovampaola, Pontificia Università Lateranense, P.zza S.Giovanni in Laterano, 4 - 00120 Città del Vaticano, Vatican City State. (Ken Reitz KS4ZR, VA) *Congrats!*

ARMENIA

Voice of Armenia, 9965 kHz. Full data Public Radio of Armenia card, plus schedule and personal letter, received in 226 days for an English report. (Scott Barbour, Intervale, NH) At press time, VO Armenia was schedule to leave shortwave next week. Correspondence or follow-up reception reports with two IRCs, may be sent to: Public Radio of Armenia, 5 Alex Manoocian St., 375025 Yerevan, Republic of Armenia. Web: (streaming audio) **www.armradio.am** Email: *pr@armradio.am* (GVH)

GABON

Inpact du Plein Evangile, via Gabon, 9580 kHz. Nondescript style letter signed by Sergine & Andre Snanoudj. Large French religious book enclosed. My prepared cards (French & English) not returned. Received in 22 days for a CD report. Mailing address: 32140 Panassac, France. (Edward Kusalik, Alberta, Canada) Station programming is relayed via Gabon's Afrique Numéro Un. (GVH)

INDIA (GOA)

All India Radio-Panaji, 11715 kHz. Full data Sculptures on Visvanatha Temple card including site, signed by Y.K. Sharman, Director of Spectrum Management & Synergy. Received in 124 days via regular mail, after posting reception details at: **www.allindiaradio.gov.in** with email response that a reply would be forthcoming. Total of 14 reports over 11 years to verify Panaji. (Jim Evans, Germantown, TN) Station address: External Service Division, Spectrum Management, All India Radio, Room 204, Akashani, Bhaven, New Delhi 110 001 India.

MADAGASCAR

Radio Nile, 9905, 12060 kHz. Full data large color Madagascar map card, plus letter signed by Rahamefy Eddy-5R8FT. Technical Dept. Received in 11 weeks after unsuccessful reports to Kampala, Ultrecht and email addresses. Station address: c/o Technical Dept., P.O. Box 404, Antananarivo-101, Madagascar. (Wendel Craighead, Prairie Village, KS) Radio Nile relays via Radio Netherlands Madagascar relay station. Programs are produced by the New Sudan Council of Churches, at studios in Uganda and Netherlands. Radio Nile is sponsored by the Dutch public broadcaster NCRV. (GVH)

MEDIUM WAVE

1610 WA, Ilwaco. Verification letter signed by Kyle L. Betts-BMI, Special Operations by direction. Received in three days for an AM report. No call letters noted in verification. Mailing address: U.S. Dept. of Homeland Security, USCG, Cape Disappointment, P.O. Box 460, Ilwaco, WA 98624. (Patrick Martin, Seaside, OR) AM QSL # 2,932.

CFMB, 1280 AM kHz. Full data prepared QSL card signed by Luigi Valente-Station Manager, plus station decal and business card. Received in 35 days for an AM report, SAE and one US dollar. Station address: 35 York Street, Montreal, Quebec H3Z 2Z5 Canada. (Greg Harris WDX9KHY, Forest Park, IL)

KCKN 1020 kHz AM. Full data card Alien Cowboy card signed by Don Niccum. Received in 16 days for a DX Test. Station address: P.O. Box 220, Roswell, NM 88202-0220. (Martin, OR)

Guam-KTWG, 801 AM kHz. Full data over sized Guam postcard and friendly note signed by Leilani Dalulig. Received for an AM report. Station address: 1868 Halsey Drive, Piti, Guam 96915. (Craig Edwards, Nhulunbuy (Gove) NT, Australia)

PIRATE

Undercover Radio, 6925 kHz USB. 20th *Anniversary Show-Progressive Music Radio* card # 442, plus CD of anniversary program highlighting 20 years as a pirate broadcaster. Received in 69 days for an email report to: *undercoverradio@mail.com* (Barbour, NH) Maildrop: P.O. Box 293, Merlin Ontario N0P 1WO Canada.

USA

Sudan Radio Service, 9525 kHz. Verification letter signed by Tamburo Michael Renzi-SRS Marketing Coordinator, plus station information, freq schedule, and brochure. Received for an English report. Mailing address: Kenya Production Studio, c/o EDC, Dennos Pret Road, P.O. Box 4392, 00100 Nairobi, Kenya. (Arnaldo Slaen, Buenos Aires, Argetina) SRS is an independent station dedicated to peace and development in Sudan, and financially supported by the United States Agency for International Development (USAID). Correspondence may also be directed to: International Development (USAID), States Agency for International Development (USAID)., Education Development Center, 1000 Potomoc Street NW - Suite 350, Washington, DC 20007 USA Web: (on-demand audio) **www.sudanradio.org/** Web: EDC parent organization **www.edc.org** (GVH)

How to Use the Shortwave Guide

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

① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

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

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

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. 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
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

MT Monitoring Team

Gayle Van Horn
Frequency Manager
gaylevanhorn@monitoringtimes.com

Daniel Sampson
danielsampson@monitoringtimes.com

Larry Van Horn, MT Asst. Editor
larryvanhorn@monitoringtimes.com

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D'Angelo/*NASWA Flash Sheet*; Anker Petersen/*DX Window*; Adrian Sainsbury/R.NZ Intl; Harold Sellers/*ODXA/DX Ontario*; Larry Van Horn N5FPW, MT Asst. Editor; *BCL News; Cumbre DX; Hard Core DX; NASWA Journal;* WWDXC-Top News.

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

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

0000	0015		Japan, Radio Japan/NHK World			13650as
			17810as			
0000	0015	s	USA, WRMI Miami FL	9955am		
0000	0027		Czech Rep, Radio Prague	7345na	9440na	
0000	0030		Australia, HCJB	15405as	15525as	
0000	0030		Australia, Radio	15405as	15525as	
0000	0030		Burma, Dem Voice of Burma	5955eu		
0000	0030		Egypt, Radio Cairo	11950na		
0000	0030		Thailand, Radio	9570va		
0000	0030		UK, BBC World Service	3915as	5970as	
			9740as	9790as	11945as	15360as
			17615as			
0000	0030		USA, Voice of America	7555as		
0000	0040		Lithuania, Radio Vilnius	9875na		
0000	0045		India, All India Radio	9705as	9950as	
			11620as	11645as	13605as	
0000	0045		USA, WYFR/Family R Okeechobee FL			17805am
0000	0057		Canada, Radio Canada Intl	11700as		
0000	0059		Canada, Radio Canada Intl	9755am		
0000	0059		Spain, Radio Exterior Espana	15385am		
0000	0100		Anguilla, University Network	6090am		
0000	0100		Australia, ABC NT Alice Springs			2310do
			4835do			
0000	0100		Australia, ABC NT Katherine	5025do		
0000	0100		Australia, ABC NT Tennant Creek			4910do
0000	0100		Australia, Radio	9660pa	12080pa	13670pa
			15240va	17715pa	17750as	17775va
			17795va			
0000	0100		Canada, CFRX Toronto ON	6070na		
0000	0100		Canada, CFVP Calgary AB	6030na		
0000	0100		Canada, CKZN St John's NF	6160na		
0000	0100		Canada, CKZU Vancouver BC	6160na		
0000	0100		China, China Radio Intl	6020na	7180as	
			9515as	9570na	13600eu	
0000	0100		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0000	0100		Cuba, Radio Havana	9550na		
0000	0100	f	Germany, Bible Voice BC Network			6140me
0000	0100		Germany, Deutsche Welle	9695as	9825as	
			9885as			
0000	0100	m	Greece, Voice of	7475va	9420va	15650va
0000	0100		Guyana, Voice of	3291do		
0000	0100		Japan, Radio Japan/NHK World			6145na
0000	0100		Malaysia, RTM/Trax FM	7295as		
0000	0100	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0000	0100		Netherlands, Radio	9845na		
0000	0100		New Zealand, Radio NZ Intl	13730pa		
0000	0100	DRM	New Zealand, Radio NZ Intl	15720pa		
0000	0100	vl	Papua New Guinea, Wantok R. Light			7120va
0000	0100		Singapore, MediaCorp Radio	6150do		
0000	0100		UK, BBC World Service	6195as	9410as	
			11955as	15280as	15310as	17790as
0000	0100	DRM	UK, BBC World Service	6010na		
0000	0100	f	UK, Bible Voice	6140me		
0000	0100	f	UK, Bible Voice	6140me		
0000	0100		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	13362usb	
0000	0100		USA, KAIJ Dallas TX	5755na		
0000	0100		USA, KTBN Salt Lake City UT	7505na		
0000	0100		USA, WBCQ Kennebunk ME	5110na	7415na	
			9330na			
0000	0100		USA, WBOH Newport NC	5920am		
0000	0100		USA, WEWN Birmingham AL	5810va	5835va	
0000	0100		USA, WHRA Greenbush ME	7520na		
0000	0100		USA, WHRI Cypress Creek SC	7490am	7555am	
0000	0100	twhfa	USA, WHRI Cypress Creek SC	9820am	13760am	
0000	0100		USA, WINB Red Lion PA	9265am		
0000	0100	twhfa	USA, WRMI Miami FL	7385am		
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/Family R Okeechobee FL			6065am
			9505am	11835am		
0000	0100		Zambia, Christian Voice	4965af		
0015	0030	m	USA, WRMI Miami FL	9955am		
0030	0045	s	USA, WRMI Miami FL	9955am		
0030	0100		Thailand, Radio	5890na		
0030	0100		UK, BBC World Service	5970as	6195as	
			9410as	9790as	11955as	15280as
			15310as	15360as		
0030	0100		USA, Voice of America	9715va	9780va	
			15185va	15205va	15290va	15560va
			17740va	17820va		
0035	0100	sm	Austria, Radio Austria Intl	9870am		
0043	0058	twhfa	Austria, Radio Austria Intl	9870am		
0055	0100		Italy, RAI Intl	11800na		

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

0100	0100		Cuba, Radio Havana	6000na	6060na	
			9820na			
0100	0115		Italy, RAI Intl	11800na		
0100	0127		Czech Rep, Radio Prague	6200na	7345na	
0100	0128		Vietnam, Voice of	6175na		
0100	0129	s	Germany, Universal Life	9480as		
0100	0130		Hungary, Radio Budapest	9590na		
0100	0145	w	Australia, Radio	15405as		
0100	0156		Romania, Radio Romania Intl	9690na	11825na	
0100	0159		Canada, Radio Canada Intl	9755am	13710am	
0100	0200		Anguilla, University Network	6090am		
0100	0200		Australia, ABC NT Katherine	5025do		
0100	0200		Australia, ABC NT Tennant Creek			4910do
0100	0200		Australia, CVC International	7355as		
0100	0200		Australia, Radio	9660pa	12080pa	13670pa
			15240va	15415va	17715pa	17750as
			17775va	17795va		
0100	0200		Canada, CFRX Toronto ON	6070na		
0100	0200		Canada, CFVP Calgary AB	6030na		
0100	0200		Canada, CKZN St John's NF	6160na		
0100	0200		Canada, CKZU Vancouver BC	6160na		
0100	0200	DRM	China, China Radio Intl	6140na		
0100	0200		China, China Radio Intl	6020na	6080na	
			9570na	9580na	9790na	11870as
			13600eu	13640as		
0100	0200		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0100	0200	f	Germany, Bible Voice BC Network			6140me
0100	0200		Guyana, Voice of	3291do		
0100	0200		Indonesia, Voice of	9525as	11785pa	
			15150al			
0100	0200		Japan, Radio Japan/NHK World			5960va
			11720va	11935sa	15325as	17685oc
			17810as	17825va	17845as	
0100	0200		Malaysia, RTM/Trax FM	7295as		
0100	0200	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0100	0200		Netherlands, Radio	9845na		
0100	0200		New Zealand, Radio NZ Intl	13730pa		
0100	0200	DRM	New Zealand, Radio NZ Intl	15720pa		
0100	0200		North Korea, Voice of Korea	7140as	9345as	
			9730am	11735ca	13760ca	15180ca
0100	0200	vl	Papua New Guinea, Wantok R. Light			7120va
0100	0200		Russia, Voice of	7250na	9665na	15555na
			15595na			
0100	0200		Singapore, MediaCorp Radio	6150do		
0100	0200		Sri Lanka, SLBC	6005eu	9770eu	15745eu
0100	0200		Taiwan, Radio Taiwan Intl	11875as	15465as	
0100	0200		UK, BBC World Service	6195as	9410as	
			11955as	15280as	15310as	15360as
			17790as			
0100	0200	f	UK, Bible Voice	6140me		
0100	0200		Ukraine, Radio Ukraine Intl	5820na		
0100	0200		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
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	9885va	11705va	
			11725va			
0100	0200		USA, WBCQ Kennebunk ME	5110na	7415na	
			9330na			
0100	0200		USA, WBOH Newport NC	5920am		
0100	0200		USA, WEWN Birmingham AL	5810va	5835va	
0100	0200		USA, WHRA Greenbush ME	5850na		
0100	0200		USA, WHRI Cypress Creek SC	5875am	7490am	
			9515am			
0100	0200	sm	USA, WHRI Cypress Creek SC	7315am		
0100	0200		USA, WINB Red Lion PA	9265am		
0100	0200	twhfa	USA, WRMI Miami FL	7385am		
0100	0200	s	USA, WRMI Miami FL	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/Family R Okeechobee FL			6065va
			9505va	15195va		
0100	0200		Uzbekistan, Christian Vision	7355as		
0100	0200		Zambia, Christian Voice	4965af		
0103	0200		Iran, Voice of the Islamic Rep	7235am	9495am	
0105	0110		Pakistan, Radio	7445eu	9340eu	
0105	0130	sm	Austria, Radio Austria Intl	9870am		
0113	0130	twhf	Austria, Radio Austria Intl	9870am		
0115	0130	a	Austria, Radio Austria Intl	9870na		
0115	0130	twhf	Seychelles, FEBA	7365va		
0130	0200		Sweden, Radio	6010na	9435va	
0130	0200	twhfa	USA, Voice of America	7405am	13740am	
0133	0200	sm	Austria, Radio Austria Intl	9870na		
0140	0200		Vatican City, Vatican Radio	7335as	9650as	
0143	0158	twhfa	Austria, Radio Austria Intl	9870na		
0145	0200	w	Australia, HCJB	15405as		

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

0200	0215		Croatia, Croatian Radio	9925na		
0200	0227		Iran, Voice of the Islamic Rep	7235am	9495am	
0200	0230		Thailand, Radio	5890na		
0200	0245		USA, WYFR/Family R Okeechobee FL			11835va
0200	0300		Anguilla, University Network	6090am		
0200	0300	twhfa	Argentina, RAE	11710am		
0200	0300		Australia, ABC NT Alice Springs			2310do
			4835do			
0200	0300		Australia, ABC NT Katherine	5025do		
0200	0300		Australia, ABC NT Tennant Creek			4910do
0200	0300		Australia, CVC International	7355as		
0200	0300		Australia, Radio	9660pa	12080pa	13630pa
			13670pa	15240va	15415va	15515va
			17750as	21725va		
0200	0300		Bulgaria, Radio	9700na	11700na	
0200	0300		Canada, CFRX Toronto ON	6070na		
0200	0300		Canada, CFVP Calgary AB	6030na		
0200	0300		Canada, CKZN St John's NF	6160na		
0200	0300		Canada, CKZU Vancouver BC	6160na		
0200	0300		China, China Radio Intl	11870as	13640as	
0200	0300		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0200	0300		Cuba, Radio Havana	6000na	6060na	
			9820na			
0200	0300		Egypt, Radio Cairo	7270na		
0200	0300	s	Greece, Voice of	7475va	9420va	17520va
0200	0300		Guyana, Voice of	3291do		
0200	0300		Malaysia, RTM/Trax FM	7295as		
0200	0300	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0200	0300		New Zealand, Radio NZ Intl	13730pa		
0200	0300	DRM	New Zealand, Radio NZ Intl	15720pa		
0200	0300		North Korea, Voice of Korea	13650as	15100as	
0200	0300	vl	Papua New Guinea, Wantok R. Light			7120va
0200	0300		Philippines, Radio Pilipinas	11885va	15270va	
			17665va			
0200	0300		Russia, Voice of	9665na	9860na	15555na
			15595na			
0200	0300		Singapore, MediaCorp Radio	6150do		
0200	0300		South Korea, KBS World Radio			9560na
			11810sa	15575na		
0200	0300		UK, BBC World Service	6195me	11760me	
			11955as	15280as	15310as	15360as
			17790as			
0200	0300		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
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	7415na	
			9330na			
0200	0300		USA, WBOH Newport NC	5920am		
0200	0300		USA, WEWN Birmingham AL	5810va	5835va	
0200	0300		USA, WHRA Greenbush ME	5850na		
0200	0300	sm	USA, WHRI Cypress Creek SC	7315am		
0200	0300		USA, WHRI Cypress Creek SC	5875am	7490am	
			9515am			
0200	0300		USA, WINB Red Lion PA	9265am		
0200	0300	twhfa	USA, WRMI Miami FL	7385am		
0200	0300	twhfa	USA, WRMI Miami FL	7385am		
0200	0300		USA, WTJC Newport NC	9370na		
0200	0300		USA, WWCR Nashville TN	3215na	5070na	
			5935na	7465na		
0200	0300		USA, WWRB Manchester TN	3185na	5050na	
			5745na	6890na		
0200	0300		USA, WYFR/Family R Okeechobee FL			5985va
			6065va	9505va	11855va	
0200	0300		Uzbekistan, Christian Vision	7355as		
0200	0300		Zambia, Christian Voice	4965af		
0200	3000		Taiwan, Radio Taiwan Intl	5950na	9680na	
0215	0220		Vatican City, Vatican Radio	15560oc		
0215	0230		Nepal, Radio	3230as	5005as	6100as
			7165as			
0230	0258		Vietnam, Voice of	6175na		
0230	0300	twhfas	Albania, Radio Tirana	6115eu	7465eu	
0230	0300		Hungary, Radio Budapest	9795eu		
0230	0300		Sweden, Radio	6010na		
0245	0300		Myanmar, Radio	9730do		
0250	0300		Vatican City, Vatican Radio	7305am	9610am	

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

0300	0320		Vatican City, Vatican Radio	7305am	9610am	
0300	0327		Czech Rep, Radio Prague	7345na	9870na	
0300	0330	mtwhfa	Belarus, Radio	5970eu	6155eu	7210eu
0300	0330		Egypt, Radio Cairo	7270na		
0300	0330		Myanmar, Radio	9730do		
0300	0330		Philippines, Radio Pilipinas	11885va	15270va	
			17665va			
0300	0330		UK, BBC World Service	3255af	6005af	
			6035af	6190af	7160af	9750af
			12035af			
0300	0330		USA, KJES Vado NM	7555na		
0300	0330		USA, Voice of America	4930af	6080af	
			7340af	9885af	12080af	15580af
0300	0330		USA, WBCQ Kennebunk ME	5110na	7415na	
			9330na			
0300	0330		Vatican City, Vatican Radio	9660af		
0300	0355		South Africa, Channel Africa	5960af		
0300	0400		Anguilla, University Network	6090am		
0300	0400		Australia, ABC NT Alice Springs			2310do
			4835do			
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	12080pa	13630pa
			13670va	15240va	15415va	15515va
			17750as	21725va		
0300	0400	twhfas	Canada, CBC NQ SW Service	9625na		
0300	0400		Canada, CFRX Toronto ON	6070na		
0300	0400		Canada, CFVP Calgary AB	6030na		
0300	0400		Canada, CKZN St John's NF	6160na		
0300	0400		Canada, CKZU Vancouver BC	6160na		
0300	0400		China, China Radio Intl	9690na	9790na	
			11870as	15110as		
0300	0400		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0300	0400		Cuba, Radio Havana	6000na	6060na	
			9820na			
0300	0400		Guyana, Voice of	3291do		
0300	0400		Japan, Radio Japan/NHK World			21610oc
0300	0400		Malaysia, RTM/Trax FM	7295as		
0300	0400		Malaysia, Voice of	6175as	9750as	15295as
0300	0400	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0300	0400		New Zealand, Radio NZ Intl	13730pa		
0300	0400	DRM	New Zealand, Radio NZ Intl	15720pa		
0300	0400		North Korea, Voice of Korea	7140as	9345as	
			9730as			
0300	0400		Oman, Radio Oman	15355as		
0300	0400	vl	Papua New Guinea, Wantok R. Light			7120va
0300	0400		Russia, Voice of	5900na	9665na	9860na
			9890na	15425na	15455na	15555na
			15595na			
0300	0400	vl	Rwanda, Radio	6055do		
0300	0400		Singapore, MediaCorp Radio	6150do		
0300	0400		South Africa, Channel Africa	3345af		
0300	0400		Taiwan, Radio Taiwan Intl	5950va	15215va	
			15320va			
0300	0400		UK, BBC World Service	6195va	9410eu	
			11760me	15575me		
0300	0400		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
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, WBCQ Kennebunk ME	5110na	7415na	
0300	0400		USA, WBOH Newport NC	5920am		
0300	0400		USA, WEWN Birmingham AL	5810va	5835va	
0300	0400		USA, WHRA Greenbush ME	5850na		
0300	0400	twhfa	USA, WHRI Cypress Creek SC	5860am		
0300	0400	sm	USA, WHRI Cypress Creek SC	7520am		
0300	0400		USA, WHRI Cypress Creek SC	5875am	7315am	
0300	0400		USA, WINB Red Lion PA	9265am		
0300	0400	twhfa	USA, WRMI Miami FL	7385am		
0300	0400	sm	USA, WRMI Miami FL	9955am		
0300	0400		USA, WTJC Newport NC	9370na		
0300	0400		USA, WWCR Nashville TN	3215na	5070na	
			5765na	5935na		
0300	0400		USA, WWRB Manchester TN	3185na	5050na	
			5745na	6890na		
0300	0400		USA, WYFR/Family R Okeechobee FL			6065am
			9505am	11740am	15255am	
0300	0400		Uzbekistan, Christian Vision	13685as		
0300	0400		Zambia, Christian Voice	4965af		
0300	0400	vl	Zimbabwe, ZBC Corp	5975do		
0300	0500	vl/mtwhf	UK, Sudan Radio Service	7120af		
0330	0345		Israel, Kol Israel	7530va	9345va	17600va
0330	0357		Czech Rep, Radio Prague	5990am	9455va	
			11600va			
0330	0358		Vietnam, Voice of	6175am		
0330	0400	twhfas	Albania, Radio Tirana	6115eu	7465eu	
0330	0400	s	Belarus, Radio	5970eu	6155eu	7210eu
0330	0400		UK, BBC World Service	3255af	6005af	
			6035af	6190af	7160af	9750af
			12035af	15420af		
0330	0400		USA, Voice of America	4930af	6080af	
			9885af	12080af	15580af	
0330	0400	twhfa	USA, WBCQ Kennebunk ME	9330na		

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

0400	0427		Czech Rep, Radio Prague	6100na		
0400	0430	mtwhf	France, Radio France Intl	9805af	11700af	

0400	0430		USA, Voice of America	4930af	4960af	
			6080af	9575af	9885af	11835af
			12080af	15580af		
0400	0445		USA, WYFR/Family R Okeechobee FL	6065va		
			6855va	9505va		
0400	0456		Romania, Radio Romania Intl	9780va	11795na	
			15110va	17780va		
0400	0459		South Africa, Channel Africa	3345af		
0400	0500		Anguilla, University Network	6090am		
0400	0500		Australia, ABC NT Alice Springs		2310do	
			4835do			
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
			15240pa	15415va	15515va	21725va
0400	0500	twhfas	Canada, CBC NQ SW Service	9625na		
0400	0500		Canada, CFRX Toronto ON	6070na		
0400	0500		Canada, CKZN St John's NF	6160na		
0400	0500		Canada, CKZU Vancouver BC	6160na		
0400	0500		China, China Radio Intl	6020na	6080na	
			9560na	9755na	11750af	
0400	0500		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0400	0500		Cuba, Radio Havana	6000na	6060na	
			9820na			
0400	0500		Germany, Deutsche Welle	7225af	9630af	
			12045af	15445af		
0400	0500		Guyana, Voice of	3291do		
0400	0500		Malaysia, RTM/Trax FM	7295as		
0400	0500		Malaysia, Voice of	6175as	9750as	15295as
0400	0500	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0400	0500		Netherlands, Radio	6165am	9590va	
0400	0500		New Zealand, Radio NZ Intl	13730pa		
0400	0500	DRM	New Zealand, Radio NZ Intl	15720pa		
0400	0500		Nigeria, Radio/Kaduna	6090do		
0400	0500	vl	Papua New Guinea, Wantok R. Light		7120va	
0400	0500		Russia, Voice of	5900na	9665na	9860na
			15555na			
0400	0500	vl	Rwanda, Radio	6055do		
0400	0500		Singapore, MediaCorp Radio	6150do		
0400	0500		Turkey, Voice of	6020na	7240as	
0400	0500	vl	Uganda, Radio	4976do	5026do	7196do
0400	0500		UK, BBC World Service	3255af	6005af	
			6190af	6195eu	7120af	7160af
			9410va	11760me	12035af	15280as
			15310as	15360as	15420af	15575me
			17760as	17790as	21660as	
0400	0500	DRM	UK, BBC World Service	6010na		
0400	0500		Ukraine, Radio Ukraine Intl	5820na		
0400	0500		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
0400	0500		USA, KAIJ Dallas TX	5755na		
0400	0500		USA, KTBN Salt Lake City UT	7505na		
0400	0500		USA, KWHR Naalehu HI	17655as		
0400	0500		USA, WBCQ Kennebunk ME	5110na	7415na	
0400	0500		USA, WBOH Newport NC	5920am		
0400	0500		USA, WEWN Birmingham AL	5810va	5835va	
0400	0500		USA, WHRA Greenbush ME	5850na		
0400	0500	twhfa	USA, WHRI Cypress Creek SC	5860am		
0400	0500	sm	USA, WHRI Cypress Creek SC	7520am		
0400	0500		USA, WHRI Cypress Creek SC	5875am	7315am	
0400	0500	mtwhfa	USA, WMLK Bethel PA	9265eu		
0400	0500	a	USA, WRMI Miami FL	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/Family R Okeechobee FL		7780va	
			9715va			
0400	0500		Uzbekistan, Christian Vision	13685as		
0400	0500		Zambia, Christian Voice	4965af	6065af	
0400	0500	vl	Zimbabwe, ZBC Corp	5975do		
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	
			6080af	9575af	11835af	12080af
			15580af			
0445	0500		Italy, RAI Intl	6110af	6145af	7235af

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

0500	0507	twhfas	Canada, CBC NQ SW Service	9625na		
0500	0520		Vatican City, Vatican Radio	5885eu	7250eu	
			9645eu			
0500	0530	mtwhf	France, Radio France Intl	13680af	15160af	
0500	0530	vl	Rwanda, Radio	6055do		
0500	0530		UK, BBC World Service	6005af	6190af	
			6195eu	7160af	9410af	11765af
			11955as	15280as	15310as	15360as
			15420af	17640af	17760as	17790as
			17885af	21660as		
0500	0530		Vatican City, Vatican Radio	9660af	11625af	
			13765af			
0500	0555		South Africa, Channel Africa	9685af		
0500	0600		Anguilla, University Network	6090am		
0500	0600		Australia, ABC NT Alice Springs		2310do	
			4835do			
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	13670va
			15160va	15240va	15415va	15515va
			17750as			
0500	0600		Bhutan, BBS	6035as		
0500	0600		Canada, CFRX Toronto ON	6070na		
0500	0600		Canada, CKZN St John's NF	6160na		
0500	0600		Canada, CKZU Vancouver BC	6160na		
0500	0600		China, China Radio Intl	6020na	6190na	
			9560na	11710al	11880as	15350af
			15360as	15465as	17505as	17540as
0500	0600		Costa Rica, University Network	5030va	6150va	
			7375va	9725va		
0500	0600		Cuba, Radio Havana	6000va	6060va	
			9550va	9820va	11760va	
0500	0600		Germany, CVC The Voice Africa		9430af	
0500	0600		Germany, Deutsche Welle	9630af	9700af	
			15410af	17800af		
0500	0600		Guyana, Voice of	3291do		
0500	0600		Japan, Radio Japan/NHK World		5975eu	
			6110na	7230eu	15195as	17810as
			21755oc			
0500	0600		Malaysia, RTM/Trax FM	7295as		
0500	0600		Malaysia, Voice of	6175as	9750as	15295as
0500	0600	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0500	0600		New Zealand, Radio NZ Intl	13730pa		
0500	0600	DRM	New Zealand, Radio NZ Intl	15720pa		
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	15120af		
0500	0600	vl	Papua New Guinea, Wantok R. Light		7120va	
0500	0600		Russia, Voice of	17635oc	21790oc	
0500	0600		Singapore, MediaCorp Radio	6150do		
0500	0600		South Africa, Channel Africa	7240af		
0500	0600		Swaziland, TWR	3200af	4775af	9500af
0500	0600	vl	Uganda, Radio	4976do	5026do	7196do
0500	0600		UK, BBC World Service	11760me	15575me	
0500	0600	vl/ mtwhf	UK, Sudan Radio Service	9525af		
0500	0600		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
0500	0600		USA, KAIJ Dallas TX	5755na		
0500	0600		USA, KTBN Salt Lake City UT	7505na		
0500	0600		USA, KWHR Naalehu HI	11565as	13650as	
0500	0600		USA, Voice of America	4930af	6080af	
			6180af	12080af	15580af	
0500	0600		USA, WBCQ Kennebunk ME	5110na	7415na	
0500	0600		USA, WBOH Newport NC	5920am		
0500	0600		USA, WEWN Birmingham AL	5850va		
0500	0600		USA, WHRA Greenbush ME	6145na		
0500	0600	twhfa	USA, WHRI Cypress Creek SC	5860am	7465am	
0500	0600	sm	USA, WHRI Cypress Creek SC	7315am		
0500	0600	mtwhfa	USA, WMLK Bethel PA	9265eu		
0500	0600	asm	USA, WRMI Miami FL	9955am		
0500	0600		USA, WTJC Newport NC	9370na		
0500	0600		USA, WWCR Nashville TN	3215na	5070na	
			5765na	5935na		
0500	0600		USA, WWRB Manchester TN	3185na		
0500	0600		USA, WYFR/Family R Okeechobee FL		6855va	
			9355va			
0500	0600		Uzbekistan, Christian Vision	13685as		
0500	0600		Zambia, Christian Voice	4965af	6065af	
0500	0600	vl	Zimbabwe, ZBC Corp	5975do		
0505	0520	m	Austria, Radio Austria Intl	17870me		
0505	0530	as	Austria, Radio Austria Intl	17870me		
0515	0600		Germany, CVC The Voice Africa		9555af	
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915do	
0530	0600		Thailand, Radio	17655eu		
0530	0600		UK, BBC World Service	3255af	6005af	
			6190af	6195eu	7160af	9410af
			11765af	11955as	15310as	15360as
			15420af	17640af	17760as	21660as
0530	0600	mtwhf	UK, BBC World Service	17885af		
0530	0600	vl/ mtwhf	Vatican City, Vatican Radio	6185va		
0535	0600	as	Austria, Radio Austria Intl	17870me		
0545	0600	twhf	Austria, Radio Austria Intl	17870me		
0545	0600	vl	Rwanda, Radio	6055do		

