Who's Who in Scanning, Shortwave, Satellites, Ham Radio, Computers & Internet

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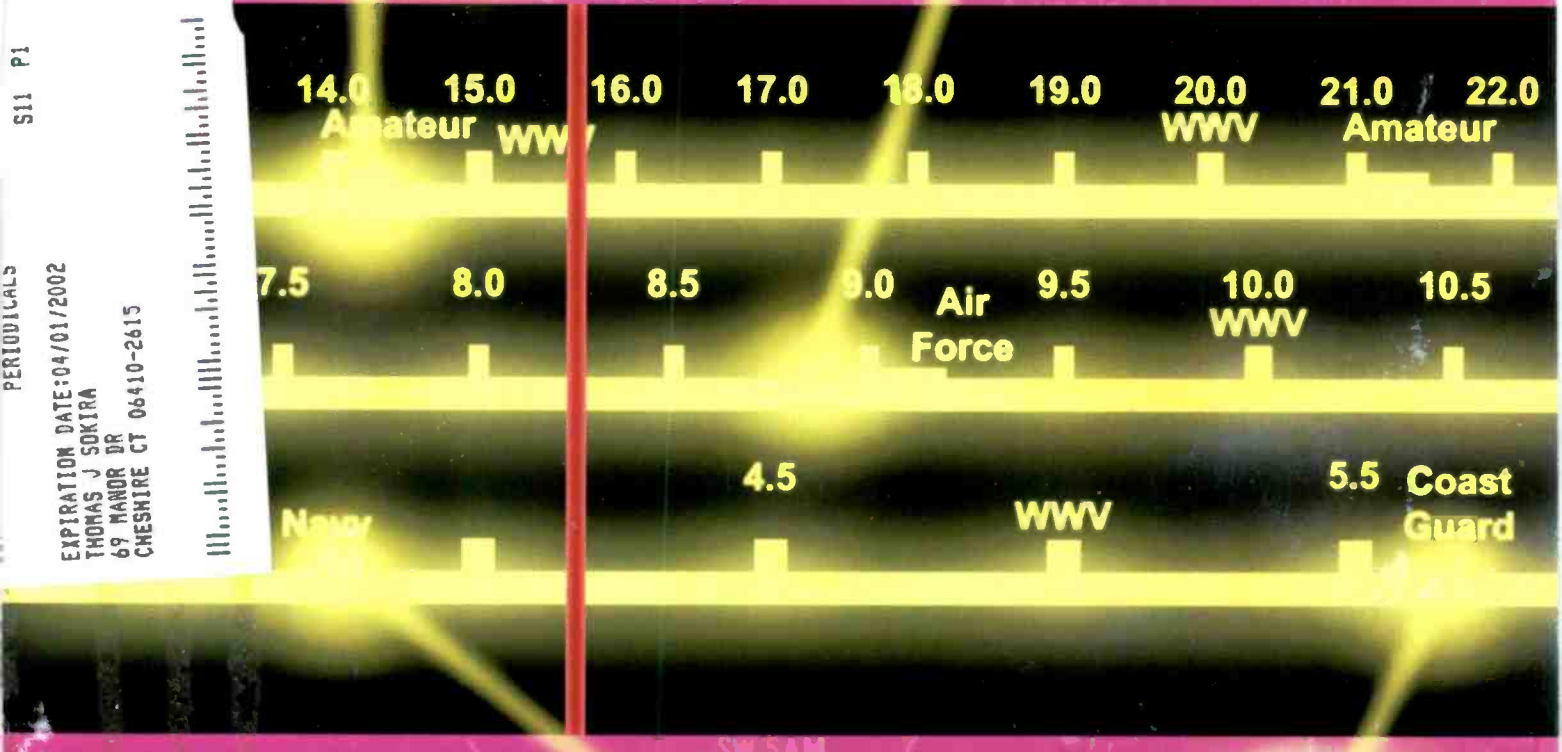

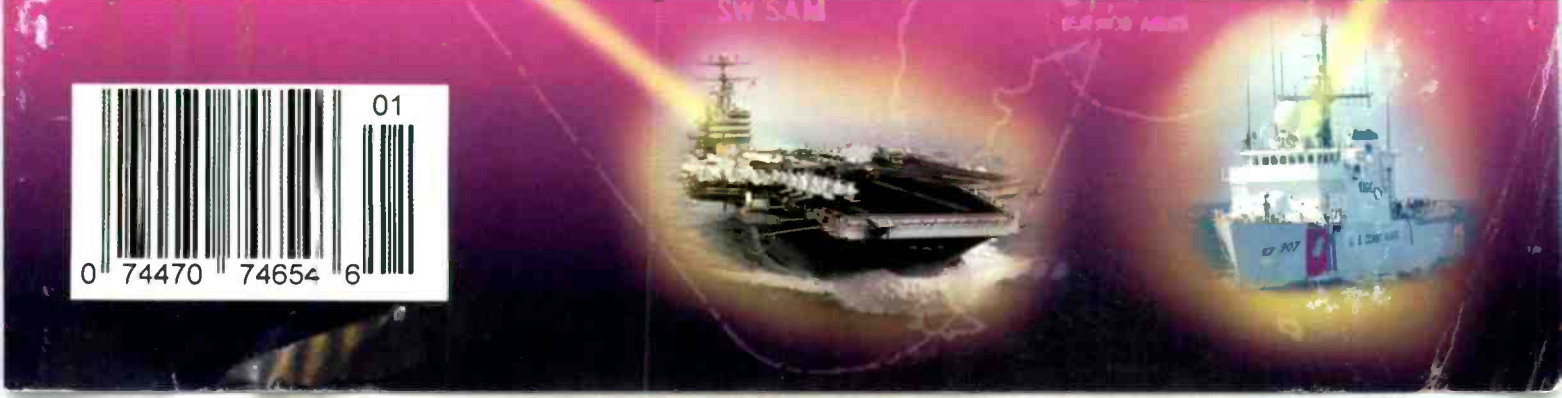

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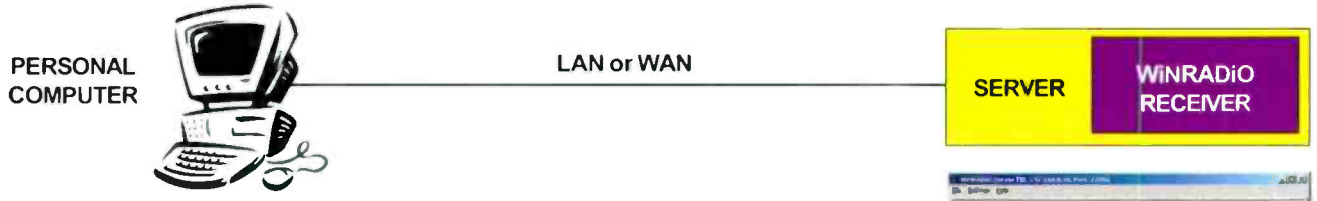
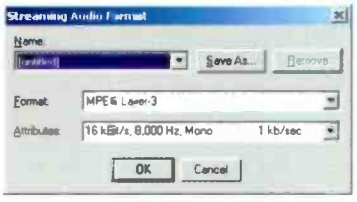


WiNRADiO Virtual Control Panel



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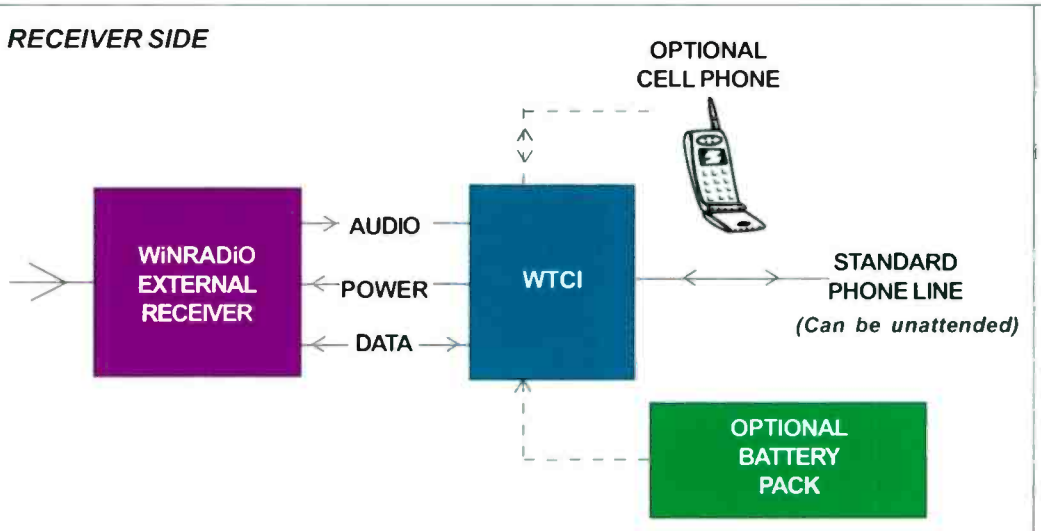

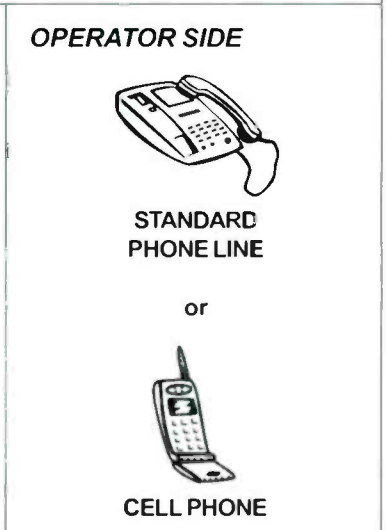

For more information on WiNRADiO remote control products, please visit:

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Monitoring Times

Vol. 21, No. 1 January 2002

On our cover

Who's Who in the Radio Spectrum?

By Larry Van Horn

For the first time since 1985, *MT* embarks on an analysis of spectrum assignments from the bottom to the top. The big difference is, today's hobbyists can tune in all of it on one general-coverage receiver!

In fact, affordable, wide coverage receivers offer such enormous possibilities, a new owner may feel overwhelmed. Where do you start? Is there really anything to be heard at the lowest and highest reaches of your receiver? What the heck are all those noises? Where should you tune to find amateur radio conversations? Broadcasters? Military aircraft? The local fire department? Tuning around at random can be fun, too, but then how do you know what you're hearing?

This several-month series is a "keeper" – one to keep by your radio, that is. This month we start 'way down in radio's basement where Mother Nature and a whole company of interesting folks like to hang out. Story starts on page 10.

Cover illustration by Hugh Stegman.

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Monitoring Times

Monitoring Times
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The Future and the Past come together on your computer!

FUTURE ISSUES:

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For less than the cost of a subscription in the U.S., you can be reading the entire *Monitoring Times* magazine anywhere in the world before U.S. subscribers receive their printed copies! Active utilities loggings, world hotbed frequencies, international broadcasting schedule changes, new product announcements! This is the exact same magazine that has gained a worldwide reputation for reliable radio information that's easy to understand, and products and projects of proven value.

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

Publisher
Bob Grove, W8JHD
bgrove@grove-ent.com

Managing Editor
Rachel Baughn, KE4OPD
mteditor@grove-ent.com

Assistant Editor
Larry Van Horn, N5FPW

Art Director
Bill Grove

Advertising Svcs.
Beth Leinbach
(828) 389-4007
beth@grove-ent.com

Reviews:

For some kinds of interference, only a notch filter can do the job; but is there much difference between filters? Bob Parnass compares filters from Grove Enterprises, Par Electronics, and Stridsberg Engineering (p.80).

In the Year 2002, John Catalano finally finds his long-awaited "total radio environment" – the software that does everything and does it well. See why Bonito's RadioCom 5.1 makes the grade (p.82).

Bob Grove compares seven different magnetic-mount scanner and cellular antennas against the cream of the crop – the Nil-Jon "Super M." The results might surprise you (p.87).

In Jock Elliott's opinion, NOAA Weather Radio is one of the best returns we get from our tax dollars, and the Midland WR-10 AM/FM/weather radio is an excellent way to take advantage of the service (p.86).

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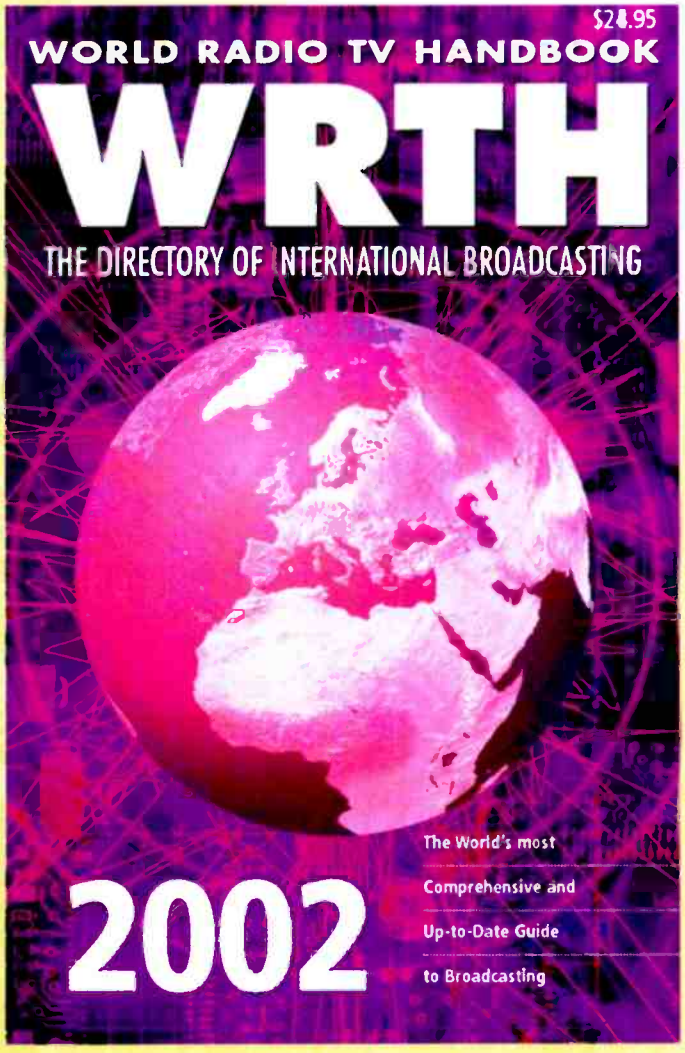

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Frequency schedules and broadcaster information as updated by

Teresa Beatrice Abreu, Olle Alm, Jorge Aloy, Rogildo Fontenele Aragão, Herman Boel, Héctor García Bojorge, Ruud Brand, Jordi Brunet, Bryan Clark, Marcelo A. Cornachioni, Svetomir Cuckovic, Alok Dasgupta, Alan Davies, Edward Dunne, Roberto Elizondo, Nicolas Eramo, Bernt Erfjord, Bengt Ericson, David Foster, Yimber Gaviria, Aivars Ginters, Victor Gocnetilleke, Keith Gough, Rudolf Walter Grimm, Henrik Hargatai, Wolf Harranth, Stig Hartvig-Nielsen, Karel Honzik, Jose Jacob, Richard Jary, Dave Kenny, Anatoly Klepov, Thord Knutsson, Hans-Joachim Koch, Erik Koie, Tetsuya Kondo, Vashek Korinek, Miroslav Krupieka, Andrejs Kuznecovs, Tore Larsson, Zacharias Liangas, Kai Ludwig, Carlos Maldonado, Bjorn Malm, Ruben Guillermo Margenet, Humberto Molina, Dario Monferini, Winter Monges, Cláudio Rótolo de Moraes, National Radio Club, Inc., Horacio A. Nigro, L Oberto, Paul Ormandy, Alexey Osipov, Rumen Pankov, Anker Petersen, Andy Reid, Mauno Ritola, James Robinson, Rafael Rodríguez, Ibrohim Rustamov, Roberto Scaglione, Djaci Franklin Silva, Arnaldo Slaen, Juan Francisco de la Torre Perez, Bernd Trutenau, Mahendra Vachjee, Thierry Vignaud, Torgeir Woxen, John Wright, and the WRTH team

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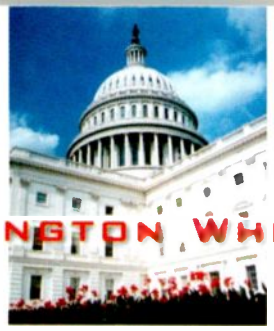


WASHINGTON WHISPERS

Military Technology in the Private Sector

Fred Maia, W5YI

Our lives have been reshaped and enriched by systems that were originally developed for the U.S. military. The Internet, Global Positioning Satellites and Spread Spectrum are all communication systems that have their roots in military technology.

Development of the Internet

In 1957, the USSR launched Sputnik, the first artificial earth satellite. In response, the United States formed the Advanced Research Projects Agency (ARPA) within the Department of Defense (DoD) to develop military science and technology.

The Internet grew out of an experiment begun in the 1960s by the U.S. Department of Defense. The DoD wanted to create a computer network that would continue to function in the event of a disaster, such as a nuclear war. If part of the network were damaged or destroyed, the rest of the system still had to work. That network was ARPANET, which linked U.S. scientific and academic researchers. It began operation in 1970.

It proved that computers can be networked and, in 1972, e-mail was invented to send messages across the network. The first personal computer arrived in 1975. The TCP/IP networking protocol was adopted in 1983 as the Internet standard. The Domain Name System (DNS) was introduced in 1984.

The National Science Foundation (NSF) created NSFNET in 1985 and it was provided free to U.S. research and educational institutions. Sprint and MCI began to build their own networks, which they linked to NSFNET. The National Science Foundation withdrew from the backbone business once commercial firms assumed operation of the major Internet arteries. NSF also coordinated a service called InterNIC, which registered all addresses on the Internet so that data could be routed. This service was later taken over by Network Solutions, Inc.

The World Wide Web (WWW), a web of hypertext documents – within which people communicate with each other and with computers – was developed at a Swiss Physics laboratory in 1991. It contained an address scheme called Universal Resource Locators (URLs) for pointing users to a particular location within the WWW information space. The new WWW information phenomenon was well received and the Internet headed from the university and researchers to the living room. Within a year, a million users had logged on to the Internet.

The White House came on line in 1993 (**http://www.whitehouse.gov/**). That same year, the "Mosaic" web browser – written by a college student – took the Internet by storm. It would lead to the development of the Netscape and Microsoft browsers. The consulting firm Network Solutions was selected by the NSF to register domain names.

Internet phones turned up in 1996 and telecom carriers asked Congress to ban them. It didn't. In 1998, Network Solutions registered its two millionth domain name. By 2000, more than one billion indexable pages are on the Internet. And there are now more than one hundred million Internet users in the United States. All of this growth took place within a span of only ten years!

Global Positioning System

In the early 1970s, the Defense Department needed a navigational tool that troops on the ground could use to pinpoint their location. The solution they developed required two dozen satellites, atomic clocks, microwave radio transmitters and on board computers. The military called it the Global Positioning System, or GPS, and like the Internet, it was a cold war development that is now used by millions of civilians.

GPS evolved as a solution to problems experienced by the U.S. military forces during the Vietnam conflict – how troops can keep in contact with each other. The NavStar system was developed and GPS became partially operational during the Gulf War in 1990. It became fully operational on June 26, 1993, when the U.S. Air Force completed the network by launching the 24th Navstar satellite into orbit. Civilians were also allowed to use the system.

GPS satellites orbit the earth twice a day, 11,000 miles above the earth, transmitting their precise position and elevation. GPS satellites send out radio signals that a GPS receiver can detect. To calculate the distance from the satellite to the receiver, the system uses a basic high-school math equation: distance is equal to the speed of travel multiplied by the time.

In addition to the time, a signal from a GPS satellite also includes information about the satellite's exact location, which is known, tracked and kept accurate by ground control stations. The time signal is also very accurate, because each satellite contains several atomic clocks. These rely on the oscillation frequencies of atoms to keep time.

The receiver measures the amount of time it takes for the signal to travel from the satellite to the receiver. Since radio signals travel at the speed of light (186,000 miles per second), we can measure the interval between transmission and receipt of the signal to determine the distance between the receiver and the satellite.

Once the receiver has calculated this data for at least three satellites, its location and altitude on the earth's surface can be pin-pointed. The end result is that a GPS receiver can produce highly accurate coordinates of latitude, longitude and altitude.

Commercial software developers can use GPS information to place your location on a graphic map, or even give you turn-by-turn directions to where you want to go. These programs can determine speed and direction from longitude and latitude readings that update every second for display on a road, topographical, or marine map.

Spread Spectrum

One of actress Hedy Lamarr's early husbands (she had six) was an arms manufacturer, and Hedy absorbed an education in munitions manufacturing. Disturbed by his arms sales to the Nazis, she escaped on a train to London in 1937.

Hedy, once named the "most beautiful woman in the world," knew that guided torpedoes were much more effective at hitting a target. The problem was that radio-controlled torpedoes could easily be jammed by the enemy.

On the eve of World War II, Hedy Lamarr and George Antheil, an American composer, dreamed up an interesting radio guidance device while at a dinner party. Antheil, a pioneer in player pianos, noted that the holes in a piano roll caused the piano to skip from one key to another. Hedy conceived the idea of having a radio guidance frequency do the same thing.

She suggested a "frequency hopping" scheme using two paper piano rolls perforated with identical patterns installed in the submarine transmitter and torpedo receiver. Signals broadcast by the transmitter over quickly changing frequencies would be recognized only by the receiver. She reasoned that this would protect U.S. radio-guided torpedoes from German interception because a constantly changing frequency cannot be jammed.

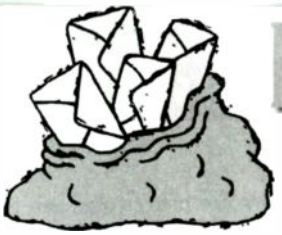
While they had the foresight to patent their invention in 1942, the patent expired in 1959 without either of them realizing any money from their invention. Although offered to the U.S. military, the invention was not taken seriously and the frequency hopping system was never used during World War II. Digital technology and fast microprocessors had yet to be developed.

In 1960, however, the technology was renamed "spread spectrum" and the military adopted it for secure communications during the Cuban Missile Crisis and in weapon systems during the Gulf War. In 1981, spread spectrum technology was released into public domain.

Commercial interests began using this "new" technology in the 1990s as high-speed digital microprocessors became inexpensive. Spread spectrum has now revolutionized worldwide communications and forms a basic principle that enables simultaneous but private multi-channel operation. Among other things, it is now used in modern digital cellular telephones, pagers and the wireless Internet. Its possibilities are endless.

Spread spectrum is also seen as one answer to the crowded radio spectrum, since different users can use the same band in the same area without interference by changing the spreading formula. Spread spectrum transmits under the noise level without disrupting existing narrow band radio systems.

On March 12, 1997, the Electronic Frontier Foundation (EFF) honored Hedy Lamarr and George Antheil with a special "Pioneer Award" for their "trail-blazing" co-invention of spread-spectrum broadcast communications technologies. "Ironically," EFF said "the tool they developed to defend democracy half a century ago promises to extend democracy in the 21st century." Hedy Lamarr, born Hedwig Kiesler, died in Florida last year at the age of 86.



LETTERS TO THE EDITOR

The more things change, the more they stay the same

In his September *Closing Comments*, Bob Grove asked, "So how does the visitor to a web page know that this is a dealer who can be trusted?" Here's a reply from Bernie Brainerd.

"Ever since long before we were kids, newcomers were free to set up shop, put up a new sign, and open for business. Some succeeded, some didn't. I think those who did succeed were generally adept at their business and honest with their customers. Those who failed were generally inept at business or dishonest. To be sure, some innocent businessmen fell through the cracks because they couldn't adapt to the new competition, but that's always a possibility in the American way of doing business... I don't think it all has to do with profit margins or point-of-sale prices, it has to do with the customer's confidence in that business. If a person shops solely based on bottom line price, then they get what they pay for.

There are businesses I avoid because I don't like their service or attitude. There are also places I shop because they remember my name or face, treat me right, and answer my questions... So how does the visitor to a web page know that this is a dealer who can be trusted? That depends on the visitor. An informed visitor will do a little research... If a visitor to a website isn't willing to be informed, then they get what they deserve.

What do I look for?

* Years in business, for one. It took me three years to finally buy something from Amazon.com.
* Personal support, for another. I need a phone number to call and an honest number of hours per day to call that number. If something goes wrong or I need help, I want someone to call.
* References. Give me some testimonials that don't sound corny. Real names and real experiences please.
* Location. If you don't have a storefront, tell me. If you do have a storefront, tell me where it is. I may want to visit it.
* Secure server. Don't make me email my order, but it's ok if you give me the option instead of using a secure server.

Computers vs. radio

A bit on and off the subject: I'm always amused by the various discussions of how computers will change the radio hobby. Computers were a good thing when they made programmable scanners and radios possible. Now computers are coming into question because they may be replacing radio as it has traditionally been.

That's progress, I guess, but things really haven't changed that much. I remember being a kid and driving around the lake and listening to the clear channels like WBZ, WABC, or WLS. There was a strong signal and then there was fading. Now I can connect through RealAudio and guess what? Net congestion and buffering! Kinda the same thing from a listening standpoint.

Radio is a hobby that has various fascinations to various people. Some people restore old radios, some people crave the state-of-the-art radios. Computers are here to stay, like it or not. But whether one chooses to listen to the BBC on SW or satellite or the internet, who cares? If people are enjoying what they are doing, then they should have every right to do so. On the other hand, few people drive the same car they did 20 years ago, so they shouldn't expect everyone else to do that either."

– Bernie Brainerd

Barrel Capacitors

In the September 2001 article by Mark Colborn, "Following Trunked Radio Systems by Computer," the author stated on page 21 that he replaced R2 in the circuit with a 0.1k barrel capacitor. My question is, where can I find a 0.1k barrel capacitor?