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

0600	0615	as	South Africa, TWR	11640af		
0600	0630	mtwhf	France, Radio France Intl	15160af	17800af	

0600	0630		UK, BBC World Service	6005af	6190af	
			9410af	9530af	11765af	11940af
			12095af	17640af		
0600	0645	mtwhf	South Africa, TWR	11640af		
0600	0645	vl/ mtwhf	Vatican City, Vatican Radio	6185va		
0600	0655		South Africa, Channel Africa	15255af		
0600	0658		New Zealand, Radio NZ Intl	13730pa		
0600	0658	DRM	New Zealand, Radio NZ Intl	15720pa		
0600	0659		South Africa, Channel Africa	7240af		
0600	0700		Anguilla, University Network	6090am		
0600	0700		Australia, ABC NT Alice Springs			2310do
			4835do			
0600	0700		Australia, ABC NT Katherine	5025do		
0600	0700		Australia, ABC NT Tennant Creek			4910do
0600	0700		Australia, CVC International	15335as		
0600	0700		Australia, Radio	9660pa	12080pa	13670va
			15160va	15240va	15415va	15515va
			17750as			
0600	0700		Canada, CFRX Toronto ON	6070na		
0600	0700		Canada, CFVP Calgary AB	6030na		
0600	0700		Canada, CKZN St John's NF	6160na		
0600	0700		Canada, CKZU Vancouver BC	6160na		
0600	0700		China, China Radio Intl	11870as	11880as	
			13620as	15350as	15465as	17490eu
			17505as	17540as		
0600	0700		Costa Rica, University Network	5030va	6150va	
			7375va	9725va	11870va	
0600	0700		Cuba, Radio Havana	6000va	6060va	
			9550va	9820va	11760va	
0600	0700		Germany, CVC The Voice Africa			9555af
			15640af			
0600	0700		Germany, Deutsche Welle	6140eu	7170af	
			15275af	17860af		
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do	
0600	0700		Guyana, Voice of	3291do		
0600	0700		Japan, Radio Japan/NHK World			11715eu
			11740as	11760eu	13630va	15195as
			17870pa	21755oc		
0600	0700		Liberia, ELWA	4760do		
0600	0700		Malaysia, RTM/Trax FM	7295as		
0600	0700		Malaysia, Voice of	6175as	9750as	15295as
0600	0700	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0600	0700		Netherlands, Radio	9700pa		
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	15120af		
0600	0700	vl	Papua New Guinea, Wantok R. Light			7120va
0600	0700		Russia, Voice of	17635oc	21790oc	
0600	0700	irreg/ vl	Sierra Leone, SLBS	3316do		
0600	0700		Singapore, MediaCorp Radio	6150do		
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do	
0600	0700		Swaziland, TWR	3200af	4775af	9500af
0600	0700	as	UK, BBC World Service	17885af		
0600	0700		UK, BBC World Service	6195eu	9410eu	
			11955as	12095eu	15310as	15360as
			15565eu	15575me	17760as	17790as
			21660as			
0600	0700		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
0600	0700		USA, KAIJ Dallas TX	5755na		
0600	0700		USA, KTBN Salt Lake City UT	7505na		
0600	0700		USA, KWHR Naalehu HI	11565as	13650as	
0600	0700		USA, Voice of America	6080af	6180af	
			12080af	15580af		
0600	0700		USA, WBCQ Kennebunk ME	5110na	7415na	
0600	0700		USA, WBOH Newport NC	5920am		
0600	0700		USA, WEWN Birmingham AL	5850va	7570va	
0600	0700		USA, WHRA Greenbush ME	5860na		
0600	0700		USA, WHRI Cypress Creek SC	7315am	7465am	
0600	0700	mtwhfa	USA, WMLK Bethel PA	9265eu		
0600	0700	s	USA, WRMI Miami FL	9955am		
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/Family R Okeechobee FL			6000va
			7780va	9680va	11530va	11580
0600	0700		Uzbekistan, Christian Vision	13685as		
0600	0700	vl	Vanuatu, Radio	4960do		
0600	0700		Yemen, Rep of Yemen Radio	9780me		
0600	0700		Zambia, Christian Voice	6065af		
0600	0700	vl	Zimbabwe, ZBC Corp	5975do		
0630	0645		Vatican City, Vatican Radio	4005eu	5885eu	
			6185eu	7250eu	9645eu	11740eu
			15595va			
0630	0645		Vatican City, Vatican Radio	15595va		
0630	0656		Romania, Radio Romania Intl	9655va	11830va	
			15440va	17770va		
0630	0700		Bulgaria, Radio	9500eu	11500eu	
0630	0700		UK, BBC World Service	6005af	6190af	
			9410af	9530af	11765af	11940af
			11990af	12095af	17640af	
0630	0700		Vatican City, Vatican Radio	11625af	13765af	
			15570af	15595af		
0645	0700	s	Albania, TWR Europe	11865eu		
0645	0700	s	Monaco, TWR	9800eu		
0659	0700		New Zealand, Radio NZ Intl	6095pa		
0659	0700	DRM	New Zealand, Radio NZ Intl	7145pa		

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

0700	0715		UK, BBC World Service	6005af	6190af	
			11940af	11765af	15400af	15485af
			17640af	17830af		
0700	0727		Czech Rep, Radio Prague	9880eu	11600eu	
0700	0745		USA, WYFR/Family R Okeechobee FL			7780va
0700	0800	smtwhf	Albania, TWR Europe	11865eu		
0700	0800		Anguilla, University Network	6090am		
0700	0800		Australia, ABC NT Alice Springs			2310do
			4835do			
0700	0800		Australia, ABC NT Katherine	5025do		
0700	0800		Australia, ABC NT Tennant Creek			4910do
0700	0800		Australia, CVC International	15335as		
0700	0800		Australia, HCJB	11750as		
0700	0800		Australia, Radio	9660pa	9710pa	11750pa
			12080pa	13650pa	15160va	15240va
			15415va	17750as		
0700	0800		Canada, CFRX Toronto ON	6070na		
0700	0800		Canada, CFVP Calgary AB	6030na		
0700	0800		Canada, CKZN St John's NF	6160na		
0700	0800		Canada, CKZU Vancouver BC	6160na		
0700	0800		China, China Radio Intl	11880as	13710eu	
			15350as	15465as	17490eu	
0700	0800		Costa Rica, University Network	5030va	6150va	
			7375va	9725va	11870va	
0700	0800		France, Radio France Intl	17800af		
0700	0800	f	Germany, Bible Voice BC Network			6140me
0700	0800	s	Germany, Bible Voice BC Network			5945eu
0700	0800		Germany, CVC The Voice Africa			9555af
			15640af			
0700	0800		Germany, CVC The Voice Africa			9555af
			15640af			
0700	0800		Germany, Deutsche Welle	6140eu		
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do	
0700	0800		Guyana, Voice of	3291do	5950do	
0700	0800	as	Italy, IRRS	9310eu		
0700	0800		Liberia, ELWA	4760do		
0700	0800		Liberia, Star Radio	9525af		
0700	0800		Malaysia, RTM/Trax FM	7295as		
0700	0800		Malaysia, Voice of	6175as	9750as	15295as
0700	0800		Monaco, TWR	9800eu	11865eu	
0700	0800		Myanmar, Radio	9730do		
0700	0800	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
0700	0800		Netherlands, Radio	9700pa		
0700	0800		New Zealand, Radio NZ Intl	6095pa		
0700	0800	DRM	New Zealand, Radio NZ Intl	7145pa		
0700	0800		Nigeria, Radio/Ibadan	6050do		
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do	
0700	0800		Nigeria, Radio/Lagos	3326do	4990do	
0700	0800	vl	Papua New Guinea, Wantok R. Light			7120va
0700	0800		Russia, Voice of	17495oc	17635oc	21790oc
0700	0800	irreg/ vl	Sierra Leone, SLBS	3316do		
0700	0800		Singapore, MediaCorp Radio	6150do		
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do	
0700	0800		Swaziland, TWR	6120af	9500af	
0700	0800		Taiwan, Radio Taiwan Intl	5950na		
0700	0800		UK, BBC World Service	11955as	15310as	
			15575me	17760va	17790as	17885as
			21660as			
0700	0800	as	UK, Bible Voice	5945eu		
0700	0800		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
0700	0800		USA, KAIJ Dallas TX	5755na		
0700	0800		USA, KTBN Salt Lake City UT	7505na		
0700	0800		USA, KWHR Naalehu HI	11565as	13650as	
0700	0800		USA, WBCQ Kennebunk ME	5110na	7415na	
0700	0800		USA, WBOH Newport NC	5920am		
0700	0800		USA, WEWN Birmingham AL	5850va	7570va	
0700	0800		USA, WHRA Greenbush ME	5860na		
0700	0800		USA, WHRI Cypress Creek SC	7315am	7495am	
0700	0800	mtwhfa	USA, WMLK Bethel PA	9265eu		
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/Family R Okeechobee FL			5985va
			6855va	9505va	9715va	9930va
0700	0800	vl	Vanuatu, Radio	4960do		
0700	0800		Zambia, Christian Voice	6065af		
0715	0745	s	Monaco, TWR	9800eu	11865eu	
0715	0750	a	Albania, TWR Europe	11865eu		
0715	0750	a	Monaco, TWR	9800eu	11865eu	
0715	0800	f	UK, Bible Voice	5945eu		
0730	0800	as	Guam, TWR/KTWR	17665as		
0730	0800		Pakistan, Radio	15100eu	17835eu	

0730	0800		UK, BBC World Service	6190af	11765af		
			11940af	15400af	15485af	17640af	
			17830af				
0740	0800	mtwhf	Guam, TWR/KTWR	17665as			

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

0800	0815	f	Germany, Bible Voice BC Network			6140me	
0800	0820	smtwhf	Albania, TWR Europe	11865eu			
0800	0820		Monaco, TWR	9800eu	11865eu		
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		Pakistan, Radio	15100eu	17835eu		
0800	0830	f	UK, Bible Voice	5945eu			
0800	0830		Vatican City, Vatican Radio	9625na			
0800	0845	s	Germany, Bible Voice BC Network			5945eu	
0800	0845	as	UK, Bible Voice	5945eu			
0800	0845		USA, WYFR/Family R Okeechobee FL			5950va	
			9930va				
0800	0900		Anguilla, University Network	6090am			
0800	0900		Australia, ABC NT Alice Springs			2310do	
			4835do				
0800	0900		Australia, CVC International	15335as			
0800	0900		Australia, HCJB	11750as			
0800	0900		Australia, Radio	5995pa	9580pa	9590pa	
			9710pa	11750pa	12080pa	13630pa	
			15240va	15415va	17750as		
0800	0900		Bhutan, BBS	6035as			
0800	0900	DRM	Bulgaria, World Radio Network			13865	ei
0800	0900		Canada, CFRX Toronto ON	6070na			
0800	0900		Canada, CFVP Calgary AB	6030na			
0800	0900		Canada, CKZN St John's NF	6160na			
0800	0900		Canada, CKZU Vancouver BC	6160na			
0800	0900		China, China Radio Intl	11880as	13710eu		
			15350as	15465as	17490eu	17540as	
0800	0900		Costa Rica, University Network	5030va	6150va		
			7375va	9725va	11870va		
0800	0900		Germany, CVC The Voice Africa			9555af	
			15640af				
0800	0900		Germany, Deutsche Welle	6140eu			
0800	0900	DRM	Germany, Deutsche Welle	21820af			
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do		
0800	0900		Guam, TWR/KTWR	11840as	17665as		
0800	0900		Guyana, Voice of	3291do	5950do		
0800	0900		Indonesia, Voice of	9525as	11785pa		
			15150al				
0800	0900	as	Italy, IRRS	9310eu			
0800	0900		Liberia, Star Radio	9525af			
0800	0900		Malaysia, RTM/Trax FM	7295as			
0800	0900		Malaysia, Voice of	15295as			
0800	0900		New Zealand, Radio NZ Intl	6095pa			
0800	0900	DRM	New Zealand, Radio NZ Intl	7145pa			
0800	0900		Nigeria, Radio/Ibadan	6050do			
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do		
0800	0900		Nigeria, Radio/Lagos	3326do	4990do		
0800	0900		Papua New Guinea, Catholic Radio			4960do	
0800	0900		Papua New Guinea, NBC	4890do			
0800	0900	vl	Papua New Guinea, Wantok R. Light			7120va	
0800	0900		Russia, Voice of	17495oc	17635oc	21790oc	
0800	0900	DRM	Russia, Voice of	15780eu			
0800	0900	irreg/ vl	Sierra Leone, SLBS	3316do			
0800	0900		Singapore, MediaCorp Radio	6150do			
0800	0900	vl	Solomon Islands, SIBC	5020do	9545do		
0800	0900		South Korea, KBS World Radio			9570as	
			9640eu				
0800	0900		Swaziland, TWR	6120af	9500af		
0800	0900		Taiwan, Radio Taiwan Intl	9610as			
0800	0900		UK, BBC World Service	6190af	6195as		
			9740as	11760me	11940af	15310as	
			15360as	15400af	15485af	15575me	
			17640af	17760as	17790as	17830af	
			17885af	21470af	21660as		
0800	0900		USA, American Forces Radio	4319usb	5446usb		
			5765usb	6350usb	7812usb	10320usb	
			12133usb	12759usb	12579usb		
0800	0900		USA, KAIJ Dallas TX	5755na			
0800	0900		USA, KNLS Anchor Point AK	6150as			
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	5850va	7570va		
0800	0900		USA, WHRA Greenbush ME	5860na			
0800	0900		USA, WHRI Cypress Creek SC	7315am	7495am		
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/Family R Okeechobee FL			5985va	
			6855va				
0800	0900	vl	Vanuatu, Radio	4960do			
0800	0900		Zambia, Christian Voice	6065af			
0815	0900	as	Guam, TWR/KTWR	11840as			
0830	0900		Australia, ABC NT Katherine	2485do			
0830	0900		Australia, ABC NT Tennant Creek			2325do	
0845	0900	f	UK, Bible Voice	17595va			

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

0900	0900		USA, WBCQ Kennebunk ME	5110na	7415na		
0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do		
0900	0927		Czech Rep, Radio Prague	9955am	9880eu		
			21745va				
0900	0930	as	Guam, TWR/KTWR	11840as			
0900	0930		USA, WRMI Miami FL	9955am			
0900	1000		Anguilla, University Network	6090am			
0900	1000		Australia, ABC NT Alice Springs			2310do	
			4835do				
0900	1000		Australia, ABC NT Katherine	2485do			
0900	1000		Australia, ABC NT Tennant Creek			2325do	
0900	1000		Australia, CVC International	11955as			
0900	1000		Australia, Radio	9580pa	9590pa	11750pa	
			11880as	15240as	15415va		
0900	1000	DRM	Bulgaria, World Radio Network			13865eu	
0900	1000		Canada, CFRX Toronto ON	6070na			
0900	1000		Canada, CFVP Calgary AB	6030na			
0900	1000		Canada, CKZN St John's NF	6160na			
0900	1000		Canada, CKZU Vancouver BC	6160na			
0900	1000		China, China Radio Intl	15210oc	17490eu		
			17690oc				
0900	1000		Costa Rica, University Network	5030va	6150va		
			7375va	9725va	11870va	13750va	
0900	1000		Germany, CVC The Voice Africa			9555af	
0900	1000		Germany, Deutsche Welle	6140eu			
0900	1000	DRM	Germany, Deutsche Welle	21820af			
0900	1000		Guyana, Voice of	3291do	5950do		
0900	1000	as	Italy, IRRS	9310eu			
0900	1000		Malaysia, RTM/Trax FM	7295as			
0900	1000		Malaysia, Voice of	15295as			
0900	1000	vl	Namibia, Namibian BC Corp	3270do	3290do		
			6060do	6175do			
0900	1000		New Zealand, Radio NZ Intl	6095pa			
0900	1000	DRM	New Zealand, Radio NZ Intl	7145pa			
0900	1000		Nigeria, Radio/Ibadan	6050do			
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do		
0900	1000		Nigeria, Radio/Lagos	3326do	4990do		
0900	1000		Papua New Guinea, Catholic Radio			4960do	
0900	1000		Papua New Guinea, NBC	4890do			
0900	1000	vl	Papua New Guinea, Wantok R. Light			7120va	
0900	1000	vl	Rwanda, Radio	6055do			
0900	1000	irreg/ vl	Sierra Leone, SLBS	3316do			
0900	1000		Singapore, MediaCorp Radio	6150do			
0900	1000	vl	Solomon Islands, SIBC	5020do	9545do		
0900	1000		UK, BBC World Service	6190af	6195as		
			9605as	9740as	11940af	15310as	
			15360as	15400af	15485af	17640af	
			17760as	17830af	17885af	21470af	
0900	1000	f	UK, Bible Voice	17595va			
0900	1000		USA, American Forces Radio	4319usb	5446usb		
			5765usb	6350usb	7812usb	10320usb	
			12133usb	12759usb	12579usb		
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, WBCQ Kennebunk ME	5110na	7415na		
0900	1000		USA, WBOH Newport NC	5920am			
0900	1000		USA, WEWN Birmingham AL	5850na			
0900	1000		USA, WHRI Cypress Creek SC	7315am	7520am		
0900	1000		USA, WTJC Newport NC	9370na			
0900	1000		USA, WWCR Nashville TN	5070na	5765na		
			5935na	9985na			
0900	1000		USA, WWRB Manchester TN	3185na			
0900	1000		USA, WYFR/Family R Okeechobee FL			5985va	
			6885va	9755va			
0900	1000	vl	Vanuatu, Radio	4960do			
0900	1000		Zambia, Christian Voice	6065af			
0905	1000	s	Greece, Voice of	9420eu	12120eu	15630eu	
0930	0945		Israel, Kol Israel	13680eu	15760eu		

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

1000	1015	f	UK, Bible Voice	17595va			
1000	1015	as	USA, WRMI Miami FL	9955am			
1000	1025	DRM	Germany, Deutsche Welle	21820af			
1000	1030		Mongolia, Voice of	12085as			
1000	1030		UK, BBC World Service	6195as	9690as		
			9740as	15310as	15360as	17760as	
			17790as	21660as			
1000	1059		New Zealand, Radio NZ Intl	6095pa			
1000	1100		Anguilla, University Network	11775am			
1000	1100		Australia, ABC NT Alice Springs			2310do	
			4835do				
1000	1100		Australia, ABC NT Katherine	2485do			
1000	1100		Australia, ABC NT Tennant Creek			2325do	
1000	1100		Australia, CVC International	11955as			

1000	1100		Australia, HCJB	15400as	15540as	
1000	1100		Australia, Radio	9580pa	9590pa	11880as
			15240as	15400as	15415va	
1000	1100	DRM	Bulgaria, World Radio Network			13865eu
1000	1100		Canada, CFRX Toronto ON	6070na		
1000	1100		Canada, CFVP Calgary AB	6030na		
1000	1100		Canada, CKZN St John's NF	6160na		
1000	1100		Canada, CKZU Vancouver BC	6160na		
1000	1100		China, China Radio Intl	6040na	17490eu	
1000	1100		Costa Rica, University Network	5030va	6150va	
			7375va	9725va	11870va	13750va
1000	1100		Germany, CVC The Voice Africa			9555af
1000	1100		Guyana, Voice of	3291do	5950do	
1000	1100		India, All India Radio		13695oc	15020as
			15410as	17510as	17800as	17895oc
1000	1100	as	Italy, IRRS	9310eu		
1000	1100		Japan, Radio Japan/NHK World			6120na
			9695as	11730as	17585va	17720me
			21755oc			
1000	1100		Malaysia, RTM/Trax FM	7295as		
1000	1100		Malaysia, Voice of	15295as		
1000	1100		Netherlands, Radio		12065as	13710as
			13820as			
1000	1100	DRM	Netherlands, Radio	7240eu		
1000	1100	DRM	New Zealand, Radio NZ Intl	7145pa		
1000	1100		Nigeria, Voice of	15120af		
1000	1100		North Korea, Voice of Korea	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		South Africa, Channel Africa	9620af		
1000	1100		UK, BBC World Service	6190af	11940af	
			15485af	15575me		
1000	1100	as	UK, BBC World Service	15400af		
1000	1100		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
1000	1100		USA, KAIJ Dallas TX	5755na		
1000	1100		USA, KNLS Anchor Point AK	6150as		
1000	1100		USA, KTBN Salt Lake City UT	7505na		
1000	1100		USA, KWHR Naalehu HI	9930as	11565as	
1000	1100		USA, WBCQ Kennebunk ME	5110na	7415na	
1000	1100		USA, WBOH Newport NC	5920am		
1000	1100		USA, WEWN Birmingham AL	5850na		
1000	1100		USA, WHRI Cypress Creek SC	7520am	7555am	
1000	1100		USA, WINB Red Lion PA	9265am		
1000	1100		USA, WTJC Newport NC	9370na		
1000	1100		USA, WWCR Nashville TN	5070na	5765na	
			5935na	15825na		
1000	1100		USA, WWRB Manchester TN	3185na		
1000	1100		USA, WYFR/Family R Okeechobee FL			5950va
			5985va	6855va	9755va	
1000	1100		Zambia, Christian Voice	6065af		
1030	1045	mtwhf	Ethiopia, Radio	5990af	7110af	9704af
1030	1057		Czech Rep, Radio Prague	9880eu	11665va	
1030	1058		Vietnam, Voice of	7285as		
1030	1100		Iran, Voice of the Islamic Rep	15600as	17660as	
1030	1100		UK, BBC World Service	6195as	9740as	
			15310as	17760as	17790as	
1059	1100		New Zealand, Radio NZ Intl	9870pa		

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

1100	1127		Iran, Voice of the Islamic Rep	15600as	17600as	
1100	1128		Vietnam, Voice of	9840as	7220as	7285as
1100	1130		Australia, HCJB	15540as		
1100	1130		Australia, Radio	5995pa	9475va	9590va
			9580pa	9590pa	11880va	15240va
			15540as			
1100	1130		UK, BBC World Service	6190af	11940af	
			15400af	15485af	17640af	17830af
			17885af	21470af		
1100	1145		USA, WYFR/Family R Okeechobee FL			9550va
			9755va			
1100	1159	s	Germany, Universal Life	6055me		
1100	1200		Anguilla, University Network	11775am		
1100	1200		Australia, ABC NT Alice Springs			2310do
			4835do			
1100	1200		Australia, ABC NT Katherine	2485do		
1100	1200		Australia, ABC NT Tennant Creek			2325do
1100	1200		Australia, CVC International	13635as		
1100	1200	DRM	Bulgaria, World Radio Network			13865eu
1100	1200	as	Canada, CBC NQ SW Service	9625na		
1100	1200		Canada, CFRX Toronto ON	6070na		
1100	1200		Canada, CFVP Calgary AB	6030na		
1100	1200		Canada, CKZN St John's NF	6160na		
1100	1200		Canada, CKZU Vancouver BC	6160na		
1100	1200		China, China Radio Intl	6040na	11750na	
			13650eu	17490eu		
1100	1200		Costa Rica, University Network	5030va	6150va	
			7375va	9725va	11870va	13750va
1100	1200		Germany, CVC The Voice Africa			9555af
1100	1200	1st a	Germany, Overcomer Ministries			6110eu
1100	1200	as	Italy, IRRS	9310eu		
1100	1200		Japan, Radio Japan/NHK World			6120na
			9695as	11730as		
1100	1200	vl	Libya, Voice of Africa		17725af	21695af
1100	1200		Malaysia, RTM/Trax FM	7295as		
1100	1200		Malaysia, Voice of	15295as		
1100	1200		Netherlands, Radio		11675na	
1100	1200		New Zealand, Radio NZ Intl	9870pa		
1100	1200	DRM	New Zealand, Radio NZ Intl	7145pa		
1100	1200		Nigeria, Voice of	15120af		
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		South Africa, Channel Africa	9620af		
1100	1200		Taiwan, Radio Taiwan Intl	7445as		
1100	1200		UK, BBC World Service	6130sa	6195asas	
			9660va	9740as	11865va	15310as
			15575me	17760as	17790as	
1100	1200		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
1100	1200		USA, KAIJ Dallas TX	5755na		
1100	1200		USA, KTBN Salt Lake City UT	7505na		
1100	1200		USA, KWHR Naalehu HI	9930as	11565as	
1100	1200		USA, WBOH Newport NC	5920am		
1100	1200		USA, WEWN Birmingham AL	5850na		
1100	1200		USA, WHRI Cypress Creek SC	7520am	7555am	
1100	1200		USA, WINB Red Lion PA	9265am		
1100	1200		USA, WTJC Newport NC	9370na		
1100	1200		USA, WWCR Nashville TN	5070na	5935na	
			15825na			
1100	1200		USA, WWRB Manchester TN	3185na		
1100	1200		USA, WWRB Manchester TN	3185na		
1100	1200		USA, WYFR/Family R Okeechobee FL			5950va
			5985va	7780va	9625va	
1100	1200		Zambia, Christian Voice	6065af		
1115	1200	s	USA, WRMI Miami FL	9955am		
1130	1159	a	Germany, Universal Life	6055me		
1130	1200	mtwhfa	Australia, HCJB	15425as		
1130	1200		Australia, Radio	5995pa	9475va	9590va
			9580pa	9590pa	11880va	15425as
1130	1200		Bulgaria, Radio	11700eu	15700eu	
1130	1200		Guam, AWR/KSDA	15435as		
1130	1200		UK, BBC World Service	6190af	11940af	
			15485af	17640af	17830af	17885af
			21470af			
1130	1200		Vatican City, Vatican Radio	15595va	17515va	
1157	1200		Greece, Macedonias Radio	9935eu		

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

1200	1230		France, Radio France Intl		17815af	21620af
1200	1230		Malaysia, Voice of	15295as		
1200	1230		UAE, AWR Africa	15140as	15365as	
1200	1245		USA, WYFR/Family R Okeechobee FL			5950am
			5985am			
1200	1259		Canada, Radio Canada Intl	9660as	15170as	
1200	1259		New Zealand, Radio NZ Intl	9870pa		
1200	1259	DRM	New Zealand, Radio NZ Intl	7145pa		
1200	1259		Poland, Radio Polonia	9525eu	11850eu	
1200	1300		Anguilla, University Network	11775am		
1200	1300		Australia, ABC NT Alice Springs			2310do
			4835do			
1200	1300		Australia, ABC NT Katherine	2485do		
1200	1300		Australia, ABC NT Tennant Creek			2325do
1200	1300		Australia, CVC International	17860me		
1200	1300		Australia, Radio	5995pa	9475va	9590va
			9580pa	9590pa	11880va	
1200	1300	DRM	Bulgaria, World Radio Network			13865eu
1200	1300	as	Canada, CBC NQ SW Service	9625na		
1200	1300		Canada, CFRX Toronto ON	6070na		
1200	1300		Canada, CFVP Calgary AB	6030na		
1200	1300		Canada, CKZN St John's NF	6160na		
1200	1300		Canada, CKZU Vancouver BC	6160na		
1200	1300		China, China Radio Intl	9730as	9760oc	
			11760oc	11980as	13650eu	13790eu
			17490eu	17625af		
1200	1300		Costa Rica, University Network	9725va	11870va	
			13750va			
1200	1300		Germany, CVC International	13860eu	17830as	
1200	1300		Germany, CVC The Voice Africa			9555af
1200	1300		Germany, Overcomer Ministries			13810eu
1200	1300	f	Italy, IRRS	15750af		
1200	1300	vl	Libya, Voice of Africa		17670af	17675af
			17680af	21695af		
1200	1300		Malaysia, RTM/Trax FM	7295as		
1200	1300		Malaysia, Voice of	6175as		
1200	1300	DRM	Netherlands, Radio	7240eu		
1200	1300		Nigeria, Voice of	15120af		
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 6150as	6080as		
1200	1300		South Korea, KBS World Radio	9650na		
1200	1300		Taiwan, Radio Taiwan Intl	7130na		
1200	1300		UK, BBC World Service	6190af	6195as	
			9660va	9740va	9750af	11865va
			11940af	15310as	15485af	15575me
			17640af	17760as	17790as	17830af
			17885af	21470af		
1200	1300		Ukraine, Radio Ukraine Intl	9950eu		
1200	1300		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
1200	1300		USA, KAIJ Dallas TX	5755na		
1200	1300		USA, KNLS Anchor Point AK	6915as		
1200	1300		USA, KTBN Salt Lake City UT	7505na		
1200	1300		USA, KWHR Naalehu HI	11565as	12130as	
1200	1300		USA, Voice of America	6160va	9645va	
			9760va	11750va		
1200	1300		USA, WBOH Newport NC	5920am		
1200	1300		USA, WEWN Birmingham AL	5850na		
1200	1300		USA, WHRA Greenbush ME	15665na		
1200	1300		USA, WHRI Cypress Creek SC 12050am	9495am	9840am	
1200	1300		USA, WINB Red Lion PA	13570am		
1200	1300		USA, WTJC Newport NC	9370na		
1200	1300		USA, WWCR Nashville TN	7465na	9985na	
			13845na	15825na		
1200	1300		USA, WWRB Manchester TN	3185na		
1200	1300		USA, WYFR/Family R Okeechobee FL 17750am		17555am	
1200	1300		Zambia, Christian Voice	6065af		
1205	1220	m	Austria, Radio Austria Intl 17715as	6155eu	13730eu	
1205	1230	as	Austria, Radio Austria Intl 17715va	6155eu	13730eu	
1215	1230	twhf	Austria, Radio Austria Intl	17715va		
1215	1300		Egypt, Radio Cairo	17835as		
1230	1258		Vietnam, Voice of	9840as	12020as	
1230	1300		Bangladesh, Bangla Betar	7185as		
1230	1300		Sweden, Radio	13580va	15240na	15735va
1230	1300		Thailand, Radio	9835va		
1235	1300	as	Austria, Radio Austria Intl 17715va	6155eu	13730eu	
1245	1300	twh	Austria, Radio Austria Intl 17715va	6155eu	13730eu	
1255	1258		Finland, YLE/Radio Finland	13715do	15400do	
1259	1300		New Zealand, Radio NZ Intl	7145pa		
1259	1300	DRM	New Zealand, Radio NZ Intl	6095pa		

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

1300	1315	w	Australia, HCJB	15405as		
1300	1315	w	Australia, Radio	15435as		
1300	1327		Czech Rep, Radio Prague	13580as	17540na	
1300	1330		Australia, HCJB	15400as		
1300	1330		Australia, Radio	15400as		
1300	1330		Egypt, Radio Cairo	17835as		
1300	1330	DRM	Netherlands, Radio	7240eu		
1300	1350	s	Italy, IRRS	15750as		
1300	1356		Romania, Radio Romania Intl	11845eu	15105eu	
1300	1400		Anguilla, University Network	11775am		
1300	1400		Australia, CVC International	17860me		
1300	1400		Australia, Radio	5995pa	6020pa	9560pa
			9580pa	9590pa		
1300	1400	DRM	Bulgaria, World Radio Network		13865eu	
1300	1400	as	Canada, CBC NQ SW Service	9625na		
1300	1400		Canada, CFRX Toronto ON	6070na		
1300	1400		Canada, CFVP Calgary AB	6030na		
1300	1400		Canada, CKZN St John's NF	6160na		
1300	1400		Canada, CKZU Vancouver BC	6160na		
1300	1400		Canada, Radio Canada Intl 17800am	9515am	13655am	
1300	1400		China, China Radio Intl	9570na	9650pa	
			11760oc	11900oc	11980as	13790eu
			15260na	17490eu		
1300	1400		Costa Rica, University Network 13750va	9725va	11870va	
1300	1400		Germany, CVC International	13860eu	17830as	
1300	1400		Germany, CVC The Voice Africa		9555af	
1300	1400		Germany, Deutsche Welle	6140eu		
1300	1400		Germany, Overcomer Ministries		13810eu	
1300	1400		Jordan, Radio	11690na		
1300	1400	vl	Libya, Voice of Africa	17690af	17675af	
			17680af	21695af		
1300	1400		Malaysia, RTM/Trax FM	7295as		
1300	1400		Malaysia, Voice of	6175as		
1300	1400		New Zealand, Radio NZ Intl	7145pa		
1300	1400	DRM	New Zealand, Radio NZ Intl	6095pa		
1300	1400		Nigeria, Voice of	15120af		
1300	1400		North Korea, Voice of Korea	7570eu	9335na	
			11710na	12015eu	13760eu	15245eu
1300	1400		Papua New Guinea, Catholic Radio		4960do	
1300	1400		Papua New Guinea, NBC	4890do		
1300	1400	vl	Papua New Guinea, Wantok R. Light		7120va	
1300	1400		Singapore, Radio Singapore Intl 6150as		6080as	
1300	1400		South Korea, KBS World Radio 9770na		9570na	
1300	1400		UK, BBC World Service	6190af	6195as	
			9740as	11760me	11940af	12095eu
			15310as	15420af	15485af	15565eu
			15575me	17640va	17760as	17790as
			17830af	17885af	21470af	
1300	1400		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
1300	1400		USA, KAIJ Dallas TX	5755na		
1300	1400		USA, KTBN Salt Lake City UT	7505na		
1300	1400		USA, KWHR Naalehu HI	12130as		
1300	1400		USA, Voice of America	9645va	9760va	
1300	1400	w f	USA, WBCQ Kennebunk ME	9330na		
1300	1400		USA, WBOH Newport NC	5920am		
1300	1400		USA, WEWN Birmingham AL	5850na		
1300	1400		USA, WHRA Greenbush ME	15665na		
1300	1400		USA, WHRI Cypress Creek SC 12050am	9840am	11785am	
1300	1400		USA, WINB Red Lion PA	13570am		
1300	1400		USA, WTJC Newport NC	9370na		
1300	1400		USA, WWCR Nashville TN	7465na	9985na	
			13845na	15825na		
1300	1400		USA, WWRB Manchester TN	9385na		
1300	1400		USA, WYFR/Family R Okeechobee FL		9415eu	
			11520va	11560va	11830va	11865va
			11910va	17750va		
1300	1400		Zambia, Christian Voice	6065af		
1330	1400	s	Australia, HCJB	15435as		
1330	1400	s	Australia, Radio	15435as		
1330	1400	twhfa	Guam, AWR/KSDA	15275as		
1330	1400		Guam, TWR/KTWR	9585as		
1330	1400		India, All India Radio 13710as	9690as	11620as	
1330	1400		Laos, National Radio	7145as		
1330	1400		Sweden, Radio	15240na	15735va	
1330	1400		Turkey, Voice of	11735as	12035eu	

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

1400	1415		Russia, FEBA	9500as		
1400	1415		Seychelles, FEBA	9500va		
1400	1427		Czech Rep, Radio Prague	7385na		
1400	1430		Australia, Radio	5995pa	6080pa	7420va
			9590pa	11750as		
1400	1430	DRM	Canada, Radio Canada Intl	9815eu		
1400	1430		Thailand, Radio	9830va		
1400	1430		Turkey, Voice of	11735as	12035eu	
1400	1500		Anguilla, University Network	11775am		
1400	1500		Australia, CVC International	15795as		
1400	1500	DRM	Bulgaria, World Radio Network		11540eu	
1400	1500	as	Canada, CBC NQ SW Service	9625na		
1400	1500		Canada, CFRX Toronto ON	6070na		
1400	1500		Canada, CFVP Calgary AB	6030na		
1400	1500		Canada, CKZN St John's NF	6160na		
1400	1500		Canada, CKZU Vancouver BC	6160na		
1400	1500		Canada, Radio Canada Intl 17800am	9515am	13655am	
1400	1500		China, China Radio Intl	6100af	9560as	
			11675as	11765as	11775as	13685af
			13710na	13740na	13790na	17490eu
			17650eu			
1400	1500		Costa Rica, University Network 13750va	9725va	11870va	
1400	1500		France, Radio France Intl	21620as		
1400	1500	as	Germany, Bible Voice BC Network		15690as	
1400	1500		Germany, CVC International	13860eu	15795as	
1400	1500		Germany, CVC The Voice Africa		9555af	
1400	1500		Germany, Deutsche Welle	6140eu		
1400	1500		Germany, Overcomer Ministries		17810me	
1400	1500	a	Greece, Voice of	9420eu	15630eu	
1400	1500		Guam, TWR/KTWR	9975as		
1400	1500		India, All India Radio 13710as	9690as	11620as	
1400	1500	s	Italy, IRRS	9310eu		
1400	1500		Japan, Radio Japan/NHK World		7200as	
			11730as	11840oc		
1400	1500		Jordan, Radio	11690na		
1400	1500		Libya, Voice of Africa	17725af	17850af	
1400	1500		Malaysia, RTM/Trax FM	7295as		
1400	1500		Malaysia, Voice of	6175as		
1400	1500		Netherlands, Radio 11835as	9345as	9890as	
1400	1500		New Zealand, Radio NZ Intl	7145pa		
1400	1500	DRM	New Zealand, Radio NZ Intl	6095pa		
1400	1500		Nigeria, Voice of	15120af		
1400	1500		Oman, Radio Oman	15140as		
1400	1500	vl	Papua New Guinea, Wantok R. Light		7120va	

1400	1500		Russia, Voice of	6205as	7165as	7370as
			9745as	11755as	12055as	15605as
			17645as			
1400	1500		Singapore, MediaCorp Radio		6150do	
1400	1500		South Africa, Channel Africa		9620af	
1400	1500		Taiwan, Radio Taiwan Intl		15265as	
1400	1500		UK, BBC World Service		6190af	6195as
			9740as	11940af	15310as	12095eu
			15485va	15565eu	15575me	17640va
			17760as	17790as	17830af	21470af
			21660af			
1400	1500as		UK, Bible Voice	15690as		
1400	1500		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
1400	1500		USA, KAIJ Dallas TX		13815na	
1400	1500		USA, KJES Vado NM		11715na	
1400	1500		USA, KNLS Anchor Point AK		6150as	
1400	1500		USA, KTBN Salt Lake City UT		7505na	
1400	1500		USA, KWHR Naalehu HI		9930as	
1400	1500		USA, Voice of America		15490va	17730va
1400	1500		USA, WBCQ Kennebunk ME		9330na	
1400	1500		USA, WBOH Newport NC		5920am	
1400	1500		USA, WEWN Birmingham AL		9955na	
1400	1500		USA, WHRA Greenbush ME		17650na	
1400	1500		USA, WHRI Cypress Creek SC		9840am	11785am
			12050am			
1400	1500		USA, WINB Red Lion PA		13570am	
1400	1500		USA, WRMI Miami FL		7385am	
1400	1500		USA, WTJC Newport NC		9370na	
1400	1500		USA, WWCR Nashville TN		9985na	12160na
			13845na	15825na		
1400	1500		USA, WWRB Manchester TN		9385na	
1400	1500		USA, WYFR/Family R Okeechobee FL			9415eu
			11520va	11560va	11830va	11910va
			13695va	17750va		
1400	1500		Zambia, Christian Voice		6065af	
1415	1430		Nepal, Radio	3230as	5005as	6100as
			7165as			
1430	1459	s	UK, Bible Voice	12005as		
1430	1500		Australia, Radio	5995pa	6080pa	7420va
			9475pa	9590pa	11660va	11750va
1430	1500	DRM	South Korea, KBS World Radio			9770eu

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

1500	1510	mtwhfa	Turkmenistan, Turkmen Radio		5015eu	
1500	1528		Vietnam, Voice of	9550va	9840va	12020va
			13860va			
1500	1530	s	Hungary, Radio Budapest		6025eu	9690eu
1500	1530		Mongolia, Voice of	12015eu		
1500	1530		UK, BBC World Service		9695af	11690af
			11940af	15400af	15420af	15485af
			17640af	17830af	21470af	21660af
1500	1530	fs	UK, Bible Voice	13840as		
1500	1545		Germany, CVC The Voice Africa			9555af
			15715af			
1500	1545		Russia, FEBA	7320as		
1500	1545		Seychelles, FEBA	7320va		
1500	1545	a	UK, Bible Voice	15690as		
1500	1545		USA, WYFR/Family R Okeechobee FL			15770va
1500	1555		South Africa, Channel Africa		17770af	
1500	1557		Canada, Radio Canada Intl		11675as	15360as
			17720as			
1500	1557		China, China Radio Intl		6100af	7160as
			9800as	11965eu	13640eu	13685af
			13740na	17490eu		
1500	1559		Canada, Radio Canada Intl		9515as	13655as
			17800as			
1500	1559		South Africa, Channel Africa		9620af	
1500	1559	w	UK, Bible Voice	15680as		
1500	1600		Anguilla, University Network		11775am	
1500	1600		Australia, CVC International		15795as	
1500	1600		Australia, Radio	5995pa	6080pa	7420va
			9475pa	9590pa	11660va	11750va
1500	1600	DRM	Bulgaria, World Radio Network			11540eu
1500	1600	as	Canada, CBC NQ SW Service		9625na	
1500	1600		Canada, CFRX Toronto ON		6070na	
1500	1600		Canada, CFVP Calgary AB		6030na	
1500	1600		Canada, CKZN St John's NF		6160na	
1500	1600		Canada, CKZU Vancouver BC		6160na	
1500	1600		Costa Rica, University Network		9725va	11870va
			13750va			
1500	1600		France, Radio France Intl		17850af	
1500	1600	a	Germany, Bible Voice BC Network			15680as
1500	1600		Germany, CVC International		15795as	
1500	1600		Germany, Deutsche Welle		6140eu	
1500	1600		Germany, Overcomer Ministries			17810me
1500	1600		Japan, Radio Japan/NHK World			6190as
			7200as	9505va	11730as	
1500	1600		Jordan, Radio	11690na		
1500	1600		Libya, Voice of Africa		17725af	17850af
			21695af			
1500	1600		Malaysia, RTM/Trax FM		7295as	
1500	1600		Malaysia, Voice of		6175as	
1500	1600		Netherlands, Radio		9345as	9890as
			11835as			
1500	1600		New Zealand, Radio NZ Intl		7145pa	
1500	1600	DRM	New Zealand, Radio NZ Intl		6095pa	
1500	1600		North Korea, Voice of Korea		7570eu	9335na
			11710na	12015eu	13760eu	15245eu
1500	1600	vl	Papua New Guinea, Wantok R. Light			7120va
1500	1600		Russia, Voice of	4965me	4975me	7370eu
			9660as	7300eu	9810eu	
1500	1600		Singapore, MediaCorp Radio		6150do	
1500	1600		UK, BBC World Service		5975as	6195as
			9740as	11750as	12095eu	15310as
			15485eu	15565eu	17640va	17790as
1500	1600	vl/ mtwhf	UK, Sudan Radio Service		15575af	
1500	1600		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
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		6080af	7125va
			9590va	9760va	12040va	12150va
			13735va	13795va	15105va	15550va
			15580af	17895af		
1500	1600		USA, WBCQ Kennebunk ME		9330na	
1500	1600		USA, WBOH Newport NC		5920am	
1500	1600		USA, WEWN Birmingham AL		9955na	
1500	1600		USA, WHRA Greenbush ME		17650na	
1500	1600		USA, WHRI Cypress Creek SC		9840am	11785am
			13760am			
1500	1600		USA, WINB Red Lion PA		13570am	
1500	1600	smtwhf	USA, WMLK Bethel PA		9265eu	
1500	1600		USA, WRMI Miami FL		7385am	
1500	1600		USA, WTJC Newport NC		9370na	
1500	1600		USA, WWCR Nashville TN		9985na	12160na
			13845na	15825na		
1500	1600		USA, WWRB Manchester TN		9385na	11915na
1500	1600		USA, WYFR/Family R Okeechobee FL			6280va
			11830va	11910va	15750af	17750va
1500	1600		Zambia, Christian Voice		4965af	
1500	1600	f DRM	Taiwan, Radio Taiwan Intl		9770eu	
1505	1520	m	Austria, Radio Austria Intl		13775am	
1505	1530	as	Austria, Radio Austria Intl		13775am	
1515	1530	twhf	Austria, Radio Austria Intl		13775am	
1530	1559	smhf	UK, Bible Voice	15680as	13840al	
1530	1600		Bangladesh, Bangla Betar		4753as	
1530	1600	mh	Germany, Bible Voice BC Network			15680as
1530	1600	s	Germany, Bible Voice BC Network			13590me
1530	1600		Iran, Voice of the Islamic Rep		7370as	9635as
1530	1600		UAE, AWR Africa	15225as		
1530	1600		UK, BBC World Service		6190af	11940af
			15400af	15485af	17640af	17830af
			21470af	21660af		
1530	1600		Vatican City, Vatican Radio		12065va	13765va
			15235va			
1535	1600as		Austria, Radio Austria Intl		13755am	
1540	1600	mtwhf	Germany, Bible Voice BC Network			13590me
1540	1600	t	UK, Bible Voice	13590me		
1545	1600	mtwhf	Austria, Radio Austria Intl		13755am	
1545	1600	a	UK, Bible Voice	13590me		

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

1600	1615	mtwhf	Germany, Bible Voice BC Network			13590me
1600	1615		Pakistan, Radio	9380va	11570va	12105va
			15725va			
1600	1615	f	Seychelles, FEBA	9850va		
1600	1615		UK, BBC World Service		3255af	6190af
			12095af	15105af	15400af	15485af
			17830af	17885af	21470af	21660af
1600	1615	mwf	UK, Bible Voice	13590me		
1600	1620	mtwh	Moldova, Radio DMR Pridnestrovye			5965eu
1600	1627		Czech Rep, Radio Prague		5930eu	17485af
1600	1627		Iran, Voice of the Islamic Rep		7370as	9635as
1600	1628		Vietnam, Voice of	7280va	9550va	9730va
			11630va	13860va		
1600	1630		Guam, AWR/KSDA	11640as	11680as	
1600	1630		Jordan, Radio	11690na		
1600	1630		Myanmar, Radio	9730do		
1600	1640	f	Moldova, Radio DMR Pridnestrovye			5965eu
1600	1645	h	UK, Bible Voice	13590me		
1600	1645		USA, WYFR/Family R Okeechobee FL			11830va
			11865va	17750va		
1600	1700		Anguilla, University Network		11775am	
1600	1700		Australia, CVC International		15795as	
1600	1700		Australia, Radio	5995pa	6080pa	7240va
			9475pa	9710pa	11660as	
1600	1700	DRM	Bulgaria, World Radio Network			11540eu
1600	1700	a	Canada, CBC NQ SW Service		9625na	
1600	1700		Canada, CFRX Toronto ON		6070na	
1600	1700		Canada, CFVP Calgary AB		6030na	
1600	1700		Canada, CKZN St John's NF		6160na	

1600	1700		Canada, CKZU Vancouver BC	6160na			
1600	1700		China, China Radio Intl	6100af	9570af		
			11900af	11940eu	11865eu	13760eu	
			17490eu				
1600	1700		Costa Rica, University Network	11870va	13750va		
1600	1700		Egypt, Radio Cairo	11740af			
1600	1700		Ethiopia, Radio	5990af	7110af	7165af	
			9560af	9704af			
1600	1700		France, Radio France Intl	7170af	11615af		
			15160af	15605af	17605af		
1600	1700		Germany, CVC International	15795as			
1600	1700		Germany, CVC The Voice Africa		15715af		
1600	1700		Germany, Deutsche Welle	6170as	9485as		
			15705as				
1600	1700	f	Italy, IRRS	9310va			
1600	1700	s	Italy, IRRS	9310eu			
1600	1700		Malaysia, RTM/Trax FM	7295as			
1600	1700		Malaysia, Voice of	6175as			
1600	1700		New Zealand, Radio NZ Intl	7145pa			
1600	1700	DRM	New Zealand, Radio NZ Intl	6095pa			
1600	1700		North Korea, Voice of Korea	9990va	11545va		
1600	1700	vl	Papua New Guinea, Wantok R. Light		7120va		
1600	1700		Russia, Voice of	6070as	7370eu	9405as	
			11755as	11985af	12055va	12115as	
			15540me				
1600	1700		South Korea, KBS World Radio		5975va		
1600	1700		Swaziland, TWR	6130af			
1600	1700		Taiwan, Radio Taiwan Intl	11550as			
1600	1700		UK, BBC World Service	3915as	5975as		
			6195as	7160as	9510as	11955as	
			12095va	15485eu	15565eu	17790va	
1600	1700	ta	UK, Bible Voice	13590me			
1600	1700	vl/ mtwhf	UK, Sudan Radio Service	15575af			
1600	1700		USA, American Forces Radio	4319usb	5446usb		
			5765usb	6350usb	7812usb	10320usb	
			12133usb	12759usb	12579usb		
1600	1700		USA, KAIJ Dallas TX	13815na			
1600	1700		USA, KJES Vado NM	11715na			
1600	1700		USA, KTBN Salt Lake City UT	15590na			
1600	1700		USA, KWHR Naalehu HI	9930as			
1600	1700		USA, Voice of America	4930af	6080af		
			12080af	13600af	15580af	17895af	
1600	1700		USA, WBCQ Kennebunk ME	9330na			
1600	1700		USA, WBOH Newport NC	5920am			
1600	1700		USA, WEWN Birmingham AL	6890na			
1600	1700		USA, WHRA Greenbush ME	17640na			
1600	1700		USA, WHRI Cypress Creek SC	9840am	13760am		
			15285am				
1600	1700		USA, WINB Red Lion PA	13570am			
1600	1700	smtwhf	USA, WMLK Bethel PA	9265eu			
1600	1700		USA, WTJC Newport NC	9370na			
1600	1700		USA, WWCR Nashville TN	9985na	12160na		
			13845na	15825na			
1600	1700		USA, WWRB Manchester TN	9385na	11915na		
1600	1700		USA, WYFR/Family R Okeechobee FL		6085va		
			13695va	18980va	21455va		
1600	1700		Zambia, Christian Voice	4965af			
1615	1630		Vatican City, Vatican Radio	4005eu	5885eu		
			7250eu	9645eu	15595va		
1615	1700		UK, BBC World Service	3255af	6190af		
			12095af	15105af	15420af	15485af	
			17830af	17885af	21470af	21660af	
1615	1700	as	UK, BBC World Service	9695af	11690af		
1615	1700	mwf	UK, Bible Voice	9430me			
1630	1700	as	Germany, Bible Voice BC Network		9430me		
1630	1700		Guam, AWR/KSDA	11975as			
1630	1700	mtwf	UK, Bible Voice	13580me			
1630	1700	as	UK, Bible Voice	9430me			
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio	4930eu			

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

1700	1715	t	UK, Bible Voice	13580me			
1700	1727		Czech Rep, Radio Prague	5930va	17485va		
1700	1730		France, Radio France Intl	15605af	17605af		
1700	1735	mwf	UK, Bible Voice	9430me	13580al		
1700	1740		Moldova, Radio DMR Pridnestrovye		6205eu		
1700	1745		UK, BBC World Service	3255af	6005af		
			6190af	9630af	9740as	11945af	
			12095va	15105af	15400af		
			17830af	17885af	21470af		
1700	1750		New Zealand, Radio NZ Intl	7145pa			
1700	1750	DRM	New Zealand, Radio NZ Intl	6095pa			
1700	1755		South Africa, Channel Africa	15235af			
1700	1759		Poland, Radio Polonia	7220eu	7265eu		
1700	1759	as	UK, Bible Voice	9430me			
1700	1800		Anguilla, University Network	11775am			
1700	1800		Australia, CVC International	13635as			
1700	1800		Australia, Radio	5995pa	6080pa	9475va	
			9580pa	9710pa	11880pa		
1700	1800	DRM	Bulgaria, World Radio Network		11540eu		
1700	1800	a	Canada, CBC NQ SW Service	9625na			
1700	1800		Canada, CFRX Toronto ON	6070na			
1700	1800		Canada, CFVP Calgary AB	6030na			
1700	1800		Canada, CKZN St John's NF	6160na			
1700	1800		Canada, CKZU Vancouver BC	6160na			
1700	1800		China, China Radio Intl	9570af	9600eu		
			11900af	11940eu	13760eu		
1700	1800		Costa Rica, University Network	11870va	13750va		
1700	1800		Egypt, Radio Cairo	11740af			
1700	1800	as	Germany, Bible Voice BC Network		13590me		
1700	1800		Germany, CVC The Voice Africa		15715af		
1700	1800	f	Italy, IRRS	9310va			
1700	1800	s	Italy, IRRS	9310va			
1700	1800		Japan, Radio Japan/NHK World		9535na		
			11970eu	15355af			
1700	1800	DRM	Japan, Radio Japan/NHK World		9770eu		
1700	1800		Japan, Radio Japan/NHK World		9535va		
			11970eu	15355af			
1700	1800		Malaysia, RTM/Trax FM	7295as			
1700	1800		Malaysia, Voice of	6175as			
1700	1800		Nigeria, Voice of	15120af			
1700	1800	vl	Papua New Guinea, Wantok R. Light		7120va		
1700	1800		Russia, Voice of	7370eu	9405as	9890eu	
			11510af	11985af			
1700	1800	as	Russia, Voice of	7390eu	11675eu		
1700	1800		Swaziland, TWR	3200af			
1700	1800		Taiwan, Radio Taiwan Intl	15690va			
1700	1800		UK, BBC World Service	3915as	5975as		
			6195eu	7160as	9410eu	9510as	
			11955as	15485va	15565eu		
1700	1800	vl/ mtwhf	UK, Sudan Radio Service	11705af			
1700	1800		USA, American Forces Radio	4319usb	5446usb		
			5765usb	6350usb	7812usb	10320usb	
			12133usb	12759usb	12579usb		
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	as	USA, Voice of America	4930af			
1700	1800		USA, Voice of America	6080af	15410af		
			15580af				
1700	1800		USA, WBCQ Kennebunk ME	9330na	18910na		
1700	1800		USA, WBOH Newport NC	5920am			
1700	1800		USA, WEWN Birmingham AL	6890va	15220va		
1700	1800		USA, WHRA Greenbush ME	17640na			
1700	1800		USA, WHRI Cypress Creek SC	13760am	15285am		
			15665am	15785am			
1700	1800		USA, WINB Red Lion PA	13570am			
1700	1800	smtwhf	USA, WMLK Bethel PA	9265eu			
1700	1800		USA, WTJC Newport NC	9370na			
1700	1800		USA, WWCR Nashville TN	12160na	13845na		
			15825na				
1700	1800		USA, WWRB Manchester TN	9385na	11915na		
			15250na				
1700	1800		USA, WYFR/Family R Okeechobee FL		13690va		
			17795va	va	18980va	21455va	
1700	1800		Zambia, Christian Voice	4965af			
1730	1745		Israel, Kol Israel	9345va	11590va	13675va	
1730	1745	mtwhf	UK, United Nations Radio	7170af	15495me		
			17810af				
1730	1800		Bulgaria, Radio	9500eu	11500eu		
1730	1800		Guam, AWR/KSDA	9385as			
1730	1800		Liberia, ELWA	4760do			
1730	1800		Philippines, Radio Pilipinas	11720va	15190va		
			17720va				
1730	1800		Swaziland, TWR	9500af			
1730	1800		Sweden, Radio	6065va			
1730	1800		Vatican City, Vatican Radio	11625af	13765af		
			15570af				
1745	1800		Bangladesh, Bangla Betar	7185eu			
1745	1800		India, All India Radio	7410eu	9445af		
			9950eu	11620eu	11935af	13605af	
			15075af	15155af	17670af		
1745	1800		UK, BBC World Service	3255af	6190af		
			11945af	12095af	15105af	15400af	
			15485af	17830af	17885af	21470af	
1751	1800		New Zealand, Radio NZ Intl	9630pa			
1751	1800	DRM	New Zealand, Radio NZ Intl	9440pa			

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

1800	1815		Bangladesh, Bangla Betar	7185eu			
1800	1815	t	UK, Bible Voice	13590me			
1800	1828		Vietnam, Voice of	5955eu	7280va	9730va	
1800	1830		Austria, AWR Europe	15315af			
1800	1830		South Africa, AWR Africa	3215af	3345af		
			9610af				
1800	1830		UK, BBC World Service	3255af	5975as		
			6190af	9510as	11945af	12095af	
			15400af				
1800	1830	as	UK, Bible Voice	13590me	13810al		
1800	1830	whf	UK, Bible Voice	11710me			
1800	1830		USA, Voice of America	6080af	15410af		
			15580af	17895af			
1800	1830	as	USA, Voice of America	4930af			
1800	1845		USA, WYFR/Family R Okeechobee FL		17535va		
1800	1850	DRM	New Zealand, Radio NZ Intl	9440pa			
1800	1850		New Zealand, Radio NZ Intl	9630pa			

1800	1850	DRM	New Zealand, Radio NZ Intl	9440pa		
1800	1856		Romania, Radio Romania Intl	9635eu	11730eu	
1800	1859		Canada, Radio Canada Intl	9530af	11765af	
			13730af	15255af		
1800	1900		Anguilla, University Network	11775am		
1800	1900	mtwhf	Argentina, RAE	9690eu	15345eu	
1800	1900		Australia, Radio	6080pa	7240pa	9475va
			9580pa	9710pa	11880pa	
1800	1900	DRM	Bulgaria, World Radio Network		9310eu	
1800	1900		Canada, CFRX Toronto ON	6070na		
1800	1900		Canada, CFVP Calgary AB	6030na		
1800	1900		Canada, CKZN St John's NF	6160na		
1800	1900		Canada, CKZU Vancouver BC	6160na		
1800	1900		China, China Radio Intl	9600eu	11940eu	
			13760eu			
1800	1900		Costa Rica, University Network	11870va	13750va	
1800	1900	fas	Germany, Bible Voice BC Network		9430me	
1800	1900		Germany, CVC The Voice Africa		13820af	
1800	1900		Germany, Overcomer Ministries		13855af	
1800	1900		India, All India Radio	7410eu	9445af	
			9950eu	11620eu	11935af	13605af
			15075af	15155af	17670af	
1800	1900		Italy, IRRS	9310va		
1800	1900		Liberia, ELWA	4760do		
1800	1900		Malaysia, RTM/Trax FM	7295as		
1800	1900		Malaysia, Voice of	6175as		
1800	1900		Netherlands, Radio	6020af	7120af	
			11655af			
1800	1900		North Korea, Voice of Korea	7570eu	12015eu	
			13760eu	15245eu		
1800	1900	vl	Papua New Guinea, Wantok R. Light		7120va	
1800	1900		Philippines, Radio Pilipinas	11720va	15190va	
			17720va			
1800	1900		Russia, Voice of	7300eu	9430af	9745af
			9820eu	9890eu	11510af	
1800	1900		Swaziland, TWR	3200af	9500af	
1800	1900		Taiwan, Radio Taiwan Intl		3965eu	
1800	1900		UK, BBC World Service		6195eu	9410eu
			12095eu			
1800	1900	as	UK, Bible Voice	6015eu	11710al	
1800	1900		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
1800	1900		USA, KAIJ Dallas TX		13815na	
1800	1900		USA, KTBN Salt Lake City UT		15590na	
1800	1900	smtwhf	USA, WBCQ Kennebunk ME		7415na	
1800	1900		USA, WBCQ Kennebunk ME		9330na	18910na
1800	1900		USA, WBOH Newport NC		5920am	
1800	1900		USA, WEWN Birmingham AL		6890va	15220va
1800	1900		USA, WHRA Greenbush ME		17640na	
1800	1900		USA, WHRI Cypress Creek SC		13760am	15285am
			15665am	15785am		
1800	1900		USA, WINB Red Lion PA		13570am	
1800	1900	smtwhf	USA, WMLK Bethel PA		9265eu	
1800	1900		USA, WTJC Newport NC		9370na	
1800	1900		USA, WWCR Nashville TN		9975na	12160na
			13845na	15825na		
1800	1900		USA, WWRB Manchester TN		9385na	11915na
			15250na			
1800	1900		USA, WYFR/Family R Okeechobee FL		7240va	
			13690va	13800af	15750va	17795va
			18980va			
1800	1900		Yemen, Rep of Yemen Radio		9780me	
1800	1900		Zambia, Christian Voice		4965af	
1815	1900		Bangladesh, Bangla Betar		7185eu	
1830	1900		UK, BBC World Service		3255af	6005af
			6190af	9630af	11945af	12045me
			12095af	15400af	17795af	17830af
			21470af			
1830	1900		USA, Voice of America		4930af	6080af
			15410af	15580af	17895af	
1845	1900		Congo, RTV Congolaise		4765af	5985af
1851	1900		New Zealand, Radio NZ Intl		13730pa	
1851	1900	DRM	New Zealand, Radio NZ Intl		15720pa	