– David Warrick

Mark Colburn replies, "Radio Shack carries them. They are the flat, round, two pinned & yellow colored capacitors.

"Please share with your readers as a follow-up to my article that the BC-780XLT makes an excellent second scanner with Trunker and Etrunker. Plug the 9 pin serial connector wired to the transmit and ground pins in the two level FSK decoder box directly into the rear 9 pin connector on the 780XLT. By holding down the "E" or "REM" key for two seconds the 780XLT goes into the Remote mode even while operating in conventional and trunked modes. When it receives a signal it automatically displays the frequencies appearing on the Trunker/Etrunker program screen. The same batch file parameters for the BC-245 work fine with the 780XLT."

Caddo Parish, LA

"I just read the article 'Scanning the Heart of Dixie' in the November 2001 issue of *MT*. We have a new communication system in Caddo Parish, effective Oct.15th. Please check out the site at **http://signal51group.com/Unipages/radio_freq.htm** Thanks for the great magazine."

– Jerry Lindsay

Motorola Trunked System Frequencies

866.1875 866.7750 867.1375 867.7875 868.3375 866.2250 866.7875 867.3000 867.9250 868.3875 866.2875 866.8875 867.4375 868.0875 868.5875 866.4375 867.0500 867.6375 868.1750 868.8125 866.5875 867.0875 867.6750 868.3125 868.8375

We welcome your ideas, opinions, corrections, and additions in this column. Please mail to ***Letters to the Editor,*** PO Box 98, Brasstown, NC 28902, or email *mteditor@grove-ent.com*. Letters may be edited for length and clarity. Happy monitoring!

-Rachel Baughn, KE4OPD, editor

Shreveport Fire Department

ID	Division		
8047		8432	
8054		8464	
8079		8496	
8175		8528	Prevention
8240	Main	8560	Maintenance
8241		8562	
8242		8592	Academy
8272		8601	
8304	Dispatch	8624	EMS
8336	TAC 1	8626	
8368	TAC 2	8665	
8400	TAC 3	8681	
8422		8995	
		8995	

Note: The S.F.D. dispatch frequency to the fire stations' paging system is 155.94 MHz, but the message is also broadcast on ID 8304.

SFD, EMS & FIRE Dispatch

155.940	Individual or All Call by tones Simplex

Caddo Fire Districts

ID	District		
24240	1	25008	5
24263		25200	6
24272	TAC	25232	TAC
24432	2	25305	
24438		25392	Fire Com
24588		25394	
24624	3	25424	
24728		25484	
24809	4	25496	
24816		25584	8
24848	TAC	25776	9
24864		25808	
24984		25868	
		25904	
		25936	

William Cooper Killed

William Milton Cooper, 58, of Eager, Arizona, was a national leader of the militia movement by virtue of his talk show, "Hour of the Time," broadcast on WWCR out of Nashville. Like some other patriot leaders, Cooper refused to get a driver's license or pay federal income taxes. Cooper was indicted on federal charges of failing to pay taxes from 1992 to 1994, but officers were reluctant to make him a martyr and left him alone, until he threatened a local man with a gun. On November 6, during an attempt to arrest him on a warrant for aggravated assault, Cooper was killed and an Apache County sheriff's deputy was seriously wounded with two shots to the head.

Glenn Jacobs, a newspaper publisher and friend of Cooper, said he didn't think the police operation was unjustified. "I think Bill just went nuts. He was looking for martyrdom anyway and swore he would never surrender."

In an unrelated case, radical Kentucky militia member, Steve Anderson, opened fire at a Bell County, Kentucky, sheriff's deputy during a routine traffic stop near Middlesboro on October 23, hitting the police cruiser repeatedly before escaping into the woods. Anderson, who operated the clandestine United Patriot Radio, has not been apprehended.

E-911 Behind Schedule

Although the predicted stampede to cellular phones did not occur following the World Trade Tower attacks, the growth in number of cell phone users continued to rise within a declining economy. A good portion of new users say they are buying the phones for security, especially when away from home.

When emergencies happen, 911 is the number most folks call. However, when you reach dispatch from a cellular phone, you have no idea where the answering dispatch is and they don't know where you are. That was supposed to change October 1, 2001 – the deadline to start the implementation of Phase II of E-911 requiring Automatic Location Identification (ALI). (*See related feature story.*)

Instead, a flurry of appeals for extensions forced the Federal Communications Commission to modify the deadline. Rather than extend the 5-year deadline, the FCC is formulating a schedule for progress reports on a case-by-case basis depending on degree of preparedness and merit of the appeal. The FCC has already ruled on schedules for compliance for five of the six largest nationwide carriers; the mid and small-sized carriers had until the end of November to submit their extension requests.

Numerous groups have expressed their concerns that the tracking information be safeguarded so that persons with a need to protect their location, such as battered wives, cannot be tracked, and consumers are protected against nuisance advertising calls by nearby companies.

Fight for Spectrum Space Heats Up

Congress had mandated that spectrum was to be freed up by Sept 30, 2002, for use by advanced mobile wireless services (3G), but the Bush administration would like to extend that deadline for another two years to allow further study. The frequencies are expected to come from the government sector, but the military is fighting to keep what it already has. Defense Secretary Donald Rumsfeld told a House committee, "In Kosovo, we had one-tenth the number of people that we did in the Gulf War, and we used 100 times the bandwidth." The spectrum under consideration for auction is the 1710 - 1755 MHz and 2110 - 2150 MHz bands, portions of which are used for data links between aircraft and air launched weapons.

FAA Begins Upgrade

In the first phase toward upgrading its communications system, the Federal Aviation Administration awarded a $20.5 million contract to Indiana-based ITT Industries for a multi-mode VHF digital air-to-ground radio system. The digital radios (called CAVU 2100 meaning "ceiling and visibility unlimited") will employ both 25 kHz and 8.33-kHz double-sidebands. AM is used for analog voice, and VHF Digital Link Mode-3 is used for integrated digital voice and data.

The radios will be available in 2002 for testing, and then will be deployed at 1500 remote air-to-ground and emergency communications facilities serving 21 Air Route Traffic Control Centers. As the Next Generation Communications system is gradually implemented, it will eventually affect all aircraft, but general aviation will probably not need to reequip until 2010 or later.

Merlin Communications Sold

Four years ago, the transmitting business of the BBC World Service was privatized and sold to a group of BBC ex-employees and venture capitalists. The company, Merlin Communications Group, has now been sold to Vosper Thornycroft Holdings PLC (VT) for £95 million – seven times its original cost. VT is a civil and defense contractor focusing on support services, shipbuilding and marine products, with operations in the UK, Europe, United States and Middle East. Merlin will remain an independent subsidiary of the holding company.

Merlin's plans are to grow as a global communications facilities management company. Merlin already has a 10-year contract to operate and maintain the BBC World Service's short and medium-wave transmitters, and is working on a deal to upgrade the transmitter relay station in Oman. It has also signed a five-year contract with the European Space Agency (ESA), to operate and maintain their tracking, telemetry reception and command transmission satellite ground station in Kourou, French Guyana.

All of Africa Now Online

The ITU reports that the year 2000 was a momentous one in the African telecommunications calendar, because that was the year all countries on the continent became connected to the Internet and that sub-Saharan Africa passed the threshold of one telephone subscriber per 100 inhabitants. Within a few years, the report says, it is conceivable that the majority of African citizens will be within range of a mobile signal. Indeed, before the end of 2001, there may be more mobile than fixed subscribers on the whole continent.

WRN Moves to Telstar

World Radio Network has begun digital satellite transmissions in North America on TelStar 5 for its WRN1 English and WRN2 Multi-lingual radio networks. Use of Galaxy

BULLETIN BOARD

January 7: DX Test

KTNS-1090, Oakhurst, CA, DX test 12:00-1:00am PST. KTNS ("Kittens AM 1090") 1000 watts nondirectional. Tones and CW IDs identifying KTNS, along with their regular Music of Your Life (MOYL) format. Reception reports (with return postage) may be sent to: Larry Gamble, General Manager, KTNS-AM, P.O. Box 2020, Oakhurst, CA 93644; E-Mail: mtkaat@sierratel.com; http://www.KTNSRadio.com (Arranged by Lynn Hollerman for the IRCA CPC.)

January 12: DX Test

WRCS-970, Ahoskie, NC, DX test 12:00-1:00am EST. 1000 watts nondirectional. Tones and CW IDs identifying WRCS. If any music, it will be gospel music with spoken liners between songs. But the test will consist mostly of CW IDs. Reception reports (with return postage) may be sent to: Bob Carter, Chief Engineer, WRCS-AM, 443 Hwy 42 W, Ahoskie NC 27910; E-Mail: *wrcs970am@yahoo.com*; http://www.geocities.com/wrcs970am (Arranged by Lynn Hollerman for the IRCA CPC.)

January 20: Babylon, New York

Third annual Ham Radio University, 9a.m. at the Babylon Town Hall Annex on Phelps Lane, North Babylon, Long Island. Ham Radio University 2002 is a day of education about Amateur Radio. There will be 20 one-hour presentations with special forums geared to the non-ham as well as the experienced ham radio operator. The focus will be "hands on" with many demonstrations, and a Special Event Station operational on HF.

HRU 2002 is a cooperative effort between over twenty clubs and organizations in the New York City/ Long Island area. $2 donation. For full information check out http://www.arrlhudson.org/nli/hru2002.htm or contact: Phil Lewis N2MUN, 631-226-0698 *N2MUN@optonline.net*

5 will be phased out at the end of 2001 as distribution migrates to the widely used Ku band, DVB standard.

World Space Acquires Voyager

The World Space Corporation has acquired Radio Voyager, an English-language adult contemporary radio network previously owned by Finger Lakes Productions International Inc. Voyager has a network of radio affiliates in European and African markets, and has been part of the WorldSpace broadcast lineup since the company began service with its AfriStar satellite in 1999. Radio Voyager's audio service converges Internet webcasting with traditional radio for global listener reach; it also provides a customized radio streaming service for Fortune 500 corporations.

Satellite TV Rules in Kabul

Before the Taliban banned television, a few Afghan viewers dared to watch the small screen. According to reports, they got their TV from foreign television channels captured via hidden satellite dishes.

As soon as the Taliban left Kabul, movies, music and television re-emerged almost immediately. Residents soon found out that the only way they can see TV for more than a few hours is through a dish. Kabul's TV station, broadcasting with 30-year-old equipment delivered through a 10-watt transmitter, is on the air about three hours a day.

Radio Free Afghanistan?

The U.S. House of Representatives approved the establishment of "Radio Free Afghanistan" to broadcast news and help explain the United States' war aims to Afghans in their local languages. The Senate has no companion measure, and the Bush administration has not yet weighed in with their support at press time.

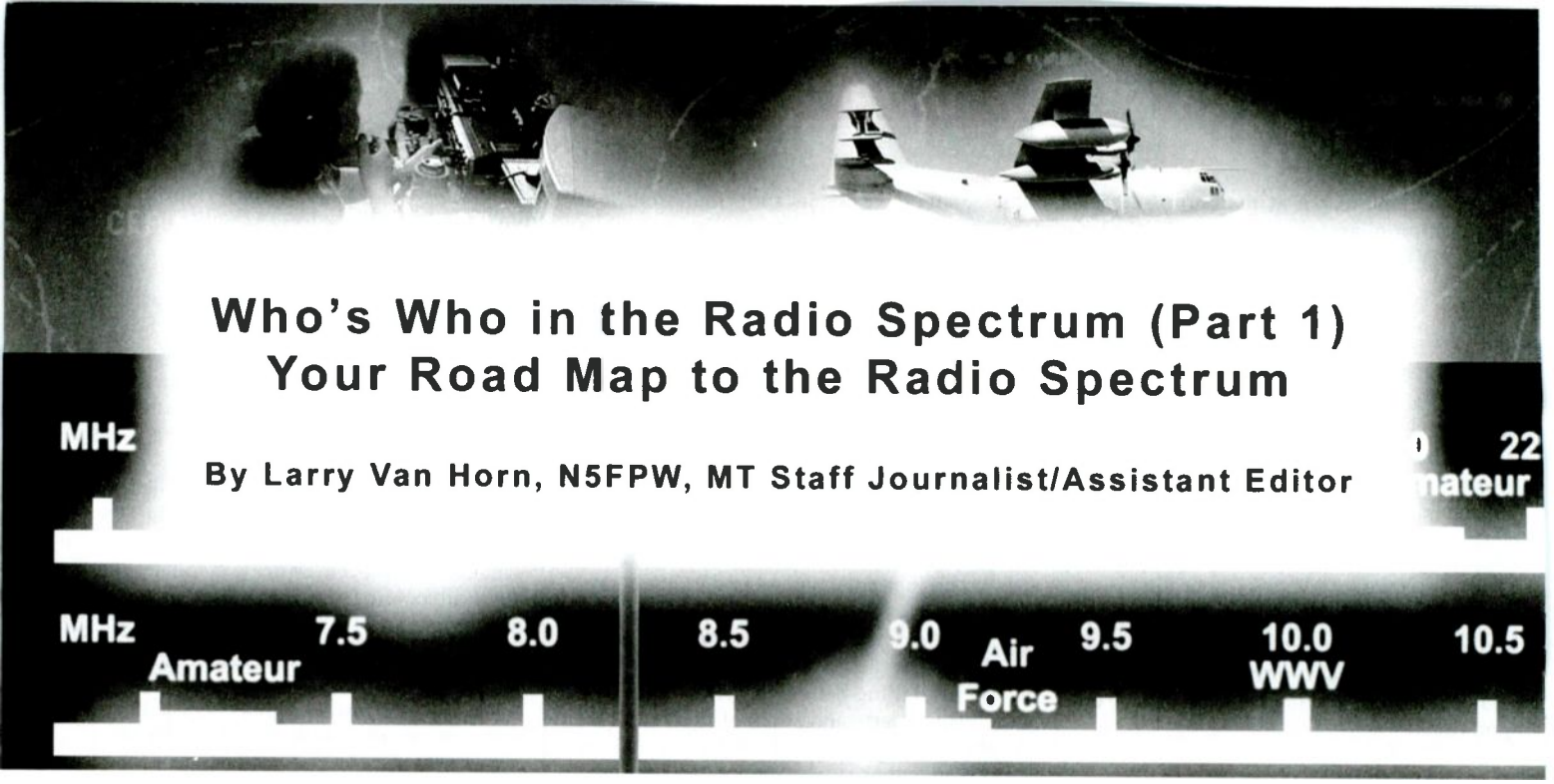
Supporters said the broadcasts were needed to get the truth to the Afghan people. "...We are falling behind in the battle for the minds and hearts and souls of the people of Afghanistan," said California Rep. Tom Lantos, member of the House International Relations Committee.

The measure authorizes spending more than $27 million over the next two years for transmissions into Afghanistan under the auspices of the existing Radio Free Europe/Radio Liberty service. It covers 12 hours of broadcasting into Afghanistan a day and the $10 million cost to move three transmitters from the recently closed VOA facility in Spain to Kuwait.

RFE broadcast into Afghanistan during the last half of the Soviet-Afghan war, but ended transmissions shortly after the Soviet Union pulled out of the region. Supporters argued that if the service had been operating in recent years, the followers of Osama bin Laden would not have had such fertile ground in Afghanistan.

The Voice of America has expanded radio broadcasts into Afghanistan since the U.S. military campaign began last month, but some lawmakers have been critical of the service for not advocating the U.S. position forcefully enough.

"Communications" is compiled by editor Rachel Baughn KE4OPD (mteditor@grove-ent.com) from newsclippings contributed by our readers. Thanks to this month's MT reporters: Anonymous, Albany, NY; Jenks Garrett, Weatherford, TX; Doug Robertson, Oxnard. CA; Brian Rogers, Melvindale, MI; Robert Thomas, Bridgeport, CT. Via e-mail: Mark Ansel, Roger Cravens, Robert Felton, John Figliozzi, Robert Foxworth, Alan Henney, Maryanne Kehoe, Bob Kozlarek, Ed Muro, Chris Pancheri, Ken Reitz, Doug Smith, Hugh Stegman, Larry Van Horn, Peter Vieth, Robert Wyman, George Zeller



Who's Who in the Radio Spectrum (Part 1)
Your Road Map to the Radio Spectrum

By Larry Van Horn, N5FPW, MT Staff Journalist/Assistant Editor

It's a day you have been waiting for a long, long time. You have saved your pennies and finally put away enough money to purchase the ultimate experience in the radio hobby. As you watch, the big brown truck pulls up your driveway to deliver the new toy – a wideband general coverage radio from Grove Enterprises.

You hurriedly unpack the radio, set it up on your radio room desk, connect your outside antennas to the rear apron, then you press the power button. You focus immediately on the warm glow of the frequency display. Turning the main tuning dial you watch the numbers on the display change as all sorts of squeals, squeaks, squawks and chirps start coming from the speaker in your new receiver.

There is just one small problem: You really don't know where to tune to hear something intelligible. You suddenly realize that in order to use your new receiver you are going to have to get some sort of guide or radio frequency road map to help you with your journey. You are going to have to learn where and when to tune for what you want to hear.

So, for the beginner as well as the seasoned veteran looking for a new challenge, here is the first in a series of exclusive articles in *Monitoring Times* called *Who's Who in the Radio Spectrum*. This series will look at the radio spectrum from the bottom to the top, showing where various services are located on the radio frequency road map and providing some tips to tuning them in.

Longwave 0-535 kHz

The longwave range – sometimes referred to as "radio's basement" – occupies the first 500 kilohertz (kHz) of the radio spectrum. Table one outlines some of the basic allocations in this frequency range – except for Mother Nature who doesn't need permission to transmit!

Table One: 0 - 535 kHz

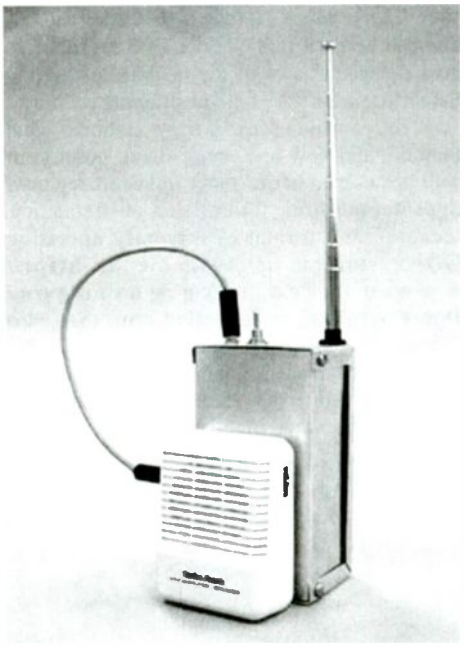
0-25 kHz	Natural Radio (Spherics, Seismic events, and Schumann Resonance/0.2-11 kHz), Caver Communications System, Power Mains (50/60 Hz), Naval/Submarine communications, Standard Time and Frequency Signals (Russian 20 kHz), Radio Navigation (Russian Alpha/Chinese Systems)
25-90 kHz	Fixed stations, Naval/Submarine Communications, US Military Airborne Command Post, Civilian airline crash black box pingers, Standard Frequency and Time Signals (United States WWVB/ United Kingdom MSF 60 kHz)
71.6-74.4 kHz	73 kHz Amateur Radio band (U.K.)
90-110 kHz	Navigation Signals (Loran-C)
135.7-137.8 kHz	136 kHz Amateur radio band (CEPT European allocation)
153-279 kHz	Broadcasting in Europe, Africa, Near and Middle East, Asia and Pacific regions
160-190 kHz	1750 meter license-free experimental band (LowFER)
190-280 kHz	Non-Directional Beacons (NDB) for aeronautical navigation (Morse code identifications)
281-325 kHz	Maritime Differential Global Positioning System (DGPS)
325-415 kHz	NDB for aeronautical navigation (Morse code identifications)
415-510 kHz	Ship-to-ship and ship-to-shore (Morse code or CW/SITOR-B modes)
490 kHz and below	Utility-operated power line carrier (PLC) systems
500 kHz	International calling and distress frequency (Morse code)
510-535 kHz	NDB for aeronautical navigation (Morse code identifications)

Now let's take a closer look at some of the many types of stations we can hear in this portion of the radio spectrum.

Natural Radio

In the basement of the radio spectrum, Mother Nature's radio transmitters reign supreme. Known as natural radio, these signals are electromagnetic energy from natural phenomena. The frequencies are so low, in fact, that if they were acoustic waves instead of electromagnetic waves, they would be in the range of human hearing. Therefore, receiving natural radio is basically a matter of connecting a suitable antenna to an audio amplifier! Some of these phenomena are not too hard to hear, though it does help to be away from electrical power lines. Some of the most interesting natural radio signals are at a much lower level than power line hum in the typical residential area.

The quickest way to experience natural ra-



A homebuilt natural radio receiver by Chuck Bliley, NY.

dio sounds is to check out Steve McGreevy's sound archive at the University of Iowa (**http://www-pw.physics.uiowa.edu/mcgreevy/**) for recordings in .wav format. A CD of Natural Radio sounds is available for purchase, featuring Steve's recordings at **http://www.triax.com/vlfradio/cd.htm**.

If you would like to explore natural radio first-hand, check out Steve's home page at **http://www.triax.com/vlfradio/natradio.htm** to learn how to get started. This site is one of the best sources of information on the internet on natural radio, with accounts and photos of recent monitoring expeditions, receiver designs, ordering information, and links to other sites.

Utility

The bulk of the signals you will hear below 535 kHz are utility or nonbroadcast transmissions. The U.S. Navy uses the lower portion of this spectrum to transmit messages to submerged submarines. There are several Navy longwave systems used for this purpose. Project Extremely Low Frequencies (ELF) in Michigan transmits extremely slow-speed Morse code (taking up to five minutes to send one letter) on a frequency of 76 Hz (that isn't a misprint). A variety of other frequencies in this range use Minimum Shift Keying (MSK, also known as F1B) form of digital transmission.

The U.S. Navy isn't the only service to use this range. You will also find transmitters from other nations with naval services, including France, Germany, India, Italy, Japan, Russia and many more which use the MSK mode.

Time signals are another staple in the land below 500 kHz. The Russians have long operated a time station network known as Beta in the longwave portion of the band. Look for Beta signals on 20.3, 23.0, 25.0, 25.1, and 25.5 kHz. You will find a very interesting write-up on these Russian stations by one of the deans of the longwave listening world, Trond Jacobsen, at the following internet URL: **http://www.vlf.it/russianvlf/russianvlf.htm**.

One of the more famous time stations in this frequency range is run by the National Institute of Standards and Technology: station WWVB on 60 kHz near Fort Collins, Colorado. This station produces an effective radiated power output of 50 kW (kilowatts) and can be heard throughout the United States.

WWVB transmits a time signal on 60 kHz

Loran-C

Loran-C was originally developed to provide radio navigation service for United States coastal waters. It was later expanded to include complete coverage of the continental U.S. as well as most of Alaska. Twenty-four U.S. Loran-C stations work in partnership with Canadian and Russian stations to provide coverage in Canadian waters and in the Bering Sea. Loran-C provides better than 0.25 nautical mile, absolute accuracy for suitably equipped users within the published areas. Loran-C signals can be heard on and around 100 kHz.

Broadcast

153 to 279 kHz is used for AM (amplitude modulation) broadcasting in Europe, Asia, the Pacific and parts of Africa. Unlike standard AM broadcast stations in North America that use power outputs up to 50,000 watts, longwave stations are very high power, often running up to two million watts.

On occasion, especially during the North American winter months, these stations are audible in the United States. However, don't expect to hear many English language broadcasts. Like our standard AM broadcast band stations, these stations are intended for the domestic audiences of the country from which they are broadcasting. Therefore, the only English language broadcasts you are likely to hear in the longwave spectrum are from stations in the United Kingdom on 198 kHz.

LowFERs

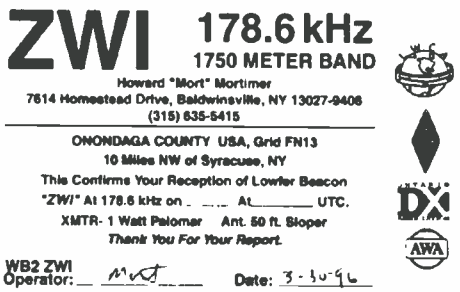
LowFER stands for Low Frequency Experimental Radio, which is governed under Part 15 of the Federal Communications Commission (FCC) Rules. FCC Part 15 rules cover both unintentional radiators (devices such as computers and TV receivers, all of which may generate radio signals as a side effect of their operation); and intentional radiators (such as garage door openers, cordless telephones, wireless microphones, etc., which depend on deliberate radio signals to perform their jobs).

It is the intentional radiators which are of interest to us, because we can make them achieve extraordinary results when conditions are right, and some hobbyists enjoy doing just that. Although any type of modulation is permitted which will fit in the 1750 meter band, serious experimenters use Morse Code and other various digital modes for the greatest distance (DX).

You can find out more about LowFER operations on the Longwave Club of America (LWCA) website at: **http://www.lwca.org/part15/whatisit.htm**.

The Longwave Ham Bands

In the spring of 1996, the United Kingdom Radiocommunications Authority allocated 71.6



A QSL card from LowFER ZWI/178.6 kHz, Baldwinsville, NY

to 76.4 kHz to holders of Class A amateur licenses in the British Isles. Operation is permitted on an experimental, non-interference basis, and is conducted under individual Notices of Variations.

The band was activated, in part, as a stopgap while the rest of Europe debated other possible amateur allocations in the longwave spectrum.

After 136 kHz was agreed upon, the UK Radiocommunications Authority quit issuing Notices of Variation at the end of June 1998, and operation on this band was supposed to cease two years later. In the spring of 2000, the UK authorities agreed to allow an extension to the cutoff until June 2001. No new Notices of Variation were to be issued, but future discussions about continued use of the band were not ruled out.