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

1900	1915		Congo, RTV Congolaise		4765af	5985af
1900	1925		Israel, Kol Israel	9400va	11590va	15640af
1900	1928		Vietnam, Voice of	7280va	9730va	
1900	1929	s	Germany, Universal Life		11880me	
1900	1930		Hungary, Radio Budapest		3975eu	6025eu
1900	1930		Lithuania, Radio Vilnius		9710eu	
1900	1930		Philippines, Radio Pilipinas		11720va	15190va
			17720va			
1900	1930	as	UK, Bible Voice	6015eu	9775al	
1900	1945		India, All India Radio		7410eu	9445af
			9950eu	11620eu	11935af	13605af
			15075af	15155af	17670af	
1900	1945		USA, WYFR/Family R Okeechobee FL		6085va	
1900	2000		Anguilla, University Network		11775am	
1900	2000		Australia, Radio	6080pa	7240pa	9500as
			9580pa	9710pa	11880pa	
1900	2000	DRM	Bulgaria, World Radio Network		9310eu	
1900	2000		Canada, CFRX Toronto ON	6070na		
1900	2000		Canada, CFVP Calgary AB	6030na		
1900	2000		Canada, CKZN St John's NF	6160na		
1900	2000		Canada, CKZU Vancouver BC	6160na		
1900	2000		China, China Radio Intl	7295af	9440va	
			11940eu			
1900	2000		Costa Rica, University Network	11870va	13750va	
1900	2000		Eqt Guinea, Radio Africa	15190af		
1900	2000		Germany, CVC The Voice Africa		13820af	
1900	2000		Germany, Deutsche Welle	13780af	15620af	
1900	2000		Germany, Overcomer Ministries		13855af	
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do	
1900	2000		Italy, IRRS	5775eu		
1900	2000		Liberia, ELWA	4760do		
1900	2000		Malaysia, RTM/Trax FM	7295as		
1900	2000	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
1900	2000		Netherlands, Radio	5905af	7120af	
			11655af	17810af		
1900	2000	as	Netherlands, Radio	15315na	17735na	
			17660na			
1900	2000		New Zealand, Radio NZ Intl	13730pa		
1900	2000	DRM	New Zealand, Radio NZ Intl	15720pa		
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	15120af		
1900	2000		North Korea, Voice of Korea	3560va	7100af	
			11535 9975	11535va	11910af	
1900	2000		Papua New Guinea, Catholic Radio		4960do	
1900	2000		Papua New Guinea, NBC	4890do		
1900	2000	vl	Papua New Guinea, Wantok R. Light		7120va	
1900	2000		Russia, Voice of	7310eu	9890eu	12070eu
1900	2000	irreg/ vl	Sierra Leone, SLBS	3316do		
1900	2000	vl	Solomon Islands, SIBC	5020do	9545do	
1900	2000		South Korea, KBS World Radio		5975va	
			7275eu			
1900	2000	a	Sri Lanka, SLBC	6010eu		
1900	2000		Swaziland, TWR	3200af		
1900	2000		Thailand, Radio	7155eu		
1900	2000	vl	Uganda, Radio	4976do	5026do	7196do
1900	2000		UK, BBC World Service	3255af	6005af	
			6190af	6195eu	9410eu	9630af
			12045me	12095af	15400af	17795af
			17830af			
1900	2000		UK, Bible Voice	9405af		
1900	2000		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
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	4940af
			6040me	6080af	9670me	15410af
			15445af	15580af	17895af	
1900	2000		USA, WBCQ Kennebunk ME	7415na	9330na	
			18910na			
1900	2000		USA, WBOH Newport NC		5920am	
1900	2000		USA, WEWN Birmingham AL		6890va	15220va
1900	2000		USA, WHRA Greenbush ME		13710na	
1900	2000		USA, WHRI Cypress Creek SC		13760am	15285am
			15665am	15785am		
1900	2000		USA, WINB Red Lion PA		13570am	
1900	2000		USA, WTJC Newport NC		9370na	
1900	2000		USA, WWCR Nashville TN		9975na	12160na
			13845na	15825na		
1900	2000		USA, WWRB Manchester TN		9385na	11915na
			15250na			
1900	2000		USA, WYFR/Family R Okeechobee FL		3230va	
			7370va	13800va	17795va	17845va
			18930va	18980va		
1900	2000		Zambia, Christian Voice		4965af	
1900	2000	vl	Zimbabwe, ZBC Corp		5975do	
1930	2000	as	Germany, Bible Voice BC Network		9775af	
1930	2000		Iran, Voice of the Islamic Rep	6205eu	7205eu	
			7540af	9800af	9925af	
1930	2000		Sweden, Radio	6065va		
1930	2000		Turkey, Voice of	6055eu		
1930	2000	s	UK, Bible Voice	9775af		
1935	1955		Italy, RAI Intl	5960eu	9485eu	
1945	2000	mtwhfa	Albania, Radio Tirana		6130eu	7465eu
1945	2000	vl	Rwanda, Radio	6055do		
1950	2000		Vatican City, Vatican Radio	4005eu	5885eu	
			7250eu	9645eu		

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

2000	2020		Vatican City, Vatican Radio	4005eu	5885eu	
			7250eu	9645eu		
2000	2027		Czech Rep, Radio Prague	5930va	11600va	
2000	2027		Iran, Voice of the Islamic Rep	6205eu	7205eu	
			7540af	9800af	9925af	
2000	2030	mtwh	Italy, IRRS	5775eu		
2000	2030		Mongolia, Voice of	12015eu		

2000	2030		South Africa, AWR Africa	7180af		
2000	2030		Swaziland, TWR	3200af		
2000	2030		Turkey, Voice of	6055eu		
2000	2030	h	UK, Bible Voice	9605va		
2000	2030		USA, Voice of America	4930af	4940af	
			6080af	15410af	15445af	15580af
2000	2030		Vatican City, Vatican Radio	9755af	11625af	
			13765af			
2000	2045		USA, WYFR/Family R Okeechobee FL		13690va	
			17750va			
2000	2059		Canada, Radio Canada Intl	5850eu	7235eu	
			11765eu			
2000	2059	mtwhf	Spain, Radio Exterior Espana	9595af	15290eu	
2000	2100		Anguilla, University Network	11775am		
2000	2100		Australia, ABC NT Alice Springs		2310do	
			4835do			
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	DRM	Bulgaria, World Radio Network		9310eu	
2000	2100		Canada, CFRX Toronto ON	6070na		
2000	2100		Canada, CFVP Calgary AB	6030na		
2000	2100		Canada, CKZN St John's NF	6160na		
2000	2100		Canada, CKZU Vancouver BC	6160na		
2000	2100		Canada, Radio Canada Intl	15325am	17765am	
2000	2100		China, China Radio Intl	7295as	9440va	
			9800eu	11640af	11790eu	13630af
2000	2100		Costa Rica, University Network		13750va	
2000	2100		Egypt, Radio Cairo	15375af		
2000	2100		Eqt Guinea, Radio Africa	15190af		
2000	2100		Germany, CVC The Voice Africa		9765af	
2000	2100		Germany, Deutsche Welle	7130af	11795af	
			13780af	15205af		
2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do	
2000	2100		Indonesia, Voice of	9525as	11785pa	
			15150al			
2000	2100	fas	Italy, IRRS	5775eu		
2000	2100		Liberia, ELWA	4760do		
2000	2100		Malaysia, RTM/Trax FM	7295as		
2000	2100	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
2000	2100	as	Netherlands, Radio	15315af	17735na	
			17660af			
2000	2100		Netherlands, Radio	5905af	7120af	
			11665af	17810af		
2000	2100		New Zealand, Radio NZ Intl	13730pa		
2000	2100	DRM	New Zealand, Radio NZ Intl	15720pa		
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	15120af		
2000	2100		Papua New Guinea, Catholic Radio		4960do	
2000	2100		Papua New Guinea, NBC	4890do		
2000	2100	vl	Papua New Guinea, Wantok R. Light		7120va	
2000	2100		Russia, Voice of	7310eu	9890eu	15735sa
2000	2100	vl	Solomon Islands, SIBC	5020do	9545do	
2000	2100		South Africa, Channel Africa	3345af		
2000	2100	vl	Uganda, Radio	4976do	5026do	7196do
2000	2100		UK, BBC World Service	3255af	6005af	
			6190af	6195eu	9410eu	9630af
			12095af	15400af	17830af	
2000	2100		UK, Bible Voice	9405af		
2000	2100		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
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	6890va	15220va	
2000	2100		USA, WHRA Greenbush ME	13710na		
2000	2100		USA, WHRI Cypress Creek SC	9840am	13760am	
			15285am			
2000	2100		USA, WINB Red Lion PA	13570am		
2000	2100		USA, WTJC Newport NC	9370na		
2000	2100		USA, WWCR Nashville TN	9975na	12160na	
			13845na	15825na		
2000	2100		USA, WWRB Manchester TN	9385na	11915na	
			15250na			
2000	2100		USA, WYFR/Family R Okeechobee FL		3230va	
			13800va	17725va	17795va	17845va
			18980va			
2000	2100		Zambia, Christian Voice	4965af		
2000	2100	vl	Zimbabwe, ZBC Corp	5975do		
2005	2100		Syria, Radio Damascus	9330eu	12085eu	
			13610al			
2025	2045		Italy, RAI Intl	5970af	11875af	
2030	2045		Thailand, Radio	9680eu		
2030	2058		Vietnam, Voice of	7280va	9550va	9730va
			13860va			
2030	2100	mthf	Belarus, Radio	7125eu	7340eu	7440eu
2030	2100		Cuba, Radio Havana	9505va	11760va	
2030	2100		USA, Voice of America	4930af	6080af	
			7555af	15410af	15445af	15580af
2030	2100	as	USA, Voice of America	4940af		
2045	2100		India, All India Radio	7410eu	9445eu	
			9910oc	9950eu	11620va	11715oc
2055	2100	DRM	Vatican City, Vatican Radio	9800na		

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

2100	2123		Serbia, International Radio Serbia		6185eu	
2100	2130	mtwhfa	Albania, Radio Tirana	7530eu		
2100	2130		Australia, ABC NT Katherine	2485do		
2100	2130		Australia, ABC NT Tennant Creek		2325do	
2100	2130		Austria, AWR Europe	11955af		
2100	2130	a	Canada, CBC NQ SW Service	9625na		
2100	2130		China, China Radio Intl	11640af	13630af	
2100	2130		Cuba, Radio Havana	9505va	11760va	
2100	2130		Egypt, Radio Cairo	15375af		
2100	2130		Hungary, Radio Budapest	6025eu	9525eu	
2100	2130		South Korea, KBS World Radio		3955eu	
2100	2130		UK, BBC World Service	11675va	15390va	
2100	2130	DRM	Vatican City, Vatican Radio	9800na		
2100	2145		Nigeria, Radio/Ibadan	6050do		
2100	2145		USA, WYFR/Family R Okeechobee FL		13690va	
			13800va	17795va	18980va	
2100	2159		Canada, Radio Canada Intl	9800na	17765na	
2100	2159	as	Spain, Radio Exterior Espana	9595af	9840eu	
2100	2200		Anguilla, University Network	11775am		
2100	2200		Australia, ABC NT Alice Springs		2310do	
			4835do			
2100	2200		Australia, Radio	7240pa	9660pa	11650pa
			11660pa	11695pa	12080pa	13630pa
2100	2200		Bulgaria, Radio	5800eu	7500eu	
2100	2200		Canada, CFRX Toronto ON	6070na		
2100	2200		Canada, CFVP Calgary AB	6030na		
2100	2200		Canada, CKZN St John's NF	6160na		
2100	2200		Canada, CKZU Vancouver BC	6160na		
2100	2200		China, China Radio Intl	9600eu	9800eu	
			11790eu			
2100	2200		Costa Rica, University Network		13750va	
2100	2200		Eqt Guinea, Radio Africa	15190af		
2100	2200		Germany, Deutsche Welle	9440af	11865af	
			15210af			
2100	2200	vl	Ghana, Ghana BC Corp	3366do	4915do	
2100	2200		Guyana, Voice of	3291do	5950do	
2100	2200		India, All India Radio	9910oc	11620oc	
			11715oc			
2100	2200	fas	Italy, IRRS	5775eu		
2100	2200		Japan, Radio Japan/NHK World		6035va	
			6055eu	6180eu	11855af	17825va
			21670oc			
2100	2200		Liberia, ELWA	4760do		
2100	2200		Malaysia, RTM/Trax FM	7295as		
2100	2200	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do	6175do		
2100	2200		New Zealand, Radio NZ Intl	13730pa		
2100	2200	DRM	New Zealand, Radio NZ Intl	15720pa		
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do	
2100	2200		Nigeria, Radio/Lagos	3326do	4990do	
2100	2200		North Korea, Voice of Korea	7570eu	12015eu	
			13760eu	15245eu		
2100	2200		Papua New Guinea, Catholic Radio		4960do	
2100	2200		Papua New Guinea, NBC	4890do		
2100	2200	vl	Papua New Guinea, Wantok R. Light		7120va	
2100	2200		Russia, Voice of	15735sa		
2100	2200	vl	Rwanda, Radio	6055do		
2100	2200	irreg/ vl	Sierra Leone, SLBS	3316do		
2100	2200		South Africa, Channel Africa	3345af		
2100	2200		Syria, Radio Damascus	9330eu	12085eu	
			13610al			
2100	2200		UK, BBC World Service	3255af	3915as	
			5965as	6005af	6190af	6195as
			11675sa	11945as	12095af	13765sa
			15400af			
2100	2200		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
2100	2200		USA, KAIJ Dallas TX	13815na		
2100	2200		USA, KTBN Salt Lake City UT	15590na		
2100	2200		USA, Voice of America	6080as	15580af	
2100	2200		USA, WBCQ Kennebunk ME	7415na	9330na	
			18910na			
2100	2200		USA, WBOH Newport NC	5920am		
2100	2200		USA, WEWN Birmingham AL	6890va	15220va	
2100	2200		USA, WHRA Greenbush ME	11610na	11765na	
			skd1106			
2100	2200		USA, WHRI Cypress Creek SC	9840am	13760am	
			15285am			
2100	2200		USA, WINB Red Lion PA	13570am		
2100	2200		USA, WRMI Miami FL	7385am		
2100	2200		USA, WTJC Newport NC	9370na		
2100	2200		USA, WWCR Nashville TN	9975na	12160na	
			13845na	15825na		
2100	2200		USA, WWRB Manchester TN	9385na	11915na	

			15250na			
2100	2200		USA, WYFR/Family R Okeechobee FL			6045va
			11565va	17725va	17845va	
2100	2200		Zambia, Christian Voice		4965af	
2100	2200	vl	Zimbabwe, ZBC Corp		5975do	
2115	2200		Egypt, Radio Cairo 9990eu			
2130	2156		Romania, Radio Romania Intl		7210va	9535va
			11940va	15465va		
2130	2157		Czech Rep, Radio Prague		9410na	11600af
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	DRM	Netherlands, Radio		9800na	
2130	2200		Sweden, Radio	6065va	7420va	
2130	2200		Turkey, Voice of	9525as		
2130	2200		UK, BBC World Service		15390va	

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

2200	2210		Syria, Radio Damascus		9330eu	12085eu
2200	2230		Belarus, Radio	7125eu	7340eu	7440eu
2200	2230	s	Belarus, Radio	7125eu	7340eu	7440eu
2200	2230		Cuba, Radio Havana		9505va	11760va
2200	2230	DRM	Germany, Deutsche Welle		9800na	
2200	2230		India, All India Radio		9910oc	11620oc
			11715oc	9950eu	11620va	11715oc
2200	2230		Papua New Guinea, NBC		4890do	
2200	2230		Turkey, Voice of	9525as		
2200	2245		Egypt, Radio Cairo 9990eu			
2200	2245		USA, WYFR/Family R Okeechobee FL			15770va
2200	2259		Canada, Radio Canada Intl		6100na	
2200	2300		Anguilla, University Network		6090am	
2200	2300		Australia, ABC NT Alice Springs			2310do
			4835do			
2200	2300		Australia, ABC NT Katherine		5025do	
2200	2300		Australia, ABC NT Tennant Creek			4910do
2200	2300		Australia, Radio	12010va	13620as	13630pa
			15515pa	15230as	15240pa	17785pa
			17795pa			
2200	2300	smtwhf	Canada, CBC NQ SW Service		9625na	
2200	2300		Canada, CFRX Toronto ON		6070na	
2200	2300		Canada, CFVP Calgary AB		6030na	
2200	2300		Canada, CKZN St John's NF		6160na	
2200	2300		Canada, CKZU Vancouver BC		6160na	
2200	2300	DRM	Canada, Radio Canada Intl		9800na	
2200	2300		China, China Radio Intl		7170eu	
2200	2300		Costa Rica, University Network		13750va	
2200	2300		Eqt Guinea, Radio Africa		15190af	
2200	2300		Germany, Deutsche Welle		7115as	9720na
2200	2300	vl	Ghana, Ghana BC Corp		3366do	4915do
2200	2300		Guyana, Voice of	3291do		
2200	2300		Italy, IRRS	5785va		
2200	2300	f	Italy, IRRS	5775va		
2200	2300		Malaysia, RTM/Trax FM		7295as	
2200	2300	vl	Namibia, Namibian BC Corp		3270do	3290do
			6060do	6175do		
2200	2300		New Zealand, Radio NZ Intl		13730pa	
2200	2300	DRM	New Zealand, Radio NZ Intl		15720pa	
2200	2300		Nigeria, Radio/Kaduna		4770do	6090do
2200	2300		Nigeria, Radio/Lagos		3326do	4990do
2200	2300		Papua New Guinea, Catholic Radio			4960do
2200	2300	vl	Papua New Guinea, Wantok R. Light			7120va
2200	2300	irreg/ vl	Sierra Leone, SLBS		3316do	
2200	2300	vl	Solomon Islands, SIBC		5020do	9545do
2200	2300		Taiwan, Radio Taiwan Intl		15600eu	
2200	2300		UK, BBC World Service		5955af	5965as
			5975va	6195as	7105as	7255as
			9740af	12095sa	13795sa	15400af
2200	2300		Ukraine, Radio Ukraine Intl		5840eu	
2200	2300		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
2200	2300		USA, KAIJ Dallas TX		13815na	
2200	2300		USA, KTBN Salt Lake City UT		15590na	
2200	2300		USA, Voice of America		7215va	7555as
			11725va	15185va	15290va	
2200	2300	mtwhf	USA, WBCQ Kennebunk ME		5110na	18910na
2200	2300		USA, WBCQ Kennebunk ME		7415na	9330na
2200	2300		USA, WBOH Newport NC		5920am	
2200	2300		USA, WEWN Birmingham AL		9975va	15745va
2200	2300		USA, WHRA Greenbush ME		11610na	11765na
			skd1106			
2200	2300		USA, WHRI Cypress Creek SC		7490am	9840am
			13760am	15285am		
2200	2300		USA, WINB Red Lion PA		13570am	
2200	2300	mtwhf	USA, WRMI Miami FL		7385am	
2200	2300	as	USA, WRMI Miami FL		9955am	
2200	2300		USA, WTJC Newport NC		9370na	
2200	2300		USA, WWCR Nashville TN		7465na	9985na
			12160na	13845na		
2200	2300		USA, WWRB Manchester TN		9385na	11915na
			15250na			
2200	2300		USA, WYFR/Family R Okeechobee FL			11740va
			15195va			
2200	2300		Zambia, Christian Voice		4965af	
2205	2230		Italy, RAI Intl	11895as		
2215	2230		Croatia, Croatian Radio		9925sa	
2230	2257		Czech Rep, Radio Prague		7345na	9415af
2230	2300		Papua New Guinea, NBC		9675do	
2230	2300		USA, Voice of America		9570va	13755va
			15145va			
2245	2300		India, All India Radio		9705as	9950as
			11620as	11645as	13605as	

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

2300	0000		Anguilla, University Network		6090am	
2300	0000		Australia, ABC NT Alice Springs			2310do
			4835do			
2300	0000		Australia, ABC NT Katherine		5025do	
2300	0000		Australia, ABC NT Tennant Creek			4910do
2300	0000		Bulgaria, Radio	9700na	11700na	
2300	0000	smtwhf	Canada, CBC NQ SW Service		9625na	
2300	0000		Canada, CFRX Toronto ON		6070na	
2300	0000		Canada, CFVP Calgary AB		6030na	
2300	0000		Canada, CKZN St John's NF		6160na	
2300	0000		Canada, CKZU Vancouver BC		6160na	
2300	0000		China, China Radio Intl		5990am	6145na
			13680na			
2300	0000		Costa Rica, University Network		13750va	
2300	0000		Egypt, Radio Cairo 11950na			
2300	0000		Germany, Deutsche Welle		5955as	9890as
			15135as	17860as		
2300	0000		Guyana, Voice of	3291do		
2300	0000		India, All India Radio		9705as	9950as
			11620as	11645as	13605as	
2300	0000		Malaysia, RTM/Trax FM		7295as	
2300	0000	vl	Namibia, Namibian BC Corp		3270do	3290do
			6060do	6175do		
2300	0000		New Zealand, Radio NZ Intl		13730pa	
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	vl	Papua New Guinea, Wantok R. Light			7120va
2300	0000		Romania, Radio Romania Intl		6140va	7265va
			9645va	11940va		
2300	0000	irreg/ vl	Sierra Leone, SLBS		3316do	
2300	0000		Singapore, MediaCorp Radio		6150do	
2300	0000	vl	Solomon Islands, SIBC		5020do	9545do
2300	0000		Turkey, Voice of	5960na		
2300	0000		UK, BBC World Service		3915as	5965as
			6195as	9580as	9740as	11850as
			11945as	11955as		
2300	0000		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7812usb	10320usb
			12133usb	12759usb	12579usb	
2300	0000		USA, KAIJ Dallas TX		13815na	
2300	0000		USA, KTBN Salt Lake City UT		15590na	
2300	0000		USA, Voice of America		7215va	7555as
			11725va	15185va	15290va	
2300	0000		USA, WBCQ Kennebunk ME		5110na	7415na
			9330na	18910na		
2300	0000		USA, WBOH Newport NC		5920am	
2300	0000		USA, WEWN Birmingham AL		9975va	15745va
2300	0000		USA, WHRA Greenbush ME		7520na	
2300	0000		USA, WHRI Cypress Creek SC		7490am	7555am
			9840am	13760am		
2300	0000		USA, WINB Red Lion PA		13570am	
2300	0000	mtwhf	USA, WRMI Miami FL		7385am	
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/Family R Okeechobee FL			15255am
			17750am			
2300	0000		Zambia, Christian Voice		4965af	
2300	2315		Nigeria, Radio/Kaduna		4770do	6090do
2300	2315		Nigeria, Radio/Lagos		3326do	
2300	2330		Australia, Radio	9660pa	12010pa	12080pa
			13670va	15230va	15240va	17785va
			17795va			
2300	2330	DRM	Germany, Deutsche Welle		9800na	
2300	2330		USA, Voice of America		9570va	13755va
			15145va			
2300	2345		USA, WYFR/Family R Okeechobee FL			11740va
2330	0000		Australia, HCJB	15390as		
2330	0000		Australia, Radio	9660pa	12010pa	12080pa
			13670va	15230va	15390as	15415va
			17750as	17785pa	17795va	
2330	0000		Burma, Dem Voice of Burma		5955eu	
2330	0000		Lithuania, Radio Vilnius		9875na	
2330	0000	DRM	Sweden, Radio	9800na		
2330	0000		USA, Voice of America		7260va	9570va
			13725va	13755va	15145va	
2330	0000	s	USA, WRMI Miami FL		9955am	
2330	2358		Vietnam, Voice of	9840as	12020as	

Larry Van Horn, N5FPW
larryvanhorn@monitoringtimes.com

MilSatcom – The Early Days

Long before the crystal or first UHF scanner entered the marketplace, the Department of Defense launched military communication satellites that operated in the military aircraft band (225-400 MHz). From the beginning, the satellite subbands in the 225-400 MHz military aircraft band were set aside for mobile unit communications (ships, backpack, aircraft, etc). Other frequencies capable of wider bandwidths use higher frequencies, but these are not monitorable on any hobby radios in today's marketplace.

❖ TACSATCOM

Military communications satellites got their start in 1965, when the three military services initiated studies on tactical/mobile satellite communications. On July 1, 1967, LES 5 (Lincoln Experimental Satellite) [International Designator 1967-66E/ NORAD SSC number 02866], a UHF military satellite repeater weighing 225 pounds, was placed into high orbit inclined 6.8 degrees with a multi-payload Titan 3C rocket.

The satellite UHF communications system was tested by aircraft of the then Strategic Air Command (SAC), as well as by Army and Navy mobile units. The communications tests were very successful, and this led to the next communications satellite in the series LES 6. In September 1968, LES 6 [1968-81D/03341] was launched into geostationary orbit to further support of the tactical communications study program.

This was followed in February 1969 with the launch of TACSAT 1 [1969-13A/03691], onboard another Titan 3C rocket into geostationary orbit. TACSAT 1 was a high powered experimental tactical communications satellite for use by all the military services to assess the role of satellites in tactical situations.


TACSAT-1

TACSAT 1 carried the following communications payloads:

Downlink (MHz)	Uplink (MHz)	Purpose
7252.500-7262.500	7977.500-7987.500	SHF Comm Package
7298.500		SHF Beacon
249.3875-249.8125	302.500-312.500	UHF Comm Package
254.100		UHF Beacon

Once TACSAT 1 was launched, the TACSATCOM (Tactical Satellite Communications) program included it and the LES 6 satellite. LES 6 was a small, single-band UHF satellite, whereas TACSAT 1 was the largest and most powerful communications satellite launched up to that time, with the ability to operate in both the UHF and SHF bands.

The TACSATCOM program primarily served the mobile user in tactical situations. There were some 100 research and development terminals, mostly using the UHF band that ranged from manpack size to those mounted on 1-1/4 ton trucks. A number of airborne terminals were also tested with the program. TACSAT 1 ceased operations in December 1972.

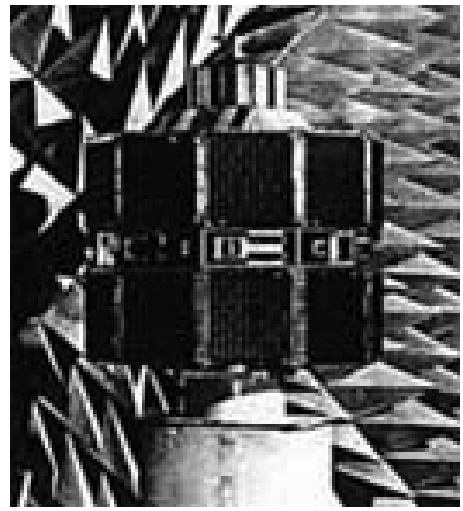
❖ LES-8/9

On March 15, 1976, a Titan 3C rocket lifted off from Cape Canaveral, Florida, carrying the last two LES communications satellites and two SOLRAD satellites. The two LES satellites were used to test design concepts for the new Defense Satellite Communications System Phase III (DSCS 3) series satellites. This introduced satellite crosslinking and operations in the 36 GHz band.

LES-8/9 also tested the use of nuclear power as an alternative source of energy. Each satellite carried radioisotope thermoelectric generators aboard, rather than solar panels that could easily be damaged by enemy anti-satellite weapons. Nuclear power also extends the satellite's lifetime, since no battery supply is needed during extended eclipse periods from the sun.

These two revolutionary satellites also tested crosslinking experiments in the 225-400 MHz band, as well as 36.9-38.0 GHz, to determine the feasibility of using only two satellites for global coverage instead of the usual three or four.

The UHF portion of the LES-8/9 satellites was part of the U.S. Army Satellite Communications Agency (USASATCOMA) UHF system. Today that mission has been changed (see below). Each satellite had one wideband UHF repeater subdivided as follows (frequencies in MHz):


LES-9

Ch.	*Downlink*	*Uplink*
1	249.350	303.150
2	249.375	303.175
3	249.400	303.200
4	249.425	303.225
5	249.450	303.250
6	249.475	303.275
7	249.500	303.300
8	249.525	303.325
9	249.550	303.350
10	249.575	303.375
11	249.600	303.400
12	249.625	303.425
13	249.650	303.450
14	249.675	303.475
15	249.700	303.500
16	249.725	303.525
17	249.750	303.550
18	249.775	303.575
19	249.800	303.600
20	249.825	303.625
21	249.850	303.650

At last report, the LES-9 is still operational and is being utilized by ships and submarines of the Canadian Navy. The 30-year-old satellite is mainly used for submarines to transmit signals ashore, but HMC surface ships use this service on a non-interference basis with submarines. We have not been able to determine positively the current status of the LES-8 satellite, but we believe the satellite has been retired from service.

New CAP Frequencies Posted?

Recently on a public, scanner-related internet forum, the following frequencies were posted and identified as the new Civil Air Patrol VHF narrowband assignments:

Simplex: 138.0125 140.6375 142.2250 150.1625 150.5625 150.6375
Repeater: 143.725 143.900 148.175 148.775

These certainly deserve a spot in your scanner memory loadout, so you can be on the lookout for any possible future CAP activity in your area.

Search and Rescue

Speaking of CAP, whenever a search and rescue (SAR) operation is underway, monitors like to join in on the action. Here is an official list of frequencies for alerting, SAR operations, and Maritime Safety frequencies from the *United States National Search and Rescue Supplement Manual* that should keep you busy monitoring the action. Of course, the primary players here in the United States for search and rescue operations are the United States Coast Guard (USCG), the USCG Auxiliary, and the Civil Air Patrol.

490 kHz	Maritime Safety Information (MSI): Narrowband Direct Printing
518 kHz	Maritime Safety Information (MSI): Navtex warnings (SITOR-B)
2003.0 kHz	Small craft: Great lakes
2174.5 kHz	Distress and Safety Traffic/On Scene Communications: MF Narrowband Direct Printing
2182.0 kHz	On Scene Communications (including aircraft)/Distress and Safety Traffic: MF Radiotelephony
2187.5 kHz	Alerting: MF/HF DSC
2635.0 kHz	Small craft: All areas
2638.0 kHz	Small craft: All areas
2738.0 kHz	Small craft: All areas
2830.0 kHz	Small craft: All areas
3023.0 kHz	Aircraft Comms: On Scene including SAR
4125.0 kHz	Aircraft Comms/Distress and Safety Traffic: On Scene including SAR/Small craft: Alaska
4177.5 kHz	Distress and Safety Traffic: Narrowband Direct Printing
4207.5 kHz	Alerting: MF/HF DSC
4209.5 kHz	Maritime Safety Information (MSI): Narrowband Direct Printing
4210.0 kHz	Maritime Safety Information (MSI): Narrowband Direct Printing
5680.0 kHz	Aircraft Comms: On Scene including SAR
6215.0 kHz	Distress and Safety Traffic: Radiotelephony
6268.0 kHz	Distress and Safety Traffic: Narrowband Direct Printing
6312.0 kHz	Alerting: MF/HF DSC
6314.0 kHz	Maritime Safety Information (MSI): Narrowband Direct Printing
8291.0 kHz	Distress and Safety Traffic: Radiotelephony
8376.5 kHz	Distress and Safety Traffic: Narrowband Direct Printing
8414.5 kHz	Alerting: MF/HF DSC
8416.5 kHz	Maritime Safety Information (MSI): Narrowband Direct Printing
12290.0 kHz	Distress and Safety Traffic: Radiotelephony
12520.0 kHz	Distress and Safety Traffic: Narrowband Direct Printing
12577.0 kHz	Alerting: MF/HF DSC
12579.0 kHz	Maritime Safety Information (MSI): Narrowband Direct Printing
16420.0 kHz	Distress and Safety Traffic: Radiotelephony
16695.0 kHz	Distress and Safety Traffic: Narrowband Direct Printing
16804.5 kHz	Alerting: MF/HF DSC
16806.5 kHz	Maritime Safety Information (MSI): Narrowband Direct Printing
19680.5 kHz	Maritime Safety Information (MSI): Narrowband Direct Printing
22376.0 kHz	Maritime Safety Information (MSI): Narrowband Direct Printing
26100.5 kHz	Maritime Safety Information (MSI): Narrowband Direct Printing
121.500 MHz	Alerting/Aircraft Comms: VHF AM (also on scene including SAR)
123.100 MHz	Aircraft Comms: On Scene including SAR
156.300 MHz	Aircraft Comms: On Scene including SAR
156.525 MHz	Alerting: VHF DSC <Channel 70>
156.650 MHz	Safety of Navigation <Channel 13>
156.800 MHz	Alerting/On Scene communications/Aircraft comms/Distress and Safety Traffic: VHF FM <Channel 16>
406.0-406.1 MHz	Alerting: 406 EPIRBs (earth-to-space)
1530.0-1544.0 MHz	Distress and Safety Traffic: Satellite (space-to-earth)
1530.0-1545.0 MHz	Maritime Safety Information (MSI): Satellite (space-to-earth)
1544.0-1545.0 MHz	Alerting: Inmarsat SES (space-to-earth)
1626.5-1646.5 MHz	Alerting/Distress and Safety Traffic: Inmarsat SES (earth-to-space)
1644.3-1644.5 MHz	Alerting: Inmarsat-E EPIRB (earth-to-space)
1645.6-1645.8 MHz	Alerting: Inmarsat SES (earth-to-space)
9200.0-9500.0 MHz	Hominwg Signal: 9 GHz Radar Transponders (SART)

Tyndall AFB Frequencies

If you are heading to the Florida Gulf Coast and you take your milair scanner along, here is a list of confirmed Tyndall Air Force Base frequencies to put in your scanner.

119.100/379.300	Tyndall Approach (north of Tyndall below 5,000 feet)
119.925	Apalachicola Airfield SOS
119.975	Panama City ATIS
120.500/269.000	Panama City Tower
122.800	Apalachicola Airfield Unicom
122.950	Panama City Unicom
124.150/341.700	Tyndall Approach (south of Tyndall)
125.200/392.100	Tyndall Approach (north of Tyndall above 5,000 feet)
132.100	Eglin Approach VFR
133.750	Cairns Approach
133.950/384.400	Tyndall Tower
135.900	Tallahassee Approach

Major Military Communications Bands

Where can I tune my radios to hear military communications?

This is a very common question I hear from *Monitoring Times* readers. The old pros know where to search for milcom transmissions, but newcomers to the radio hobby usually struggle to hear their first military traffic. The frequency ranges below will give the radio hobbyist the general areas in the radio spectrum to look for military communications.

In the shortwave spectrum, military communications can be heard just about anywhere, but the aeronautical off-route bands offer concentrated areas to search for military communications activity. Most voice high frequency (HF) military communications utilize the upper sideband (USB) mode. The listener will occasionally hear a smattering of lower sideband (LSB) voice communications. When you tune the HF military bands listed below in USB, you will catch the majority of the voice military traffic that can be heard.

If you don't live close to a military base, HF offers one of the few ways to hear a high volume of military communications. There are literally thousands of HF frequencies in use by military organizations all over the world. Protecting one's nation is a 24-hour a day operation, so there is never a shortage of military communications on HF.

SHORTWAVE

Note: For transmission mode information, see above text. The frequencies below are in kHz.

3026.0-3152.0
4700.0-4745.0
5684.0-5726.0
6685.0-6760.0
8965.0-9037.0
11175.0-11271.0
13200.0-13257.0
15010.0-15097.0
17970.0-18027.0
23200.0-23250.0

VHF/UHF MILITARY ACTION BANDS

Note: This is a United States only bandplan. Outside the CONUS, usage will vary. The frequencies are in MHz.

30.000-30.550	FM/AM-10 kHz spacing
32.000-32.990	FM/AM-10 kHz spacing
34.000-34.990	FM/AM-10 kHz spacing
36.000-36.990	FM/AM-10 kHz spacing
38.000-38.990	FM/AM-10 kHz spacing
40.000-41.990	FM/AM-10 kHz spacing
46.600-47.000	FM/AM-10 kHz spacing
49.610-49.990	FM/AM-10 kHz spacing
118.000-138.000	AM-25 kHz spacing/8.33 kHz spacing in Europe [Note: Mostly civilian aircraft]
138.0000-144.0000	FM/AM-12.5 kHz spacing
148.0000-150.8000	FM/AM-12.5 kHz spacing
162.0125-173.9875	FM-12.5 kHz spacing
225.0000-379.9750	AM/FM-25 kHz spacing [Note: FM used by milsats and wideband systems]
380.0000-399.9875	FM/AM-12.5 kHz spacing [Note: Mix of land mobile and aero frequencies with the bulk of the band supporting LMR transmissions]
406.0125-419.9875	FM-12.5 kHz spacing

And that does it for another edition of *MT's Milcom* column. Until next time, 73 and good hunting.

Chris Parris
chrisparris@monitoringtimes.com

FAA NARACS Reborn

In the May 2005 *Fed Files* I mentioned that the Federal Aviation Administration's National Radio Communications System, known by the acronym of NARACS, had fallen into a state of disuse and disrepair. However, recent indications are that the NARACS system will rise from the ashes to be rebuilt.

Following the terrorist attacks of September 11, 2001, the federal government started enforcing guidelines that would provide better and more reliable communications channels for federal agencies and first responders of state and local public safety. Among the communications systems that are being upgraded under these guidelines is the FAA land mobile communications network.

The new FAA communications system is being referred to as the FAA Command and Control, or C2 system. It will utilize P-25 digital mode full time and will be capable of encryption. New equipment is being installed at FAA facilities, airports and remote sites around the country.

Here is the new frequency lineup for the FAA C2 radio system. You may notice some of the same frequencies that were used in the NARACS channel plan, but also some new frequencies as well.

Channel	*Receive*	*Transmit*
Channel 1	172.9250	169.3250
Channel 2	172.9500	169.3500
Channel 3	172.9750	169.3750
Channel 4	172.8500	169.2500
Channel 5	172.8750	169.2750
Channel 6	166.1000	162.3000
Channel 7	172.8250	169.2250
Channel 8	172.9125	169.3125
Channel 9	162.1375	166.0375
Channel 10	167.9375	171.4875
Channel 11	166.3875	162.3375
Channel 12	171.7125	167.8875
Channel 13	172.1750	172.1750
Channel 14	166.1750	166.1750

Keep these in the scanner and let us know when they become active in your area!

❖ Federal Trunked Systems in New York City

On a recent trip to Manhattan, I decided to concentrate some of my monitoring time to check out the various federal and military trunked radio systems that are currently operating in the New York City area.

As in most parts of the country, the most predominant agency using trunking for its facilities is the US Bureau of Prisons. They have several facilities in the area and make use of both analog and digital trunked systems. Here are the systems in use in the immediate New York City area:

FEDERAL BUREAU OF PRISONS
Metropolitan Correctional Center (located in lower Manhattan, adjacent to Foley Square and across the street from the Federal courthouse).
System ID = 931a
Motorola Type II with P-25 voice
Base = 407.0000 MHz
Offset = 380 kHz
Step = 12.5 kHz
407.4125 408.8125 409.5125 409.9000 410.4125

Federal Metropolitan Detention Center Brooklyn (located near the Gowanus Bay, between 2nd and 3rd Avenue on 29th Street).
System ID = b12e
Motorola Type II with P-25 voice
Base = 406.5000 MHz
Offset = 380 kHz
Step = 12.5 kHz
406.5000 406.9250 407.8125 407.9500 408.2125 408.8125

Please note that both of these systems seem to be designed to cover only the area around the BoP facilities, so unless you are nearby you probably won't catch too much from these systems. I was lucky enough to be staying on the 45th floor of my hotel in Manhattan, so I was able to pick up both of these systems fairly well.

Also notice that these two systems share a common frequency. 408.8125 MHz is used by both trunked systems, apparently without many difficulties. I don't know if this was done due to a shortage of available federal UHF channels or not.

There is an additional federal prison facility in Otisville, NY, that can be heard from New York City if you are in the right place (as I was):

Federal Correctional Institution, Otisville (located in the southeastern part of New York state, near the Pennsylvania and New Jersey, and 70 miles northwest of New York City).
System ID = a826
Motorola Type II
Base = 407.0125 MHz
Offset = 380 kHz
Step = 12.5 kHz
407.0125 408.0125 408.8125 409.4125 410.0125

And if you are *really* up in the right spot, you might be able to pick up the Federal Correctional Institution in Danbury, Connecticut.

FCI Danbury (located in southwestern Connecticut, 70 miles from New York City)
System ID = b139
Motorola Type II
Base = 407.0500 MHz
Offset =380 kHz
Step = 12.5 kHz
407.0500 408.2125 409.4125 409.8125

Another federal trunked system in NYC appears to be used mostly by the US Postal Service, but most describe this as simply a "federal" or "unknown" system. Some Internet sources list some "US Customs" talk groups, but most of the activity I have monitored seems to be operations at a main Post Office Facility in New York City (anyone know which one?). The US Customs use of the system would not be out of line with this being a Postal system, as Customs routinely handles inspection of international mail shipments.

US POSTAL SERVICE, NYC
System ID = 3517
Motorola Type II analog
Base = 412.0000 MHz
Offset = 380 kHz
Step = 25 kHz
413.7000 415.1500 415.5500 415.9500 416.9500 418.3500

A couple of additional trunked systems you might try to pick up when you are in the New York area are the Ft. Hamilton and West Point Military Academy systems. Both of these are Department of Defense systems, so apologies to Larry Van Horn and the *Milcom* column, but they are worth a listen. Both of these trunked systems represent the new generation of digital Project 25 systems that can be best received with the latest digital scanners. The West Point system is a multi-site VHF trunked system, and the Ft. Hamilton is a new 380 MHz trunked system.

WEST POINT MILITARY ACADEMY
System ID = 00f
Base = 136.0000 MHz
Offset = 380 kHz
Step = 12.5 kHz
Tower 101
138.0375 138.1875 138.3375 138.5125 138.6875 139.0375 139.1875
Tower 202
138.1125 139.3375 139.4875 139.6375 140.6625

FORT HAMILTON, BROOKLYN, NY
www.hamilton.army.mil/
System ID = 00b
Base Frequency = 380.0000 MHz
Step = 12.5 kHz

Offset = 380 kHz
380.07500 380.27500 380.42500 380.57500 380.72500

So, besides the normal VHF and UHF conventional federal activity in the Big Apple, give these trunked systems a try, too.

❖ Pittsburgh Area Scanning

While recently in the Pittsburgh area for work, I had the opportunity to meet some of the members of the Three Rivers Area Monitoring Association, otherwise known as TRAMA. The group has their own Yahoo group **http://groups.yahoo.com/group/TRAMAlist/**, as well as a weekly "Scanner Net" on one of the area 2-meter Amateur repeaters in the Pittsburgh area. Special thanks go to the TRAMA members for their help with monitoring in the Pittsburgh area.

While in there I was able to attend the Wings Over Pittsburgh Air Show. I had missed the show in previous years but decided to make an effort this year. The Blue Angels were the highlight of the show and the Monitoring Times Air Show frequency listings (**www.monitoringtimes.com/html/mtairshow06.pdf**) were 100% right on the money – thanks, Larry!

Also, while I was in town, preparations were underway for the 2006 Major League Baseball All-Star Game in Pittsburgh. There was an unprecedented number of local, state and federal agencies on hand to provide security for the events around PNC Park and other locations in the area. Some new frequencies popped up during the days prior to the game and were noted by the local scanning community and myself.

163.0250, CSQ - US Army Corps of Engineers, Pittsburgh Rivers
163.1000, P-25 - Federal Common, FBI D-7 used during All Star Game 2006
163.2000, 127.3 - US Marshal
163.2000, 136.5 - US Marshal
162.2250 - US Coast Guard – River patrol during All Star Game 2006
163.2375 - VA Medical Center Paging
163.2625, P-25 - VA Medical Center Police
163.3750, CSQ - USPS Mail Trucks (recently replaced by 172.9875)
163.5875, 162.2 - US Army Corps of Engineers
163.5875, 173.8 - US Army Corps of Engineers
163.5875, 192.8 - US Army Corps of Engineers
164.0625, 127.3 - VA Medical Center
164.2125, 114.8 - VA Medical Center Maintenance
164.3375, D152 - US Postal Service - input to 172.9875 MHz repeater
164.5500, P-25 - FBI D4, used for All Star Game 2006
164.8750, 103.5 - VA Hospital Transportation
165.2375, 100.0 - DHS CBP Customs NET 1
165.2875, P-25 - ATF NET 1
166.0125, P-25 - VA Medical Center Police – input to 163.2625 MHz repeater
166.2250 - VA Medical Center (no longer in use)
166.4625 - DHS Common, used for All Star Game 2006
167.4375, P-25 - FBI, encrypted and clear
167.5375, P-25 - FBI D6, used for All Star Game 2006
169.8000, P-25 - FBI, encrypted and clear
170.3750, 136.5 - Unknown Agency
170.6250, 167.9 - FBI
170.8250, Unknown Agency
171.6500, Unknown Agency
172.9000, P-25 - DHS TSA at Pittsburgh International Airport
172.9875, D152 - USPS Mail Trucks
406.3375, P-25 - USPS Postal inspectors
407.1375, P-25 - USPS Postal Security
407.7250, P-25 - USPS Postal Inspectors
407.7750, P-25 - USPS Postal Inspectors
407.9000, D032 - Federal Reserve Bank
409.2750, 162.2 - USPS input to 415.4500 repeater
409.3375 - Federal Itinerant, used OSCAR and LION call signs for All Star Game 2006
410.0000, 100.0 - Unknown Agency
410.0500, D032 - Federal Reserve Bank
410.3500 - Department of Energy paging
412.8375 - Federal Itinerant, used OSCAR and LION call signs for All Star Game 2006
413.8750, CSQ - DHS Federal Protective Service
414.4500, 162.2 - USPS Maintenance Control – General Mail Facility
414.7750 - Unknown Agency
415.0500 - USPS Postal Inspectors, tactical simplex
415.3375, P-25 - Input to 406.3375
415.4500, 162.2 - USPS Mail Sorting
416.4000, 107.2 - Bruceton Research Center, US Bureau of Mines
416.4250, CSQ - General Services Administration Building Services
417.6750, CSQ - Bruceton Research Center, DoE, US Bureau of Mines, CDC, NIOSH
418.6750 - DEA F4
418.9000, P-25 - DEA
419.1750 - DHS Federal Protective Service input to the 413.8750 repeater
419.6500, 110.9 - General Services Administration, input to 416.4250 repeater

Well, that's it for the last *Fed Files* of 2006. It sure seems like the year went by way too quickly. Be sure and check the *Fed Files Blog*, and other *Monitoring Times* blogs at **http://mt-fedfiles.blogspot.com/**. We'll be back in the January issue of *Monitoring Times* with more *Fed Files*!

Your Fed Files columnist (left) with Frank (K3FSS) and Rich of the Three Rivers Monitoring Association

Iden Rogers
idenrogers@monitoringtimes.com

Base Station Aircraft Listening Antennas

What is the best base station antenna to use for VHF aircraft communications listening? "Best" can be different things to different people and complicated by competing factors such as gain, bandwidth, cost, inconspicuousness, ruggedness, ease of installation, etc.

VHF civil aircraft communications occur in the 118-137 MHz band, so for best reception, antennas need to be designed for that band or specifically include it. Not all multi-band scanner antennas do. So, let's talk antennas.

❖ Bandwidth, Impedance, and Coax

When it comes to VHF and UHF antennas, amateur radio operators and commercial two-way technicians most commonly install types that are tuned to specific frequencies. These tend to have narrow bandwidths (limited transmit frequency ranges), have design impedances of 50 Ohms, and are intended to be used with 50 Ohm coaxial cable.

Figure 1 – RG-6 coax and adapters from F to BNC, N, and UHF.

Scanner antennas are intended for entire bands of frequencies. The center of band impedance may or may not be 50 Ohms, and as one departs in frequency from the antenna center band point, the impedance can be all over the place, so 50 or 75 Ohm coax – it really doesn't matter! See: **www.irving.org/ftplib/scanning/50v75ohm.txt** .

RG-6 coax is a good choice for many listeners and, yes, "F" connectors can be accommodated quite easily with adapters, see Figure 1. For long runs, consider Belden 1523A – see **http://bwccat.belden.com** and enter 1523A and then click on PDF. For those who feel a need to stay with 50 Ohm coax, with its more familiar connectors and connector installation, and who can afford it, consider LMR-400, **www.timesmicrowave.com/wireless** .

The higher the frequency and the longer the coax run, the more signal is lost along the way to the receiver. Coaxial cable losses are often rated in terms of dB (decibels) of loss per 100 feet at a given frequency. Lower numbers are better. See manufacturers' specifications for loss figures. Avoid RG-58 and RG-59.

❖ Antenna Comparisons

To me, part of the hobby is comparing antennas; I rarely take an advertiser's word on antenna performance. To compare antennas, I mount them at the same height on different sides of my tower and run fairly equal, short lengths of the same type of coaxial cable to a tower-mounted, UHF-rated coaxial relay (a specialized remotely-operated coax switch). The relay output coax runs into my shack.

Then, on many different frequencies across the 118-137 MHz band, I remotely switch the relay between the two antennas during single ground transmissions from Air Traffic Controllers, ATIS, AWOS, etc. I write down the signal strengths displayed on the S-meter (signal strength meter) of my Icom R7000 receiver (discontinued), see Figure 2.

Figure 2 – Icom R7000 S-Meter used to compare signal strengths.

Why go to all this trouble when some listeners can already hear aircraft at altitude for over one hundred miles with just a telescoping antenna? Primarily because, by going to the extra trouble, time, and expense to improve your antenna system, you may enable reception from ground stations and aircraft on the ground. It's just more enjoyable to hear both sides of the conversation, as well as extending the distance from which you can hear aircraft in flight.

During antenna comparisons and evaluations, the objective is to tune in as many ground station transmissions as possible, from as many directions as possible, and to get them on frequencies spread across the entire band. This results in a more thorough and meaningful comparison.

Figure 3 – Reference quarter-wave VHF Ground Plane with horizontal radials and impedance matching section.

Figure 3 shows a hobby grade antenna that was sold 25 or more years ago and came with a frequency cutting chart for radial length, vertical element length, impedance matching section dimensions, and (believe it or not) no coaxial connector. Refurbished many times over the years, this antenna has proven itself as a good antenna. As I recall, it is cut for about 124 MHz and works well across the band for receiving. For my particular environment and tuning methods, it has produced better averaged S-meter readings than the other antenna designs I have tried for this band. Therefore, I call it my reference antenna for this band.

Quarter-wave Ground Plane with sloping radials. Radials 23 inches from antenna center. Vertical element 23 inches from insulator base.

In addition to a standard scanner discone, which covers a wide range of frequencies, I have compared my reference antenna to ground planes with sloping radials and no matching section, a carefully constructed J-Pole, a folded ground plane, a folded dipole, a home brew "X" antenna, a surplus FAA Lindenblad array (a four slanted-dipole affair once commonly in use), a coaxial antenna, a five foot tall 5/8 wave base loaded ground plane – and all cut by calculation to about 124 MHz (or in some cases, factory ordered to frequency).

My "X" home brew antenna patterned after a dipole cluster antenna like the Scantenna but designed optimally for the VHF aircraft band. Fed with a TV type 300-75 Ohm transformer and then to RG-6. Diagonal dimension tip-to-tip is 47.5 inches.

The "X" antenna and the Folded Dipole were pretty much audibly indistinguishable from my reference ground plane, but its S-meter readings were a little better. I was surprised to discover the standard scanner discone, installed for this article, did well enough to be considered "competitive." (Discone example: **www.grove-ent.com/wrax71c.html**) Some professional antennas don't necessarily receive better when used with scanners but they do stand up to harsher environments, can handle substantial transmit power, and, as a result, cost considerably more.

Folded dipole reworked from an Antennacraft FMSS Turnstile FM Antenna. Fed with a TV type 300-75 Ohm transformer and then to RG-6. Tip-to-tip dimension is 44.75 inches.

To do comparisons, you don't need a tower or even a remote coax relay near the antennas. If the two antennas being compared are mounted not too far from each other, at similar heights, and the coax runs are of the same type, length, and age (a potential performance deterioration factor), the switching can be done in the shack with a coax switch during single ground transmissions.

❖ Complications, Inclinations, and Perspectives

Comparing antennas isn't without its complications. Though the antennas are mounted about four feet from the tower, there is an inevitable interaction between the antennas and the tower, which alters the circular pattern to one that can favor some directions a little better than others for one or both the antennas.

If you are curious about this effect and are concerned about the degree to which it may be influencing your comparison, you can reverse the positions of the antennas on their mounts and take all the readings over again and compare the two sets of readings.

It is a good idea to write down antenna comparison results for each ground station transmission. Unless one antenna is obviously inferior, just coming away with a mental impression of which antenna is better can be misleading. One can unconsciously *want* one antenna to be better than the other, such as when comparing a $40 antenna to one costing four times as much. Another reason for taking good notes is for a more certain resolution, and to prevent arriving at a premature and inaccurate conclusion as to which antenna is better.

There are two ways to look at comparison results. I determine the better antenna of two by closely looking at the signal strength readings. But, let's say that a pair of readings is 3.5 on the S-meter for one antenna and 4.5 for the other for a single given ground station transmission. Potentially warped-pattern / directional considerations aside, I regard the better antenna as the one that produced the higher reading. In many, but certainly not all cases with readings this close, there is not an audible difference. With eyes closed, for all practical purposes, they are the *same!*

For those who are more detail oriented, the record-keeping way may be more appealing. For those who don't have a receiver with an S-meter or who are less detail oriented or less patient in their approach, the more casual, audible comparison can work well enough.

There is also a "no comparisons / who cares" approach. This is where a person buys a scanner and an antenna with little or no research. He hooks it up, listens, has not a clue as to what he might *not* be hearing, has a wonderful time, and is happy as a clam. All are legitimate approaches with different degrees of involvement in the hobby – whatever brings personal enjoyment is what really matters.

❖ Military Listening

This column is for civil aircraft communications, but I feel it would be unfair not to mention military aircraft listening briefly since it so neatly ties in with this discussion. The military can use the VHF aircraft band just like the civilian users can; they call it VICTOR for VHF. The 225-400 MHz band is where many strictly military aircraft communications take place. They call this UNIFORM for UHF. It is a very broad band in terms of frequency span – 175 MHz. Two other bands that can include military aircraft or base communications are 138-144 and 148-150.8 MHz.

The military surplus discone AT-197A/GR, 225-400 MHz, is coveted by some Mil listeners. This particular one is rebuilt with an "F" connector way up inside.

❖ Multiple Bands

Aviation includes many frequency ranges, so what antenna should one choose? If you plan to listen to VHF aircraft, some voice transmissions by way of VOR stations in the 108-118 MHz band, the two smaller VHF bands (military), and UHF aircraft, plus public safety tossed in (or not), get a scanner discone – unless you plan an installation with multiple, band-specific antennas. It's really that simple!

The discone antenna is particularly well suited for a broad range of frequencies and for multiple frequency ranges. It is an issue of bandwidth vs. gain. A discone will generally perform less well for a single, narrow frequency range as compared to more efficient narrow-band antenna designs.

❖ Antenna Height / Safety

Every bit as important as your antenna selection is putting your antennas up as high as reasonably possible, in the clear, and using good quality coaxial cable. Not everyone has the physical or technical ability nor the freedom (whether spousal, parental, financial, zoning, or covenant, lease or rental agreement) to put antennas up high, but, within your constraints, go as high as you can!

When it comes to safety during antenna installations and soundness of installation, use established precautions and methods. Be safe, make it safe, and ask for help if you need it. A solid, well planned installation can provide years of enjoyment. See you next time.

Kevin Carey, WB2QMY
kevincarey@monitoringtimes.com

Details, Details

Not everyone is interested in the nitty-gritty details of beacon reception. For many, it is enough to know the location of a station and perhaps the name of the facility that it serves. Still, I find that many *MT* readers are accustomed to digging a bit deeper. For serious "ute" monitors, it is often the details that make the difference between an ordinary intercept and one that is worth putting down in the logbook.

This month, we'll look at some little-known facts about beacons and discuss how these tidbits of data may affect your listening. Even if you're not a DX hound, the information will provide insight on why beacons operate the way they do.

ID, Please

Did you know that many beacons can transmit additional information besides their ID? For example, to indicate that operation has switched to emergency (battery) power or to a backup transmitter, some stations automatically append a "dit" (Morse letter E) to their ID. Beacon ENS/400 kHz (Ensenada, Mexico) has sometimes been heard in this mode – sporting an ID of "ENS-E."

Several Canadian beacons also have a clever way of indicating their status. Normally, there is a 600 ms space between the end of the ID and the long dash that is common to virtually all Canadian beacons. However, when there is an AC power failure and operation switches to battery power, the ID changes to three cycles of 600 ms spacing and three cycles of 1200 ms spacing.

Should a beacon's main transmitter fail and switch over to a reserve unit, the normal 600 ms spacing is extended to 1200 ms on *every* ID cycle, and will continue in this way until the problem is corrected.

Speaking of Canadian beacons, did you know there are a handful of special IDs reserved for *transportable* beacons? If you're lucky enough to hear UAA, UFF, UGG, UJJ, UNN, USS, UTT, UWW or UZZ, you'll know you've tuned one in. Transportable beacons might be used at temporary airfields or for military operations.

Finally, there are two common pitches used in North America; 400 Hz and 1020 Hz. With few exceptions, 400 Hz is used in Canada, and 1020 Hz is used in the United States. Telling these tones apart is easy, and can be a first indicator of a beacon's location.

It's Your Call

Did you ever wonder why beacons don't send conventional "K" or "W" call signs like other radio stations? Most beacons operate under the auspices of the FAA, which, as a government agency, does not come under FCC control. For this reason, you will not typically find aviation beacons listed in FCC databases claiming to cover the "whole spectrum."

The *BeaconFinder II* directory (described elsewhere in this issue) does cover all FAA beacons, plus many other stations operating in the 0 to 535 kHz spectrum.

What Goes Up...