Then in the late summer of 2000, word was received that existing Notice of Variations for the 76 kHz ham band were being renewed for three years. By autumn, UK hams received word that some new notices were again being issued.

Early discussions of a possible longwave ham band in Europe included possible allocations around 143 or 147 kHz, but a consensus was eventually achieved for a band at 135.7 to 137.8 kHz. When a working group of the Conference of European Post and Telecommunications (CEPT) issued their report in early 1997, several administrations began rule-making proceedings or issued special permits for use of the band.

A full CEPT recommendation was issued in September 1997, followed by further action in several European nations. On January 30, 1998, the United Kingdom opened the band within its borders, resulting in some of the most prolific activity to date.

You can get much more information on 136 kHz ham band activity worldwide at Dave Pick's (G3YXM) website at **http://www.wireless.org.uk/index.htm**.

In October 1998, the American Radio Relay League (ARRL), amateur radio's national organization in the United States, petitioned the FCC to create two new longwave ham bands at 135.7-137.8 kHz and 160-190 kHz. The League asked for a 200 watt PEP power limit and asked that the new bands be made available to those holding a General or Extra Class license. The League proposed permitting CW, SSB, RTTY/data, and image emissions. The League petition was designated RM-9404. According to a recent ARRL press release in the fall of 2001, League officials anticipate that the FCC will combine three pending ARRL petitions (including RM-9404) into a single proceeding sometime early this year.

Non-Directional Beacons (NDB)

Most of the low frequency utility stations monitors encounter are nondirectional beacons (also known as NDBs). Many of them were formerly for coastal navigation, but those are generally being decommissioned, or are being replaced with DGPS broadcasts (see below).

Aeronautical beacons remain in common use, and automated voice weather reports are being added at some sites. Most of these low-powered Morse code beacons (identifiers are between one and three characters long) are used for close-in navigation to airports. If you hear a beacon signal that begins with the letter "Y" or starts with a number, you have probably logged a Canadian NDB. These beacons transmit their continuous calls so slowly that even if you don't know code you can understand the letters as they are being transmitted.

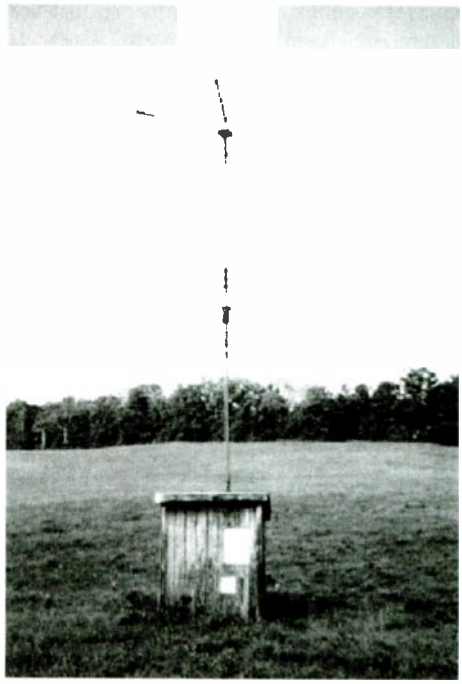
Beacon monitors in the United States with internet access will find Paulo Santos' AirNav website at **http://www.airnav.com/** extremely useful in identifying the Morse code Identifications they are hearing. European beacon monitors will find a wealth of information including station lists at the *Beacon World* website presented by Alan Gale (G4TMV) at **http://www.alan.gale.clara.co.uk/enter.htm**.

Of course, don't forget to check Kevin Carey's monthly column *Below 500* here in the pages of *Monitoring Times* magazine.

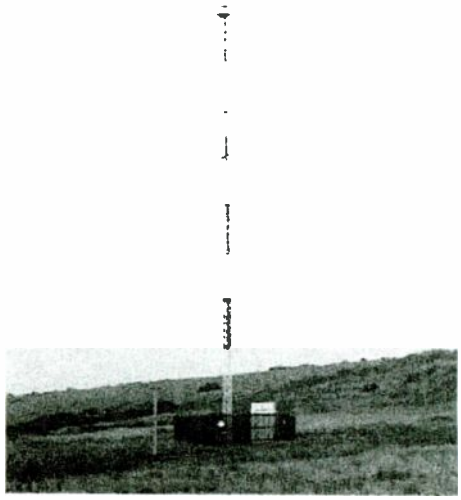
DGPS

The United States Coast Guard operates Differential GPS stations in the 281 to 325 kHz range, often at sites of former maritime NDBs, and now also at some of the former US Air Force Groundwave Emergency Network (GWEN) sites. These stations transmit correction signals that can be used with special GPS receivers to give domestic users of the Global Positioning Satellite system very high positioning accuracy.

To learn more about these stations, what they do, and how to identify them, point your web browser to **http://www.navcen.uscg.gov/dgps/default.htm**. Information on frequency, location, and format of currently operating DGPS stations is available at **http://www.navcen.uscg.gov/dgps/DgpsCompleteConfiguration.htm**. (*See also "IDing DGPS Beacon Stations," May 2001 MT -ed*) Other nations also operate DGPS services, although not always with the same formats that we use here in the United States.



LLX/353 kHz, Lyndonville, VT, beacon typical of those used at small private airfields.



DGPS site at Pigeon Pt, CA, courtesy DJL

NAVTEX

NAVTEX is an international, automated system for instantly distributing maritime navigational warnings, weather forecasts and warnings, search and rescue notices, and similar information to ships. It has been designated by the International Maritime Organization (IMO) as the primary means for transmitting coastal urgent marine safety information to ships worldwide.

In the United States NAVTEX is broadcast from twelve U.S. Coast Guard facilities on a frequency of 518 kHz using the SITOR-B transmission mode. Coverage is reasonably continuous along the East, West, and Gulf Coasts of the United States, as well as the area around Kodiak, Alaska, Guam, and Puerto Rico. The typical NAVTEX transmission coverage ranges from 200-400 nautical miles.

You will find an extensive list of NAVTEX information at Bill Hepburn's website at: **http://www.iprimus.ca/~hepburnw/dx/navtex.htm**.

Other Sources of Information

If navigational aids, automated weather information, Differential GPS, and similar stations are your cup of tea, you'll especially want to check out all the aforementioned Longwave Club of America has to offer. Their homepage URL is

at: http://www.lwca.org/.

Kevin Carey, WB2QMY, our *Below 500* columnist for *Monitoring Times*, has put together an audio cassette tape of the fascinating signals found only on the frequencies between 0 and 500 kHz. Carey's tape includes extensive commentary on the history of these signals, plus tips on listening to these signals yourself. Kevin also provides information on a number of references where you can learn more about listening to the world below 500 kHz.

On this tape you will get details – and audio samples – of many different types of longwave transmissions including: maritime distress, navigation beacons, automated and transcribed weather broadcasts, differential GPS, longwave AM commercial broadcasts, low frequency experimenters band or LowFER, LORAN, Omega (no longer on the air), military MSK, the former encrypted "GWEN" system, and time/frequency standard stations.

No self-respecting longwave radio fanatic should be without this resource. Carey's tape can be ordered from: Kevin Carey, P.O. Box 56, West Bloomfield, NY 14585 USA. Cost is US$11.95, which includes postage to the United States.

Propagation

There are certain advantages to listening to longwave signals. Since most propagation in this spectrum is by groundwave, fading is either nonexistent or very slow (but deep).

There are also disadvantages. The band is extremely noisy with lots of atmospheric noise and static, making it hard at times (especially during the summer months) to pull out intelligible audio from longwave stations. You will also soon discover that other listening patterns exist – winter being better than summer and night better than day.

In order to have distant reception at these frequencies, a darkness path must exist between the receiver and the transmitter. For instance, the best time to listen for European and African signals is around your local sunset here in North America. Asian and Pacific stations are best heard near your local sunrise.

Equipment

So, what equipment are you going to need? First a good, sensitive receiver with product detector circuitry is a must. Most of the shortwave receivers available in the marketplace have coverage which extends down to 100 kHz. These receivers and portables include the AOR AR-3000, Grundig Satellite 800 (portable), Icom R-8500, Palstar R-30, and the Yaesu VR-5000. The Grundig Yachtboy 400 and Sangean ATS-909 portables start their coverage at 160 and 150 kHz respectively. Receivers that start even lower in frequency include the Icom R-75, beginning at 30 kHz, and the AOR AR-5000, JRC NRD-545, and the Drake R-8B communications receivers, at 10 kHz. One other receiver of note for longwave reception is the AOR AR-7030. Its coverage begins at "0" and stops at 32 MHz.

A longwire antenna and good ground is recommended. When picking a receiver for longwave use, you should steer away from the portable radios, since an external antenna cannot be connected to the receiver for longwave or medium wave reception. These radios only use their built-in ferrite loop coils for antennas in these bands.

Finally, your location can play a big part in your success in monitoring this band. Noisy city or suburban locations could pose real problems to hearing signals in the low frequencies. Man-made noise can also be a major obstacle. Even a television set can cause major interference to the weak signals commonly heard in the longwave spectrum.

Longwave may not be the easiest band to DX and it doesn't have a lot of voice signals to monitor, but for those who seek unusual or low-powered listening targets, this is the band to try. Give it a shot if you have the equipment – it can be fun listening to radio's basement frequencies.

Emergency Communications – "Who do you call?"

By Ken Windyka (ken.windyka@the-spa.com)

Today a variety of radio/cellular/PCS wireless services that do not require any license are being purchased by the radio hobbyist and general consumer for the primary purpose of providing a way to obtain emergency assistance when away from home. Ignoring the sales hype, the fact there is such a variety of communications options on the market is a sure sign that none of these is perfect. But which is most reliable for you or for the loved one you want to protect? And, just as important, when you call will anyone be listening?

Cellular/PCS Phones:

There's a wide choice of telecommunications companies, services, and price ranges available for the budget conscious consumer. Check with your local wireless store for specific plans and equipment.

If you plan to take the cell phone on trips, be aware that some companies utilize proprietary networks and have no roaming capability to other systems. Others do offer roaming as long as the remote system allows it.

Dual band phones (digital/analog) are probably the best bet, since analog services have been around longer and therefore have more widespread coverage, and they are more tolerant of interference/low signal strength than digital systems which will drop the signal quicker. However, analog systems do use more radio power, so your portable cell/PCS phone battery could discharge quicker. You might want to investigate the new emergency zinc batteries to keep in the car for emergency; they supposedly stay fresh for years.

You should always check coverage maps, but be aware that even within the primary coverage area there can be many "dead spots." Coverage is normally reliable on most interstate highways and many major secondary highways.

The national emergency calling number (911) is still to be implemented on cellular systems. Generally, when dialed from a cell phone it will send the caller to a public safety answering point (PSAP). The PSAP may have the capability to transfer the call to the proper jurisdiction *or* they may have to obtain the necessary information and telephone or radio the appropriate agency for you.

In Phase I of the FCC-mandated implementation, the cellular telephone number of the caller will be displayed on the 911 system. Phase II will provide the caller's actual location (within 100 yards) in relation to the nearest cell/PCS site.

Some states have alternative numbers for highway emergencies. These will normally be posted on signs when you enter the state via the interstate highway system (e.g. in Massachusetts *677 Western MA and *77 for Eastern MA). These answering points do have the capability to transfer calls to appropriate jurisdictions.

You can also do some of your own preparation. In communities that have implemented land line 911 systems, there are alternate emergency numbers listed in phone books which you can program into your cell/PCS phone for emergency services in the jurisdictions you normally travel through.

A strong advantage of cellular/PCS phones (especially in the digital mode) is that conversations are private and cannot be monitored by the average person. Furthermore, when one dials an emergency 911 PSAP there's accountability (e.g. call recorded, dispatch log entry, etc.) from the time the call is received until units arrive on scene.

Cellular/PCS service is not a "sure thing" during an emergency. Sites can be down due to weather, power loss, technical problems, or they may be overburdened with emergency calls from a particular area. Or, the user may be out of range of any cellular/PCS system. The system will either work or not work; there is no in between option. You can't transmit "in the blind" hoping someone might pick up your signal!

Citizen Band Radio (CB):

The CB radio system on 27 MHz has been around for more than 30 years. That means there's a variety of portable, base, and mobile units, as well as antenna accessories, available at very affordable prices. The units are simple to operate and can take a fair amount of abuse. Portable units are larger than the typical Family

Police aid man in Utah

CONCORD, N.H. (UPI) — By some quirk of nature, New Hampshire state troopers found themselves responding to a report of a fatal accident over the weekend near Green River, Utah.

Ken Windyka of Rochester heard a distress call about the accident over his citizens band radio on channel 9, the national emergency band. He called New Hampshire State Police to report it late Saturday.

"He said a guy needs help on Route 40 about 45 miles west of Green River, Utah." Cpl. John Healy said Sunday. New Hampshire alerted Utah.

"According to them, our teletype message got to Utah Highway Patrol at about the same time they got a report about the accident. One guy was dead and one was critically injured," said Healy.

"We just sat here and shook our heads. It's one of those million to one shots," he said. "That's about the only odds I can lay on it."

The CB radio frequencies "skipped" or bounced off the atmosphere from Utah, finding their way across the country to Windyka's set, Healy said.

The CB normally picks up signals not more than 20 miles away "on a good day," Healy said. "And that's at optimum if you're sitting on top of a hill."

When it's time to call for help, how do you call? Will anyone be listening? (Photo by SLC Sheriff Deputy Marc Peterson KA7SLC)

Radio Service (FRS) equipment.

Communications range (1/2 to 1,000+ miles) can vary greatly depending upon the radio equipment and antenna system, terrain, and atmospheric conditions. For example, radio atmospheric skip can overload the channels with transmissions – but they can also aid in an emergency. (See the article in side bar that I was involved in, with only a portable antenna attached to the back of my base CB radio!) Since the radios have approximately 4 watts of output power, and operate in a simplex mode, CB can be an excellent communications tool in the event of an emergency and the non availability of cellular/PCS phones systems – *if* you also have an antenna and a power source. Even one-way transmissions "in the blind" may be monitored and acted upon by parties you cannot hear.

The Federal Communications Commission has designated CB Channel 9 (27.065 MHz) as the official emergency channel. Radio Emergency Associated Communication Teams (REACT International) has response teams in 45 states, District of Columbia, Puerto Rico, Canada (4 provinces), West Indies and United Kingdom, that are "encouraged" to monitor CB Channel 9 for emergencies (see table for states and number of teams).

Also, state, county, and local government emergency agencies and/or other nongovernment (voluntary) services may monitor Channel 9 either on an official or unofficial basis. However, it should be noted that in some states the Channel 9 program has been eliminated in lieu of cellular/PCS phones (e.g. Massachusetts). Since CB Radios have 40 channels, even if no one is on channel 9, there's a very good chance that someone will be on one of the channels to provide assistance (such as on Channel 19, 27.185 MHz, an unofficial motorist in transit channel).

Family Radio Service (FRS)

The Family Radio Service (462/467 MHz) is a relatively new service that has exploded in popularity among a diverse group of consumers – young, middle-aged, and elderly. There's a very wide range of portable walkie-talkie type equipment available in a price range that just about anyone can afford. Recently, additional base station equipment and mobile equipment models have been introduced to the marketplace as well. Many units have CTCSS/DPL codes to screen out all but desired calls (see table for a complete list of typical CTCSS available in FRS equipment), scan mode (both for finding active channels and codes),

Your celiphone won't help you here if everyone has tied up all available frequencies. (Photo by Garry Watts)

scrambling mode (speech inversion), and a wide variety of other options (e.g. NOAA weather radio, AM/FM radio, stop watch, etc.)

Units have an output of 1/2 watt, and operate on 14 frequencies in the 462/467 MHz range, and the external antennas are limited by regulation. Typical operating range is approximately 3/4 to 1 mile, but the terrain or number of buildings can affect communications distance For example, someone on a mountaintop might be heard 70 miles away! Their small size and weight makes them very practical for outdoor activities such as hiking, camping, boating, and bike riding, as well as communications between vehicles while in transit. Of course, it can also be used around the house/neighborhood for keeping track of the kids, crime watch, or just chatting with the neighbors.

Although REACT International proposed to equipment manufacturers last year that FRS Channel 1 (462.5625 MHz) with no CTCSS

code be voluntarily designated as the emergency/calling channel, the industry failed to implement this request. However, since this service has such a very large number of users, there's a strong potential in an emergency for obtaining assistance especially if you are involved in some sort of outdoors recreational emergency (e.g. hiking, boating, etc.). If you are involved in outdoor activities in a particular area (e.g. state/national park, Disneyworld, etc.) you might want to ask the public safety authorities if they monitor a particular FRS channel and utilize any PL code. (If a PL code is used, be sure you check your radio against theirs, since not all PL code numbers correspond with each other.)

Multi-Use Radio Service (MURS)

Multi Use Radio Service is a very recent addition to unlicensed radio services. Presently the FCC has authorized a power output of 2 watts and operation on five VHF high band frequencies in the 151/154 MHz area (see the table for a complete list of current frequencies). There is also a proposal pending with the FCC from one radio manufacturer (that was initially opposed to this service) to add four additional VHF high band frequencies and also add a new UHF band with four frequencies. Unlike FRS, this service does allow base or mobile external antennas.

Since this is a new service, units are relatively high priced ($100 to $500 range) but it's expected that prices will fall once the FCC finalizes the overall radio service parameters.

MURS has a very strong emergency assistance potential, particularly for hikers and mountain climbers, because of the propagation characteristics of VHF high band transmissions and the increased power and antenna options. Users of this system should check with appropriate authorities in the area they would be in to see if any of the VHF high band frequencies are monitored.

Marine VHF Radio

For individuals that own boats and regularly use them on large lakes, ocean/bay areas, and large rivers, there's the Marine Radio Service available (156-161 MHz). Overall, these units have declined in price over the last few years, now falling in the $120 to $250 range for portable (1 to 5 watts) and mobile or fixed units (25 to 1 watt selectable).

FCC regulations designated marine channel 16 (156.80 MHz) as the distress, safety and calling channel. The US Coast Guard, as well as its auxiliary, monitors this frequency on a continuous basis where they have active units assigned. Range on high-powered models over water can be up to 30 miles (depending upon antenna and weather conditions). However, it should be noted that in some areas the Coast Guard has recommended that cellular/PCS phones also be carried.

Conclusion

No radio or wireless cellular/PCS telephone system is perfect. Ideally, radio hobbyists and "educated' consumers will have more than one communications system with them in event of an emergency, but they should also maintain a healthy skepticism; *none* of the radio/wireless systems may work in an emergency.

It's vital that proper emergency equipment be carried for whatever activity you are engaged in – driving on rural roads, hiking in dense wooded/isolated areas, traveling for the holidays or on business, etc. These should include spare tire, tire repair kit, basic tools, flares, first aid kit, signaling mirror, proper footwear/clothing, rain gear, protective emergency blanket, water, etc.

Also, it's very important to leave word with someone about what communications equipment you are carrying with you and what frequency you will be monitoring. Many public safety agencies have helicopters/aircraft that have the ability to monitor and respond to calls for assistance while flying overhead *if* they know what frequency to monitor. Moreover, scanner hobbyists should consider monitoring the most common emergency frequencies for potential calls. When someone calls for help the only one listening may be you.

(*See the related guest editorial on page 92.*)

REACT EMERGENCY MONITORING TEAMS

Alabama:	2
Alaska:	1
Arizona:	3
Arkansas:	None
California:	37
Colorado:	1
Connecticut:	1
Delaware:	None
District of Columbia:	1
Florida:	12
Georgia:	3
Hawaii:	1
Idaho:	1
Illinois:	15
Indiana:	14
Iowa:	4
Kansas:	2
Kentucky:	6
Louisiana:	None
Maine:	1
Maryland:	10
Massachusetts:	1
Michigan:	7
Minnesota:	5
Mississippi:	None
Missouri:	3
Montana:	1
Nebraska:	7
Nevada:	1
New Hampshire:	3
New Jersey:	9
New Mexico:	1
New York:	19
North Carolina:	14
North Dakota:	3
Ohio:	23
Oklahoma:	4
Oregon:	1
Pennsylvania:	17
Puerto Rico:	2
Rhode Island:	2
South Carolina:	3
South Dakota:	1
Tennessee:	4
Texas:	13
Utah:	1
Vermont:	1
Virginia:	13
Washington:	9
West Virginia:	3
Wisconsin:	8
Wyoming:	None

OTHERS:
Canada: Alberta (1), New Brunswick (1), Ontario (11), Prince Edward Island (1)
Germany (1), West Indies (Trinidad Tobago (8)), United Kingdom (1).

FAMILY RADIO SERVICE CHANNELS/ FREQUENCIES (in megahertz)

462.5625
462.5875
462.6125
462.6375
462.6625
462.6875
462.7125
467.5625
457.5875
467.6125
467.6375
467.6625
467.6875
467.7125

FAMILY RADIO SERVICE TYPICAL CTCSS SUBAUDIBLE TONES (in Hertz)

1	67.0	20	131.8
2	71.9	21	136.5
3	74.4	22	141.3
4	77.0	23	146.2
5	79.7	24	151.4
6	82.5	25	156.7
7	85.4	26	162.2
8	88.5	27	167.9
9	91.5	28	173.8
10	94.8	29	179.9
11	97.4	30	186.2
12	100.0	31	192.8
13	103.5	32	203.5
14	107.2	33	210.7
15	110.9	34	218.1
16	114.8	35	225.7
17	118.8	36	233.6
18	123.0	37	241.8
19	127.3	38	250.3

MULTI USE RADIO SERVICE FREQUENCIES (no current channel designations)

151.820
151.880
151.940
154.570
154.600

ARTICLE REFERENCE SOURCES:

http://www.provide.net/~prsg/
http://www.911dispatch.com/
http://www.state.ma.us/msp/spdepts.htm
http://www.apcointl.org/
http://www.fcc.gov/e911/
http://members.tripod.com/~jwilkers/frspage.html
http://www.reactintl.org/

SKY WARS

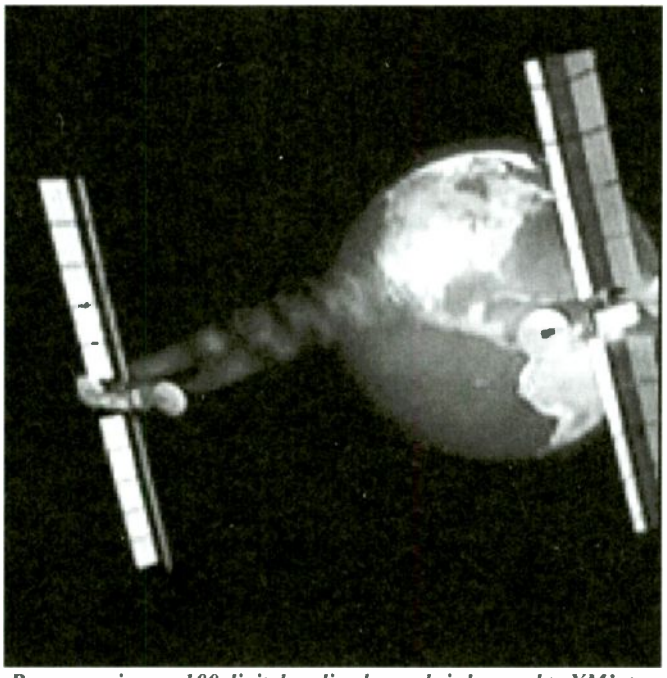
Satellite radio begins with a battle for your car radio in troubled times

By Ken Reitz

When you think of auspicious broadcast debuts, the beginnings of AM and FM radio come to mind. Though separated by decades, each had a profound impact on the way Americans listened to their radios. When AM began a large percentage of listeners built their own radios to tune in. With the dawn of FM radio came the concept of *high fidelity* and eventually *stereo* broadcasts. Now comes what the FCC calls the Digital Audio Radio Service (DARS) in which hundreds of digitally transmitted channels are broadcast direct from geostationary orbiting satellites to specially equipped radios in listeners' cars. Will this be the "radio revolution" predicted by those who stand to profit by its success? Or will it simply be another electronic gadget taking its place in an ever lengthening line of such devices?

The two companies awarded licenses to broadcast in the DARS call it simply "Satellite Radio." Sirius Satellite Radio (formerly CD Radio) and XM Satellite Radio (originally a division of American Mobile Radio Corp.) won the DARS lottery when the FCC asked for applications in 1992 and only four companies came forward. The Commission's plan was to award two licenses to the highest bidders in the hopes of developing a competitive atmosphere from the beginning. In April of 1997 the awards were issued and the flurry of press releases began.

From digital state-of-the-art studios in Washington, D.C., XM Satellite Radio pioneers a new concept in radio broadcasting. (Courtesy: XM Satellite Radio)



Programming on 100 digital audio channels is beamed to XM's two satellites: "Rock" at 115° W and "Roll" 85° W from their own uplink facilities. (Courtesy: XM Satellite Radio)

The first four years were spent in a relentless effort to whet the consumer appetite by declaring that service was just a few months or half year away at worst. After considerable setbacks and delays, XM Satellite Radio actually made it on the air at the end of this past September. The final delay came when the original debut of September 12 was rescheduled following the 9/11 attacks in New York and Washington, D.C. And, as if an omen of things to come, XM was forced to announce just two days after its official debut that Boeing, the company which made both its 702 series satellites, warned them that those particular satellites had a malfunction in the solar array which could eventually reduce output power and shorten the life of the satellites. While XM did make it on the air, Sirius Satellite Radio has been dogged by technical and legal delays which have resulted in an as yet unannounced broadcast debut.

The cheery economic conditions of the late '90s, when Satellite Radio plans began, have deteriorated to the extent that now even Wall Street is having second thoughts. Last year analysts set a target price for shares of Sirius Satellite Radio to hit $54 per share. That's been knocked down to $20 per share. XM has similarly suffered, watching its target price tumble from $49 to $19. As of this writing shares for both hover around the $6-7 range. Meanwhile, several class action law suits have been filed on behalf of Sirius stock purchasers who allege that the company's rosy predictions were misleading. Sirius says the suits are without merit. Merit or not, the crumbling facade on Sirius' corporate face has forced CEO David Margolese to step down in favor of taking a lower profile position in the company.

One of the things making potential investors shy is that, contrary to earlier "pep rally-style" press releases, Satellite Radio appears to be a money sink at a time when stoppers are in short supply. According to a report in the *L.A. Times*, XM has spent over $1 billion dollars so far and *The Washington Post* reports that XM must raise an additional $200 million by the end of this year. That,

coupled with downwardly revised estimates as to the number of subscribers expected to be signed up at the end of the first year, have kept the stock from bucking the general downward market trend.

As bad as the financial problems are for XM things are decidedly worse for Sirius. Even though all its satellites are currently in orbit; its studios, uplink facilities, and staff in place; Sirius finds itself essentially without a product on offer. As the months slip by XM gets all the glory while Sirius has to sit on its hands. Even so, Sirius has seen fit to actually raise its subscription fee. When (or if) Sirius services do commence, customers will have to pay $13/month for the service as opposed to $10/month for XM. However, given the nature of satellite delivered entertainment in general, and given XM's financial condition in particular, it's clearly only a matter of time before they, too, announce their first rate hike.

To add to the mayhem, traditional terrestrial broadcast interests have kept up a steady barrage of regulatory sniping from the sidelines. Fearing further erosion of listeners in local markets, the National Association of Broadcasters has fought the establishment of a vast terrestrial network of Satellite Radio repeaters needed to "fill in" the reception gaps which can occur when large buildings, landscapes, tunnels and the like block direct satellite reception. Last fall the Commission allowed operation of a temporary repeater system in return for Satellite Radio broadcasters' promise that they won't begin local program origination to compete directly with local broadcasters.

The NAB's fears are not unfounded. It's not hard to imagine XM buying out Sirius at a fire sale price and, claiming they're the only competition to increasingly monopolized local markets, hitting up a *laissez faire* FCC for permission to begin local program origination.

Satellite Radio Programming

XM is offering 100 channels of digital audio services ranging from music to "talk radio," and, while you might think that for $10/month you'd be buying a refuge from announcers and commercials, you aren't. All channels have announcers and most are commercially supported.

Channels are categorized as Decades, Country, Hits, Rock, Urban, Jazz & Blues, Dance, Latin, World, Classical, Kids, News, Sports, Comedy, and Variety. Most categories are self-explanatory. There are six "Decades" featuring the music from the '40s to the '90s. "Hits" include a wide range of music from the Top-20 countdown (Top 20 on 20) to adult contemporary hits with a Christian message (The Fish). There are five channels for Hispanics, including "Music from the Caribbean"; seven channels of World music, and four Classical music channels.

News programming is mostly limited to the audio from standard cable-TV news channels such as CNN Headline News, FOX News, CNBC, CNNfn, Bloomberg News, C-SPAN Radio, and CNet Radio. The only full service international news channel will be a retransmission of the BBC World Service.

Sports channels include ESPN Radio, NASCAR Radio, and CNN/SI, among five. All-talk programming is listed under Variety, which includes "BabbleOn" – which they say is "talk and irreverence for the young and restless," and "FamilyTalk" – "straight talk and faith-based guidance."

Sirius Satellite Radio plans to offer a similar line-up of categories featuring Newws which will include CNBC, Bloomberg, NPR, BBC World Service, C-SPAN Radio, and World Radio Network. Sports and Entertainment are the other "talk radio" formats. Music formats include Latin (five channels), Rock (six channels), Jazz (three channels), Hits (seven channels), R&B (six channels), Popular (three channels), Country (five channels, including Bluegrass), Classical (three channels) and Eclectica, which includes New Age, Kids, Christian Hits, World, Dance, Blues and Specials. While Sirius plans to have its 50 music channels commercial-free, the other 50 channels will be commercially supported. They also plan to have announcers on the 50 music channels and retain the option to add commercials if the revenue stream isn't as strong as they hope.

The big news for shortwave radio listeners is the chance to catch the BBC World Service on either of the Satellite Radio systems and to listen to World Radio Network's line-up of various international shortwave broadcasters currently available on some cable-TV systems and all C-band satellite TV systems. WRN will be available only on Sirius Satellite Radio.

Programming presents another place to speculate on the future of Satellite Radio. If XM were to buy out Sirius it would have an additional 100 channels to play with. That's more than enough room to provide local origination for the top 50 U.S. radio markets and still have 50 more channels to offer more niche programming. Again, the blueprint for this comes directly from DISH TV network, whose current bid to buy out DirecTV will allow them to add another 25 cities to their already growing line-up of local stations to offer in those markets. Of course, the additional channels and services will entitle the winner to healthy rate increases.

Judging from their earlier comatose response to similar rises in cable and satellite-TV rates, Satellite Radio needn't worry about objections from the Commission, though objections from consumer advocate groups will prove embarrassing.

What You'll Need to Tune In

Learning from their earlier quagmire with DBS satellite TV, the FCC, from the beginning, mandated that reception equipment for both Satellite Radio licensees be compatible. This eliminated the need for a marketplace technology shootout and almost anticipates the demise of one or the other licensee.

Designing and building the hardware to tune in Satellite Radio has worked fairly well for XM Satellite Radio. They entered into agreements early on to develop and produce the receiving equipment needed to listen to Sat-

Car tunes never sounded better. Alpine, Pioneer and Sony are just three manufacturers of Satellite Radio receivers. (Courtesy: XM Satellite Radio)

ellite Radio with all the big consumer electronics manufacturers. The result is that there are quite a few models to choose from. XM has a catalog of receivers and manufacturer's suggested retail prices on their website, though they don't sell the units (see list of retailers). They also list "Estimated Street Price" which will give consumers an idea about how much all this music and entertainment will cost. A check with any of the retailers listed will show how realistic that price is.

There are several ways to tune into XM in your car. One is to use your existing car stereo and a cassette adaptor or an FM modulator. Another is to get a special AM/FM/SAT in-dash receiver and separate speakers for the full XM effect. Using your existing stereo will be cheaper, but may not sound as good as a whole new car stereo system. Depending on which you choose, you may have to buy the Satellite Radio antenna separately, which will add another $100 to the cost. The tuner module such as the Sony DRN-XM01C complete costs about $300 and uses your existing car stereo. An AM/FM/SAT receiver such as the Pioneer XM Radio Head Unit and Receiver Combo will cost about $400.

Factory installed Delphi-Delco XM radios are currently offered in Cadillac DeVille and Seville models and will be expanded to 20 other GM models in the coming year which mostly reflects the financial stake General Motors has in XM radio. Sirius has made similar arrangements with high-end autos such as Jaguar, BMW and Porsche, which might reflect their initial lack of penetration in mass market car sales.

It's also here, in the hardware department, that the NAB's fears appear warranted. Sony has just released a Satellite Radio receiver for car and *home*. The Sony DRN-XM01R features a Satellite Radio tuner, FM modulator, antenna, wireless remote, and "docking station" for your car for $400. For another $150 you get the Sony DRN-XM01HK which is a "home kit" allowing you to take your Satellite Radio tuner out of your car, bring it into the house and, using the AUX or Tape inputs, play the tuner through your home stereo. A separate Satellite Radio antenna is included. Already there are accessories available such as the Truck Mirror Mount for the XM antenna to connect to your truck or RV.

Looking Ahead

There can be no doubt that prices on all Satellite Radio hardware will decline as the volume of sales increase. Following the DBS satellite TV model, don't be surprised to see these units given away as premiums for purchasing high end car audio systems or high end home stereo systems.

By the end of this year it will be only too clear whether or not the billion dollar Satellite Radio gamble has even a chance of paying off. As with the DBS satellite TV model, the money is in the monthly subscriptions. That's why, after the initial fad has subsided, the emphasis will be on generating the kind of numbers that make investors happy. That means giving the systems away, if necessary, to achieve those sign-up numbers. Following the trend in the DBS satellite TV industry, one of the biggest problems XM and Sirius may have to contend with is "churn", those subscribers who take advantage of introductory offers but fail to become long term subscribers. And, in times of uncertain economics, how will consumers react to the kind of price hikes typically seen in the cable and satellite TV market? If they're attracted at $10/month will they flinch at $15/month or $20/month?

The Iridium satellite telephone debacle; saturation of the cell phone market; collapse of the PC market; and contraction of the satellite TV market have given us interesting models of electro-communications gadgetry to study. The introduction of Satellite Radio raises important questions and it will be interesting to see how the future of Satellite Radio plays out. Will Satellite Radio have, as its predecessors did, a profound impact on the way Americans listen to the radio? In the car our "AM and FM" buttons are free and they are indispensable. Will we feel the same about the "SAT" button with its monthly bill which arrives with the gas, electric, credit card, ISP, cable-TV, mortgage, heating, home security and trash collection bills?

Satellite Radio Sources:

Sirius Satellite Radio **www.siriusradio.com** 1221 Avenue of the Americas, New York, NY 10020 Phone: 212-584-5100
XM Satellite Radio **www.xmradio.com** 1500 Eckington Place N.E., Washington, DC 20002 Phone: 202-380-4000

Retailers carrying Satellite Radio receivers:

Best Buy, Circuit City, Tweeter, Crutchfield, Good Guys, CarToys, Audio Express, Sound Advice and participating Radio Shack dealers and franchisees.

Readers Respond:

"I am very impressed with your magazine. It has a great cross-section of articles and they are quite level-headed."

"Keep up the great work. I am sure I will be subscribing for a long time to come."

- Al, Milford, PA

Radio Prague- 65 Years of Dedication

By Bill Bergadano, KA2EMZ

It was late afternoon on a frigid Sunday in January 1975. Lunch had been eaten, and it was time to get back to that still brand-new shortwave radio which I had received as a Christmas gift less than a month earlier. The world was coming into my bedroom! I had "traveled" the globe, hopping off to Australia, Ecuador, England; but try as I might, one nation eluded me – Czechoslovakia. I had read about Radio Prague, its external service, but I couldn't find it (blasted analog tuning!).

Thus began the adventures, which would find me, nearly 27 years later, reliving each day of an enjoyable hobby. Moreover, I clearly remember that cold Sunday, when on 1990 kHz I finally heard that station that eluded me. I finally heard Radio Prague!

The Early Years

Radio Prague was first heard at 0830 UTC, August 31, 1936, as storm clouds gathered on the European continent and Adolph Hitler began to test his power. Although ostensibly created for the more than 2 million Czech and Slovak citizens, the broadcaster's unstated purpose was to inform the world about Czechoslovakia.

Back in 1924, when the Prague-based Radio Journal Broadcasting Company began to air music programs in both English and Esperanto on the frequency of 815 kHz, there were few stations on that part of the radio dial, so long distance reception was possible at night throughout Europe, even on mediumwave. When a 5kW transmitter was inaugurated on 815 kHz in 1926, it was one of the most powerful transmitters in Europe. The new transmitter even sent Prague's programming – music concerts for the most part – into the ears of North Americans! Its 815 kHz signal was heard quite well across the Atlantic.

As 1936 went on, Radio Journal found itself airing weekly foreign language programs about Czechoslovakia on its shortwave station. Though mainly intended for European audiences, radio signals know no bounds, and the station and the nation of Czechoslovakia was becoming better known to foreign listeners.

What's in a name?

It was affectionately called, "*Elektra*" – a transmitter operated by a Prague maker of light bulbs. Later, it was known as "Tesla." By whatever name, the new shortwave transmitter set the stage for future years. The firm's engineers had virtually no idea that the transmitter that could go from 10 to 50kW was able to reach the British Isles on the new medium of shortwave, since up to then, Prague had only been on 815 kHz with good results ... but shortwave? It was literally untested; in fact, in those days, it was considered useless and only good for experimenters and radio amateur operators. However,

The English-Language Staff. Standing, left to right: Daniela Lazarova, Ita Dungan, Pavla Navaratilova, Peter Smith, Dita Asiedu, Olga Szantova, Vladimir Tax, Alena Skodova. Kneeling: Bill Bathurst, Rob Cameron, Nick Carey.

Mr. Miraslov Krupicka, Director, Radio Prague

in 1934, as war clouds swirled above Europe, it was hoped that shortwave might be a valuable aid to the nation. A decision that year brought the funds needed to construct a transmitter in Podebrady; two years later, the site was ready for test transmissions with the power near 30 kilowatts.

The first test transmission was made in the evening hours of July 24 into the early hours of the following morning, and then again on August 13 to the 14th. The second test lasted 24 hours with no breaks; gramophone recordings alternated with foreign language announcements made especially for the broadcast. Radio Prague was born.

Learning to walk

In 1937, the radio service from Prague had been split into three different groups for the geographic areas served: the Americas, the Orient, and Europe. The station was on the air approximately 4 hours a day, with few changes from the 1936 format. Languages were added to the output: Spanish, Portuguese, Serbian and Italian. Occasional output in Romanian, Bulgarian, Dutch, Swedish were also on the broadcast menu.

However, 1938 saw Radio Prague responding to events in nearby Germany and theimpact that Hitler was having across Europe. From January to June, 8.5 hours of output grew to 22 hours a day during the Munich crisis; from then until March 15, 1939; Radio Prague remained on the air 19 hours a day.

The Nazi occupation during World War II would see an end to independent Czechoslovakia and "free" broadcasts from Radio Prague; however, even though 3 hours a day was allotted for expatriates now in North America, Radio Prague would remain silent for six years.

Welcome Back?

"Calling All Czechs." These were the first words spoken on the revived Radio Prague as part of an anti-Nazi uprising on May 5, 1945. External services resumed with depleted technical resources and a severe shortage of skilled linguists. Still, Radio Prague found the ability to once again inform the world about the nation. The first transmissions were beamed to Eastern Europe and consisted of eight languages, including Russian. plus transmissions worldwide for Czech and Slovak expatriates. By the end of 1947, German was added; in 1948, Greek was also added. However, budgetary problems forced the station to reduce output in the newly added languages from 30 minutes to 15. Still, Radio Prague was reaching the corners of the globe, telling the listener of the Marshall Plan to rebuild Europe.

The year 1948 also brought a Communist coup, which created Czechoslovak Radio on April 28. Radio Prague rather unofficially divided its broadcasts between "capitalist nations" and "friendly nations" (i.e., the Soviet Union). The listener in the capitalist world would be told of how wonderful the communist system was, as Radio Prague became a mouthpiece for Moscow. However, at one point, these programs were cancelled for a Soviet-led program exchange more suited to Moscow's tastes.

This ideology would continue for many years; in 1952, only 7 years after the end of a World War, Czechoslovakia continued under Soviet tyranny. A reorganization of Czechoslovak Radio gave Radio Prague the role of an autonomous voice, to build the international image of Prague. However, such changes did not go without paying a price. Many staff members were sacked without warning overnight, with quite a few becoming victims of the Communist regime "sham" trials.

Programs sang praises to the Communist way of life. More languages, including Swahili, were added. Radio Prague was finding itself on the front lines of the cold war: Listeners in the emerging African and Asian nations were to be lured to Communism by being told of the system's advantages, while listeners in regions like North America were given a large amount of propaganda. The impact of the cold war on international radio was obvious. Four more languages were added, including Italian. Radio Prague was able to rely on the services of American citizens turned off by U.S. Senator Joseph McCarthy.

Radio Prague was growing in popularity, no matter the type of broadcast. While no exact records exist, the station received in 1957 some 25,000 letters: 36,400 in 1959, and more than double that amount when over 100,000 were received in 1965. During the Cuban missile crisis of 1961, Radio Prague's Spanish service aired many hours of live programming each day.

1968

In 1968, I was 10 years old and was enjoying watching and rooting for Al Kaline and the Detroit Tigers on TV that summer, cheering for Denny McLain to win 30 games. My peers in Czechoslovakia, along with everyone else in that nation, had something that didn't make them cheer: at 1:30am on August 21, the world was informed by Radio Prague of the invading Warsaw Pact troops. At 4 a.m., a statement was read by the Czech Communist Party; ".... this is happening without our knowledge and against our will..." The national anthem was aired during a scheduled noon news bulletin; however, the bulletin was interrupted by rapid submachine gun fire!

Radio Prague and Czechoslovak Radio workers at 12 Vinohradska Street found that the broadcast center had become a battlefield. Twenty people were killed. The next day, a clandestine Radio Prague transmitted from a home in the southeast Prague; it condemned the Warsaw Pact invasion. Soon the nation went "back to normal"; many of the staff who were not able to flee to the West in time were sacked and banned from working in the media.

The Later Years

1989. The year saw many changes to Czechoslovakia: the Iron Curtain fell, and democracy returned to the country in November

Mr. David Vaughn, Editor-in-Chief

of that year. Radio Prague was reborn, no longer under the cloak of Soviet tyranny as to what to say. The station began again to give the listener worldwide a true picture of the nation and its activities. Returning to its early days, the station revived the signature tune, Dvorak's *New World* Symphony.

Radio Prague saw the need to redesign itself. In early spring of 1990, save for its Czech service, all other services were briefly stopped. On May 7, it returned with only four languages – English, French, Spanish and German. While several languages were dropped, Czech and Slovak reporters were given assignments to put them with expatriates worldwide. The idea worked until Czechoslovakia split into two nations.

In 1995, Radio Prague began broadcasts via satellite to Europe and North America via the World Radio Network in London. In the Czech Republic, listeners can tune in on FM for a 30-minute program in English targeted to speakers of that language in Prague. The previous year saw Radio Prague add its Internet service, which includes a streaming real audio broadcast – bringing the Czech Republic even closer to those having no knowledge of that nation.

A Personal Observation

For over 26 years, I have been tuning into Prague. It is one of the most listener friendly stations on shortwave! At a time when many stations seem to be cutting back on sending out QSLs (verification cards) to listeners – or even deleting them entirely, the QSL service is a mainstay at Radio Prague. The 2001 series of cards includes a picture of a 4-tube radio. Past years have brought to my mailbox many images of the country's landscape depicted on verification cards.

If you want to add Radio Prague to your listening habits, I highly recommend it! The English broadcast schedule will show you the time and frequencies in your area. And don't forget – after you have listened in, drop Radio Prague a note to let them know you heard their broadcast. The station accepts email reception reports at *cr@radio.ca* or by good old snail mail with a simple address of Radio Prague, 120 99 Prague 12, Czech Republic.

About the author:

Bill Bergadano is 43, licensed ham operator KA2EMZ since 1979, and has heard stations from 177 different countries.

Radio Prague: Various Languages

UTC	Language	Targets	kHz
0000-0027	SPANISH	Am	7345 11615
0030-0057	CZECH	Am	7345 11615
0130-0157	SPANISH	Am	6200 7345
0230-0257	CZECH	Am	6200 7345
0300-0327	SPANISH	Am	6200 7345 7385**
0330-0357	CZECH	Am	7345 9435
0500-0527	RUSSIAN	EuAs	6055 11600
0700-0727	FRENCH	Eu	5930 7345
0730-0757	GERMAN	Eu	5930 7345
0830-0857	SPANISH	Eu	11600 15255
0900-0927	FRENCH	Eu	11600 15255
0930-0957	CZECH	EuMEAf	15255 21745
1030-1057	CZECH	AfAs	21745
1100-1127	GERMAN	Eu	7345 9880
1200-1227	CZECH	EuAs	11640 21745
1230-1257	RUSSIAN	EuAs	6055 17495* 21745
1300-1329	GERMAN	Eu	6055 7345
1330-1357	CZECH	Eu	6055 7345
1430-1457	CZECH	AfAm	21745
1500-1527	SPANISH	Eu	11600 13580
1530-1557	RUSSIAN	EuAs	5915* 11975 13580
1600-1627	GERMAN	Eu	5930
1630-1657	RUSSIAN	Eu	5990*
1630-1657	CZECH	EuAf	5930 17485
1730-1757	GERMAN	Eu	5990*
1730-1757	FRENCH	EuAf	5930 17485
1830-1857	CZECH	EuAsAu	5930 7315
1900-1927	SPANISH	Eu	5930 9430
1930-1957	FRENCH	EuAf	5930 9430
2000-2027	SPANISH	Eu	5930 9430
2030-2057	CZECH	EuAsAu	5930 9430
2100-2127	ENGLISH	EuAsAuAm	5930 9430
2130-2157	SPANISH	EuAm	5930 9435
2200-2227	CZECH	EuAm	5930 9435
2300-2327	FRENCH	Am	7345 9435

(Radio Prague via BBC Monitoring)

Radio Prague Daily Program Schedule

Monday
- News
- Current Affairs
- Spotlight / One on One

Tuesday
- News
- Current Affairs
- Talking Point

Wednesday
- News
- Current Affairs
- Czechs in History / Central Europe Today

Thursday
- News
- Current Affairs
- Economic Report

Friday
- News
- Current Affairs
- Magazine

Saturday
- News
- Readings from Czech literature
- Musical Feature (Classical and Ethnic Music alternates with Contemporary and Traditional Jazz)

Sunday
- News
- A Letter From Prague
- The Arts
- Mailbox

Radio Prague welcomes all program comments, questions and criticism. It carries out a continuous reception survey and confirms all reception reports by QSL verification cards.

E-mail: *english@radio.cz*
or via post;
Radio Prague,
English Service
120 99 Prague2,
Czech Republic

Radio Prague's English Schedule

28 October 2001 - 30 March 2002

UTC	kHz	m	kW	Area
0800 - 0827	11600	25	100	N.W. Europe
	15255	19	100	
1000 - 1029	21745	13	100/100	S. Asia/ W. Africa
1130 - 1157	11640	25	100	N. Europe
	21745	13	100	E. Africa/ Mi. East
1400 - 1429	21745	13	100/100	E. Africa/ N. America
1700 - 1727	5930	49	200	N.W. Europe
	17485	16	100	C.&W. Africa
1800 - 1827	5930	49	200	N.W. Europe
	7315	41	100	E. Europe/Asia/Australia
2100 - 2127	5930	49	100	N.W. Europe/N. America
	9430	31	100	S.&E. Asia/Australia
2230 - 2257	7345	41	100	N. America
	9435	31	100	W. Africa
2330 - 2357	7345	41	100	N. America
	9435	31	100	
0100 - 0127	6200	49	100	N. America
	7345	41	100	
0200 - 0227	6200	49	100	N. America
	7345	41	100	
0400 - 0427	7345	41	100	N. America
	7385**	41	50	
	9435	31	100	
0430 - 0457	9865	31	100	Mi. East/ S.W. Asia
	11600	25	100	

Transmitters at Litomysl 16E10 49N48
** Relayed via Rimavska Sobota, Slovakia 20E00 48N23*
*** Relayed via WRMI Miami, Florida 80W22 25N54*

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BC245XLT	SCN 35	$199.95
BC895XLT	SCN 9	$194.95
ALINCO		
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DJ-X3T	SCN 11	$249.95
DJ-X10T	SCN 1	$349.95
DJ-X2000T	SCN10	$499.95
AOR		
AR8200IIB	SCN 50	$559.95
AR3000AB-DS	SCN 26	$1062.95
AR8600	SCN 8	$899.95
YAESU		
VR-500	SCN 6	$324.95**
ICOM		
R10	SCN 4	$339.95**
R2	SCN 5	$189.95**
R3	SCN 7	$499.95**
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800 MHz for base w/ right-angle conn.	ANT 23	$34.95
OMNI II Scanner	ANT 5	$29.95
Professional Wideband Discone	ANT 9	$99.95
2 1/2" Long Close Range	ANT 18	$15.95
Scantenna + 50' coax	ANT 7	$54.95
Stealth Mobile Monitoring	ANT 30	$34.95
H800 Skymatch Active	ANT 15	$129.95*
Active Duck	ANT 36	$39.95
Select-A-Tenna	ANT 21	$59.95
Super Select-A-Tenna	ANT 40	$189.95
AOR DA3000 Aerial Discone	ANT 11	$129.00
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 Universa Telescoping Whip	ANT 6	$19.95
Nil-Jon Super-M Superior Mobile Ant.	ANT 10	$79.95
Create CLP513C1N Log-Periodic Ant.	ANT 16	$429.95
Create CLP513C2N 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*

ACCESSORIES

UNIDEN BC SCANNERS		
Computer interface cable for BC395	ACC 15	$29.95
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BP-180 Uniden battery pack	BAT 5	$19.95
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BC235/245 hard leather case	CAS 3	$29.95
DC cord	DCC 7	$15.95
Uniden BP1200 Nickel Hydride batt.	BAT 1	$29.95
Scanner Master Winscan 245 Software	SFT 1	$59.95
Scanner Master Winscan 895 Software	SFT 3	$59.95
ALINCO SCANNERS		
EBP-34N Longlife NiCd battery	BAT 21	$79.95
EBP-37N Standard battery	BAT 21A	$39.95
EDH-16 battery case, 4 "AA"	BAT 22	$9.95
DJ-X10T soft case	CAS 19	$12.95
EDC-36 car lighter cable w/filter	DCC 14	$23.95
AOR SCANNERS		
Extended memory card for AR8200II	ACC 27	$79.00
AR8200II leather case	CAS 21	$24.95
AR8200II soft case	CAS 25	$12.95
Tape recording lead for AR8200II	CBL 7	$61.00
Computer control lead for AR8200II	CBL 8	$109.00
AC adaptor for AR8200II	PWR 24	$21.95
CTCSS squelch & search card	ACC 24	$96.00
Tone eliminator (256 steps) card	ACC 25	$58.00
Chip based recording & playback card	ACC 26	$77.00
Computer Interface Cable for 8200	CBL 13	$20.00
YAESU SCANNERS		
VR-500 cloning software and cable	SFT 25	$39.95
ICOM SCANNERS		
R3 battery pack	BAT 4	$46.95
R2 soft case	CAS 20	$29.95
R3 leather case	CAS 2	$19.95
R3 Cigarette Adaptor	DCC 18	$24.95
R3 drop-in charger	PWR 15	$69.95
R2 CS-R2 cloning software	SFT 7	$12.50
R3 software for Windows 95/98	SFT 14	$19.95
OPC-478 Computer Interface (PC to radio)	ACC 3	$44.95
MISCELLANEOUS ACCESSORIES		
Universal Cigarette Adaptor	DCC 3	$12.95
GRE Super Amplifier	PRE 1	$49.95
Scancat Gold for Windows	SFT 2W	$99.95
Scancat Gold for Windows SE Upgrade	SFT 2SE	$59.95
Grove FTR-100 Scanner Filter 90-174MHz	FTR 100	$49.95
PAR VHF Intermod Filter 152MHz	FTR 152	$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
Professional Mobile Speaker	SPK 1	$19.95
Drake MS-8 External Speaker	SPK 2	$48.95

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Your Beginner's Questions Answered

Over the last few months there hasn't been enough room in the Beginner's Corner to cover the questions many of you have asked. While I try to answer the questions as quickly as I can when they come in, it takes a while for them to find their way into print. Now let's see what's on our readers' minds.