Many FAA beacons include a "V" shaped antenna that is usually orange in color. This antenna is not part of the longwave equipment, but is for a separate 75 MHz marker beacon housed in the same shelter as the LF equipment. Marker beacons transmit a tightly focused beam straight up to help pilots determine when they are directly over the beacon site.

"V" shaped antennas at many longwave sites are for a separate 75 MHz marker beacon. This is LH/334 kHz, Bloomington, IL.

On the Road Again

Have you ever been traveling and come across what you suspect might be an LF beacon? Here's a trick that may help you find the answer: It is often possible to hear the second or third harmonic of a beacon on your car's AM radio. I used this trick while on vacation to hear EVB/417 kHz at New Smyrna Beach, Florida, near 834 kHz (417 x 2 = 834). Of course, you must be quite close to the station (1/8 mile or so) for this to work.

End Notes

The ARRL Letter, Vol 25, No. 31, reports that the Irish Radio Transmitters Society has applied to Irish communications regulator ComReg for a small allocation in the region of 500 kHz for Amateur Radio experimentation. The move follows a similar proposal made by the RSGB to UK regulator Ofcom in 2004.

Ofcom has not yet made a decision on the RSGB proposal, but the society is hopeful of an allocation between 501 and 504 kHz. There is also a possibility that Ofcom might designate the spot frequency of 500 kHz as a maritime memorial frequency. In recent years, there has been little traffic on the band 415 to 526.6 kHz, after most countries stopped using it as a Morse emergency maritime frequency in the 1990s.

Some Tense Moments

Ralph Craig, AJ8R (OH) wrote to us with an interesting story about his radio hobby that had a (thankfully) happy ending. Ralph writes: "A year after 9/11, the security around the naval shipyard in Portsmouth, New Hampshire, had been greatly tightened with small Coast Guard and naval auxiliary boats maintaining a patrol around the docks. As usual, when visiting my mother-in-law in NH, I took my Yaesu FR-101S with a LW converter installed in place of the 6-meter converter. I was down at the beach in a state park overlooking the entrance to the harbor where a Navy shipyard is located. Two USCG cutters are based there.

"My antenna was a homebuilt large loop with a 360-degree compass rosette and pointer. I had logged many stations including Nova Scotia, Maine, Quebec, even Gander, Newfoundland, when I noticed a Rye police car pull up and park close on my right. The officer gave me a once over and sat there. Soon a second police car pulled in and parked on my left also looking me over. At this point I became a bit concerned. When a third police car pulled in and parked on my right I decided to leave. As I packed up my gear, the three officers got out of their cars, grabbed their brown bags and sat down at a picnic table for lunch. They couldn't have cared less about what I was doing!"

I wish all of our readers a happy Thanksgiving, and I'll see you next month!

George Zeller
georgezeller@monitoringtimes.

FCC Upholds Fines for Selling Transmitters

Gibson Tech, a retailer who sold Ramsey FM transmitters from an internet web site, was fined $14,000 in 2005 by the FCC for selling transmitters that do not have FCC type acceptance and are only allowed for export.

In its defense, Gibson said that the FCC had inappropriately used a "secret shopper" on their hobbytron.com web site, that the Ramsey transmitters have been sold by "hundreds of retailers," and that their customers signed a document claiming the purchase was for export. They also said they couldn't pay and they were taking the website down at the end of April 2006.

This summer the FCC denied the appeal on all counts and says that the fine is due within 30 days. The website is still there selling the transmitters last time we looked. Caveat emptor!

❖ Hezbollah TV Relay Provider Arrested

New York police in late August arrested Javed Iqbal, aged 42. He was charged with providing Hezbollah TV signals to customers in the New York City area. The Associated Press quoted US Attorney Michael Garcia, who said that the USA government had determined that Hezbollah was a "global terrorist entity," and thus it is illegal to relay their satellite feeds to customers in New York. Iqbal used a satellite dish in Queens to pick up the signals, using a company called HDTV Limited in Brooklyn, New York. Thanks to veteran shortwave publisher Larry Magne of *Passport to World Band Radio* for providing two of our lead items this month.

❖ Laser Hot Hits Busted in Europe

In late August, longtime Europirate **Laser Hot Hits** announced that they were terminating their shortwave broadcasts as a result of a bust. The station's own announcement about the situation reads,

"After 12 years of successful broadcasting to Europe, we have reluctantly been forced to shutdown our shortwave transmissions. This is due to action from the radio authorities. In the meantime, we shall keep the Destiny stream and shows on our website available so listeners can continue to hear our programmes. Please keep checking this website for more updates over the coming weeks. Thanks to all the shortwave listeners who have supported us over the years."

Both streaming audio and the latest news from this station are available on their internet web site at the **http://laserhothits.co.uk/ i**nternet URL. The station was active earlier in August, and was logged in North America prior to the bust on 6220 kHz around 2330 UTC.

❖ Another FM Pirate Fined

The FCC has announced that they have closed down yet another FM pirate operation. This time they fined Matthew Britcher $17,000 for operating an unlicensed radio station on 103.3 MHz in Bettendorf, Iowa, and for refusing to allow an inspection.

Despite frequent FCC busts of FM pirates, many scores of such stations continue to operate across the United States. Thus, it pays to scan around your local FM dial to see if you notice any unusual activity.

❖ Clandestine Video

The sharp eyes of Horacio Nigro in Uruguay noted that the U Tube television network has posted a video memorializing the antique North American clandestine **Radio Venceremos** from the 1980s. Although this program is in Spanish, it is very much worth a look at **www.youtube.com/watch?v=PfJR-aH9S2M**

❖ New Clandestine Podcast

Veteran DXer Nick Grace, part of the outstanding team that produces both *Clandestine Radio Watch* and **clandestineradio.com**, has announced that he is producing an internet podcast. Nick's programming is devoted to the latest news in clandestine radio and unofficial international broadcasting. Those of us who are interested in political clandestine radio will certainly want to check out Nick's internet "radio" stream. Click on **www.ClandestineRadio.com/gcw/** for the latest edition of this interesting new program service.

❖ Part 15 Stations Legal

Not all unlicensed broadcasters are illegal under United States law. During mid-August, amateur radio operator **N9OGL** in Illinois successfully tested a part 15 low power transmitter with a limited antenna on 13,556 kHz around 0000 UTC using lower sideband modulation. On this frequency, under good propagation conditions, his **Omega One Radio** broadcast was widely heard across eastern North America. This sort of experimentation is completely legal, if FCC part 15 rules are followed carefully.

❖ Old Pirate QSLs

We have news from veteran pirate DXer Mike Prindle, who owns a very old pirate radio QSL. He heard and verified Radio Dublin International on 24th September 1981. The QSL is written on a half-sheet of some kind of legal or accounting paper. Michael says that, "I had forgotten that this was actually my first pirate radio station received, as I used it as a shortwave country. I hate to take away Craig Krist's moment in the spotlight, but ... I believe I have him by a couple of months!"

Meanwhile we received a very interesting collage of pirate QSLs from a contributor in the United Kingdom who forgot to mention his name. It also included a photo of an old Basque **Radio Euzkadi** clandestine. In later years that one was found to be broadcasting from a utility station transmitter in Venezuela, but this information was not known by DXers back during the 1960s. Here we see a nice World Music Radio QSL from March 26, 1972, from this anonymous contributor. We thank this contributor, but we wish that we knew who he or she is!

❖ What We Are Hearing

Monitoring Times readers heard sixteen 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. In the United States, Halloween and Thanksgiving will be the next upcoming major holidays. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but more than 95% of all North American shortwave pirate broadcasts are heard on **6925 kHz**, plus or minus 30 or 40 kHz.

Good Times Radio- This apparent new station has been broadcasting rock music and commentary

Continued on page 61

ON THE HAM BANDS

THE FUNDAMENTALS OF AMATEUR RADIO

T.J. "Skip" Arey, N2EI
tjarey@monitoringtimes.com

Great Radio in Grubby Times

Depending on which prognosticating propagation pundit you choose to believe, we are more or less at the bottom of the 11 year sunspot cycle. If you have been on the HF bands at all, you know just how bad things have been. However, if you dig through your back issues of *MT* or any other radio hobby magazine from around 11 years or so ago, you'll probably find more than a few folks wringing their hands and stating that the radio hobby would die due to the lack of quality long distance HF signals to play with.

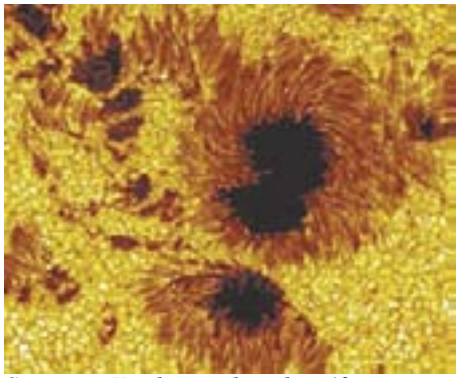
Well, I guess those various experts missed the side of the barn back then and any who take that stand today would be just as wrong. I have been through four of the 11 year sunspot cycles since I began playing radio, first as a listener and then as an active ham, and throughout that time I still head off to my shack and spin the dials.

I decided to "celebrate" the current band conditions by sharing some of the ways I've have made it through the bottom of past solar cycles when you have to grub for a signal. You don't have to convert your operating desk to a model train layout just because the sunspots aren't showing up right now.

❖ Operate Anyway

Oh, I'll grant you that I am not likely to nail V7's (Marshall Islands) with five watts on phone right now. But I still wouldn't be surprised if I didn't dig up one or two islands on a contest weekend working QRP CW. Things are tough below 30 MHz right now, but I still haven't stopped operating HF running low power. I have just changed my expectations a bit to fit the situation. Even with a lot more rag chewing and a bit less DX chasing, I still fill the log book. If you just look at the bottom of the sunspot cycle as being something to work through, you can do the same. Remember, it's just as nasty on the bands for everyone else; we are all equally disadvantaged. So accept the challenge and continue to have fun.

First off, get into the habit of listening more. Even in the weak section of the solar cycle, some interesting band openings can happen. Remember, radio signals may propagate in the HF regions largely due to the sunspot cycle, but that's not the exclusive cause. (See Tomas Hood's background article on propagation in September *MT - ed*) Much more is involved in bringing that signal around the world to you, so if enough other seasonal and geomagnetic factors fall into place, good things can still happen. Keep an ear out for things going your way. And



Sunspots - You have to love them if you are an HF operator.

if you hear 'em, try to work 'em.

And, while you're doing all that listening, do not be afraid to throw out a call on what you think is a dead band. Think of it as fishing in a cloudy pond. You don't know where the fish are hiding, but you know they are there someplace. It doesn't hurt to throw out a few casts.

Also, do not feel that contesting is futile during these rough times on the bands. Remember what I said earlier: things are bad for everyone. The handicap presented by the bottom of the cycle is getting in the way of those big gun stations, too. Maybe it even levels the playing field a bit. So if you enjoy throwing your call out on a contest weekend, have at it! There will still be lots of multipliers to work.

❖ Fill in the Gaps

As mentioned earlier, DX is going to be fairly tough right now. Sometimes it is going to seem as if the F2 layer doesn't have a single ion left in it. Shorter distance communication will be the order of the day on HF in many cases.

Okay, as they say, we have lemons: let's make a nice batch of lemonade. Go through your logs and look at the gaps in your domestic lists. Find that handful of states you haven't gotten around to adding to your log and start searching for them.

One great way to accomplish this is to find out when those elusive states are holding the annual QSO parties. Most ham publications list these and I even note many of them in the sidebar to this column in *MT*. With so many ears looking for your signal during a localized contest, you may get a chance to work a new one or two even if the cycle has bottomed out.

So, if you are missing Delaware on 20 meters or Wyoming on 40 meters, this would be a good time to turn your energies toward 5 band Worked All States. You can even apply this to targeted DX contests. Contests representing specific countries or entities will have more stations on the air than even some of the bigger general contests.

❖ CW Cuts the Mustard

If you haven't given Morse code a try in a long time, now is the time to dust off your key. CW has always been able to get through in difficult band conditions. Why do you think it is the mode of choice for most Moon Bounce aficionados?

You don't have to send fast, just send clean. Under bottom of the cycle conditions, a good slow fist can win the day against a very high noise floor. And who knows: once you get back in the CW saddle, you may decide to stick around. The CW portions of the HF band are a great place to play radio.

❖ Go Digital

The newer digital modes such as PSK31 can also do a very good job under current band conditions. Most modern digital modes make use of error correcting protocols that help to alleviate the problems presented by poor propagation and band noise. If you haven't looked into digital HF yet, the bottom of the solar cycle is a great place to start.

❖ Build Something

Okay, even with the pep talk I have given you up to this point, I am enough of a realist to know that there are going to be a few days when the bands are just going to be dead. Not to worry. When you can't listen to or talk on the radio, you can always build one! I have a slight advantage over some hams in that I probably enjoy building radio gear even more than I do operating.

If you look thorough the pages of most amateur radio publications or search on the internet, you will find kits of all sizes and prices. You can build station accessories or even an entire transceiver. The "quiet" times on the bands are the "solder melting" times for me around my shack.

If you want to go beyond kit building, there are hundreds of circuits published in books such as the *ARRL Handbook* as well as on the Internet. Most HF ham gear can be built "Ugly Style" without the need for etched printed circuit boards. I can tell you that one of the proudest moments you can have in ham radio is to let the station on the other side of the QSO know that

your rig is homebrew.

This is also a good time to experiment with different antennas. One of the great things about HF is that great wire antennas can be built for very low cost. If you find solar cycle conditions seem to be favoring one band over another, you may want to look into constructing a gain antenna for that band.

❖ Upgrade

So then, if bad conditions have you spending less time at the dials, maybe you could devote an hour or two to getting your next highest amateur radio license. Grab a study guide for your next license challenge and spend those radio-free hours getting ready to head to the next Volunteer Examiner's Test Session. If you haven't met the CW requirement yet (still needed for General and Extra), 15 minutes of serious practice copying code per day should get you to the 5 word per minute requirement in about 4 weeks. Make yourself a promise to greet the rise of the new solar cycle licensed to operate on all amateur radio frequencies and in all modes.

❖ Going Higher

I almost called this section "Sunspots? We don't need no stinking sunspots!" but thought better of it. I saved this toward the end, because I don't see VHF/UHF operating as a replacement for HF operating. With the exception of perhaps contesting, the "vibe" tends to be different in the world above 30 MHz.

That said, there is a lot of fun to be had on those bands which are not as directly affected by the solar cycle. If you still like the hunt of DXing, you may want to give a serious look at weak signal work. Instead of collecting countries, you will be shooting for grid squares, but the joy of the chase is still there.

If you are an HF operator, you can look at using transverters to get your equipment up into the VHF/UHF bands, or you can look at dedicated transceivers. If you own one of the newer broadband rigs such as something from the ICOM 706 series, now would be a good time to see what the non-FM modes are like above 30 MHz. There is a lot more to be found than repeaters up there. Sideband and digital modes dominate the world of weak signal DXing.

VHF/UHF radio also lends itself to experimentation, especially with the smaller antenna sizes.

❖ Community Service

Public service radio assistance is always needed, regardless of band conditions. But, since you may find yourself doing more VHF/UHF operating during this period of poorer HF conditions, you may find using your radios to help other people to be even more rewarding than catching that next country needed toward the Honor Roll. Contact your local ARES or RACES coordinator and offer your assistance. You will get to participate in drills and training as well as getting out on the road to offer radio communication to community activities and for area emergencies.

❖ Here Comes the Science

Galileo Galilei made the first observation of Sunspots in 1610 with his early telescope. The 11 year sunspot cycle was first proposed by German astronomer Heinrich Schwabe in 1843.

By the way, if you want a great time lapsed glimpse of the solar activity from the last solar cycle, Web on over to **www.nasa.gov/mpg/143937main_SOHO_EIT_sm.mpg** and get a look at NASA's SOHO satellite movie.

Now for the best news of all: thanks to the latest technology and science (including the work of the aforementioned SOHO Team) the experts are predicting that the next solar cycle may get off to a slow start but is expected to peak in 2012 with sunspot activity up to 50% greater than the peak of the last solar cycle. You can bet I am getting ready for a run at DXCC with 1 watt, maybe even 1/2 watt. Good things come to those who wait.

Have fun. I'll see you at the bottom end of 40 meters, even if it is noisy right now.

UNCLE SKIP'S CONTEST CALENDAR

ARRL Sweepstakes Contest (CW)
2100 UTC Nov 4 - 0300 UTC Nov 5

Kentucky QSO Party
1400 UTC Nov 11 - 0600 UTC Nov 12

ARRL Sweepstakes Contest (SSB)
2100 UTC Nov 18 - 0300 UTC Nov 20

NA Collegiate ARC Championship (SSB)
2100 UTC Nov 18 - 0300 UTC Nov 20

CQ Worldwide DX Contest (CW)
0000 UTC Nov 25 - 2400 UTC Nov 26

Outer Limits continued from Page 59

on other pirate stations. (None known)

Grasscutter Radio- By now a veteran pirate, their programming is usually rock music. (Uses *grasscutterradio@yahoo.com*)

KIPM- Alan Maxwell's existential drama programming remains on the air. He may have the most complex productions in pirate radio today. (None; formerly used Elkhorn)

MAC Shortwave- They recreate a genuine oldies rock format that sounds just like the old medium wave rock stations did in prior decades. They still sometimes omit the "shortwave" part of their ID, and they use both 6925 and 6851 kHz. (Uses *macshortwave@yahoo.com*)

North Woods Radio- Still broadcasting "from the Great Lakes," their loon bird call noise makes their rock and comedy easy to spot. (Uses *northwoodsradio@yahoo.com*)

Omega One Radio- This relatively new one has been playing very diverse rock music songs. (Unknown)

Radio Caliente- Jerry Guy heard this one on the unusual frequency of 13955 kHz at 1552 UTC. Their programming was Latin American music. (None, asked for reports via the Free Radio Network web site)

Radio Sixpack- The format on this new one has been very old rock music oldies. (Unknown)

Sunshine Radio- Their female announcer hosts rock music, still in association with Grasscutter Radio. (Uses *grasscutterradio@yahoo.com*)

The Crooked Man- This old offbeat pirate from the 1980s has returned. Their announcer said that he fell on his head, accounting for his strange rants. (None valid)

The Crystal Ship- The Poet's "Voice of the Blue States Republic" normally features classic rock and leftist political commentary on highly variable frequencies such as 6875 kHz and 1710, 3320, 6854, 6925, and 9057 kHz. (Belfast and uses *tcsshortwave@yahoo.com*)

The International Voice of Pickle's Worth- This one appeared late in the summer, but it featured only IDs with no other programming. (None)

Undercover Radio- Dr. Benway's rock music and pirate radio history discussions still are transmitted "from the middle of nowhere." (Merlin and uses *undercoverradio@mail.com*)

WBNY- At it best, Commander Bunny is a funny parody of political clandestine broadcasting. At other times they feature rock music and slow scan TV experiments. (Belfast and uses *rodentrevolutionhq@yahoo.com*)

WMPR- When you hear techno rock music with a "dance party" slogan, then you are hearing this one. (None; has QSLed only at the Winter SWL Festival)

WTPR- Using a "tire pressure radio" slogan, this one proves that literally any subject can pop up in pirate radio programming. (None)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations, especially in Europe. 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 109, Blue Ridge Summit, PA 17214; PO Box 69, Elkhorn, NE 68022; PO Box 146, Stoneham, MA 02180; 383 Kingston Avenue, Suite 94, Brooklyn NY 11213; and PO Box 293, Merlin, Ontario N0P 1W0. Unfortunately, PO Box 69, Elkhorn, NE 68022 is no longer a valid address.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletin for submitting pirate loggings with a hope that pirates might QSL is now the e-mailed *Free Radio Weekly* newsletter, still free to contributors via *yukon@tm.net*. A few pirates will sometimes QSL reports left on the Free Radio Network web site, at **http://www.frn.net**. Unfortunately, given the demise of *The ACE,* that formerly widely read bulletin can no longer be used in order to notify pirates that a listener heard a broadcast.

❖ 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**:** Kirk Baxter, North Canton, OH; Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; Dean Burgess, Manchester, MA; Gerry Dexter, Lake Geneva, WI; Rich D'Angelo, Wyomissing, PA; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Nick Grace, Washington, DC; Jerry Guy, Atlanta, GA; William T. Hassig, Mt. Prospect, IL; Harry Helms, Smithville, TX; Kraig Krist, Manassas, VA; Ed Kusalik, Coaldale, Alberta; Chris Lobdell, Stoneham, MA; Larry Magne, Penn's Park, PA; Greg Majewski, Oakdale, CT; Will Martin, St. Louis, MO; A. J. Michaels, Blue Ridge Summit, PA; Joe Miller, Troy, MI; Horacio A. Nigro, Montevideo, Uruguay; John Poet, Belfast, NY; Mike Prindle, New Suffolk, NY; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Bryan Wade, Elizabethtown, KY; and Joe Wood, Greenback, TN.

Clem Small, KR6A
clemsmall@monitoringtimes.com

Real Grounds, Radio Grounds, and Artificial Grounds

❖ Electrical Ground

One meaning of the term "ground" refers to a connection to the earth, often by means of an 8-ft long metal rod driven into the earth. By connecting the grounding terminal on our equipment to this ground, we may help reduce the likelihood of getting an electrical shock from our equipment and also reduce the likelihood of lightning-induced damage to that equipment. This kind of ground is called an "electrical ground."

❖ Radio Ground

Yet another meaning of "ground" refers to the earth beneath an antenna. Earth conducts electrical current, and the electrical resistance of the earth beneath an antenna varies widely from one location to another. The interaction between the earth beneath the antenna and the radio-frequency energy from that antenna is important. Some portion of the RF energy from an antenna is usually directed earthward. When this energy encounters the earth, some portion of the energy reflects from the earth and combines with the other RF energy launched by the antenna. This combined energy helps determine the shape of the radiation and reception pattern of the antenna.

The depth to which radio energy appears to penetrate the earth before being reflected is sometimes referred to as the "radio ground" (not "RF ground" which is discussed later). When the earth beneath an antenna is highly resistive, the depth to which the radio energy penetrates is greater than for more conductive earth. Thus, as far as the behavior of radio waves are concerned, the apparent surface of the earth can be lower than the actual surface of the earth. For example, once when the radio pioneer Marconi was in a desert region he used an antenna constructed by laying wires directly on the highly-resistive, dry sand. The antenna performed as if it were elevated high in the air. It was as though the antenna was sitting atop a tall insulator made of dry sand.

In addition to reflection of RF energy, some portion of the energy that encounters the earth is converted to electrical current. As this current flows in the earth, some of it is dissipated as heat in the earth's resistance. This current is therefore lost to the communication process. If the earth beneath the antenna is dry and rocky, it will have high resistance and much of the current will be lost as heat. If the earth is moist, then it will have a lower resistance and less current will be lost as heat.

So, at times it is worthwhile to make the earth more conductive by putting wires in the earth beneath the antenna. For the Marconi quarter-wavelength antenna these wires usually radiate out from the base of the antenna like spokes of a wheel, and are referred to as "radials." The radials are connected to the base of the antenna where they can return the current that they capture back into the antenna's circuit. Radials make the antenna more efficient both in amount of power launched in transmitting or captured in receiving.

❖ Radio-Frequency Grounds: Actual and Artificial

When transmitting, if you find that you get stinging shocks or RF burns from your microphone, radiotelegraph key, or transmitter case, the chances are that you need a better RF ground. This condition is often called "having RF in the shack," or having a "hot chassis."

RF in the shack is usually caused either from using no RF ground, or an excessively long ground lead-in wire. If you have no RF ground (that is, no connection from the earth to your equipment's ground terminal), you should install one. This not only helps with keeping RF where it belongs, but, as mentioned earlier, it can help reduce your chances of getting an electrical shock from the AC power if a short occurs in your equipment.

Whereas you may get by using only a single 8-foot rod driven into the earth, many operators suggest using two to six rods, all separated by several feet. They should be connected together by heavy conductors. With heavy wire, make the shortest lead practical from the RF ground to your transmitter's ground terminal. If a separate antenna tuner is used, connect to its ground terminal rather than to the transmitter's.

If your transmitter is located in an upper story of a building, you probably won't be able to make a sufficiently short RF connection to the earth. If you can't install a satisfactory RF ground, usually you can solve this problem by connecting one or more radials (each a quarter wavelength long at the transmitter's operating frequency) to the transmitter's or antenna-tuner's ground connector.

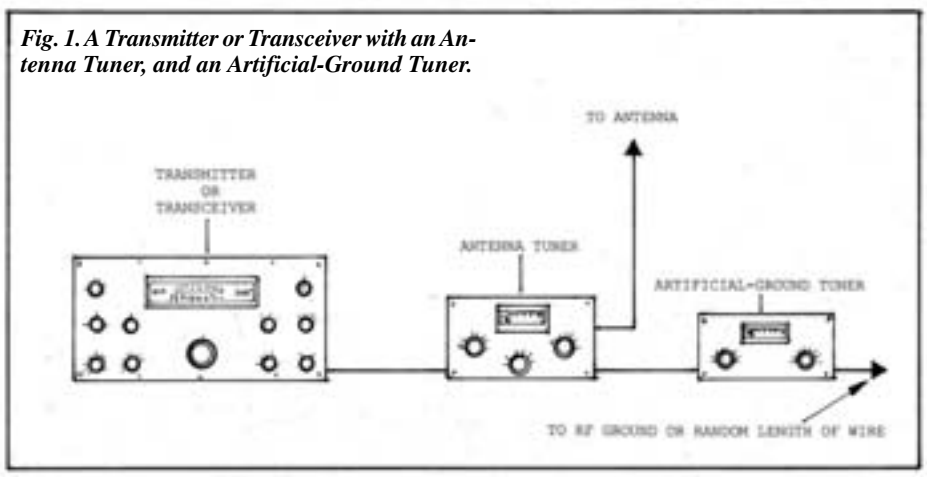
Another solution when ground leads are too long is to use a device called an "artificial ground" (fig 1). Connect it from your transmitter's ground terminal to either a random-length wire or to the RF ground wire that leads to an actual earth ground. Again, if a separate antenna tuner is used, connect to its ground terminal rather than to the transmitter's terminal.

❖ Counterpoises and Above-Ground Radials

Sometimes counterpoise elements and above-ground radials are thought of as substitutes for the earth. However, in some antenna designs, elements called counterpoises are radiating antenna elements rather than a substitute for the actions of the earth. The set of above-ground *resonant* radials used with ground-plane antennas are sometimes referred to as a "counterpoise." On the other hand, an above-ground, *non*-resonant wire net or screen beneath an antenna is also sometimes called a "counterpoise."

Because above-ground radials used with ground plane antennas are resonant, radiating elements, they should perhaps better be thought of as antenna elements rather than as part of a ground system. The net or screen is not resonant, and radiates little if any energy.

Fig. 1. A Transmitter or Transceiver with an Antenna Tuner, and an Artificial-Ground Tuner.



This Month's Interesting Antenna-Related Web site:

Operation manual of an MFJ artificial ground-device:
www.mfjenterprises.com/man/pdf/MFJ-931.pdf#search=%22artificial%20ground%22

Artificial-ground tuner discussion:
www.remeeus.eu/english/hamradio/artificial_ground.htm

A program to determine coil size for artificial ground used with a 1/4 wavelength vertical antenna:
www.smeter.net/grounds/c_poise.php

One ham's ideas on curing RF in the shack:
http://dzabcik.home.texas.net/ground.html

At times a half-wavelength of wire is strung just above the earth, but directly below a half-wavelength, horizontal dipole antenna. This resonant wire is often though of as a counterpoise in the antenna system – a sort of replacement for a highly-conductive ground. In a sense it's true that resonant above-ground radials and resonant, above-ground counterpoises do substitute for the earth. However, they have much lower resistance than earth and function as resonant, radiating antenna elements, not as a non-resonant, reflective resistor as does the earth.

❖ For the Record

The radio pioneer Lee DeForest once took a wireless set on a balloon flight to make some tests. The technician helping him became concerned that, high in the air, they would have no ground connection for the antenna of the wireless set. So, just before take-off, he dashed away to return shortly carrying a flower pot, complete with flower. Inserting the ground lead into the earth in the flower pot he pronounced the system ready to go!

RADIO RIDDLES

Last Month:

I asked: "We now know what a dummy some antennas are. Now what is an 'artificial antenna'?"

Well, just as the dummy antenna was used as an aid in adjusting transmitters, an artificial antenna is useful in adjusting receivers. The artificial antenna is shielded, and thus receives no usable signal from the space around it as a normal antenna would do. However, it does receive a signal via a connection to a signal generator.

A signal generator is a device for furnishing a low-level radio-frequency signal to a receiver's antenna-input circuit for circuit-adjustment purposes. The impedance of the artificial antenna is matched to the impedance of the receiver's antenna-input circuit. Thus, after adjustment, the input circuits of the receiver will match the impedance of antennas designed to work with the receiver when it is put into service later.

This Month:

What in the world is "sky billiards"? Hint: No, it's not playing pool while riding in a jet liner.

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.

Marc Ellis
marcellis@monitoringtimes.com

Sizing Up Our Trans-Oceanic

Last month, by way of introducing our new project radio, the B600 Trans-Oceanic, I presented a brief, condensed, history of the evolution of the classic "suitcase" models of this much-loved receiver. By the time the B600 was introduced in 1959, the first of the smaller, lighter "Royal" transistorized Trans-Oceanics was already on the market. Thus, the B600 we're about to examine – as the last of the tube-model "suitcases" – represented the end of an era.

❖ Dealing With the Mold (Ugh!)

I've been holding onto this B600 for maybe 20 years, planning one day, to use it as the subject of a restoration article. But when I took it down from the shelf in my basement workshop (not a particularly damp environment), I found its leatherette covering coated by a very unappetizing deposit of mold. A nice Hickock 6000A tube tester stored nearby was similarly affected.

Taking both items outside, I washed the cases using a soft cloth and my wife's Murphy's oil soap, a cleaner she uses for some of the more delicate household tasks. Swirls of mold spores puffed into the air as I worked. But after I had washed the cases twice and rinsed with plain water, both the standard "Black Stag" covering of the Zenith and the Hickock's trademark red leatherette were mold free (at least to the naked eye!).