❖ Antenna Questions

One of the most popular columns was the one which appeared in the October '00 issue of *MT* called "The Only SWL Antenna You'll Ever Need." For six months I was getting questions and reports from readers building, intending to build, or having built the antenna. Since then the CD ROM anthology of *MT* was released and a number of new readers have discovered the plans and now they're doing the same thing. So, for the benefit of everyone who's interested in an easy to build, very effective, all band outdoor antenna here's a brief description (see diagram).

The antenna is an "off-center fed dipole" with one leg of the antenna being 44 feet and the other being 90 feet. It's connected at the "off-center" with a Hy-gain® center insulator #155S. Connected at the center insulator is 48.5 feet of 300 ohm TVM "ribbon wire," the other end of which is connected to the terminals at the top of a 4:1 balun. The bottom of the balun has an SO259 connector which accepts a length of RG/8m long enough to go to your radio shack and plug into the back of your receiver. The length of this coax cable doesn't matter.

The design is from *MT*'s own Bob Grove and is intended to be a ham radio "all-band tunerless antenna." That means that it operates in the ham bands from 80 meters (3.5 MHz) to 10 meters (29.9 MHz) without requiring the use of an outboard tuner to match the antenna to the transmitter. What that means to SWLers is that it is an antenna which tunes those bands and everything in between with optimal performance, even on the AM band.

One problem readers had was obtaining the particular Hy-gain center insulator for this project. Try ordering direct from Hy-gain (addresses for parts at the bottom of this column). Another question is about the exact dimensions. Since the wire has to be twisted around and through an "egg" insulator at the ends and at the center, should the dimensions be increased to make up for the connections?

Well, even though antenna building requires a certain amount of precision, a couple of inches here or there won't make any appreciable difference in operation especially if it's used only for receiving. If you were to turn the inches into feet, then it would start to make a difference, but again, only for transmitting, and even then the effect would be minimal.

Another question has to do with antenna law and comes from Richard Schultz. He wrote, "...Where on the FCC web site should I go to obtain info/rulings on what is allowed in the way of antennas within a condominium complex for receiving satellite, TV, shortwave, etc. transmissions?"

I wrote a feature article in the April, '00 *MT* on "Antenna Law: What you can and can't do" which covers the subject of antennas in the HF, VHF/UHF, and satellite TV range including the use of external antennas, beams and dishes. The two main locations for information on this subject are found at the American Radio Relay League's site (**http://www.arrl.org**) and at the FCC's Fact Sheet "Over-the-Air Reception Devices Rule" which is found at **http://www.fcc.gov/csb/facts/otard.html.** It's a ten page Q & A from the Commission which is well worth reading.

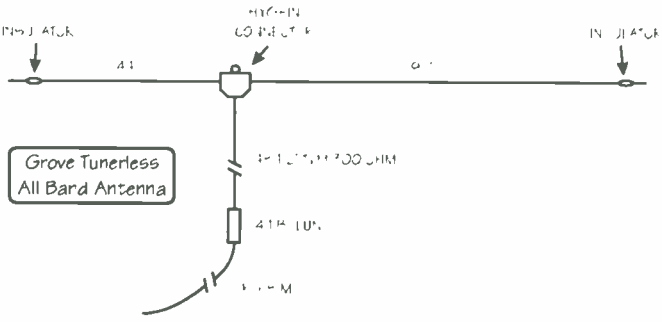
Sources for the Grove Tunerless All-Band Antenna

150 feet 14 AWG Stranded Copperweld antenna wire ($22.50) Surplus Sales of Nebraska, 1502 Jones Street, Omaha, NE 68102-3112 Phone: 402-346-4750
http://www.surplussales.com

Hy-Gain Center Connector ($15) Hy-Gain, 308 Industrial Park Road, Starkville, MS 39759 Phone: 800-973-6572
http://www.hy-gain.com

50-ft 300 Ohm TVM wire ($6) and RG/8mini coax Radio Shack 800-THE-SHACK

Van Gorden 4:1 Balun ($15) Amateur Electronic Supply, 800-558-1411
http://aesham.com



❖ Scanners

Conrad Garcia read "Getting Started in Scanning" (*MT* October, 2001) and was intrigued about the Radio Shack Pro-79 hand-held scanner. "Can you tell me if this scanner is any good? I listen to shortwave but have been considering buying a scanner. Would this be a good beginner scanner...?"

I bought one over a year ago and have to say I've been very satisfied. The main thing, as I said in the article, is to have an idea of what you want to listen to. I find that the Pro-79 tunes everything in my location I want to hear. It has a WX band button which is separate and allows you to monitor your nearest WX radio station. It also has a priority mode with which you can set it up to alert you in the event of impending bad weather. Most local WX radio stations do a test of this system each week so that users can determine if their system is working. I found it works great and really came in useful this summer when we had some very bad storms.

Another question comes from long time *MT* reader Judy May who writes, "I just bought a BC245XLT scanner and am really enjoying it. Years ago a policeman told me that it was against the law to carry a scanner in my car. I think I ran across a reference recently that inferred that getting a ham radio license made one exempt from that law. Is that true? If so, it might just be the push I needed to finally go for it!"

Now, I happen to know that Judy is also a tandem bike enthusiast and I can't resist prodding her toward a ham license. The FCC exam is so simple you can actually memorize enough correct answers to pass; there's no code requirement; there's a terrific ham/bicyclists club (Bicycle Mobile Hams of America); 2 meter rigs are so small and so cheap that their use in summoning help in the event of a bicycle breakdown or accident should make them as indispensable to serious bike riders as a helmet. Well, enough brow-beating!

Laws regarding scanning mobile vary state by state. Check out the *Listening Lawbook* on the *Monitoring Times* website and also **http://www.afn.org/~afn09444/scanlaws/**, which may be a bit more up to date.

❖ Satellite TV Receivers

Chris Singleton, KE3MC, saw my April Beginner's Column of '01 about using an old Primestar dish and LNB with an MPEGII receiver. He writes, "...Is there any way that I could modify the Primestar receiver to work with anything else? I am a 'tinkerer' and would like to experiment with this and am looking for some guidance as to how to get started...I am an Extra Class Ham and an ex-Broadcast Engineer, so I have a strong technical background which could be applied here with some help..."

The Primestar receivers are all essentially junk and there's plenty of them. That means that if you collected as many of them as you could, you could tinker to your heart's delight and not actually ruin anything! The problem, as I see it, is that the essence of the receiver is the software in the chips, and I doubt that it would be worth learning how they work to try to reprogram them for any other purpose. Maybe another *MT* reader has another idea; if so, let's hear it!

The old Primestar *dish*, on the other hand, is actually still useful since it is a good dish and it uses a standard Ku-band LNBF. You can get a nice, functioning, used C/Ku-band receiver for $25 or less at flea markets, yard sales, ham fests or the Internet which can be used with the old Primestar dish/lnbf to pick up standard Ku-band fare. Typically you'll see news feeds, sports backhauls, and various NTSC, in-the-clear programming such as CCTV's 24/day broadcasts from China. Add an inexpensive MPEGII receiver, such as the ST-7700 reviewed in last month's column, and you can set it up on Telstar 5 for a cornucopia of international broadcasts from all over the world. I always hate to see all those old Primestar systems just sitting in dumpsters all over the country.

Speaking of MPEGII reception, John Stanko writes to let us know of a site he uses to get updated info on MPEGII transmissions. John says, "...go to **http://emantechnology.com**...you will see satellite station updates. I have found them to be very accurate and posted very quick. They really watch Telstar 5 action as stations come and go..." Thanks for the tip, John.

❖ Final Wrap-up

Finally, here are some other interesting things readers have written. William Andrade, who is into weird antennas says, "...I live in an apartment on the top (5th) floor and have a 'slinky' helical indoor corner dipole/closed loop. Each segment equals 67 feet flat wire...I have 5 segments in a more or less rectangular closed loop which equals 335 feet. I get excellent reception on 49 m and below...." He also uses a 5-story metal fire-escape for an antenna. ". .I wrap one leg of a capacitor around the bare end of the 50 feet of 14 gauge wire and insert the other capacitor leg into the hi-z post of the R8B [receiver] so as to prevent overloading."

Pirar Mohazzabi, AB8HU, writes, "...in reference to your article on Whole House Audio which appeared in March 2001 of *Monitoring Times* ..it works great. By a simple modification on the Sound Feeder (FM stereo transmitter)...I managed to get a range of 200 ft...I replaced its 3-inch antenna to a couple of feet telescopic antenna...instead of 1.5 volts I am using 3 volts...you can use 3 feet of wire connected to an alligator clip, then clip to the telescopic antenna of the Sound Feeder." Great tips Piran!

Charley Jackson, N4WJP, from Austin, TX writes, "...I enjoyed your article in November *MT* ("The Best Way to Learn Morse Code") and thought I'd pass along how I learned code. I started with the straight memorization and graduated to WIAW's 5 wpm lessons. I struggled to get to 7.5 wpm and wondered how I would get up to 13. A friend of mine...gave me a suggestion: ...tune into the FAST lessons. Start with 35 wpm, even if all you're able to do is copy T's and E's. As the lessons wind down you'll find that 15 wpm sounds really slow. Obviously, it still takes a little time to get comfortable with 13-15 wpm, but I'm here to tell you, it was so much easier than the traditional method of starting slow and working your way up." Great point Charley!

Getting Started

Ask Bob

Bob Grove, W8JHD
bgrove@grove-ent.com

Q. What is the proper way to weatherproof coax connectors? I don't want to keep climbing the tower in an effort to open connections, dry and clean them, then re-tape them.

A. Reader John Diefenbach, K1TLV, of Mason, NH, has the answer from years of professional experience installing major antenna systems:
(1) Apply a small portion of silicon grease (not spray lubricant) to the threads of the connector, but don't get any on the center pin.
(2) Reassemble the connectors, then PVC-tape the connections with the tape extending two to three inches onto the coax on both sides of the connection.
(3) Apply Mastic Seal* over the length of the tape and slightly beyond, onto the coax.
(4) Starting from the *lower* end of the Mastic Seal and spiraling *upward* (important), wrap with Scotch 33 or 88 tape*. At the upper end of the tape winding, cut – do not stretch-break – the tape. Stretched tape relaxes and can uncurl! Now do this tape spiral again, but this time from the top down. Repeat these reverse applications for a total of five layers.
(5) Finally, clear-coat with acrylic spray lacquer the entire taped section, over-spraying slightly at the ends. This securely weatherproofs your outdoor coax connectors. You may wish to add a black wire-wrap (the UV-resistant type) at each end of the tape for additional security against separation or unwinding. And if you have several lengths of coax, color-code them with colored tapes for identification.

* If you can't find Mastic Seal or Scotch 33 or 38 tape, you can order weatherproofing kits from Site Advantage (1-888-748-3238) for about $14.00 + postage. There is enough to do several connections.

Q. I would like to monitor the two-tone page frequencies from my area fire departments to determine their tone frequencies. How can I do this? (Mark Nelson)

A. While there are expensive pieces of test equipment designed to do this, there are two much more affordable alternatives, although they may be less convenient because you have to be there to see the readout when the paging tones are being transmitted:
(1) There are many free down-loadable software programs allowing your sound card to become an audio spectrum analyzer; you could get a rough calibration from one of those, and compare it with a chart of standard two-tone frequencies;
(2) Inexpensive frequency counters that go down into the audio range can be plugged into your scanner external audio jack, allowing you to sample the tone while it's being sent. To avoid the inconvenience of having to be ready to plug it in and disabling the scanner's speaker, you could make a Y adaptor with an external speaker on one side and the frequency counter on the other.

Q. Just as gun makers can still legally repair assault weapons made before the ban went into effect, can repairs be legally made on cellular-capable scanners made before the 1993 ban on such products? (Mark Burns, Terre Haute, IN)

A. Yes, it is legal to repair and use lawfully any product that has been approved by the FCC. Approval of such early products has never been withdrawn.

Q. Can I legally use a remote antenna on a hand-held FRS transceiver?

A. No, the FCC requires the antenna to be permanently attached to discourage long distance interference to licensed services. However, at least one FRS manufacturer has apparently found a legal way around this: they mount all the electronics at the antenna base which can be rooftop-mounted, with the control cable coming down to the operator.

Q. I recently acquired a working Grundig 700 portable radio, but after I left a strong magnet in front of it for a minute or so, the receiver quit working – no audio, no reception. What went wrong? (Herbert Kusche, Springdale, AR)

A. I haven't the foggiest notion. It's not likely that you demagnetized the speaker, and there aren't any magnetic switches. ICs, transistors, resistors, capacitors and other common components are not vulnerable to such magnetic fields, and even if the display were affected, you'd still get reception.

There's a remote possibility that rapidly swinging a strong magnet might have induced voltages into the wiring or inductors (coils) which may have been high enough to damage delicate components, or even incorrectly bias the settings of ICs, including the processor and RAM.

It will be interesting to learn whether or not the radio "heals" after removing the power plug and batteries for a period of a day or so. Readers? Any ideas on this one?

Q. Is amateur radio legal in North Korea and are there many hams? (Anonymous)

A. While U.S. hams are allowed to talk to any licensed amateurs anywhere in the world on our bands, not all countries' citizens have the same reciprocal privilege. American hams have been watching for the P5 North Korean prefix to show up on the air for years, but so far none has been heard.

It's hard for Americans to visualize the isolationism and repression which are a daily regimen in many countries around the world. Hobbies are not even a concept in countries where survival is the mode, and where military regimes regard radio as a clandestine activity.

Q. My Grundig Satellit 800 fell into a bathtub filled with water. I quickly rescued it and it seems to work; what should I do now besides use it for a boat anchor? (Richard Dailey, Pittsburgh, PA)

A. By the time you read this, the radio should be pretty well dried out! Fortunately, if it worked soon after retrieving it from the depths, it couldn't have taken on too much water. The important thing in such an instance is *immediate* drying out. A good bet would be to take off the battery cover to see if there is any water in there, and if there is, it might also be a good idea to remove the cabinet screws and part the cabinet very carefully to encourage air circulation. Even forced air flow with a fan or cool hair dryer would be recommended.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bgrove@grove-ent.com. (Please include your name and address.) The current Ask Bob is now online at our website: www.monitoringtimes.com

Getting Started

Bright Ideas

Gary Webbenhurst
P. O. Box 344, Colbert, WA 99005-0344
ab7ni@arrl.net

Welcome to year 2002. The Chinese New Year's Day for the Year of the Horse is February 12th. No doubt this will be another year of interesting twists and turns. I find it amazing that so many of our major news stories are heard first or simultaneously on our radios. What new radio products will come to market? Start saving your money because I think this is the year we make a giant leap forward. Get out your highlight pen and let's dive into another column of bright ideas.

1

Listen to chatter where there was none. I am referring to the military 225-400 MHz range for military aircraft (AM mode), satellites, and special usage. Listen in FM mode to the 395-400 MHz range. National Guard special operations are often found there. With constant patrols by jet fighters, there is now more chatter in the UHF range as well as the VHF air range. These planes need to be refueled in mid-air so the refueling tracks are busier than normal. In addition, the shipments of men and supplies to the Middle East is continuous.

Do you have a scanner with UHF military capability? I dusted off my rarely-used Pro 2052. I used the computer program to upload the correct frequencies. Then I hooked up my discone antenna, which seems to work well over the large frequency spectrum of military air allocations. With 1,000 channels and a fast scan rate, the Pro 2052 is an ideal scanner. RS has lowered the price: Check your local store. The Bearcat 895XLT is also a good choice, and the price has plummeted well below $200.

2

The events of 9-11 were horrific, yet deemed low tech. It seems to me that any new terrorist activities might be coordinated via radio. They might use some off-the-shelf radios such as the low power business band, or FRS. If you are monitoring and hear suspicious activity, note the details and contact authorities. Before you pick up the phone, you might want to bounce the information off a spouse or close friend. We need to be careful to not to overload the law enforcement authorities with non-serious or incomplete information.

3

Are you a fire buff? Do you have a serious interest in fire equipment, history etc.? There is an excellent article in the September issue of *Firehouse* magazine. Call your local fire station to see if there is a group in your area. None? So start one. These groups often respond to the scene and provide refreshments and rehabilitation services for local firefighters. For more info visit **http://www.firehouse.com/magazine/**.

4

Purchased the new 2002 *Police Call*? Get your money's worth. Remember to use plastic page protectors for the front and rear covers, use fluorescent highlight pens for important information, and use the little pop-up flaggers for bookmarks. You can also use the marker pens to mark pages by grasping the page(s) and highlighting the outside edge of the page. Do it again and really lay on the ink. Close the book and examine your work. Do the pages stand out? If not, hit them again with the pen marker. Now you can easily find your important pages.

The Ultimate Vest™

5

I know that many of my readers are involved in public service work thru their ham radio RACES/ARES, Red Cross, Salvation Army, or REACT programs. Well, here is a vest that is light years beyond the chest packs just mentioned in the November column. I have one and really find it useful, comfortable, and sharp looking in the red version. I have it fully stuffed with the many little equipment items I need in the field. It rests on a hanger in the back of my vehicle, ready for immediate deployment at any time. No more leaving something behind. The vest supplements my "grab and go bag" for emergencies.

After the September events, proper ID and the "official professional look" will be the new standard mode for emergency radio communications responders. You can visit the website at **http://emcommsupply.com/UltimateVest.htm** or contact Emergency Communications Supply Inc., P. O. Box 3404, Florence, OR 97439, (541) 997-7004. These run in the $100-150 range. Can't afford one? Can you afford to be without one? Well, you can at least look at them...

6

Do you have a radio that can be programmed via computer? It is well worth the money because it makes it so easy to load up a new set of frequencies or trunked system when you are preparing to travel or use the radio for a special event such as an air show, car race, or disaster monitoring. Here is a partial list of radios that can be programmed via software. Yaesu transceivers FT-10, 11, 40, 41, 50, and 50R. Also their 2600M, FT 90, 1500, 3000, 8000, 8100, 8500, VX-1R, 5R, VX-110, 150, and VR-500. Icom T series, R series and 2100/207 series. There are some websites that offer downloaded databases. The best one is the Pro 92 and 2067 at **http://www.pro-92.com/database.htm**.

I am planning to put up a website and would like to establish a list depository of databases for special events or geographical areas. If you have a list to contribute or a special request, please drop me an email note. If there is enough interest, I will create an area for files that you could download.

7

If you are a faithful reader of this column, you will remember an earlier idea of using auto stereo speakers and/or mini desktop speakers for your scanner audio output. The Home/Theater and computer related ones are usually shielded. On sale they are a good bargain at $10-20. In the moving process, the black paint on the grille on my speaker rubbed off in a few places. I could have repainted the entire surface with black paint. But I used my faithful black permanent ink marker to dab the scratch marks – a near perfect match.

I just moved into my brand new retirement house. I am hoping it will qualify as a "radio ranch." In the next three monthly columns, I will present some of the problems and creative solutions I found in establishing my new radio room. They will be as follows: February-planning and installing radio equipment; March will be AC, DC, and emergency power sources; April will be the all important antenna issue. See you next month.

Robert Wyman
wymanent@bellsouth.net

Assistive Listening Devices follow-up

MT reader Allan Dunn of Holbrook, Massachusetts, sent a detailed e-mail on Assistive Listening Devices (ALDs) in follow-up to our November column. Allan installed an ALD system at his church in 1995. "It is a single channel unit manufactured by Telex. The transmitter is 50 mW operating on 71.900 MHz narrow FM. It accepts audio from either line level or microphone level sources using cables with either an XLR microphone connector or 1/4 inch phone plug," Allan wrote.

"The unit came with three credit-card-sized single-channel receivers which are powered by two AAA batteries," he continued. "For operator simplicity there is only an on/off volume control with a red LED to indicate when it is powered. There is a 1/8" phone jack for either an ear bud or a loop device for hearing aids. The ear bud cable acts as the receiving antenna."

"We currently have about a dozen people using them regularly. The users in our congregation love them. Hearing aids pick up all the sound reflections in the room including people shuffling their feet. The ALD picks up only the near field audio into the church microphones. The audio feed we use is identical to that for cablecasting the service. The users are primarily elderly, although one 8 year old requires one."

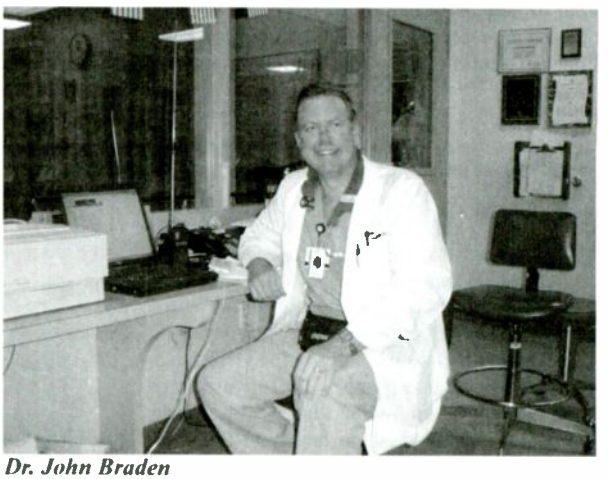
Although designed for in-house use within auditoriums and assembly areas, the radio signal can actually be heard some distance from the building. Allan continued, "The system has been virtually flawless over the past six years. One 90 year old woman who has been a member for over 60 years recently became ill and was forced to miss the services. I gave her 70 year old son (an avid scanner listener) one of the receivers to take to her, as she lived only 1/4 mile away. I asked that she try listening during the services. When she returned to the church weeks later, she thanked me profusely. It worked perfectly."

In fact, the system is quite popular. "...she asked if she could keep it. This past March a snow storm hit early on a Sunday morning, and she could not get out. Somebody phoned her at 11 o'clock, and she told the caller she could not talk as she was at church. I don't know if the caller understood!"

Allan also made a technical note for us. "I recently drove around during our early service listening on a Yaesu VX-5R ham transceiver. In most directions the signal was full quieting within a 0.7 mile radius. Not bad for 50 mW. I have monitored the frequency from my home 1.8 miles away using an Icom R7100. No sign of it there..., but I have found the frequency to be very quiet. There are pagers and one public service user in the 72-76 MHz band, but nothing near enough to cause any problems."

"Our church is continually looking for new ways to reach unchurched people in the community. We recently gained two new attendees who chose our church because they can hear, thanks to ALD receivers."

Allan, thanks so much for your informative report.



Dr. John Braden

❖ Who's Listening?

Hospital Emergency Rooms are depicted almost daily on television dramas and movies. While ER two-way communication systems are often used as props, scanners rarely enter the storyline. In real life, however, Dr. John Braden plants a Uniden BC245XLT directly in front of his desk. Dr. Braden is the ER Assistant Director at Cedars Medical Center in Miami, and his personally-owned scanner accompanies him on every working shift.

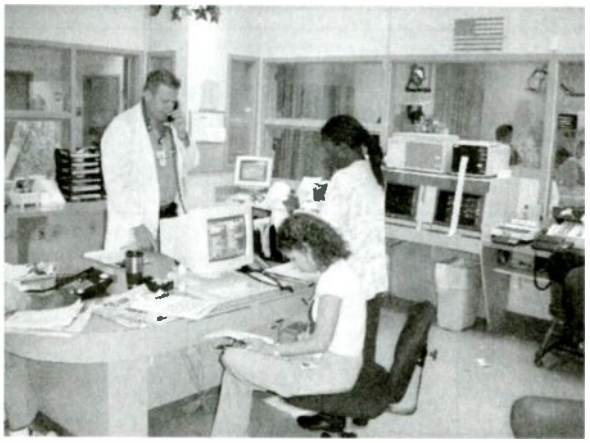
Cedars is a Category 2 Trauma Center serving the City of Miami (Florida) and surrounding communities. The facility also provides overflow support to the Ryder Trauma Center, a Category 1 unit located nearby at the University of Miami / Jackson Memorial Hospital (JMH) medical complex.

When on-duty, Dr. Braden monitors dispatch and medical channels for local fire-rescue departments, plus some police frequencies of interest. "It gives us a heads-up for traffic crashes and patient movements," John advised. A minibus rollover on I-95 in Miami was a prime example. "The rollover was a multiple-casualty incident. The injured were being transported to JMH, but we heard (on the scanner) that some patients may be headed to us because Jackson was nearing capacity."

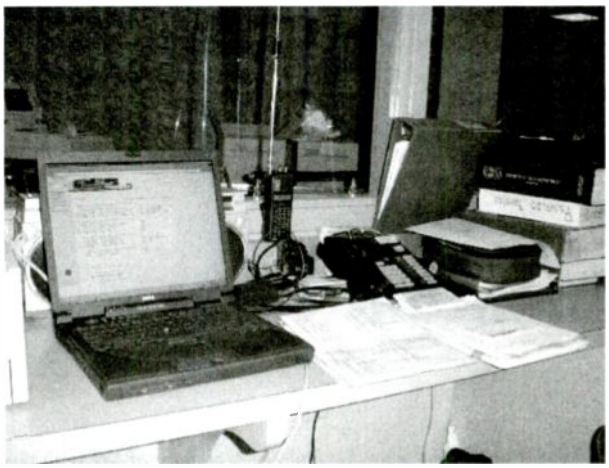
Dr. Braden monitored police, fire, medical and hospital channels for that situation. "We had an additional twenty minutes of time to prepare for the influx," John continued. ER staff began allocating resources and personnel well before the official notifications reached the hospital.

As may be expected, two-way radios and special receivers are also utilized in the ER. Currently installed systems include voice and medical telemetry channels for the City of Miami Fire Department (800 MHz Motorola trunked system) and Miami-Dade County Fire Department (462-463 MHz MedCom allocations plus 800 MHz EDACS trunked system), hospital administrative channels (UHF business band), NOAA weather radio, and a separate medical telemetry printer that can be accessed via cellular modem. Other radio systems in the building include wireless cardiac monitors and personal protection monitors.

ER staff members work 12-hour shifts and consist of one doctor, one physician assistant and five to eight nurses. All are familiar with the



Cedar's ER



Dr. Braden's work station

various radio systems and communication protocols. "We participate in all the local drills and simulations, such as those for biohazards, chemical spills, mass casualty incidents and hurricanes." These drills are now more significant in light of recent world events, and staff members are well aware of potential threats.

"We also get cruise ship passengers and crew members who are injured at sea," said John. Language barriers are easily overcome with the ER's multi-lingual staff and the use of AT&T interpreters.

"Our biggest problem is RF shielding. We're on the ground floor, and hundreds of pounds of electrical equipment and x-ray machines surround us." Although MedCom radio antennas are mounted on the hospital roof several hundred feet above the ER, other systems are problematic. The NOAA weather radio, for example, cannot easily pull in a signal with its telescopic rod antenna. Hospital engineering staff and the ER are working on new antenna mounting locations and cable runs to satisfy these issues.

I wish to thank Dr. John Braden for his outstanding information and detailed tour of the ER unit. As demonstrated by Dr. Braden and the fine ER staff at Cedars, scanners can be essential tools in the business of saving lives. A better use for scanners will be hard to find.

❖ On-Scene Commander

My tour of the ER at Cedars would not be complete without some on-scene work. Have you ever heard a wireless cardiac monitor? It's not the most exciting thing to listen for, since it sounds like a digital symphony of tones, beeps and warbles, but check out the UHF business band the next time you're visiting someone at a large hospital. Frequencies found at Cedars and the nearby JMH complex appear in Table One.

❖ Bank Number One

Let's consider some monitoring strategy issues this month instead of specific Bank One frequencies. What happens to old frequencies when an agency changes to a new radio system?

When a jurisdiction or agency switches to a new system – such as from a VHF or UHF police, fire or local government channel plan to an 800 MHz trunked system – many hobbyists ignore the older system in favor of hearing the new system. This begins when new frequencies are licensed and continues through the testing, evaluation and deployment stages.

In fact, it's great fun to listen in as technicians set up antenna sites, check signal radiation patterns, measure various transmitter parameters and begin the process of moving users from the old system to the new one. A simultaneous broadcast, or "simulcast," is often implemented to temporarily link the old and new systems.

For example, an old police repeater (consisting of a repeater input frequency and a repeater output frequency) may be simulcast as a single talkgroup on a new trunked system. Employees using the old system can operate their radios as they always have; employees who have been issued new radios are instructed that a particular talkgroup has been set up to link or patch in the old repeater.

Users on both the old and new systems operate as if they are on a single system, since the link is transparent to individual radio operators. Police radio traffic may be monitored on the old repeater (output) frequency and the trunked frequencies at the same time.

Once the new system is fully operational, old frequencies fall silent. Hobbyists sometimes delete them from scanners and consider them obsolete, but a better strategy exists. If your jurisdiction's old frequencies have been replaced by a new radio system, program all the old freqs into a new bank, including former input, output, simplex, data and paging channels.

Remember, all frequencies have specific uses or "allocations" as designated by the FCC. Let's say you're aware of a former police frequency that was used for mobile data terminals or paging. Since you never heard any voice communications on the channel, you locked it out many years ago. That channel's allocation, however, probably allows for any public safety use. Months after the new trunked system has been deployed, the police department may find a new use for the frequency and put it back into service. Tactical applications using simplex are often reported.

If the police department doesn't use the frequency, another department within the same jurisdiction may inherit it. That is, the police may dispose of the old radios or frequencies, but a department like Building and Zoning Inspection can end up with those same radios and frequencies, since they qualify as a "public safety use."

When the original jurisdiction wishes to completely dispose of the frequency, the next most likely new user will be another jurisdiction within the same geographic area. A county fire channel may find a new use as a nearby city fire or government channel.

There is no guarantee that an old frequency will be reassigned, but the radio spectrum is still a limited resource with licensing issues and equipment costs. A government jurisdiction with a small radio budget may look to reuse old systems before purchasing new ones or abandoning channels altogether.

Here's an example of how radio channels have changed in South Florida:

The Village of Pinecrest was created in the mid 1990s from a previously-unincorporated section of Miami-Dade County. They decided to implement their own police communications system instead of operating on the county system. The Pinecrest system is composed of channels abandoned by other local jurisdictions (when the others switched to trunked systems):

453.05 (formerly City of Miami PD)
453.30 (formerly City of Miami PD)
453.65 (formerly Miami-Dade County local government)

❖ On the Keyboard

I didn't have column space to include Part 1 of the Geographic Frequency List series, so we'll start that project next month!

❖ Links of interest from this column:

Telex Assistive Listening Devices:
http://www.telex.com

Table One: Wireless Cardiac Monitors

These are just a sample of channels found in Miami: search from approx. 461-470 MHz in 12.5 kHz steps, narrowband FM, for channels at hospitals in your area. These are low-power systems located in the business band, so you may also hear other communications on the same frequencies.

466.1125	466.4625	468.2375
466.1375	466.5125	468.2625
466.1625	466.5375	468.7875
466.1875	466.7625	468.8875
466.2625	467.0125	469.0375
466.3375	467.1375	469.1125
466.3875	467.1625	469.1375
466.4125	468.2125	469.1625

ER listens to City of Miami Fire Rescue

John David Corby, VA3KOT
johndavidcorby@yahoo.com

Scanning in Edmonton

Happy new year to all *Scanning Canada* readers. Your columnist from the Great White North is hunkered down in freezing temperatures waiting for spring. In just a few short weeks Canada's famous Wiarton Willie, the albino groundhog, will step out of his burrow and tell us how soon we can get up on the roof to maintain our antennas. In the meantime we will put some more wood in the fireplace and continue our cross-country tour of the nation's airports.

❖ Edmonton International Airport

Last month we touched down in Calgary – the business center of the province of Alberta, home of Canada's energy industry and nearly all of the country's oil companies. We start 2002 in the same province, but with a look at Alberta's provincial capital as *Scanning Canada* moves north to the city of Edmonton.

Just three hours road trip north of Calgary we find a very different city. While Calgary enjoys bizarre, but usually comfortable weather ("if you don't like the weather in Calgary – wait a half hour" as they say), Edmonton in January is a cold, snowy city. Some years, Edmonton is a cold, snowy city at any time of the year!

The city of Edmonton has one claim to fame; it is home to the famous "West Edmonton Mall," a huge shopping and entertainment complex. West Edmonton Mall features an enormous wave pool, a massive roller-coaster and a giant indoor lake with more submarines than the Canadian military. *Scanning Canada* will return to the mall in a later column, but this month our stop in Edmonton will focus on the International airport. Your *ScanCan* columnist has visited Edmonton several times and is quite familiar with Edmonton International Airport. The following tables provide the air traffic control and navigation frequencies that are used at the airport.

Edmonton International Airport (CYEG)
Air Traffic Control (MHz, AM)
Radio: 122.5, 126.7
Automatic Terminal Information Service: 128.0
Clearance Delivery: 124.1
Ground: 121.7, 275.6
Tower: 118.3, 381.2
Arrivals: 120.5, 363.8
Departures: 133.65, 363.8
VFR (Visual Flight Rules) Advisory: 118.3, 119.5, 127.4
Edmonton Centre 134.7, 134.9, 240.9, 250.05, 294.5

Navigation beacons
VOT: 114.8
Vortac: YEG 117.6 (53 11 08N 113 52 01W)
(Vortac = VHF Omnidirectional Range/Tactical Air Navigation)
IEG 110.3 (runway 02/20)
IFP 109.9 (runway 12)
IKB 109.1 (runway 30)

❖ Monitoring Canada's Military – part 1

The Canadian Armed Forces is an umbrella organization that includes Canada's army, navy and air force. Unlike the United States, Canada operates its Coast Guard as a government controlled civilian agency. Canada's armed forces have suffered enormous cutbacks over the last ten years, although recent world events have spurred the federal government to loosen the purse strings once again. Funding cutbacks spawned the closure of many bases, but fortunately there are still enough bases open around the country to provide something for military monitoring enthusiasts to listen for. *ScanCan's* home province of Ontario features several bases including the home of Canadian Forces Recruiting at Borden.

A recent drive to the base with the XYL (for the benefit of non-hams XYL is eX-Young Lady = wife) provided an interesting weekend trip. Amid heightened security I was more than a little apprehensive about approaching the gates with my frequency counter on the dash of my car. The imaginative engineers who designed my unit equipped the counter with a button marked "Arm." XYL was not amused and was convinced that she would be driving home alone following my detention by the base MPs. I carried photo ID and a recent copy of *MT* with the *Scanning Canada* column for identification, but fortunately my visit was uneventful. The photo showing the "Welcome to Borden" sign witnesses my visit and successful military monitoring mission.

Canadian Forces Base Borden, home of 400 Squadron

Borden is home to 400 Squadron, 1 Wing (headquartered at another Ontario base in Kingston). Although there are three runways at Borden, its days as a base for military fixed wing aircraft are over. Apart from the popular summer airshows held at the base, the only aircraft operating out of Borden are seven CH146 Griffon helicopters. Borden's 400 Tactical Helicopter Squadron is usually deployed in support of sovereignty patrols, secondary search and rescue, and in support of Land Forces Central Area during peacetime. When mobilized (as may be the case at the time of writing), 400 Squadron acts in support of 427 Squadron in Petawawa, Ontario, which has a larger deployment of the same CH-146 Griffons.

Borden Flying Club is a civilian organization operating a single Cessna 172 from inside the base. A local soaring club's gliders can also be seen in the air over Borden most weekends in the summer. Borden Flying Club caters to both military and civilian pilots. A good opportunity to visit the base is as a guest of the flying club. However, Canadian Forces requires 48 hours advance notice for non-member fly-ins.

Canadian Forces Base Borden uses two frequencies for air traffic control (118.875, 311.6) and several others for ground operations. 400 Squadron uses 40.9 MHz, but other VHF high-band frequencies that have been active in the past have fallen silent. It is believed that an 800 MHz band trunked system may have been deployed at the base. Borden is located about 50 miles north of Toronto at 44 16 20N, 79 54 42W near the small community of Angus.

Next month we will take a look at another of Canada's Forces bases in part 2 of this series. We will also continue our eastward swing through Canada's civilian airports, with February seeing *ScanCan* move into the prairies.

A special note of thanks is owed to all the *MT* readers who have written *Scanning Canada* with words of support, and information for publication. Your contributions are always welcome.

SERVICE SEARCH

Larry Van Horn
larry@grove-ent.com

HF Aero Frequencies

2850-3025 kHz AERONAUTICAL MOBILE (R)

2869 CEP MWARA: San Francisco, CA USA
SEA RDARA (14G): Australian Domestic Aeradios Southeast-Adelaide
2872 NAT MWARA: Gander, NF Canada; Shanwick, UK
2887 CAR MWARA: New York, NY USA
2899 NAT MWARA: Gander, NF Canada, New York, NY USA; Santa Maria, Azores; Shanwick, UK
2926 NCA RDARA: Baku Aeradio, Azerbadzhan; Mineralnyye-Vody; Rostov; Yerevan
2932 NP MWARA: Tokyo, Japan
2941 VOLMET: Kiev, Ukraine (H + 20)
2950 NAT RDARA (10F): Greenland Domestic Aeradios-Kangerlussuaq
2962 NAT MWARA: Canarias, Canary Islands; New York, NY USA; Santa Maria, Azores
2965 VSEA VOLMET: Bangkok, Thailand
2971 NAT MWARA: Gander, NF Canada; Shanwick, UK
2998 CWP MWARA: Honolulu, HI USA; Naha, Okinawa
3010 LDOC: Athens (Olympic Airlines), Greece; Berne, Switzerland; Dublin (Aer Lingus), Ireland
3015 EUR RDARA: Greek Domestic Aeradios Network
3016 NAT MWARA: Canaries, Canary Islands; Gander, NF Canada; New York, NY USA; Santa Maria, Azores; Shanwick, UK

3400-3500 kHz AERONAUTICAL MOBILE (R)

3413 CEP MWARA: Honolulu, HI USA; San Francisco, CA USA
LDOC: New York ARINC, NY USA
VEUR VOLMET: Shannon, Ireland
3425 VOLMET: Cordoba, Argentina (H + 30)
SP RDARA (9B): Nadi, Fiji
3440 EUR RDARA (2A/2C): Russian Domestic/Regional Aeradios-Aktyubinsk, Penza, Uralsk
3446 LDOC: Tors Cove (Rainbow Radio), NF Canada
3452 SAT MWARA: Dakar, Senegal; Recife, Brazil; Sal, Cape Verde Islands
SEA RDARA (14C): Australian Domestic Aeradios Central Eastern/Northeast/North Central-Adelaide
3455 CAR MWARA: New York, NY USA
3461 SEA RDARA (14): Australian Domestic Aeradios Southwest/South Central-Adelaide
3467 SP MWARA: Brisbane, Australia; Nadi, Fiji
MID RDARA: Russian Domestic/Regional Aeradios-Ashkhabad Samarkand, Tashkent
3470 SEA MWARA: Medan, Indonesia
3476 NAT MWARA: Gander, NF Canada; Shanwick, UK
3485 VNAT VOLMET: Gander, NF Canada and New York, NY USA
3494 LDOC: New York ARINC, NY USA
4472.5 Canada FSS Radio: Tanquary Fiord, NWT
4495 Hydro Quebec Radios (Quebec): Fontanges, Nemiscau
4564 LDOC: Berne, Switzerland
4645 VOLMET: Tallinn, Estonia

4650-4700 kHz AERONAUTICAL MOBILE (R)

4654 LDOC: Berne Radio, Switzerland
4663 VNCA VOLMET: Khabarovsk, Russia
4666 CWP MWARA: Honolulu, HI USA: Tokyo, Japan
4669 RDARA: Russian Domestic/Regional Aeradios-Aktyubinsk, Arask, Ashkhabad, Kyzl-Orda, Toshkent, Uralsk
4670 LDOC: Berne, Switzerland
4675 NAT MWARA: Bodo, Norway; Cambridge Bay (Baffin Radio), NWT Canada; Gander, NF Canada; Montreal, PQ Canada; Reykjavik (Iceland Radio), Iceland; Shanwick, UK
4678 SEA RDARA (14A/14G): Australian Domestic Aeradios Southeast-Adelaide
4682 Canada FSS Radio: Loc-a-la-Tortue, PQ
4684 SEA RDARA (14B/14C): Australian Domestic Aeradios Southwest
4687 LDOC: Sydney/Perth (Qantas Control), Australia
4693 SEA RDARA (14D): Australian Domestic Aeradios South Central-Adelaide
4712 RDARA: Russian Domestic/Regional Aeradios-Kiev, Ukraine; Minerolynyye-Vody; Odessa; Penza; Rostov; Simferopol; Tbilisi; Uralsk; Yerevan
4728 RDARA: Russian Domestic/Regional Aeradios-Aktyubinsk, Ashkhabad, Krasnovodsk, Samarkand, Tashkent
4745.5 RDARA: Upernavik Radio, Greenland (1100-1900, closed 1500-1700 UTC November 1-March 31)
4895 Canadian FSS Radio (Manitoba): Berens River, Bloodvein River, Brochet, Cross Lake, Gods Lake Narrows, Ilford, Lac Brochet, Little Grand Rapids, Norway House, Pikwitonei, Red Sucker Lake, Shamattawa, South Indian Lake, Thicket Portage, York Landing
5012 Canada FSS Radio: Fontanges, PQ
5080 Canada FSS Radio: Norway House, MAN
5281.5 Canada FSS Radio: Tanquary Fiord, NWT
5290 LDOC: Stockholm Radio, Sweden

5450-5480 kHz AERONAUTICAL MOBILE (R)/(OR)

5475 LDOC: Elite Ops (Elite/Canada 3000) Toronto, ON Canada
VOLMET: Ezeiza, Argentina (H + 00)

5480-5680 kHz AERONAUTICAL MOBILE (R)

5487 NCA RDARA: Baku Aeradio, Azerbadzhan; Mineralnyye-Vody; Rostov; Yerevan
5490 LDOC V.C. Bird (LIAT), Antigua
5493 AFI MWARA: Brazzaville, Congo; Luanda, Angola; Kano, Nigeria; Kisangani, Zaire; Kinshasa, Zaire; N'djamena, Chad
5498 Canada FSS Radio: Norway House, MAN
5505 VEUR VOLMET: Shannon, Ireland
5508 SAM RDARA (12F): Colombia Domestic Aeradios-Quibdo
5517 AFI RDARA: Addis Ababa, Ethiopia; Asmara, Eritria; Mogadishu, Somalia; Nairobi, Kenya; Tripoli, Libya
5520 CAR MWARA: New York, NY USA
5526 SAM MWARA: Belem, Brazil; Bogota, Colombia; Brasilia, Brazil; Manaus, Brazil; Paramaribo, Suriname; Porto Velho, Brazil
SEA RDARA (14): Australian Domestic Aeradios Southeast-Adelaide, Sydney
NAT RDARA (10F): Greenland Domestic Aeradio Network-Godhab, Groennedal, Julianehaab, Kangerlussuaq, Nuuk, Reykjavik (Iceland), Sondrestrom, Sukkertoppen
5528 LDOC: Manama (Falcon-Gulf Air), Bahrain
5529 LDOC: Boyeros, (Cubana) Cuba; Brussels (Sabena), Belgium; Madrid (Iberia), Spain; Reykjavik (Icelandair), Iceland; Santo Dominga, Dominican Republic
5530 CAR RDARA: Cancun, Mexico; Flores, Guatemala; Guatemala City (Aurora), Guatemala
5532 LDOC: Dublin (Aer Lingus), Ireland; Rome (Alitalia), Italy; Lisbon (Air Portugal-TAP), Portugal; Abu Dhabi, UAE; Prague (CSA Czech Airlines), Czech Republic; Springbok Radio (South African Airways) Johannesburg, South Africa
5535 LDOC: Chicago (Chicago Dispatch/United), IL USA; Lima (Flight Support), Peru; Piarco Operations (BWIA), Trinidad; Speedbird Radio (British Airways) London, England
5538 LDOC: Port Louis (Air Mauritius), Mauritius; Beruit Middle East Airlines (Cedar Base), Lebanon
55541 LDOC: Rio de Janeiro (VARIG), Brazil; Stockholm, Sweden
5544 LDOC: Jeddah (Saudi Airlines), Saudi Arabia; Boyeros (Cubana), Cuba
5547 CEP MWARA: Honolulu, HI US; San Francisco, CA USA
5550 CAR MWARA: Boyeros, Cuba; New York, NY USA
5553 LDOC: Belem (VARIG), Brazil
5556 SAM RDARA (12): Colombia Domestic Aeradios-Armenia, Buenaventure, Cali, Florencia, Ibague, Ipiales, Medellin, Neiva, Pasto, Pereira, Popayan, Puerto Asis, and Quibdo
5557 NCA RDARA: Nikolaevsk Aeradio, Russia
5562 CAR RDARA (12D): Cuban Domerstic Aerodios-Boyeros, Caya Largo, Santiago, Varadero
5565 SAT MWARA: Dakar, Senegal; Recife, Brazil; Sal, Cape Verde Islands
AFI RDARA: Johannesburg, South Africa
5568 LDOC: V.C. Bird (LIAT), Antigua; Beef Island (LIAT), British Virgin Islands; Adams (LIAT), Barbados
5571 LDOC: Moody Aviation (Moody Ops), Elizabethon, TN
5574 CEP MWARA: Honolulu, HI USA; San Francisco, CA USA;
SAM RDARA (13G): Resistencia, Argentina; La Paz, Bolivia;
SEA RDARA (6D): Singapore Radio (3413 sec)
5586 NCA RDARA (2C/3C): Russian Domestic/Regional Aeradios-Aktyubinsk, Penza, Uralsk
5589 LDOC: El Al Operations Tel Aviv, Israel
5598 NAT MWARA: Canaries, Canary Islands; Gander, NF Canada; New York, NY USA; Piarco, Trinidad; Santa Maria, Azores; Shanwick, UK
5601 MID RDARA (6A): Bombay India
VSAM VOLMET: Buenos Aires (Ezeiza), Argentina (H + 00/H + 20); Asuncion (H + 10)
5604 LDOC: Tors Cove (Rainbow Radio), NF Canada
5616 NAT MWARA: Gander, NF Canada; Reykjavik (Iceland Radio), Iceland; Santa Maria, Azores; Shanwick, UK
5628 NP MWARA: Honolulu, HI USA; San Francisco, CA USA; Tokyo, Japan
5634 INO MWARA: Antananarivo, Madagascar; Beira, Mozambique; Perth, Australia; Port Louis, Mauritius; Seychelles, Seychelles; Tananarive, Madagascar
5637 EUR RDARA (1D): Cairo, Egypt; Khartoum, Sudan; Malta, Malta; Romania Domestic Aeradia-Bucharest; Tirana, AbaniaEUR RDARA (1D): Greek Domestic Aeradios Network-Agrinion; Aleksandoupolis (Dimokritos) [LGAL]; Andravida; Athinai (Hellinikon); Chania (Souda); Corfu/Kerkyra (Ioannis Kapodistrias) International [LGKR]; Ioannina; Iraklion (Nikos Kazantzakis) International Airport [LGIR]; Kalamata; Karpathos; Kasos; Kastaria (Aristotelis) [LGKA]; Kavala (Megas Aleksandras) [LGKV]; Kefallinia (Argostalion); Khios; Kos; Kozani (Philippos) [LGKZ]; Larissa; Limnos; Mikonos; Milos; Mitilini; Mykonos; Preveza; Rodos (Diagoras) International [LGRP]; Salonika; Samos; Skiathos; Sparta; Thessaloniki (Makedonia/Mikra) International [LGTS]; Thira (Santorini); Zakinthos LDCC: Athens (Olympic Airlines), Greece
5638 EUR RDARA: YRA-Romania Domestic Aeradio-Bucharest (CW)
5640 VOLMET: Shannon, Ireland
5643 SP MWARA: Auckland, New Zealand; Brisbane, Australia; Honolulu, HI USA; Nadi, Fiji; Noumea (Tontauta), New Caledonia; Papeete (Tahiti Radio), French Polynesia; Perth, Australia
5645 LDOC: Brussels (Sabena), Belgium
5649 NAT MWARA: Gander, NF Canada; Reykjavik (Iceland Radio), Iceland; Shanwick, UK
5652 AFI MWARA: Algiers Radio, Algeria; Brazzaville, Congo; Tripoli Radio, Libya; N'djamena, Chad; Niamey, Niger
5655 SEA MWARA: Hong Kong, Hong Kong; Kuala Lumpus, Malaysia; Manila, Philippines; Singapore, Singapore
5658 AFI MWARA: Addis Ababa, Ethiopia; Asmara, Eritrea; Bujum Bura, Burundi; Cairo, Egypt; Dar es Salaam, Tanzania; Djibouti, Djibouti; Jeddah, Saudi Arabia; Khartoum, Sudan; Mogadishu, Somalia; Nairobi, Kenya; Sanaa, Yemen; Seychelles, Seychelles; Tripoli, Libya
MID MWARA: Bongkok, Thailand; Bombay, India; Dehli, India; Kabul, Afghanistan; Karachi, Pakistan; Lahore, Pakistan; Tehran, Iran; Urumqi, China
RDARA: Russian Domestic/Regional Aeradios-Ashkhabad, Samarkand, Tashkent
5661 EUR MWARA: Athens, Greece; Malta, Malta
5667 MID MWARA: Manama, Bahrain
NP MWARA: Honolulu, HI USA; Hong Kong, Hong Kong; Tokyo, Japan
5670 EA MWARA: Colombo, Sri Lanka; Dhaka, Bangladesh; Kuala Lumpur, Malaysia; Madras, India; Male, Maldives, Medan, Indonesia; Nouadhibou, Mauritania; Nouakchatt, Mauritania; Yangon, Myanmar
5673 VSEA VOLMET: Beijing, China (H + 00)
5680 Worldwide calling/distress/safety frequency
Canada FSS Radio: Alert, NWT; Baker Lake, NWT; Churchill, MAN; Fort Nelson, BC; Fort Simpson, NWT; Fort Smith, NWT; Goose Bay Radio; Inuvik, NWT; Iqaluit, NWT; Kapuskasing, ON; Kuujjuaq, PQ; Kuujjuarapik, PQ; La Grande Riviere, PQ; La Range, SK; Lynn Lake, MAN; Matagami, PQ; Norman Wells, NWT; Rankin Inlet, NWT; Resolute Bay, NWT; Roberval, PQ; Rouyn-Noranda, PQ; St. Anthony, NF; St. John's, NF; Sept-Iles, PQ; Thompson, MAN; Wabush, NF; Whitehorse, NWT; Yellowknife, NWT
5685 AFI RDARA: Mogadishu, Somalia
5691 VOLMET: Irkutsk (H + 55); Khabarovsk (H + 15)
5733 RDARA: Australian Domestic Aeradios: Darwin and Perth
5912 EUR RDARA: Greek Domestic Aeradios Network

(To be continued)

Key to Abbreviations:

AFI	Africa
CAR	Caribbean
CEP	Eastern Pacific & Hawaii
CWP	Western Pacific
EA	Eastern Asia
EUR	Europe
INO	Indian Ocean
LDOC	Long Distance Operational Control
MID	Middle East
MWARA	Major World Air Route Areas
NAT	North Atlantic
NCA	Siberia & China
NP	North Pacific
(OR)	Off-Route
(R)	Routed
RDARA	Regional and Domestic Air Route Areas
SAM	South America
SEA	Australia & S. Pacific
SP	South Pacific
VOLMET	Aviation weather broadcasts

Hugh Stegman
utilityworld@ominous-valve.com
www.ominous-valve.com/uteworld.html

Cuban Spy Base Closes

One of the world's largest listening stations is closing as of January 2002. This is the Russian intelligence base at Lourdes, just south of Havana, Cuba, about 100 miles from the United States. Its closure comes as a complete surprise; as recently as 1999 Russian president Vladimir Putin had called Lourdes an important part of his decision support capability.