Both cases were also remarkably fresh looking. As for myself, I felt that the mold was probably all over me, even though I couldn't see it. Before going further, I tossed all my clothes into the laundry and took a quick shower. Perhaps some of you readers have suggestions for a gentle chemical treatment that might prevent mold from re-growing on the cases, though I know the only real solution is to introduce cross ventilation (now lacking) and perhaps a de-humidifier.

Swinging up the front cover reveals the B600's front panel, which is dominated by the 600 series' trademark slide-rule dial and associated band-select buttons.

Now that the cabinet was clean enough to be handled, I could review the radio's general condition and refresh myself about some of its important features. But one thing was immediately clear. Cosmetically, this set is probably in the best condition of any I've ever used as a restoration project. And that's quite a relief after my experiences with the Silvertone "Little Fellow" that was our last subject.

❖ The Front Panel

The B600's front panel, revealed by lifting the swing-up cover, is dominated by the large multi-scale slide-rule dial that is a trademark of the 600 series. The topmost scale on the dial, calibrated from 0 to 60, is simply a logging scale. The next four scales below that are labeled 31 Meters (9.3 - 9.9 MHz), 25 Meters (11.4-12.2 MHz), 19 Meters (14.8-15.6 MHz) and 16 Meters (17.4-18.2 MHz).

These reflect Zenith's original philosophy of restricting shortwave coverage to a series of "sliver bands." Ease of tuning was accomplished by spreading out each dial scale over a band covering just the most popular international broadcasting frequencies.

Originally, there was an additional "sliver band" covering 49 meters. As mentioned last month, however, this was replaced, beginning with the H600, with two general coverage bands (2-4 MHz and 4-9 MHz). The idea was to make the radio more useful to yachtsmen by covering various ship-to-ship, marine, and weather frequencies. These are the next two scales on the B600 dial.

Finally, the bottom scale covers the conventional AM broadcast band. Any of the seven bands in the B600's tuning range may be selected by depressing the push-button associated with it.

Below the big slide-rule dial are the usual knobs for on/off-volume and tuning. Played up in the advertising for this model is a battery-saving "on" indicator which is nothing more than the word "ON," in small type. It's hidden by a tab on the volume control knob, but revealed once the control is rotated to power the set. As far as the tuning knob is concerned, right now it will move the dial pointer just a little bit in each direction. Apparently the dial cord(s) is intact and just slipping.

The top scale on the tuning dial is for logging. The next four are "sliver bands" (see text). The following two are general coverage bands intended to allow reception of marine frequencies. The broadcast band scale is at the bottom.

Below the knobs are four tone-control switches, labeled "treble," "voice," "alto," and "bass." Found on every model of Trans-Oceanic from the very first one, and sometimes billed as the "Radiorgan," their manipulation allows for the selection of up to 16 different tone colorations.

A phone jack and a spring-loaded dial light switch are the only other two items on the uncluttered front panel. As wired, the dial lights work only from a separate 1.5-volt battery and remain on only as long as the spring is depressed.

The inside of the B600's swing-up front cover has a little compartment with a spring-loaded door labeled "LOGS" and "CHARTS." This, unfortunately, is empty – but perhaps someone has scanned and printed out the correct paperwork for this compartment and is making it available on the internet. I'll be checking for that later.

❖ The Antennas

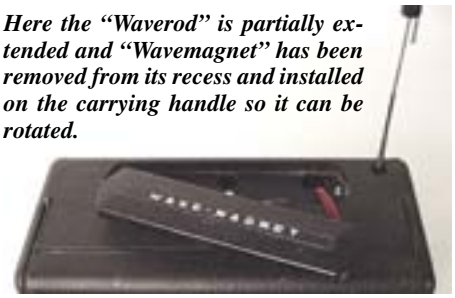
At the upper-right-hand corner of the top of the case is a round black knob that is attached to

This view of the back of the set shows the "Waverod" shortwave antenna (in collapsed position), the recessed "Wavemagnet" broadcast band antenna with its transmission line, and the radio chassis and battery compartment.

the top of the "Waverod" telescoping antenna, which is used for shortwave reception. Giving the knob a half-twist releases the top section of the antenna, after which it can be pulled out to its full length of perhaps five feet.

The broadcast antenna, or "Wave-Magnet," is a ferrite rod enclosed in a plastic case that is recessed into the top of the cabinet just behind the handle. It can be used in that position or removed from its recess by opening the rear cover and pushing up through one of the provided finger holes. A small pin extends down from the bottom center of the Wave-Magnet. This may be inserted into a hole provided in the carrying handle – allowing the listener to rotate the antenna, taking advantage of its directional properties to maximize reception.

The Wave-Magnet is attached to the receiver by a transmission line about four feet long. This allows the antenna to be pulled out and mounted on the window of a car, bus, steel-framed building, etc. to allow reception in situations where shielding might otherwise prevent it. My Wave-Magnet has two snap fasteners intended for the attachment of suction cups. These are missing.



Here the "Waverod" is partially extended and "Wavemagnet" has been removed from its recess and installed on the carrying handle so it can be rotated.

❖ Inside the Cabinet

Dropping the back cover of the receiver reveals the radio chassis, which is mounted on a shelf above a generously-sized battery compartment. The battery pack had to be big, because according to the B600 instruction book, which I was able to download from the internet, it was designed to last for about 150 hours when used for an average of 3-4 hours per day.

On the inside of the back cover are a clip to hold the instruction book as well as two fittings with knurled thumbscrews intended to capture the excess length of the Wave-Magnet's transmission line. According to an illustration in the instruction book, two suction cups for the Wave-Magnet should also be stored on the back cover – right next to the transmission line fittings. I assume that snap fasteners like the ones on the Wave-Magnet itself would have been provided. But, oddly enough, I see no sign that any such hardware had ever been present.

The chassis itself is nice and clean, though its painted surfaces do show signs of pitting here and there. A little corrosion is also visible on some unpainted metal parts, but nothing serious. A plug for the connection of a phono pickup arm is provided on the rear apron, as is a radio/phono switch.

One obviously missing part is the large spring-actuated takeup reel that used to retract the a.c. cord when the set was operated on batteries. I don't expect to be able to replace this unless I happen across somebody who is "parting out" a B600. However, it is not necessary for the operation of the radio, and the cord can just as easily be poked back into the radio cabinet manually when necessary.

I should mention that the a.c. plug must be inserted into the recessed outlet provided to switch over to battery operation.

The tube complement of the B600 is as follows: 1U4 r.f. amplifier, 1L6 oscillator/mixer, 1U4 i.f. amplifier, 1U5 detector/AVC/a.f. amplifier, 3V4 audio output. This is a series of miniature tubes designed especially for use in battery portable radios; their filaments draw only 50 mA. There's also a 50A1 voltage regulator tube to be discussed below. I did check to see that the proper tubes were inserted in the sockets. They were and I was especially pleased to see that the 1L6 oscillator/mixer was present.

This is quite a rare tube that may have been developed especially for converter (oscillator/mixer) use in the Trans-Oceanics. I understand that it rarely turns up in other battery portables – with the exception of Trans-Oceanic knockoffs such as the one by Hallicrafters. The reason for a specially developed converter tube lies in the Trans-Oceanic's shortwave coverage, which extends to over 18 MHz on the B600.

At best, converter tubes tend to be an unstable and noisy breed. Push such a tube to the limit by operating its filament and plate on just 1.4 volts and 90 volts respectively and performance becomes iffy – especially at the higher frequencies and as battery voltages begin to decline with use. The 1L6 was designed to overcome this problem. The 50A1 voltage regulator tube was introduced for a related reason – to prevent oscillator dropout due to power line voltage variations.

Substituting for an unobtainable 1L6 has been the subject of many articles in the radio restoration press. Perhaps the most common fix is described by Ludwell Sibley in his *Radio Age* (May, 1995) article "Restoring the Later Transoceanics." The readily obtainable 1R5 tube may be used instead, providing its pin 5 is carefully cut off (gentle multi-squeezing with the cutters is suggested).

The amputation is necessary because otherwise, due to internal strapping within the 1R5 tube, what is normally the 1L6 screen lead would be grounded. Several 1R5s might have to be tried before one is found that works at the higher frequencies. And the set's alignment on 16, 19 and 25 meters will be thrown off, with full correction beyond the range of the existing tuning slugs.

❖ From the Readers

Ralph Craig, AJ8R, e-mails that our recently completed Silvertone "Little Fellow" restoration brought back some fond memories. It's the same model he purchased for a quarter in a junk store when he was a boy of 11. He enjoyed listening to it in bed. I also received a second note from **Henry Schultz, WI3U,** who, like me, pored over the pages of *Radio For the Millions* as a boy – wishing he could build one of the sets described there and wondering about the people in the pictures. Perhaps the fascination with those people came from the fact that they looked like plain, ordinary folks – not the model types usually used in book illustrations! **Ken Backer** of Milton, Ontario, e-mailed pics of an interesting 1920s battery set that he picked up at a flea market. Looks like a home-made regenerative job. Good luck bringing it back to life, Ken!

This is your equipment page. Monitoring Times pays for projects, reviews, radio theory and hardware topics. Contact Rachel Baughn, 7540 Hwy 64 West, Brasstown, NC 28902; email editor@monitoringtimes.com.

You Have What It Takes to Control your R8B

By Terry Pack

For a long time I have wanted a program that would run my R8B, be small, use little overhead, and be reliable. I wanted it to run in the background and be able to schedule frequency changes on my receiver without my being there to change it.

I have a computer program that records audio and I can schedule the recording just fine. But in order not to miss program or even SSB nets or network radio shows, I needed to get the R8B to change frequencies and modes.

I looked at programs on the web and even purchased one, but was not happy. They were great for someone who was in front of the radio all day, but I did not have the time to sit there. I also wanted to keep the processing down to a minimum.

Although I don't know any newer programming languages like C++, I decided to try writing a program on my own anyway. I am running Windows XP on my computer, but I knew how to make the DOS programming do things before "windows" were on computers. I checked to see if there were any programs already on the computer that I could use. When opening up the "Command Prompt," then using the "Help" command, I found what I needed. The "print" command will send a text file to a com port: This is exactly what I needed!

I determined that instead of trying to change everything, like frequency, mode, bandwidth, etc., I would just set up memories (mem channels) in the receiver with the setting and frequencies of the stations I wanted to record. I would need only one command to tune the correct frequency. Looking at the command chart for my R8B, I found that a C followed by three numbers then a carriage return would set the radio to the memory channel I wanted.

To change it to mem channel 000 the syntax is:

C000 (carriage return)

I tried this and found that it was not working: The computer was not talking to the radio.

❖ Com Ports and Carriage Returns

OK, now I needed to work out some bugs. First, I found the com port did not boot up at the right settings, so I needed to change the computer com port settings. Using the "Help" command, I found the "Mode" command was for this and I was still able to run it from the command prompt. With a little experimenting I found the syntax that would set the com port, and I could now send commands from the computer using the "print" command to the radio.

The edit program that comes with the command prompt also has a help screen; this is how I figured out how to insert a carriage return in the .txt file using edit.

I should stop here and mention that I did have a problem at first making the .txt files: It seems that the R8B needs a carriage return (CR) to execute the command. I could not use Notepad or Word; they would not insert a carriage return. I had to use the "edit" program in DOS (at the command prompt). It is a basic editor and is more powerful than the others when you need to get down to the editing level I was. I don't have any way to show a carriage return in this article. I actually used a command in the edit program that inserted a CR for me. When you put a CR in the edit program, it inserts a character that looks like a musical note on sheet music.

❖ Going to Bat

OK, back to the fun stuff; making these commands into an executable program. I went to the good old .bat file format. I put the "Print" command in a .bat file to send the correct info to change the mem channel on the R8B. I also created a .bat file with the "mode" command in it. This will set the com port on the computer so it can communicate to the radio.

Here is a .bat file used to change the receiver to memory channel 000; they only run the txt files and therefore are very small, but I need a .bat file for each .txt file I want the task scheduler to run.

So the syntax of the .bat file that changes the R8B to mem channel 000 looks like this:

Print com1 000.txt

I named it **000.bat.** The syntax of **000.txt** is:

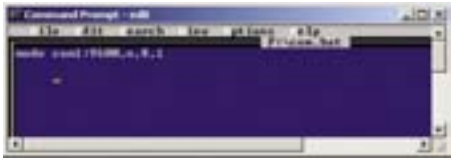
C000 (CR)

The .txt files are very simple and easy to make or change; they contain the actual commands that control the receiver. Here I use the C command and the 3-number channel for channel 000, but you can use other commands to control the receiver – just remember all commands must be followed by a "carriage return" so the R8B will execute the command.

To change the com port to the correct settings so the computer would talk to the radio without a lot of typing, I made another .bat file. The syntax is:

Mode 9600,n,8,1,p

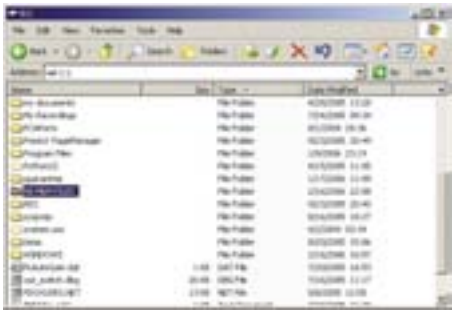
I called it **com.bat**



To change the computer com port to the correct setting, I used the mode command by running a .bat file called "com.bat." The R8B needs to be setting on the com port of 9600 baud, 1 start bit, 8 data, 1 stop bit, no parity. These settings make the computer and radio understand each other.

For each and every mem channel I want to control, I needed to make one .bat and one .txt file, but these are simple. I made one, edited it for the next channel, then saved it under a different name. I also made all of the .txt files the same way. I named each file the channel that it would set the receiver to. If I ran 000.bat, that would set the receiver to mem channel 000. I also named each .txt file the name of the corresponding .bat file.

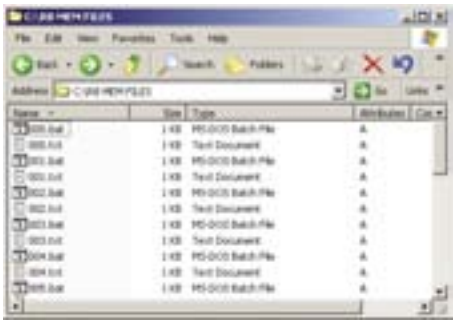
So, it goes like this: 000.bat runs 000.txt and changes the receiver to mem channel



Example of my C:\ root directory. I put the files I created into a folder that is easy to find.

000. The 001.bat runs 001.txt and changes the receiver to mem channel 001, and so on.

Now I saved both the .bat and the .txt files in the same folder called "R8B MEM FILES." Going to Windows Explorer and double clicking on a 000 .bat file runs the program and it changes the receiver to mem channel 000.



Example of the C:\R8B MEM FILES folder; all of the files I need are in this folder so I can easily find them when I go to schedule or change them.

❖ Hands-Off

Now the procedure works, but I still need to be in front of the computer to make it work, and that is not what I wanted. I used the "add scheduled task" wizard at the top of the window and it walked me right through the set-up.

Example of my task scheduler: notice that I use some frequencies more than once. I like the task scheduler because of some of the options when setting up a task to run. Notice the settings for com. This sets the com port by running com.bat.

I had problems getting the task scheduler to run a task, because I by-passed password protection when I first set up Windows. I keep my computer running 24/7 and normally never log on or use any passwords, as I did not think

Example of the add schedule task wizard on the task tab. This is where you need to type your password if prompted

I needed it. But I found that if it asks you for your password, you need to go back and create one; otherwise it won't run the task. Now that I have done that, I can change the channel of the R8B by scheduling a .bat file to run at the appropriate time.

I put the com.bat in the task scheduler at the start-up of the computer, so that when I start the computer it changes the com port to the right setting from the very beginning.

Example of the add schedule task wizard on the schedule tab. This is where the most of your scheduling happens.

❖ How It Works

Suppose I want to change the receiver to 610.00 kHz, ANT= A, MODE= AM, BW= 6.0, AGC= S, NB= N, and VFO=A. I program mem channel 000 to those settings and just make a schedule to run C:\ R8B MEM FILES\000.bat at the time and day I want to change it, and the computer does the rest.

I now have a way to schedule frequency changes on my receiver, and I can make more .bat files to go to any mem channel. It seems like a lot of trouble, but I have been recording things for quite some time and I have only used 10 mem channels, so I believe most people would only need to make at most 20 files. On an

Example of the add schedule task wizard on the settings tab. I did not check any boxes because if the computer is running I want the radio to change.

R8B there are 1000 mem channels, so it could take a while if you needed that many channels under control!

❖ Final Thoughts

Well, there it is, and I did not have to spend 100 dollars to get the program I wanted. I have used very little processor time and it is easy to edit. If I have a frequency that is not being used anymore, I just change its mem channel info. The nice thing about changing a mem channel is that it can be done right on the front panel of the receiver.

With a little creativity, you can do some other things with the .bat files. I used the "PO" and "PF" commands and made .bat files for them. "PO" turns the receiver "on", and "PF" turns the Receiver "off". I copied these to the desktop as short cuts and changed the icons to a "green arrow" for "on" and "red box" for "off" and put them in the left hand system tray, just for fun.

I am certain that this would work on other receivers, if the commands were known, but I don't have any other receivers. I think the .txt files are the only thing that would need to be modified, and maybe the com.bat so your computer would talk to your receiver.

MT REVIEW

The Tecsun R-919 (That's Chinese for "Grundig Mini 300PE")

By Eric Bryan

You may remember joining me in September 2005 in my pursuit of the poor man's pocket radio. As I continued my exploration of the world of low-cost pocket SW sets, I bought the Tecsun R-919, which is sold stateside by Eton as the Grundig Mini 300PE. This radio was part of the Grundig Mini World 100PE family (there was also a Mini 200).

Opening the box shipped to me from Hong Kong, I found the radio, earbuds, wrist-strap, a thick neoprene holster, and a clip-on wire antenna of a little under 13 feet. The wire has a durable coating/insulation and a wide alligator clip tied to its far end.

One surprise was the unit's finish: The fruity yellow-orange color I chose is actually a rubberized coating covering the plastic cabinet. This is a plus, as other low-cost Tecsun radios' paint jobs tend to wear off. Also, the exposed plastic pieces are molded in the true finish color, unlike the anemic color approximations of the plastics of other low-cost Tecsun units. It looked great.

The R-919 has a vertical layout, so, though it has two feet for standing on, it tumbles easily. It's best for handheld use.

Table 1: FREQUENCY COVERAGE

Specs	*"Drifted" Coverage*
86.1-108.4 MHz	85.9-108.5 MHz
516.5-1639.5 kHz	512-1634.5 kHz
5825-6425	5795-6395
6945-7525	6910-7490
9255-10100	9200-10050
11510-12310	11460-12255
13195-13920	13140-13865
14980-15975	14920-15910
17375-18160	17390-18095

❖ Coverage

The R-919 is a single conversion analog radio fitted with digital readout (an update of the old frequency counter). It covers MW, FM (stereo via earbuds), and the 49, 41, 31, 25, 22, 19, and 16 meter SW bands. Coverage is listed in Table One.

But the R-919 is drifty on SW, where each band can "slide and stretch" up or down by 20 to 50 kHz. Table One also shows sample coverage after a long bout of drift (MW and FM show a slight alteration, too).

The coverage drifts downward in temperature increases and upward in temperature drops. The top of 41 meters crept to 7545 during a chilly period. And once, when it topped out at 7510, half an hour in the freezer stretched that to 7600!

Drift lessens or stops when using the radio for awhile in a stable, room-temperature envi-

Table 2: RECEIVED STATIONS (kHz)

Austria	9870
Bulgaria	9700 11700
Canada (CHU)	7335
Croatia (via Julich)	9925
Cyprus (BBC relay)	9410 9875
Egypt	7260
France	7135
Gabon	15475
Germany	15205
Greece	7475 9420
Holland	9895
India	9425 11620
Israel	9345 15640 17535
Italy	11800 15380
Jordan	11690 11960
Kuwait	11675 15505
Madagascar (Radio Nile)	12060
Mexico	6185
Morocco	15345
Portugal (DW)	11955
Saudi Arabia	13710 15435
S. Africa	7390
Spain	5970 6125 15110 17850
Sri Lanka (RFA)	9350
Tunisia	7190 7275
Turkey	9460 15350
Vatican	7250 7305 9645
? (SW Radio for Zimbabwe)	15145

ronment.

The R-919 has less coverage of 41 meters than the 100PE, which receives stations in the 6800-6900 and 7500-7600 ranges. On the other hand, the 100PE doesn't cover 22 meters.

❖ Controls

Just the basics: volume and tuning dials, a band selector slider, and an on/off button. The other buttons are for clock, alarm (radio only), and sleep function set and activation. (The 100PE has no clock, alarm, or sleep features.)

The tuning dial operates traditionally – up is down, down is up; the volume dial works unconventionally – up is up, down is down.

Setting the clock functions was straightforward. The clock is in the 12-hour format, with PM indicated. The sleep function can be set from one minute, to one hour and 59 minutes. The default setting is 59 minutes. Clock and alarm times must be set with the unit off.

When turned on by the alarm, the radio will run for an hour, then shut itself off unless you turn it off sooner.

For a pocket set, the R-919 has a somewhat "augmented" telescopic antenna. (Eton describes it as "oversized" on their website, **http://www.etoncorp.com**). Rather than collapsing flush into the cabinet, it retracts into a molded extension which protrudes about 2.25 inches. This accommodates the oversized antenna, which can extend to almost 19.75 inches beyond the protrusion. (The 100PE's antenna goes to 14.5 inches.)

The best part of the controls is the tuning

dial. It has the nicest action of any of the inexpensive compact sets I've tried. It has no wobble, looseness, or backlash, with a just-right, tight, smooth, oiled feel.

The tuning dial is of a fairly big diameter, probably twice that of the 100PE. The tuning works well on SW and FM, but is jumpy on MW, where a 1/4 twist of the dial can launch you 40-60 kHz.

❖ The LCD

The LCD screen displays the clock (only with radio off), shows icons for alarm and sleep functions, identifies the received "band" (FM, MW, SW), and reads out the tuned frequency.

The frequency is given in MHz on FM and SW, and kHz on MW. For SW channels ending in 0 kHz, the zero is dropped (11.960 MHz reads as 11.96). But for channels ending in 5 kHz, a half-sized number 5 appears (for 11.965 MHz, a small 5 shows just to the right of 11.96).

For MW tuning, this 5 appears as .5 kHz, and on FM as .05 MHz.

The frequency display reads 5 kHz high on all SW bands, .5 kHz high on MW, and .05 MHz high on FM. It's easier to get to your chosen station with this system than with slide rule-style tuning. But the slightly inaccurate readout is frustrating, since being consistently high throughout means it could just as easily have been consistently correct throughout.

This smooth analog tuning with correct digital readout would have been a treat.

❖ Sensitivity

All the heavy-duty SW relays such as the BBC, Radio Netherlands, Voice of Russia, etc. are easily listenable with the telescope antenna. For weaker signals, I experimented with attaching 21 and 35 foot wires to the built-in antenna (trying both loose coupling and direct connections).

The best SW reception was had by clipping the R-919's included shorter wire to the fully extended telescope antenna and stringing it up randomly. I was happy to pull in the sometimes fairly exotic stations shown in Table Two with this simple, compact arrangement. (Most were audible with just the built-in antenna, too.)

I also heard a ham from New York on 41 meters AM (listening from the Northwest).

Though I had similar reception results with the 100PE (including hearing a ham from Maine on 41 meters AM), the R-919 has an improved 49 meter band. The images which wrack 49 meters on the 100PE aren't there on the R-919. The R-919 is also more sensitive on 49 meters

than the 100PE.

On SW and MW the R-919's LO (local oscillator) radiates at the radio's 455 kHz IF (intermediate frequency) above the tuned frequency (i.e., tuned to 10000 kHz, it sends a zeroed signal at 10455 kHz). Images are projected 910 (455 x 2) kHz below strong signals. This way, they fall mostly outside SW broadcast bands.

The 100PE is the same except on 49 meters where its LO "transmits" at 455 kHz below the tuned frequency. Its 49 meter images are from strong 60 meter signals plus twice the unit's IF, or 910 kHz.

The 100PE has a ghost of WWV 5000 at 5910, one of a station from 5070 at 5980, and another from a 5085 signal at 5995. The latter two wreak heterodyne havoc with the BBC on 5975 and Cuba on 6000, respectively. It's a relief to be free of those 49 meter messes on the R-919.

As on the 100PE, I could hear the sounds of Radio Thailand's 5890 California relay and gospel stations from 5755 or 5935 in the background at various places up 49 meters. This was eliminated by unclipping the wire antenna.

When Radio Thailand's 5890 relay signal was particularly crushing, I could hear their interval signal of massive ringing bells in the background on 7415. This disappeared when I unhooked the wire.

Because of its vertical orientation and so necessarily small ferrite stick, I didn't expect much from the R-919 on MW. I was surprised when I heard a distant, weak station on 1300 with my local one blasting away on 1330.

Though the telescope antenna is meant only for FM and SW, extending it assists MW reception. And clipping the wire on helps substantially in pulling in weak, distant MW signals.

There are some spurious signals on MW from strong 49 meter transmissions: KAIJ or WWCR on 1615 kHz from 5755 or 5935, WWCR on 1634 kHz from 5810, and Radio Thailand on 1356 from 5890. (With the wire attached, the 100PE has the same spurious signals on MW.)

These were greatly reduced by unclipping the wire, and eliminated by also collapsing the telescope antenna.

Like most small SW radios, while holding it and receiving via the built-in antenna, your body assists reception. The Grundig 300PE manual even states, "Holding the radio while listening to shortwave will improve signal strengths." Medium strength and weaker signals flag or disappear after setting down the set. This is eradicated when the wire is clipped on. The telescope antenna is adequate to bring in more powerful stations when the radio isn't being held.

❖ Selectivity

The R-919 has no trouble picking out signals spaced 10 kHz apart from each other. A signal with one of comparable or lesser strength 5 kHz away can be plucked and listened to, with a little skill and patience.

I was able to listen to a good signal over the telescope antenna from AIR India on 9425 while there was another of comparable strength on 9430.

❖ Audio

The R-919's small speaker sounds a bit more full and powerful than the 100PE's. On a strong Radio Netherlands, Radio Japan, VOA, or BBC etc. signal, the speaker is loud and vivid enough for listening to while working in the kitchen or lying in the bath.

Sound, including FM stereo, is good through the earbuds. Substituting the higher quality earbuds from a DE1103 produced excellent FM stereo and extra richness and clarity on SW and MW.

❖ Alarm & SW Drift

Since the R-919 isn't a PLL tuned receiver with memories, the radio-alarm can only come on at the presently tuned frequency. But on SW, that's not quite what it seems:

At bedtime I tuned the R-919 to 7160 (7165 on this unit), and shut it off. Instead of the World Service the next morning I got a blast of static. The radio had come on at 7200.

I tried it again the following night. I tuned to 6195 for the BBC, and in the morning was greeted with hiss on 6235, 40 kHz off again. Yet another try for 6195 gave me 6225 in the morning, 30 kHz off.

Giving MW a shot, I tuned to 1090, and in the morning it came on at 1090 perfectly. The alarm also worked on FM, where tuning to 88.5 had it coming on at 88.5 exactly.

❖ Overall

The R-919's biggest drawbacks are SW drift and limited coverage of 41 meters. Since it's mostly a handheld, hands-on radio, SW drift shouldn't be a deal-breaker.

The ergonomics are nice, especially the tuning. Analog tuning with digital readout is the ideal marriage for bandscanning. It's much easier to use than muted, press-and-pause, button-only digital tuning.

A press-on backlight and exactly-right LCD frequency readout would have been grand.

Other than the "clipped" 41 meter band, the R-919/300PE is an improvement on the 100PE.

For sitting on the porch or in an easy chair, with the wire clipped on and the other end clamped to a tree branch or curtain, the R-919 is ideal for scanning and listening on most of the major SW broadcast bands.

Grundig's 300PE and 100PE

Because of its durable coating, simplicity of operation, and the bright colors in which it's available (Eton also offers the radio in blue, red, "bronze," and "pearl"), the R-919/300PE would be a good first SW radio for kids.

❖ Where to Buy

I bought my R-919 from eBay seller Liypn for $17.90 (it's now $18.90, yellow or black only color options), plus $11.90 shipping (7-10 days' delivery to the US), which includes a one year manufacturer's warranty from date of shipment. For under $30 Tecsun gives you everything in the box you need except batteries to hear SW stations such as those listed in Table Two, depending on your location.

Eton advertises the Mini 300PE for $30, which includes holster, earbuds, batteries, one year warranty, and their excellent customer support service. (Their website **www.etoncorp.com** and manual make no mention of a wire antenna.)

(For a similarly-priced and -performing but PLL-tuned pocket SW radio, see the Kaito KA105 at Radios4You.com.)

Thanks to Liypn for supplying the R-919 specs in Table Three, which he acquired from Tecsun.

TABLE 3: SPECIFICATIONS

Sensitivity:
FM < 10 uV
MW < 1 mV/m
SW < 50 uV
Selectivity:
> 20 dB
Speaker:
Two inch, 16 ohm, .5 W
Earphone:
32 ohm
Power Source:
Two AA cells, 3 VDC
Dimensions:
Approx. 6.6 x 2.5 x .9 inches

Ramsey Aircraft Monitor

By Bob Grove W8JHD

Two years ago my wife and I decided to take a plane trip to Hawaii. I thought it would be interesting to listen to aircraft communications, but knew that scanners aren't allowed on aircraft because the oscillator could conceivably disrupt navigational instruments.

But what if the receiver had no oscillator? What if a crystal diode detector with a tuned antenna and high-gain audio amplifier could be called into service? I made one and, lo and behold, I could hear messages from aircraft in flight for quite some distance! Built into a compact box, the device provided entertainment on the trip.