Established immediately after the 1962 missile crisis, Lourdes grew into a truly sprawling facility. It gobbled up an area 28 miles square, causing the abandonment of two villages nearby. It employed 1000 to 1500 highly skilled personnel. These came from the Russian GRU, a military intelligence agency, and from FAPSI, the Federal Agency for Government Communications and Intelligence. FAPSI is the successor to the signal intelligence department of the now-defunct Soviet KGB.

At one time, 75 per cent of Russian signal intelligence came from Lourdes. Satellite photos showed two large antenna farms with satellite dishes and microwave intercept gear. Presumably, at least a few high-frequency (HF or "short wave") antennas were present as well, though pictures available to civilians never seemed to pick these up.

Russian President Vladimir Putin said that money was the reason for the closure. Indeed, the yearly cost for salaries, rent to Cuba, and general expenses translated into well over 200 million US dollars. Few experts really believe this cost-cutting explanation, however. Most think that either the base had been made at least partially obsolete by newer encryption and communication technologies, or that Russia was seeking to eliminate a longtime sore point in its relations with the United States.

So how does all this translate into things we'll hear in HF utility? This is unknown. It will definitely be worth looking for any changes in four Cuban stations. Three of these are "numbers," the deeply encrypted broadcasts almost certainly for spies. The fourth station is operated by and for the Russian Navy.

The best known numbers broadcast is, of course, the notorious "Atencion" (Attention!) transmission. This is a machine-generated, Spanish, female voice. "She" has been holding forth in a sloppily-engineered, amplitude-modulated broadcast since the sixties. Hard core numbers fans know this one as "V2." This is the identifier given by ENIGMA 2000, the new electronic version of the European Numbers Gathering and Monitoring Association.

The voice numbers have a Morse code counterpart in continuous-wave (CW) telegraphy, often with an absolutely earsplitting signal into the US. While many CW senders shorten numbers down to letters for faster transmission, this is the only "cut number" station using the sequence ANDUWRIGMT for 1 through 0. Except for a few procedural signals, no other characters ever appear in its broadcasts. This station has the ENIGMA designator of M8, and its machine sending is easily copied by computer.

The third numbers broadcast to watch is the "English Woman," ENIGMA E17, a female voice believed to come from Russian intelligence, and definitely transmitted from somewhere in the Western Hemisphere. This, too, is a powerful station, and not hard to hear when it's transmitting.

The last utility that bears watching is CMU 967, operated by the Russian Navy. It's one of the world's last holdouts for maritime Morse telegraphy, keeping up erratic, CW schedules with "RMP" and "RCV" on 14697, 16023, 18073, 18562, and 20138 kilohertz (kHz).

While it's intuitive that the closing of a sensitive listening station should have no effect on high-power HF transmitters located elsewhere, nothing is ever that simple in Cuba. For example, both V2 and M8 missed five days worth of schedules at the exact time that the fate of Lourdes was being decided in a series of Russian military meetings described as "stormy." Many listeners worldwide reported a nearly total silence from November 12 through the 17th. It ended almost at the exact hour of Putin's announcement.

Though this gap is probably unrelated, we obviously can't dismiss the Lourdes matter just yet. We'll have to keep tabs on these Cuban stations in the months to come, and see if anything changes. With any luck, all this will finally answer the question of whether any of these transmissions came from Lourdes, or (more likely) the Radio Havana site at Bauta. This is a great intelligence opportunity.

❖ US Military HF Broadcasting

Listeners worldwide are reporting a broadcast feeder for the US "Information Radio" into Afghanistan. It's on 8700 kHz upper sideband (USB), with music and bulletins in local languages. In the US, it's heard just before local dawn, and again in the evening. Since it's right in the middle of a maritime CW allocation, some interference will be inevitable.

This military feeder, from somewhere in central Asia or the Indian Ocean, is almost certainly being used by EC-130J "Commando Solo" radio aircraft of the US Air Force Reserve. These planes rebroadcast programs to Afghans in the more "normal" entertainment bands. There are even reports that windup radios have been dropped into the area to facilitate listening.

Meanwhile, the US military continues its worldwide relays of the Armed Forces Radio/TV Service and American Forces Network. These allow personnel on certain vessels to hear the "voice channel" radio programming. You'll remember that AFRTS/AFN relays came back onto HF from a number of military communication stations when a Navy satellite contract was not renewed. These, too, are in utility bands, and they are subject to interference. Several schedules are floating around the Internet, all of which are wrong. Here's the best one as of mid-November:

Location	Daytime	Nighttime
Key West, FL	12689.5	12689.5 kHz
Puerto Rico	6458.5	6458.5 kHz
Sigonella, Sicily	4993.0	10940.5 kHz
Barrigada, Guam	13362.0	5765.0 kHz
Diego Garcia	12579	4319 kHz
Hawaii	10320	6350 kHz

All frequencies in kHz, USB mode. Programs may change.
Day/Night are local at the transmitter.
Reports to QSL@mediacen.navy.mil

Utility World

Utility Logs

Hugh Stegman
utilityworld@ominous-valve.com
www.ominous-valve.com/uteworld.html

ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
AWACS	Airborne Warning And Control System
CAMSLANT	Communication Area Master Station, Atlantic
COTHEN	Customs Over-The-Horizon Enforcement Network
CW	Morse code telegraphy ("Continuous Wave")
DX	Distant Transmitter
E3	British MI6/SIS numbers, possibly Cyprus
E4	British MI6/SIS numbers, possibly Guam
E6	Russian numbers, in English
E10a	Israeli phonetic numbers, null message
EAM	Emergency Action Message
FAX	Radiofacsimile
FBI	US Federal Bureau of Investigation
FEC	Forward Error Correction teleprinting system
FEMA	Federal Emergency Management Agency
FGS	Federal German Ship
HMAS	Her Majesty's Australian Ship
MARS	Military Affiliate Radio Service
Meteo	Meteorological
M8	Cuban "Cut Number" CW (sounds like letters)
M12	Russian CW numbers, ends 000 000
M16	8BY, French intelligence, CW numbers
MFA	Ministry of Foreign Affairs
NORAD	North American Air Defense Command
Pactor	Packet Teleprinting Over Radio
RSA	Republic of South Africa
RTTY	Radio Teletype
SHARES	Shared Resources
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	Simplex Teleprinting Over Radio, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United States
V2a	Cuban "Atencionl" numbers, 3-message format
VFT	Voice Frequency Telegraphy
XPH	Russian "Polytone" numbers

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 (encrypted, usually unidentified, broadcasts thought to be intelligence-related) are identified in () with their ENIGMA station designators, as issued by the European Numbers Intelligence Gathering and Monitoring Association.

284.0 GRN-Non-Directional Beacon, Gorna Oryahovitsa, Bulgaria, in CW at 2037. (Ary Boender-Netherlands)

2203.0 MGJ-UK Royal Navy, Faslane, with RTTY channel bulletins, at 2200. (Day Watson-UK)

2813.9 MTI-UK Royal Navy, Plymouth, with RTTY channel bulletins, at 2120. (Watson-UK)

3208.5 Unid-SITOR-B message from "majed abu shaker offshore operations manager," at 1738. (Watson-UK)

3667.2 Unid-Possibly an Egyptian airfield net, with short ARQ tests at 3 minutes after each hour, also a message in Arabic, at 1815. (Watson-UK)

4027.0 Cuban "Cut Number" CW station (M8), with numbers at 0302 and 0402. (Camillo Castillo-Panama)

4241.0 4XZ-Israel Navy, CW traffic in Hebrew, at 2250. (Watson-UK) *[Enigma M22 when it runs numbers. -Hugh]*

4479.0 Cuban "Atencion" (V2a), with AM Spanish callup 82773 40383 90443, then numbers, at 0403. (Castillo-Panama)

4506.0 Cuban "Cut Number" CW station (M8), with numbers at 0323. (Tom Sevart-KS)

4556.0 WPC-Seawave Radio, with CW identifier in data pulses, at 0714. (Mid-Atlantic DXer-MD)

4700.0 "2kzglobocica"-Polish forces in Kosovo (KFOR), calling "Operacyjnypkw" (Warsaw?), in ALE, at 1805. "1kzdjankovic" calling "Operacyjnypkw," at 1812. (Watson-UK)

4770.0 The English Man-Russian AM numbers (E6), in progress at 2142. (Boender-Netherlands)

5162.0 Russian Intelligence CW numbers (M12), at 2150. (Boender-Netherlands)

5399.0 TZB159-US National Guard, ALE sounds at 0241, 0311, 0513, 0543, 0643, 0714, 0744, and 0945. (MADX-MD)

5418.0 Cuban "Atencion" (V2a), with AM Spanish callup 24492 21463 53413, then numbers, at 0202. Cuban "Cut Number" CW, different day at 0202 and 0320. (Castillo-Panama)

5696.0 US Coast Guard Cutter *Diligence* (WMEC-616), working Camslant at 1953. (MADX-MD)

5717.0 MKL-UK Royal Air Force, Kinloss, calling "V-1-H," no joy, at 0555. (MADX-MD)

5809.0 Russian Polytone station (XPH), weird tone-coded numbers in AM, null message, at 2120. (Boender-Netherlands)

5860.0 faazma- US Federal Aviation Administration, Miami, FL, ALE sound at 0715. faazdc-FAA, Washington, DC, sound at 0732. faazbw-FAA, Boston, MA, sound at 0739. (Watson-UK)

6586.0 New York Radio, taking positions from flights including American 68, American 62, and Speedbird 208. (Sue Wilden-IN)

6697.0 Stevedore-US military, with an EAM simulcast on 8992 and 11244, at 0611. (Jeff Haverlah-TX)

6768.0 Cuban "Cut Number" CW station (M8), with numbers at 1205. (Castillo-Panama)

6770.0 SIL-Rockwell Collins Systems Integration Laboratory, working COT in ALE, at 0615. (MADX-MD)

6781.0 Russian Intelligence CW numbers (M12), at 2130. (Boender-Netherlands)

6797.0 Cuban "Cut Number" CW station (M8), with numbers, twice at 1203. (Castillo-Panama)

6826.0 Cuban "Cut Number" CW station (M8), with numbers, twice at 1203. (Castillo-Panama)

6854.0 Cuban "Atencion" (V2a), with AM Spanish callup 30022 42781 12553, then numbers, at 0304. (Castillo-Panama)

6865.0 Cuban "Cut Number" CW station (M8), with numbers at 1203. (Castillo-Panama)

6912.0 KPA2-Israeli intelligence, with AM English phonetic "numbers" (E10a), at 0220. VLB2-Israeli intelligence (E10a), AM, at 0250. KPA2 (E10a), AM at 0310. KPA2 (E10a) at 0s15. (MADX-MD)

6913.0 AAA9CE- US Army MARS, Memphis, TN, calling roll of the Command Administration Net, in LSB, at 0200. (MADX-MD)

6981.0 Cuban "Cut Number" CW station (M8), with numbers, twice at 1203, twice at 1303. (Castillo-Panama)

7475.0 faazdc-FAA, Washington, DC, ALE sound at 0351, and hourly thereafter. faazob-FAA, Cleveland, OH, sounding at 0517 and 0622. faazma-FAA, Miami, FL, sounding at 0557. (Watson-UK)

7646.0 DDH7-Hamburg Meteo, with RTTY English Channel weather forecast (stormy!), at 1440. (Watson-UK)

7684.5 NNN0MDC-US Navy/Marine Corps MARS, Washington, DC, calling many stations in Pactor at 0200. (MADX-MD)

7710.0 VFF-Canadian Coast Guard, Iqaluit, with FAX ice charts at 0710. (Watson-UK)

7817.0 T159-Unknown, probably US Military, sounding in ALE at 0214, then at 15 and 45 after each hour. (Watson-UK)

7889.0 Cuban "Cut Number" CW station (M8), with numbers at 1203. (Castillo-Panama)

8122.0 Canberra Control-Royal Australian Navy comm station, working heavy landing ship HMAS Wewak (L-130), at 1210. (MADX-MD)

8335.3 DRAE-German Navy vessel FGS *Luetjens*, working DHJ 59, Wilhelmshaven, in voice and VFT, at 2300. (MADX-MD)

8912.0 TRC-US Customs Service, sounding in ALE at 2218 and 2303. (MADX-MD) TRC, sounding in ALE at 2239. (Watson-UK)

8930.0 Reach 19-US Air Force Air Mobility Command, at 0357. (MADX-MD)

8965.0 Bandsaw Mike-US military, patching Phoenix 1 at 0021. (Sevart-KS)

8983.0 Air Force Rescue 95829-US Air Force C-130 on search for a lost State Department aircraft, telling US Coast Guard CAMSLANT

Chesapeake of return to base for engine smoke, at 0130. (Allan Stern-FL)

8992.0 Raider 21-US military, checking both transmitters with Assurance, at 0418. (Haverlah-TX)

9016.0 Astra 31-US Air Force, probably a tanker, working Andrews at 0111. (Haverlah-TX)

9023.0 Darkstar Romeo, calling Deer Hunter (NORAD, Western US), no joy, at 0802. Magic 76-US Air National Guard, possibly an F-16, at 0804. (Haverlah-TX)

9025.0 Hawk 66-US military aircraft, calling Vampire 72, at 0403. Reach 6012-US Air Force Air Mobility Command, in a patch to Dover via Andrews AFB, MD, at 2318. (Sevart-KS)

9057.0 Darkstar-AWACS aircraft, no suffix heard, in a long, ALE-initiated voice patch to "Maintenance," at 2246. (Haverlah-TX)

9059.6 WBP4562-Vessel *Endless Summer*, working unid station in Pactor, at 2118. (MADX-MD)

9323.0 Cuban "Cut Number" CW station (M8), in progress at 1031. (MADX-MD)

10204.0 Tricycle-US military, with several EAM, simulcasting on 6697 and 8992, at 0708. Play Ball-US military, with a 28-character EAM, simulcast on 8992 and 11244, at 1606. (Haverlah-TX)

10345.0 Cuban "Cut Number" CW station (M8), with numbers at 0325. (Castillo-Panama)

10586.5 WWJ 98-US Government Federal Agencies Net control, Idaho, announcing that the Mountain Region Disaster Services and Federal Agencies Net would meet every Wednesday at 2100, on 5125 and 7477 kHz. Station then took SHARES check-ins from WGY 916, FEMA, TX, and WGY 998, FEMA, at 1718. (Hugh Stegman-CA)

11175.0 Unid-Station with "easy listening" music from "W???, 105.9," getting complaints from other military stations, at 1257. (Sevart-KS) AX 410-Unknown aircraft, patching Operations via Andrews, at 1723. Tuff 47-US Air Force, possibly a B-52, calling Mainsail and "any station" (same thing), no joy, at 1926. (Haverlah-TX)

11226.0 Sentry 52-US Air Force AWACS, working Raymond 24 (Tinker AFB), at 2346. (Sevart-KS)

11232.0 Trenton Military-Canadian Forces, passing weather to an aircraft at 1944. (Sevart-KS)

11244.0 Stateroom-US military, with a 28-character EAM, simulcast on 8992, at 1825. (Haverlah-TX)

11432.0 Unid-Long distance trucker chat, between Zimbabwe & Pretoria, at 0600. (Bob Hall-RSA)

11445.0 C07-US National Guard, calling C11 in ALE, at 2032. A11-Same net, calling OPS at 2111, and CDR at 2103. (Watson-UK)

11461.3 Unknown Egyptian diplomatic, with Arabic chatter and testing in SITOR-A, at 1525. (Watson-UK)

11465.0 055-Israeli Air Force headquarters, sounding in ALE, at 0659. 616, sounding at 0733. (Watson-UK)

12111.0 SA2N-Unknown CW station, bad hand sending, working FRV 4889 at 0913. Station appears every 15 minutes, working other stations with calls beginning in "F." (Geoff Halligey-UK)

12138.5 SU1-FBI, Salt Lake City, calling SUP03 (unknown FBI), in ALE at 0636. (MADX-MD)

12215.0 Cuban "Atencion," AM Spanish numbers (V2a), in progress at 0236. (MADX-MD)

12832.5 JFC-Misaki Fishery Radio, working unknown fishing vessel in CW, then back to markers, at 0832. (Watson-UK)

12921.1 MGJ-British Royal Navy, Faslane, with RTTY channel bulletins, in channel 3 of VFT, parallel on 8642.1, at 0439. (MADX-MD)

13155.0 Unknown-Weak station with a 28-character EAM, probably US Navy, at 2244. (Haverlah-TX)

13200.0 Offutt-US Air Force Global High-Frequency System, NE, with a 17-character EAM at 2045. (Haverlah-TX)

13244.2 NNN0EZL- US Navy/Marine Corps MARS, working AFA3HY on the SHARES bulletin-board channel, in Pactor, at 1449. (MADX-MD)

13245.0 Pipe Stem-US military, with 40-character and a 28-character EAMs, simulcast on 8992 and 11244, at 1729. (Haverlah-TX)

13442.0 055- Israeli Air Force headquarters, sounding in ALE, at 0659. (Watson-UK)

13597.0 JMH4-Tokyo Meteo, with FAX wave prognostic chart, showing a typhoon, at 0756. (Watson-UK)

14396.5 WPKJ 542- National Telecommunications Alliance, CA, acting as SHARES Coordination Station, West, taking weekly net check-in from Texas CAP 1090, Civil Air Patrol, at 1530. (Stegman-CA)

14400.0 OLZ69-Czech Embassy, Cairo, Egypt, sounding in ALE at 2329. (MADX-MD)

14422.0 055-Israel, ALE sound at 0753. (Watson-UK)

14535.0 055-Israel, ALE sound at 0725. 619, Israeli Air Force, sounding at 0748. (Watson-UK)

14731.7 RFFAAC-Guerre Dipermil, Paris, with an ARQ message to many units regarding public relations procedures, at 1644. (Hall-RSA)

14718.3 RFHI-French Forces, Noumea, with an ARQ message in 5-letter groups, at 0518. (MADX-MD)

14731.7 RFFAC-French Ministry of Defense, Paris, with ARQ administrative message in French to AIG2133, at 1523. (Hall-RSA)

14913.0 055-Israel, ALE sound at 0750. (Watson-UK)

14931.0 8BY-French Intelligence, Paris (M16), with 3-number groups in CW, parallel on 18415, at 1147. (Sevart-KS)

15016.0 Elective-US military, calling Mainsail ("any station"), no joy, at 1715. (Haverlah-TX)

15682.0 Lincolnshire Poacher- UK Intelligence "numbers" in English (E3), at 1214. (Sevart-KS)

16014.0 RFFINDI- French Navy, 'Admiral Indian Ocean' command, with ARQ weather at 0635. RFVIC-French Navy, Port Des Galets, with ARQ messages at 0644. RFFTC-French Air Force, with long ARQ messages to frigate Nivoise, at 1032. (Hall-RSA)

16023.0 CMU967-Russian Navy, Havana, Cuba, calling RMP in CW at 1517. (Watson-UK)

16121.7 Unid-Egyptian MFA, Cairo, with ARQ and FEC traffic, may have gone to 15770.0, at 1438. (Watson-UK)

16997.5 WLO-Mobile Radio, AL, with SITOR-B weather and traffic list, at 1402. (Sevart-KS)

17488.0 RIW-Russian Navy, Khiva, with encrypted CW traffic for RKZ, at 1037. (Watson-UK)

18003.0 Reach 8H7-US Air Force Air Mobility Command, with a patch to Charleston Meteo via Andrews, at 1705. Sentry 63, US Air Force AWACS, patch to Eagle 2 at 2203. (Sevart-KS)

18926.7 Unid- Egyptian diplomatic, with Arabic chatter and sign off in SITOR-A, at 1226. (Watson-UK)

19031.7 Unid-Islamabad MFA, Pakistan, with SITOR-A traffic in English to Paris, at 0954. Also Pakistan embassy, Damascus, Syria, with SITOR-A traffic in English, at 1021. (Watson-UK)

19043.0 055-Israel, ALE sound at 0808. (Watson-UK)

19131.0 Flint 840-US Drug Enforcement Agency, Calling Atlas (DEA, IA), at 2148. (MADX-MD)

20179.7 RFFXOC-French Army, Paris, with long, coded ARQ message to many French and US assets in Indian Ocean, at 1530. (Hall-RSA)

20555.0 RFFX-French Forces, Versailles, with a coded ARQ message from RFGW, Paris, to RFFXL, French Forces, Beirut, at 1453. (MADX-MD)

20946.0 8BY-French Intelligence, Paris (M16), with CW markers and callup 506/663/475, at 1352. (Watson-UK)

21866.0 Cherry Ripe-UK Intelligence "numbers" in English (E4), at 1303. (Sevart-KS)

21868.0 Cuban "Cut Number" CW station (M8), with numbers at 1304. (Sevart-KS) *[Pretty high frequency for them. -Hugh]*

22769.0 616-Israel, ALE sound at 0733. (Watson-UK)

24370.0 RFGW-French MFA, Paris, with an FEC embassy circular, at 0915. P6Z-MFA, Paris, calling S5F, Brasilia, in FEC at 1754. (Hall-RSA)

26161.4 CPK- Globe Wireless digital node, Santa Cruz, with Morse ID in sync markers, at 1352. (Watson-UK)

26170.4 CPK-Globe Wireless digital node, Santa Cruz, with Morse ID in sync markers, at 1339. (Watson-UK)

26241.7 RFVI-French Forces, Reunion, with French and encrypted ARQ traffic, at 1104. (Watson-UK)

26441.7 RFFA-French Forces, Paris, with French and encrypted ARQ traffic, at 1325. (Watson-UK) RFFIM-French Navy, Paris, with encrypted ARQ message for RFVIMCR, Le Port, at 1650. (Hall-RSA)

Utility World

Digital Digest

Mike Chace
mike@chace-ortiz.org
&
Stan Scalsky
sscalsk@mail.ameritel.net

New MIL-188-110A HF Modem Users

This month we look at some newly discovered users of the MIL-188-110A 2400bd HF modem, check some developments within the diplomatic networks operated by China and Egypt and profile the popular Codan modem series.

Czech Diplomatic Service with High-Speed Modem

Early one weekday morning we bumped into the Czech diplomatic service testing their variant of the popular MIL-188-110A 2400bd modem in serial tone mode on 20620.45 kHz.

Using USB voice coordination, the two operators commissioned what appears to be a link from Prague to an as yet unidentified North or South American embassy(s). The embassies in question clearly collect and forward traffic from a number of other Czech missions in the area as evidenced by email headers and documents from Brasilia, Rio, and Havana, among others. Traffic consists of email with Word Perfect document attachments. Unfortunately, no ALE is used, the operators preferring to use a CW or simple voice call-up instead.

Here is an example of the email monitored:

DATA RATE 1200 SHORT INTERLEAVER
BCDEFGHIJKLMNOPQRSTUVWXYZ[\] ^ _`abcdefghijklmnopqrstuvwxyz{ | }
Pz RP BRASILIA.EEXÒOSTA01—Message:
From: operator at POSTA01
Date: 10/11/01 2:35PM
To: BRASILIA at RPOSTA01
Subject: GK Sao Poula 1162/2001
Contents:
File item: STAT-SVA.WPD 10/11/01 9:25AM
RPSTAT-SVA.WPD • • ç¡E01öï'ê, • • tK + • tK + S"cMÎÎ • ÿÿÿÿP • ëj
VA.WPD*ÉŒ'ê?•
SKœS(Ýi KS98/TEMP/WORKBACK/STAT-SVA.WPDÎÎ

Note the interesting lead-in of upper- and lower-case characters in alphabetic order – something noticed on old Czech ASCII-ARQ traffic. This is another reason why knowledge of an organization's old message formats can be useful in identifying their use of a new system.

Mexican Navy using High-Speed Modems

Most Saturday mornings starting around 0800EST on 19106.5 kHz, you can hear the Mexican Navy exchanging traffic using a serial tone MIL-188-110A modem.

Again, there is no ALE triggering the modem activity, but there is chatter among the operators, using a very distinctive unit (also capable of providing voice encryption) which provides a short burst of 4-FSK data (for linking or synchronization) before each over. This unit is becoming popular with military units in a number of countries, but we have yet to discover the manufacturer, although Israel's Tadiran is the most likely suspect.

Here is a (somewhat corrupted) example of traffic. Note the use of the "XBRH" signature which also happened to have been used as a SITOR-A SELCAL by the Mexicans. Like the Czechs, there is also a distinctive lead-in to each frame of traffic:

####0123456789NDIENTE PRIMERA QUINCENA SEPTIEMA,,, BRE PTE. AYO, DEL PERSONAL
CAPITANES Y TTES. ESA UNIDAD, FUNGEN COMO SERVIDORES PUBLICOS.
– –
221230.- VICEALM.CG.DEM.