Now Ramsey electronics has released just such a product – much more refined – for the same application. The ABM1 "Passive Air Band Monitor" has a volume control, adjustable squelch, and comes with a set of ear buds with the cord doubling as an antenna.

The Monitor is powered by a nine-volt battery (not supplied) and its 2-1/2" x 4-1/2" case includes a convenient belt clip. Convenient thumb-wheel trimpots allow custom adjustment of sound levels and squelch threshold.

Ramsey provides a nice manual with an introduction to air-band monitoring, and which contains a complete schematic diagram of the monitor, along with stage identification.

❖ What's in the box? (For the techies!)

While you may think there's nothing special about a crystal radio with audio amplification, there's enough unique design and application that it received a patent in 1994 as an "Aircraft Band Radio that does not Radiate Interfering Signals."

The incoming signal is delivered to the radio from the earphone cord; a pair of RF chokes separates the VHF signals from the audio. Conceivably, a 1/8" (3.5 mm) Y adaptor could allow a listener to attach an air-band antenna for the reception of distant, weaker signals.

Three pass-band filters etched on the circuit board trim the received spectrum to the 118-137 MHz aircraft band. One is before the RF amplifier stage (a MiniCircuits MAR-1), another after, and the third precedes the logarithmic amplifier/AM detector (an Analog Devices AD8307AR).

From there, the detected audio is fed to an LM386 audio amplifier. Squelch action is provided by adjusting the offset voltage on an LM6492 dual op-amp which triggers an MMBF170L power MOSFET switch, clamping the audio line to the LM386.

The low-impedance audio output is fed back to the earphone jack through an RF choke to prevent the low-impedance audio line from grounding out the weak aircraft signals picked up by the ear-bud wire antenna.

The ABM1 requires a 9-volt battery; quiescent current drain is typically 20 milliamperes, peaking to 50 mA when receiving strong, audible signals.

❖ So, what does it hear?

Out here in the boonies of western North Carolina, we don't have a lot of air action! Even so, every few seconds to a minute or so, I hear the familiar voice of an aircraft pilot giving update information to an airport tower somewhere. I also hear the shrill data bursts of the aircraft's familiar ACARS digital packet transmissions; naturally, they are the loudest!

Weak signals are low in volume, and strong signals come blasting in; there is no automatic gain control (AGC) as found in conventional receivers, so it's best to keep the volume down low enough to avoid unpleasant surprises!

Unlike channelized scanners that step frequency by frequency, the ABM1 listens to the whole aircraft spectrum at once, and if two or more signals are being transmitted you'll hear them simultaneously.

Sensitivity is certainly adequate – better than 2 microvolts. I can't see the planes anywhere, but the ABM1 can hear them, and obviously from many miles away. For better reception of weak signals, it helps to push the ear bud/antenna wire away from your body – even shifting it left or right can make a difference.

The squelch works dependably, but it isn't responsive to weak signals. At my off-route location, I have to leave the squelch defeated so that there is always noise in the background; otherwise, I never receive any signals.

However, near an airport, or during an air show, or inside an airliner, signals will be strong enough to trip the squelch. But its filters are designed to receive only the 118-137 MHz civilian aircraft band; there is no provision for 225-400 MHz military air communications.

Although the filters are well designed, favoring the 120-140 MHz spectrum, the plastic case allows any strong, nearby signals to reach the diode detector and high-gain audio amplifier. Interference from my LCD computer monitor was severe; the ABM1 was unusable in that room.

While the unit works very well, perhaps Ramsey will consider some additional features in a future model:

(1) AGC as used on voice recorders to prevent blasting from strong signals;
(2) A parallel set of passband filters to include the 225-400 MHz military aircraft band;
(3) An external antenna jack or adaptor for listeners who are distant from air routes; and
(4) An external power jack to allow a wall wart to operate the unit indefinitely in a home or office; a drain of 50 mA on a 9-volt battery can drop its voltage pretty quickly.

❖ Final caveat:

Although there is no possibility that this monitor could interfere with aeronavigational equipment, with the current emphasis on security, you may wish to inform the pilot that what you have is a passive detector with no oscillator. It may help, or it may not.

The Ramsey ABM1 Air Band Monitor is available for $149.95 from Grove Enterprises (7540 Hwy 64 West, Brasstown, NC 28902; 800-438-8155 or *order@grove-ent.com*).

John Catalano, PhD
johncatalano@monitoringtimes.com

The DX Monitor Umbrella Application

The number of radio-useful programs continues to grow. Many of them are very useful to our everyday monitoring endeavors. However, remembering how to use them and keeping track of their locations seems to be an insurmountable problem, at least for me.

Therefore, I really appreciate monitoring programs that are not single-task-specific. Instead, some programs pull together a compendium of useful monitoring functions under the umbrella of one application. DX Monitor version 1.07 does exactly that.

There is no question that DX Monitor is squarely aimed at hams. But a carefully written program can serve radio monitors as well. The heart of DX Monitor is a network of stations which monitor real-time traffic on the ham bands, from shortwave through VHF. This data is then put on the Internet. Anyone using DX Monitor can automatically contribute to this body of information.

DX Monitor reads the Internet posted data and displays it in a number of useful screens. These include maps and lists showing the current and recently active QSOs between hams. (In the "Q" sign language of hams, a radio contact between two hams is designated a QSO.)

Armed with this real-time information we can immediately see what bands are active and what DX ham stations are on the air. Of course, the smart radio monitor can use the same information to decide which shortwave bands are currently optimal for trying to monitor that rare broadcast or utility catch. But we'd be selling DX Monitor very short if we stopped here! However, before we go any further, let's see what it takes to run DX Monitor.

❖ Program Requirements

I ran DX monitor on a Pentium III 1GHz, 256M RAM under Windows XP. I also ran it on a Pentium II 400MHz, 128M RAM under Windows 98SE. In both cases it ran without a problem. However, under Win98, one major feature – Real Time Google Earth – is not available. We'll cover more on this later.

To summarize, DX Monitor will work great on most Pentium II 400MHz and higher PC, running Windows XP, 2000 or 98SE with the one above-noted exception. Access to the Internet, either dial-up or high-speed is a must. A minimum screen resolution of 800 x 600 is required.

❖ Downloading DX Monitor

A 30-day, free, fully functional trial version is available for downloading at **www.benlo.com/dxmon.html**. Although the program is 2.3 Meg, it downloads reasonably fast even using dial-up. Once downloaded, a simple double click installs the program and puts a shortcut on the desktop.

At this point, you can also open the very useful Help file. I would encourage you to do this so you can take full advantage of the programs capabilities. OK, so what can DX Monitor do for us?

❖ Keeping It Simple

When DX Monitor is initially run, you must wait a few seconds for it to connect to its servers and download the latest data. Figure 1 shows one of the two displays that you will see when you start the program.

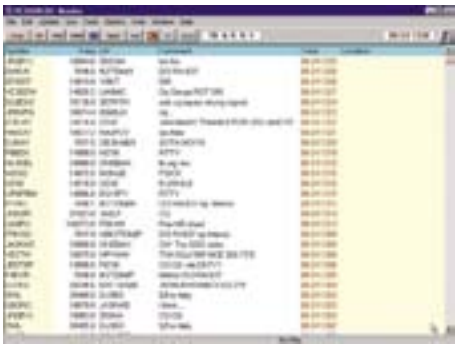


Figure 1 DX Monitor's deceptively simple looking opening screen. Don't be fooled, there's lots here!

This is a list of QSOs detailing the stations' calls, frequency and times of contact. Using the "Sort" menu, in the main command bar at the top of the screen, the list can be sorted using any one of the columns, Location, Frequency, DX (Station), Comments, Time or Spotter. The spotter is the person who posted the data.

The second screen, which is displayed when the program is started, is Band Map, seen in Figure 2. It lists the recently heard stations grouped by ham band. It starts with the 80-meter band at 3.5 MHz and ends with the 10-meter band 29 MHz. This gives a very up-to-date view of the bands. Using the "Options" menu and the Frequency Select sub-menu, activity on VHF bands such as 2-meters (144 MHz) can be similarly displayed.

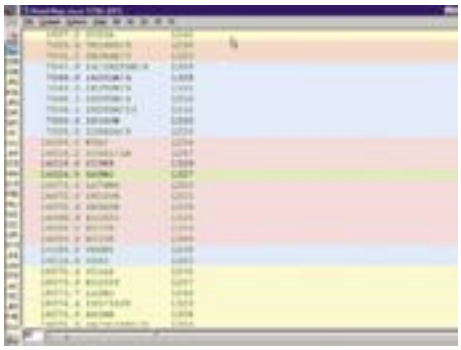


Figure 2 Band Map display showing most recent HF stations received since 1236 Zulu time. These are grouped by ham band.

❖ Lots of Options

The Option menu contains many useful features, such as filter selections which display only certain stations. The user can also group like stations together by screen colors; for example, stations currently located near the terminator can be all colored the same. The terminator is the line that defines the parts of the earth in sunlight from those in darkness. This can be an important monitoring detail since unique propagation conditions can occur at the terminator.

Also using the Option command other columns can be added to the list. For example, the station's country and the antenna heading can be added. The functions on just this one menu would be very useful to any ham or radio monitor, but DX Monitor is much more.

❖ "Seeing" the QSO

Now that we have a list of real-time and recent QSOs, how do we quickly determine what geographic paths are open and active? A

Figure 3 Mapping the QSOs for quick analysis of the list at bottom.

graphical method of transferring this complex list to a map would be very nice. And that is exactly what clicking the small Globe icon, between the "1000" and the "Spot" on the line below the command line, does. The result is Figure 3.

At the bottom of Figure 3 we have displayed the list which generated the map. The highlighted line from the list is shown on the map at the cursor: FR5HA, a 20-meter QSO. From all the activity lines we can easily see that the 20-meter band, 14 MHz, between the east coasts of the North/South America to Western Europe is "open." Also the west coast USA to Asia is active. The long-path route traced on the map is probably not correct.

And, finally, the QSO we have highlighted – Italy south to Reunion Island in the Indian Ocean – is an active path. Notice that a lone station in central Russia is on the air. Taking a closer look we can see that this is an "on terminator" station.

❖ Can This Be Correct?

When I mapped worldwide VHF contacts I thought the program had gone haywire. It showed contacts between Central USA and Europe on 2-meters, 144 MHz!! Very strange, since 2-meter signals usually propagate line-of-sight. Even under ionospheric skip conditions, USA to Europe would be very rare. One exception would be if the QSO was via a ham satellite, which I think was the case.

❖ Google the Contacts?

For those running Windows XP or 2000, you can access a DX Monitor feature that is quite interesting to watch. You'll need to download the free program Google Earth at **www.earth.google.com**. Actually, it is Google Earth that requires XP or 2000. This 11.5 MEG program takes a bit of time to download using dial-up, but it's worth it.

Figure 4 Real time Google Earth – Still picture of the starting point of the signal path animation between two stations having a QSO.

DX Monitor's Real Time Google Earth function is accessible from the "Tools" command. When a new QSO is posted, an animation of the earth viewed from between 100 to 300 miles is displayed. Starting at the originating station's exact location, the animation follows the signal path over a detailed map of the earth to the other station's exact location. Figure 4 is just one frame of the animation. Notice that other stations, whose QSOs have been recently posted on the network, are also visible on the map.

Watching the screen scan the world when a new QSO is posted is hypnotic. Even with a dial-up connection to the Internet, the screen animation is quite watch-able. With a high-speed connection, DX Monitor's Real Time Google Earth would make a great live, ever changing, screen saver.

❖ Propagation May Be Everything

Take a look at the numbers displayed on the right side of the line just below the top command line. These are the most recent values defining the state of the ionosphere, the charge cloud surrounding earth. The 78 is the current solar flux value. 5 is the "A" index and 1 is the "K" index. These parameters dictate radio propagation conditions at different radio frequencies. The first number indicates the amount of charged particles that have been emitted by the Sun. Once they reach earth they have a dramatic effect on the earth's ionosphere and therefore radio propagation.

The source of this data is NOAA Geophysical Alert Message, which is transmitted on the time station WWV. It can be viewed by selecting the button to the left of the numbers labeled "WWV."

The Solar Flux and Geomagnetic Indices screen can display propagation data in three ways: Table, Graph and Cycle. The Table is a chronological list of solar flux and indices data. The Graph displays the data and adds forecasted solar flare data for reference. The Cycle graph displays the current, previous and next predicted solar activity cycles. Remember that these predictions are an attempt to forecast a complex, and still not completely understood, interaction of geophysical, particle physics and astrophysical processes and phenomena.

❖ No, Time IS Everything!!

Time, the fourth dimension, ties our hectic world together. This is true for our science, business and social endeavors. More than ever, being synchronized with world time is important in our daily life. If you have ever missed placing your final bid on a eBay auction because it closed seconds before you bid, you know too well the power and absoluteness of time. Einstein said there is no such thing as simultaneity, but we can get close.

Figure 5 DX Monitor's time synchronizing feature – very nice.

DX Monitor's has a very nice "Check Computer Clock" function that is found under the "Windows" command menu. On this screen, Figure 5, the time from various on-line high accuracy sources can be checked. The top line is the user's computer clock setting. Next is displayed Google Time from its website. And finally, you have a choice of one of fifteen on-line time websites from which you can synchronize your computer clock. This is easily performed by clicking the "Adjust the Computer Clock" button. As you can see from the accuracy of our Computer Time display we have already synchronized the PC to the US **N**ational **I**nstitute of **S**tandards and **T**ime (NIST) website.

❖ Wrap-Up

Would you believe we have still not touched on all of DX Monitor's features! Call sign database capabilities, filters for data lists, beacons, satellites and specialty signal web searches are just some of the features we have not covered. I'll leave you to explore its website and discover all of its capabilities at **www.benlo.com/dxmon.html**. Again, the Help file contains a wealth of information on the program.

You can purchase the non-time limited version of DX Monitor for $29.95 on the website above. In my opinion, if you're an avid ham operator or SWL, DX Monitor is well worth the price. Be assured that I'll be keeping an eye on DX Monitor's future developments.

What's NEW

Tell them you saw it in Monitoring Times

NRC AM Radio Log 2006-2007

I was just looking out the window as I write this and a fresh north wind blew some leaves off the trees. That, my friends, heralds the arrival of fall and the start of a new mediumwave band DX season. It also means it's time for one of my favorite annual radio publications – the *NRC AM Radio Log*.

Formerly known as the *National Radio Club Domestic Log*, the first edition of this annual favorite was published by mimeograph and the stencils were hand-typed in Boston by the legendary AM radio hobbyist John Callarman. Since that first edition (which I still have, by the way), the *Log* has evolved to today's sleek professional publication produced by Wayne and Joan Heinen.

This 2006-2007 27th annual edition of the *National Radio Club's AM Radio Log* contains 278 pages in 8-1/2-inch by 11-inch size, 3-hole punched, loose leaf format so you can put it neatly into a 1-inch three ring notebook.

AM band radio stations from the United States and Canada are listed by frequency, including listings for the new expanded (X-band) stations from 1610-1700 kHz. Each station listing consists of its operating frequency, callsign, location (city and state of license), time zone, antenna and transmission power, mailing address and daytime telephone number, hours of operation, broadcast format/networks, and much more.

There are also cross reference listings by city and callsign, as well as a list of stations conducting AM stereo operations. A new addition to the *NRC AM Log* this year is a cross reference of stations broadcasting in IBOC (In Band on Channel) digital audio. Other recent additions to the log include FM station simulcast call letters and a list of regional groups of stations. There is also a list of talk radio hosts and their syndicator or network.

Besides the new material mentioned above, there are over 8,000 updates since the 26th edition was released in the fall of 2006.

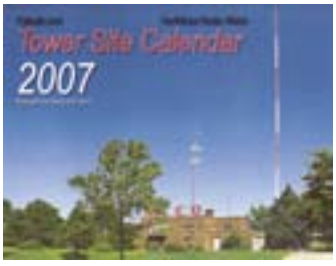
The *NRC AM Radio Log* is available from several radio dealers and directly from the club website at **www.nrcdxas.org/**. This publication lists for $25.95 (non-NRC members) and $19.95 (for members). New York residents will have to add sales tax. Be sure to check the website for current pricing, including Canadian and overseas rates on this publication. You can also get additional information or send orders via mail to: National Radio Club Publications, Box 164, Dept W, Mannsville, NY 13661-0164.

The *AM Radio Log* is the most accurate source on AM radio stations in the United States and Canada. Quite frankly, no self respecting AM DXer or listener should be without this superb publication on their radio room bookshelf.

Review by Larry Van Horn

Tower Site 2007 Calendar

I can hardly wait for my favorite calendar to arrive in the mail. For the sixth year, Scott Fybush, creator of "Tower Site of the Week" (**www.fybush.com/featuredsite.html**) and "NorthEast Radio Watch" (**www.fybush.com/nerw.html**), has put together the unique and informative Tower Site Calendar. This full-color monthly calendar has become a tradition for many radio engineers and a curiosity for those who think all radio towers look alike.



"The response to the 2006 calendar was the best yet," says Fybush. "Radio engineers have been begging me to add their towers to the calendar, and I'm hoping to make some of them very happy with the 2007 edition."

Like its predecessors, each month of the 2007 calendar features an 8"x11" color photograph of a broadcast transmitter site taken by Fybush during his travels around the U.S., Canada and beyond. A few of the sites pictured on the 2007 calendar include: WCCO, Minneapolis, 50-kW; Atlanta's new 50-kW AM signal, WCFO 1160; New York City's WEPN 1050; Boston's legendary WBZ; KGO, San Francisco, towers in the East Bay; Chicago's WGRB 1390 and WVON 1690; Historic WTIC, Hartford, Connecticut; and Andy Griffith's hometown WPAQ, Mount Airy, NC.

In addition to tower photos, the calendar's monthly pages include significant dates in radio and television history, as well as civil and religious holidays.

The 2007 calendars cost $17 each, postpaid ($18.36 including sales tax for New York State residents), and can be purchased by check (payable to "Scott Fybush") or by money order, to 92 Bonnie Brae Avenue, Rochester NY 14618. Orders can also be placed with major credit cards at **www.fybush.com**.

A Bit of SW Nostalgia

Were you a shortwave listener back in the '70s? If you were a regular listener to Radio Canada International's popular *SWL Digest* program before it went off the air in 1991, you may remember the "Shortwave Station Idents & Interval Signals Series" that was featured on this award winning program. That series featured more than 100 identification and interval signals from SW stations around the world. Many of the identification signals heard in that long running series are no longer on the air.

If you feel nostalgic about the "good old days" of SWLing, you'll be interested to know that this unique series is now available in a two CD set. The CDs are fully indexable and come with a hard copy listing all of the included identification signals.

Pricing for the two-CD set includes first class or airmail postage: $10 to Canada or $12 to US in check or money order; or $15 (money order only) to all other countries. Send your order to: Ian McFarland, 6667 Beaumont Avenue, Duncan, BC V9L 5X8, Canada. You can also download the PDF Order form from **DXer.ca**

The net proceeds from the sale of these CDs are being donated to the local Food Bank in Duncan, British Columbia.

The Key to Christmas...

Morse Express has commissioned its sixth annual Christmas Key. These are tiny keys that can fit on a Christmas tree, but are also fully functional. For the 2006 Christmas Key, Morse Express has chosen an antique European style.

The Morse Express Christmas Key is hand machined from solid brass, under-plated with nickel and finished in 18 carat gold. The 2006 key measures 2" by 1" at the base and weighs 3-1/4 ounces. All of the usual adjustments (trunnion bearing tension, lever spring tension, and contact spacing) are available by means of gold plated screws with matching locknuts, and the hand-turned ebony knob is very comfortable to use. The pre-attached shielded cable has a molded 1/8" mono plug.

The result of hand machining and assembly is a beautiful little key that is one of the smallest practical keys available; very handy for QRP portable operations. The base of each key is engraved with the Morse Express "Speedy Key" logo, "Christmas 2006," and a serial number within the limited edition of 150 keys.

The 2006 Christmas Key is $69.95 (plus s/h) from Milestone Technologies, 10691 E Bethany Drive, Suite 800, Aurora, CO 80014-2670; toll-free 800-238-8205, or email *info@MorseX.com*. Check out their other products at **www.MorseX.com**

Books and Equipment for announcement or review should be sent to What's New, c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC, 28902. Press releases may be faxed to 828-837-2216 or emailed to Rachel Baughn, editor@monitoringtimes.com.

NOW AVAILABLE

AR-ONE
Communications Receiver

The AR-ONE gives law enforcement and government professionals total command of frequencies, modes, tuning steps and more. It is possible to tune in increments of ***one*** Hz.

FOR PROFESSIONAL USE ONLY

Monitor Any Frequency from 10 KHz to 3.3 GHz

Ultra-stable reference frequency oscillator (0.1ppm)

The AR-ONE is a new beginning for wide-range monitors.

The AR-ONE is designed to support computer controlled operation. Link up to 99 receivers for control by a single PC. The AR-ONE can be used for mobile or fixed monitoring operations.

Surveillance operations are enhanced. Monitoring multiple frequencies is easier and faster. Computer control gives you maximum flexibility and unleashes the many features found in this advanced technology receiver.

The AR-ONE is the right choice for the new world we now monitor.

- Super wide coverage: 10 KHz – 3.3 GHz
- 1000 memory channels
- 10 VFOs
- Monitor AM, NFM, WFM, USB, LSB, CW, Data
- Ultra-stable reference frequency oscillator
- Two RS-232C ports
- Control up to 99 AR-ONE Units with one PC
- Triple conversion superheterodyne front end
- Antenna input level readout
- Adjustable BFO
- High intercept +2dBm (-1 dBM above 2.5 GHz)
- Multi IF signal output (10.7 MHz or 455 KHz)
- Excellent sensitivity

The AR-ONE is designed for use by the monitoring professional. The AR-ONE is so advanced, you'll be thinking of new applications for its powerful capabilities.

AOR
Authority on Radio Communications

The Serious Choice in Advanced Technology Receivers™

AOR U.S.A., Inc.
20655 S. Western Ave., Suite 112, Torrance, CA 90501, USA
Tel: 310-787-8615 Fax: 310-787-8619
info@aorusa.com • www.aorusa.com

Available only to authorized users in the USA. Documentation required.

Stock Exchange

LINE ADS
NON-COMMERCIAL SUBSCRIBER RATES: $.25 per word. All merchandise must be personal and radio-related.
COMMERCIAL, NON-SUBSCRIBER, AND MULTIPLE SALES RATES: $1.00 per word. Commercial line ads printed in bold type.

Ads for Stock Exchange must be received 45 days prior to publication date. All ads must be paid in advance to Monitoring Times.
Ad copy must be typed for legibility.

1-3/4" SQUARE DISPLAY AD:
$50 per issue if camera-ready copy or, $85 if copy to be typeset. Photo-reduction $5 additional charge. For more information on commercial ads, contact Beth Leinbach, 828-389-4007.

Time to Renew? Your label will tell you how many issues remain in your subscription. When it's time to renew, your MT will arrive with a bright yellow cover sheet with the renewal form. Renew by the second notice to avoid missing an issue!

Attention all those wanting to know what's going on with ham radio in the New Orleans area, check out: **http://groups.yahoo.com/group/GNOAmateurRadio/**

Want some GREAT deals on used equipment? Check out Bob's Bargain Bin on the web at www.grove-ent.com/hmpgbbb.html, or go to grove-ent.com and click the Bob's Bargain Bin link. Check back often as we're constantly getting new inventory!

INDEX OF ADVERTISERS

GROVE

Your Source for Scanners, Receivers, Accessories, and Publications

Established in 1979 by well-known communications expert Bob Grove, Grove Enterprises has become a world leader in radio monitoring equipment, accessories, and publications.

If you decide you don't like a product, Grove Enterprises doesn't penalize you for it. There is NO restocking fee so long as you call our toll free number for a return authorization within fifteen days of shipment and the item is returned in new condition. Once the item is received we will give you credit toward another item or issue a full refund (less shipping charges). Software cannot be returned if opened.

That's it! No hassle! No negotiations! Just call 1-800-438-8155 and our friendly staff will assist you with a return authorization number.

Grove means service and quality. You won't find better customer service anywhere.

ORDER TODAY!

www.grove-ent.com

Shipping/ Handling Charges

Total Order	Shipping Charges
$1-$29.99	$3.00
$30-$49.99	$6.95
$50-$99.99	$8.95
$100-$399.99	$12.95
$400-$899.99	$16.95
$900-$1499.99	$20.95
$1500-$1999.99	$24.95
$2000-$2499.99	$28.95
$2500+	$32.95

UNIDEN

BR330T	SCN30	$259.95
BCD396T	SCN47	$524.95
BC898T	SCN44	$209.95
BCT8	SCN08	$179.95
BC296D	SCN42	$489.95
BC246T	SCN46	$229.95
BCD996T	SCN48	$539.95
BCT15	SCN15	$229.95

ICOM

R3	SCN 7	$349.95
R5	SCN 2	$199.95
R20	SCN 20	$519.95

ALINCO

DJ-X10T	SCN 1	$319.95
DJ-X2000T	SCN10	$549.95
DJ-X7T	SCN 3	$179.95

AOR

AR8200IIIB	SCN51	$589.95

ANTENNAS & CABLES

Grove Hidden Flex-tenna	ANT49	$19.95
Super Stealth micro-mag portable scanner ant	ANT26	$19.95
Austin Condor	ANT 14	$29.95
Grove Scanner Beam II	ANT 18	$64.95
800 MHz for handhelds	ANT 22	$29.95
800 MHz base w/ right-angle conn.	ANT 23	$34.95
OMNI II Scanner	ANT 5	$29.95
Grove Flex-tenna HVU	ANT45	$14.95
Grove Flex-tenna VU	ANT46	$9.95
Professional Wideband Discone	ANT 9	$94.95
Scantenna + 50' coax	ANT 7	$49.95
Nil-jon Multiband base antenna	ANT10MBS	$94.95
Nil-jon Mobile antennna w/ NMO mount	ANT10NMO	$74.95
AOR DA3000 Aerial Discone	ANT 11	$139.00
AOR MA500 Wide Range	ANT 12	$99.00
AOR SA7000 super-wide receiving	ANT 39	$199.95
Range Extending Mobile Mag Mount	ANT 3	$24.95
WiNRADiO AX-31B Active UHF Ant.	ANT 4	$119.95
Grove Universal Telescoping Whip	ANT 6	$14.95
Nil-Jon Super-M Superior Mobile Ant.	ANT 10	$79.95
Create CLP51301N Log-Periodic Ant.	ANT 16	$409.95
Create CLP51302N Log-Periodic An.	ANT 17	$299.95
50' of RG-6U cable	CBL 50	$19.95
100' of RG-6U cable	CBL 100	$24.95

MISCELLANEOUS ACCESSORIES

Universal Cigarette Adaptor	DCC 3	$12.95
Ramsey Broadband Preamp	PRE 2	$59.95
Scancat Gold for Windows	SFT 2W	$99.95
Scancat Gold for Windows SE Upgrade	SFT 2SE	$59.95
Scancat-Lite Plus	SFT 19	$29.95
PAR VHF Intermod Filter 152MHz	FTR 152DS	$69.95
PAR VHF Intermod Filter 158MHZ	FTR 158DS	$69.95
PAR VHF Intermod Filter 462MHz	FTR 462DS	$69.95
FM Trap Filter 88-108MHz	FTR-FMDS	$69.95
PAR NOAA Weather Filter 162 MHz	FTR 162DS	$69.95
Yaesu SP-8 Speaker	SPK 4	$159.95
GRE Superamplifier	PRE 1	$59.95
VS6 Mobile Speaker	SPK 7	$14.95

GROVE

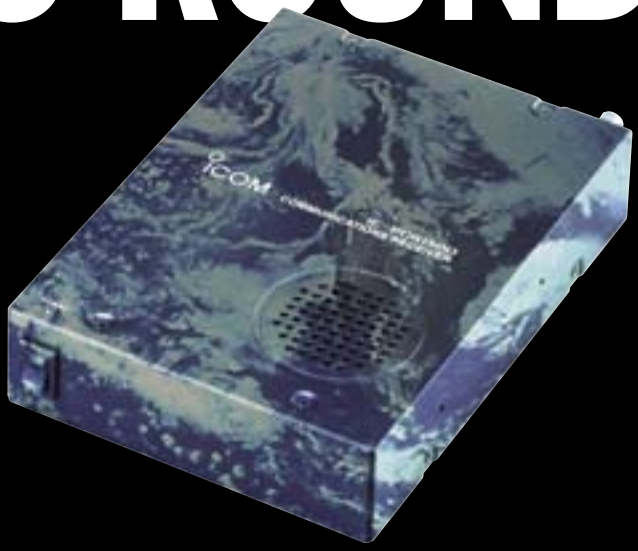
(800) 438-8155

CALL TODAY!

Grove Enterprises, Inc. - www.grove-ent.com
(800) 438-8155; (828) 837-9200; fax: (828) 837-2216
7540 Hwy 64 W; Brasstown, NC 28902 - email: order@grove-ent.com

0.01 to 3299.999 MHz** Coverage • Record and Save Audio in WAV Format • USB Cable Connection

WHO SAYS THE WORLD IS ROUND?



*

NEW IC-PCR1500

PC Controlled Wideband Receiver

NOW AVAILABLE

Also now available: **IC-R1500**

A remote control head allows you to take the radio mobile. Cable included. No PC required, but you may connect the R1500 to a PC when not using the control head. Your choice. Visit your authorized Icom dealer today.

For free literature:
425.450.6088 or
www.icomamerica.com

* Neat, look huh? It's just advertising. The radio is actually black. Very attractive, yes. But black. If we had put a black radio on this ad, the headline would not have been as quick to read. So we made up this look. Black is nice. Think of it as seeing the world from the night side. It's still there. You just can't see it. Can't get over it? If you send us $5000.00 USD, we'll make up the radio look just like this for you. Is it worth it? Not to most people. But you're not most people. Are you? E-mail icom@icomamerica.com with "worldPCR" in the subject line for more info. ** Cellular frequencies blocked.

ICOM®