VELAZQUEZ AVILES.

ERE2216 C/2 RADS. XBRH/XBRE. TB.

Investigative Help Required

As we're sure readers of this column have gathered, we take a serious interest in tracking down networks. This month, we're publishing the details for three ALE networks that have had us scratching our heads for some time. Any help, guesswork or further collection of information will be much appreciated.

Unidentified Network 1

This network would appear to be African in nature – KAM = Kampala?, MOD = Mogadisho?, DRC = Democratic Republic of Congo? – but we're not sure. Clearly voice traffic using Codan radios follows the ALE link-ups but it is always very weak and has so far defied further analysis.

Our best guess is that this is one of a number of "bushnet" systems established by aid agencies in Africa – possibly the World Food Program's DFMS (Deep Field Mailing System).

Identifiers: 12B, 26B, AHQ, DRC, HOD, KAM, KLU, MOD
Frequencies: 8056, 12190, 14360, 14395, 14483, 16360, 17137, 17173kHz USB

Unidentified Network 2

In this network the ALE triggers the Harris AVS (Analogue Voice Security) encryption system, and so is probably being transmitted by Harris Falcon-series radios. The speculation is that this network is located in North Africa.

Identifiers: MQ11, SY11, UJ11
Frequencies: 7996, 12225kHz USB

Unidentified Network 3

In this network the ALE again triggers the Harris AVS encryption system. The identifiers of this network are all Arabic male names, again adding to the possibility that this network is located in North Africa or the Middle East.

Identifiers: ATEF, BADIS, BASSEM, MALEK, MALEK MIM, SAYF
Frequencies: 7635, 11202, 12225, 13242kHz USB

One network previously published here using the identifiers BAHAMAS, MOSCRIP, VIEQUES and others has been identified as being three island bases operated by the US Navy Seebees.

China and Egypt Expand Systems

Adding to their recent move to MIL-188-110A 2400bd modems, the Chinese now appear to be testing a new variant of the Russian CROWD-36 multitone system. The Chinese version is recognizable by much wider tone spacing and lack of the 10+11+11 tone groups.

Meanwhile, the Egyptian Diplomatic Service has been extensively testing the Codan series 9100 16-tone modem over here in the US. The embassies in Washington and Havana have been heard exchanging traffic with Cairo using the new modem, with coordination on USB voice and changing back to the old SITOR-A system to close the link. Codan activity was logged on 19056.5 and 20661.5 kHz – the corresponding SITOR-A being 0.2 kHz higher. No ALE appears to be used in either case, although the proprietary chirp has been heard.

System Profile: Codan

The Australian Codan radios and modems have been a staple of many organizations working in tough environments (particularly Africa) and needing the security and reliability of good communications. Codan gear is being used by oil companies (LASMO/Ein), aid agencies (Mission Aviation Fellowship, Red Cross and Red Crescents) and many MOI operations (Angolan Police) throughout the world.

This reputation seems to have been noticed in the diplomatic community where the company's 9100-series modem has been noted under test by both Egypt and Pakistan.

The 9100-series modem's signal can be seen as a series of 16 QPSK channels, approximately 112 Hz apart ranging from +656 to +2343Hz. The modem can reach speeds of up to 6000bps under optimum conditions. Codan's proprietary 100bd SELCAL and 80bd chirp can be used for station addressing and automatic best channel selection, but this is frequently replaced by the more usual MIL-188-141A ALE.

New Gear Arrivals

By the time you read this column, it's likely that Hoka will have launched their new decoder – the Code332. This unit operates under the Windows operating system and will apparently require just a standard PC sound card. See the Resources section for some nice screen shots.

Resources

Codan – http://www.codan.com.au/radcom
Codan 9100 Audio Clip – http://rover.vistecprivat.de/~signals/WAV/CODAN16.WAV
Codan 9100 Audio Clip – http://rover.vistecprivat.de/~signals/WAV/CODAN-CHIRP.WAV
Hoka Code 332 – http://hoka.defiant.co.uk/

Glenn Hauser
P.O. Box 1684-MT, Enid, OK 73702
wghauser@yahoo.com
www.angelfire.com/ok/worldofradio

Two Militia Broadcasters In Shootouts, One Dead, One Missing

Steve Anderson of United Patriot Radio (6900 kHz) shot up a police car which stopped him for a traffic violation in mid-October, barely missing the cop's girlfriend who hit the floor in the back seat. Then he fled into the mountains of Kentucky, and was not found or heard from in the following month, despite a $5000 reward. He had threatened to kill a reporter who had written stories about him. Anderson could be hiding out with sympathizers, but was also reported to be suffering from a heart condition (per numerous articles in the *Somerset Commonwealth-Journal, Lexington Herald-Leader, Louisville Courier-Journal*)

Eagar, Arizona - One of the country's most influential militia radio broadcasters was killed early Nov. 6 in a hail of gunfire when law officers tried to arrest him on a warrant accusing him of aggravated assault. William Milton Cooper, 58, whose apocalyptic, SW radio programs were a major influence on Oklahoma City bomber Timothy McVeigh, was shot to death after Cooper shot and critically wounded an Apache County sheriff's deputy who had tried to arrest him, officers said.

The officer, Robert Marinez, 40, was listed in critical condition at St Joseph's Hospital and Medical Center in Phoenix. Apache County Sheriff Brian Hounshell said Marinez, a former Marine and Persian Gulf War veteran, was shot twice in the head by what was believed to be a .45-caliber pistol.

Cooper had been indicted on federal charges of failing to pay taxes from 1992 to 1994 and became a fugitive after failing to appear for a U.S. District Court hearing in Phoenix three years ago. Glenn Jacobs, a Round Valley newspaper publisher and friend of Cooper, said he didn't think the police operation was unjustified. "I think Bill just went nuts. He was looking for martyrdom anyway and swore he would never surrender," Jacobs said. "They had him dead to rights on aggravated assault." (Mark Shaffer, *The Arizona Republic*, Nov 7, via Larry Van Horn)

Cooper's death was devastating to his friend Allan Weiner, who planned to keep airing reruns of *The Hour of the Time*, UT Tue-Fri 0300-0400 on WBCQ 7415 (gh)

High Frequency Coordinating Committee

B-01 frequency schedule is a very useful reference, more up to date than any reference books; via **http://www.hfcc.org/data/index.html** where previous editions are also available (gh)

AFGHANISTAN As soon as Kabul was liberated, local radio broadcasts resumed, and workers reinstalled a Radio Afghanistan sign, but not on SW; hams tried to prevent reactivation on 7087v. Before jumping to conclusion that you have Kabul reactivated when something is heard on 4775, note that TWR Swaziland uses the frequency at certain hours, otherwise of no consequence (gh)

[non] A *Popular Communications* contributor sent a nastygram in September to Afghan Radio and was surprised to receive an E-mail reply denying they were pro-Taliban, and indicating that there were Americans working at the station. This longstanding "station" at **http://www.afghanradio.com** is not in Kabul, but is run by exiles and immigrants in the USA, also on the air in Washington DC and the Bay Area (gh)

The 8700-USB Information Radio transmissions may have come from Turkmenistan, an unlikely ally with a low profile through the crisis. Evidence included fading patterns and a brief exchange in the Turkmen language recorded on the frequency (Nick Grace, *Clandestine Radio Watch*) In a reply to many DXers who had E-mailed reception reports of Commando Solo on 8700, Lt. Edward Shank replied Nov 7 from *edward.shank@paharr.ang.af.mil* that he was touched by all the reports, but was not yet authorized to authenticate them or reveal details of the operation (via E. A. Wembagher, Argentina, *CRW*)

ANTARCTICA Radio Nacional Arcángel San Gabriel is still on the air! It was received October 18 at 2050 on 15476. Base name "Esperanza" wos mentioned twice (Vladimir Kovalenko, Tomsk, Russia, *DX Listening Digest*) This is to remind you that station is rumored to be closing early in 2002, so hurry up ond get it, M-F 1800-2100 (gh)

ARGENTINA RAE B-01 English added second frequency: M-F 1900-2000 Eu 9690 15345; Tu-Sa 0200-0300 Am 6060 11710 (Gabriel Iván Barrera, *Conexión Digital*) RAE was on *exactly* 11710.00 UT Nov. 8 0130, then exceedingly long multi-lingual ID sequence at 0159. Hammered by slop from RHC's sideband transmitter on 11705, but still very good signal, stronger than usual, and dead-on frequency! What's going on? (Randy Stewart, MO, *DX Listening Digest*) 11710 blasted as usual by Cuba 11705-USB, and 6060 hit by Spain 6055 and someone Arabic (Bob Thomas, CT)

AUSTRALIA HCJB has an international broadcast license. The station planned in Kununurra WA could blanket India and China; within a 2-hop range is more than 60 percent of world population in 10-40 latitude range. Still much to do. Target date Xmas 2002, the 71st anniversary of HCJB in Quito (David Maindonald, HCJB-Australia on HCJB *DXPL*)

Christian Voice, now owning the R. Australia transmitters near Darwin, has renomed itself Voice International Limited. (via Dr. Hansjörg Biener, *BC-DX*)

AUSTRIA Radia Africa International via Moosbrunn 1100-1200 English/French on 17815 (Silvain Domen, Belgium, *DX Listening Digest*) It's not the Methodist show. Announced as daily 1100-1200 17815 via Moosbrunn; 1500-1600 17895 via ?; Sundays: 1900-2000 5945 and 6155 via Moosbrunn; on the net **http://www.radioafrica.net** In English, French, German. Stories, travel reports etc. Also via FM-Orange in Vienna, so it's a relay via shortwave (Silvain Domen, Belgium, *DXLD*) This turns out to be program mentioned in an ORF press release as *"Tribüne Afrikas,"* also on 1476 daily 2200-2300. 1100-1200 on 17815 and 1500-1600 on 17895 in ORF technical schedule. Evidently a Vienna-based project which simply does not know about the "Radio Africa International" of the United Methodist Church (Kai Ludwig, *DXLD*)

BELGIUM [non] Last-minute change in RVi via Bonaire, English at 2230 even before it went into effect: 13700, not 13685 (Frans Vossen, RVI *Radio World* via John Norfolk, *DXLD*)

BHUTAN BBS Thimphu changed English schedule. Local time is UT +5.30 [like India] instead of UT+6. New programs include *Internet On Radio* Sun 1100-1130 (extended English 1000-1130 at the weekend). Unfortunately morning English is retimed at 0500-0600 (instead of 0300-0400) and reception at this time is very poor even here in Calcutta. English also 0800-0900 M-F; All on 6035 kHz. M-F 0100-0600, 0800-1230; Sat/Sun 0400-1130. E-mail addresses announced: for request program: request@bbs.com.bt For Internet On Radio program: browse@bbs.com.bt Home page is: **http://www.bbs.com.bt** (Alok Dasgupto, India, *DX Listening Digest*)

BRAZIL Rádio Difusora de Poços de Caldas, 4945: **http://www.difusorapocos.com.br** Due to energy rationing, schedule limited to 0700-1000, 1600-2200 (Marco Antonio Archanjo, Sorocaba, SP, *Radioescutas*)

BULGARIA Radio Varna ("Hello, sea"/"Zdravey, more"): 2200 Sunday-0400 Monday on new 9800, 100 kW, non-dir, ex 9955 (Observer, Bulgaria)

CAMBODIA Phnom Penh, is again active around 11940.3v, according to previous schedule, still very bad modulation (Roland Schulze, Philippines, *BC-DX*) 11940.34, Phnom Penh with lovely smooth SE Asian music 1240-1314, very low modulation, but Bucharest fortunately not using 11940 at this time (Wolfgang Büschel, Germany)

CANADA Contrary to last month, RCI features are now: Mon *Media Zone*; Tue *Maple Leaf Mailbag*; Wed *Spotlight* (arts); Thu *Business Sense*; Fri *Canada and the World* (each also repeating on weekends). *Media Zone*, hosted by Ian Jones, is a weekly forum

*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-01=winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

where Canadian journalists meet to express their ideas about topical issues facing Canadians (via gh)

CHINA Joining 21 MHz community now?, at least to jam Mandarin/Cantonese/Tibetan of RFA and other western broadcasters in the 13 meterband. Up to now, China used 90 to 16 mb only, never heard on 21 MHz (Wolfgang df5sx Büschel, *DX Listening Digest*) The bands are beginning to fill up with Chinese, just as they were full of Russians 15 years ago. Checking 1930-2130 I have spotted at least 10 new highpowered signals. A problem is that all three programs heard are also used by jammers. The nonstop music service is used by many jammers when CNR-1, CNR-2 are sleeping. 9480, 9760, 11700, 11740, 11785, 11850, 11935, 11990, 12010, 13610, 13750, 13775, 15160, 15195, 15355, 15520, 15545, 15600, 15695, 17640. Apart from 17640 these appear to originate from a single site (Olle Alm, Sweden, *BC-DX*)

Asian Broadcasting Institute has CRI schedule in time order, including English, showing the Canadian, Cuban relays correctly, as well as specifying other transmitter sites, even within China: **http://www.246.ne.jp/~abi/sked-chn.htm** (gh)

[non] Clandestine, Falun Dafa: 2100-2200 on 5925, 9445 (Ludo Maes, Belgium, *TDP, BC-DX*) Perhaps Irkutsk and Tajikistan respectively (*BC-DX*)

COLOMBIA New station in Bogotá on 7380 heard at 2230-0100, including English ID as Idea Radio (Bruce, Nov 3, *swl@qth.net*) Mixing with VOR Spanish to LAm, so not a good choice; clear when rechecked at 1024 during tropical/romantic vocal music in Spanish, and 1028 ID in English. Fading a bit but still audible at 1150 with continuous music segués of upbeat tropical music, except for canned IDs in English at approximately 1101 and 1130, Spanish at 1121 and 1144: "This is Idea Radio, a shortwave station from Colombia to the world. Idea Radio broadcasts on 7,380 kHz. For more info, please contact us: P. O. Box No. 2-5-7-3-3, Bogotá, Colombia, Sudamérica, or e-mail us: idearadio@hotmail.com " This one surely came out of nowhere! The first Colombian broadcaster ever on 7 MHz band (Glenn Hauser, OK, *DX Listening Digest*)

Male ID speaker has a foreign accent and female is fluent in Spanish. In almost 5 hours of monitoring, I heard only three themes interpreted by Colombian artists. Although the vallenato is Colombian style, I was unable to identify one single theme or interpreter. The signal is strong, and they appear to be on the air all night. The PO box ought to be at Chapinero post office (Rafael Rodriguez, Bogotá, via Henrik Klemetz) The name Idea Radio and frequency 7380 were formerly used by a pirate in Genova, Italy, who had to flee the country to Colombia (Dario Monferini, *DXLD*) Our hearing it as late as 1230 UT rules out a European location now. Aware of the clash with Russia on 7380, one night he tried 7415, but that clashed with WBCQ; in the clear however, at 1230 (Glenn Hauser, OK, *DX Listening Digest*) DFing shows it to be near Barranquilla (Dan Ferguson, *Cumbre DX*)

COSTA RICA Radio For Peace International and the International Center for Human Rights in Media present a 10 week study course dealing with social justice, human rights, ethics in journalism, researching and documenting intolerance in media, researching and preparing articles for publication, radio and news production with elective Spanish language training. Students live with a Costa Rican host family. Four overnight excursions, special activities included. Session start dates for 2002: Jan 6, March 24, June 9, September 1. Contact: IPC, SBO 66, P.O. Box 025292, Miami, FL 33102. Tel: +506-205-9092, FAX: +506-249-1095 or **http://www.rfpi.org/ipc.html** (RFPI)

To avoid Taiwan on 15050, RFPI moved to 15040, about 1300-1000, awaiting reactivation of 7445 with new antenna, around 0300-0700.

Internet streaming direct from RFPI will probably run only from 2200 to 1300 or 1400 UT, when bandwidth is available. Those who would like to join Friends of RFPI, may do so with Visa or Mastercard M-F 1500-2300 UT via 1-800-413-7695 (James Latham and Joe Bernard, RFPI *Mailbag*)

CROATIA [non] CRZ 0400-0559 to WNAm, 320 degrees, via Germany replaced 9885 with 7285 (Kai Ludwig, Germony) Still \\9925; required due to VOA on 9885, but 7285 is in US hamband! (gh)

CUBA [non] Why is the number of Cuban exile broadcasters declining? During the Clinton administration, exiles had little hope for Castro to go away. Nor did he with the fall of Communism elsewhere. Recently, the economic situation has been the principle cause. When Alpha 66 discontinued, it was literally a choice between continuing to broadcast on SW or continuing to rent space for their office. With the Cuban American National Foundation, their recent abrupt decision to end SW after 12 years was due both to internal conflicts and money. The *Miami Herald* reported that the Foundation had been largely operating from a fund that founder Jorge Mas Canosa left when he died. It was in shares of stock in his very successful telecommunications company, MasTec. That was fine until the bottom fell out of the stock market. Cuban exile broadcasting is at its lowest point since at least 1989, when Radio Miami began operations first as o broker, operating our own station. Also during the past 10 years, many of the charismatic leaders of the Cuban exile community have died. (Jeff White, WRMI, via Hans Johnson, *Cumbre DX*)

Radio Martí Director Under Investigation. Roberto Rodriguez-Tejera, Director of Radio Marti – who has been on permanent leave since OCB Director Salvador Lew took over operations, and allegedly made it clear that he was unwilling to work with him – is according to sources under investigation. Washington investigators were at the Miami compound questioning the staff (including his cronies) about Rodriguez-Tejera's alleged activities (From: **http://www.cubapolidata.com/rmo/** via Mike Terry, BDXC-UK)

DOMINICAN REPUBLIC R. Barahona, 4930, has been perfectly readable, but modulation varies, 1006-1058 (Hans Johnson, FL, *Cumbre DX*)

ECUADOR B01 HCJB times for the 30 minute *Dx Partyline*: To Europe Sat 0700 and 2000, to the South Pacific Sat 0700 and 0900, to India UT Fri 2330; to North America at UT Sun 0100 (east) and 0400 (west). *Ham Radio Today* shortened version during the Wednesday *Studio Nine* at the times above on weekdays; also: Mon, *Inside HCJB*; Tue & Thu, *Did You Hear?*; Fri, *Música del Ecuador* (John Norfolk, OKCOK, *DXLD*)

EGYPT R. Cairo and its listeners were suddenly confronted in mid November with The Overcomer, Bro. Stair, overriding its only frequency in English to NAm at 0200-0330, 9475, where it has been for sesquidecades. The USAF required WWCR to vacate 7460, so WWCR extended 9475 until 0400; also clashing with Cairo in Spanish to NAm at 0045-0200, per schedule via Alokesh Gupta (gh)

ERITREA The weekly radio program of UNMEE (the United Nations Mission in Ethiopia and Eritrea) has been suspended by Radio Eritrea. Started at the beginning of 2001, not aired since 24 October (© Radio Netherlands *Media Network*)

[non] Clandestine: Voice of Democratic Eritrea, Voice of the Eritrean Liberation Front – Revolutionary Council (Tigrigna "Demtsi Democrasiyawit Eritrea"; Arabic "Sawt Eritrea al-Dimuqratiya - Sawtu Jabhat al-Tahrir al-Eritrea") was first observed on 21st November 1997. The radio is hostile to the government of Eritrea. It is believed that Voice of Democratic Eritrea originally broadcast via a transmitter in Sudan which was shared with other Eritrean opposition radio stations including Voice of Truth. The broadcasts via Sudan were last heard sometime in 1999. Since June 2000, via hired a Deutsche Telekom transmitter. In Tigrinya, Sat 1400-1500 to Eu on 5925; Man and Thu 1700-1800 to Af on 15670; on demond archive audio: **http://www.meskerem.net** (© BBC Monitoring)

ETHIOPIA [non] Deutsche Telekom schedule shows new broadcasts from Tigrean International Solidarity for Justice and Democracy on Wed and Sat 1600-1629 on 15700 (Jülich, 125 degrees) (Kai Ludwig, Germany)

FINLAND Radio Finland in English: 0730-0758 9510 Europe, Asia, Australia, 21670 kHz Asia, Australia; 1330-1359 15400 and 17660 North America (Radio Finlond website, via Daniel Sampson)

FRANCE "*Couleurs Tropicales*," a M-F program of African and Caribbean music on RFI, retimed two 20-minute segments to 2010 and 2040 on 9790, 11955, 15300 (Mike Cooper, GA, *DX Listening Digest*)

[non?] Weak NBFM feeders in French heard when 11m reception from Europe hos been excellent at local sunrise, peaking at 1230 on 25925 and 25928 (David Hodgson, TN, *DX Listening Digest*) 25925 monitored briefly with Parisien French at 1350, but not when propagation favored Europe. Could be from a French overseas department in Caribbean, or Africa (Alan Roberts, QU, via Sheldon Harvey, *DXLD*) Always many signals all piled up, making usable audio very difficult. I was able to rule Africa out due to much European radio traffic in 25 MHz range, yet absolutely no African or Caribbean traffic. Caribbean does not usually open here in SE USA on 11m till an hour or two after sunrise. I am receiving these signals right at sunrise to 90 minutes after sunrise.

Also, unlike the pileup around 25925, a single wideband FM TV feeder station in French heard 1310-1345 on 26143-26150. An obvious TV cue station. I can hear technicians talking over the feed from time to time; sometimes I can hear a phone being dialed, ringing, then conversation superimposed on the feed audio. Program consists of news, commentary, small talk and ads (David Hodgson, TN, *DX Listening Digest*)

GREECE ERA5 sent NAm schedule as: 0000-0550 7475, 1200-1500 11900, 1600-2200 17705 (Petro Giannokopaulos, Atlanta, *DX Listening Digest*) So only one evening frequency designated for us now; it's direct, the other two Delano. Weekly hour in English, *Hellenes Around the World* confirmed now at 1700 UT Sat on 17705. Same 100 km/hr YL announcer, has finally learnt to pronounce it "hel-EENZ" instead of previous "HELL-uh-nuzz". *It's Greek to Me* music show announced in English on Sundays, is at 1900 on same (gh) Also try these for the Atlantic Ocean: 0000-0400 12110, 0400-0600 9420, 0600-0800 15630 9420, 0800-1000 15630, 1100-1200 15630, 1200-1850 15630, 1900-2400 7475. And for SAm, Panamá Canol and SW Africa: 2000-2200 17565 [Greenville], 2300-2400 12110 (via F. Brazhnikov via Wolfgang Büschel)

INDIA AIR GOS B-01 in ENGLISH:
1000-1100 15260 Sri Lanka, 11585 15020 17800 NE Asia, 13700 17510 17895 Australia NZ
1330-1500 11620 13710 SE Asia
1745-1945 7410 11620 Europe, 11935 13605 15155 17670 Africa
2045-2230 7410 9650 11620 Europe, 7150 9910 11715 Australia NZ
2245-0045 9705 9950 13605 Asia

To receive this info from All India Radio, please send a request to dx_indio@rediffmail.com : E-mail address list; B-2001 Complete SW Schedule (Home & External Services) in Frequency Order; B-2001 External Service Schedule (Language Order). I also invite you to join dx_india egroup which deals exclusively on Broadcasting in India. E-mail dx_india-subscribe@yahoogroups.com (Jose Jacob, *DX Listening Digest*)

IRAN VOIRI English to NAm at 0030 is poor to foir on 6065, but wiped out at 0100 by WYFR, also splashed by 6070 CFRX and 6055 Madrid. 6135 hit by 6145 NHK via RCI or 6130 VOA (Bob Thomas, CT)

For official contradictory version to schedule below see **http://www.irib.com/worldservice/time%20table/friquenci/english.htm** (gh)
B-01 Voice of Islamic Republic of Iran /IRIB/:
ENGLISH (RADIO SHALOM)
2000-2027 7175 7255 (ex 1900-1927);
0030-0127 6065 6135;
1100-1227 15385 15480 15575 21470 21730;
1530-1627 9605 11775 11870;
1930-2027 6110 9890 11695 15140;
2130-2227 9780 11740.

Deleted traditional 9022 for several languages at 0630-0727, 1600-1727, 1830-0127 (Ivo and Angel!, *Observer*, Bulgaria, Nov 13, *DX Listening Digest*) Hardly coincidental, 9022 now designated for US military usage! (gh) Air/ground facility changed Bann-B HF station (call sign: Metaphor) provides HF voice frequency support to all US aircrews, ground stations, on 6730 and 9022, 0500-2100Z (*WUN* via Dick van der Knaap, *BDXC*)

KOREA SOUTH [non] RKI relays via Sackville not only added 0200-0300 on 9560, but enlarged morning prepeat to an hour, 1130-1230 on 9650 (via Bill Matthews, OH) Resultantly, *Multiwave Feedback* half an hour later Sun 1205 as well as UT Mon 0235 (gh)

LAOS Lao National Radio, Vientiane, External Service, is on 7145 at 1130-1400* including 1330-1400 English. Also 2330-0030* French and English. Very informative local and international news, also local reparts, folk music. Every segment ends with National Anthem and ID "That is the Lao National Radio, broadcasting from Vientiane, the Lao Democratic Republic." Also jamming can be heard on 7145, but not sure if aimed at Laos (Roland Schulze, Philippines, *BC-DX*)

LITHUANIA R. Vilnius, English to NAm at 2330 on 9875, 0030 on 7325 (Sigitas Zilionis, Vilnius, *DX Listening Digest*)

MALAYSIA Two spurs noted from V. of Malaysia, Kajang on 15294.905, on 13.635 kHz either side, symmetrically on 15281.27 and 15308.54 (Wolfgang Büschel, Germany)

MÉXICO XERLK, Súper Stéreo Miled, Atlacomulco (harmonic 2 x 1170) at 1035-1127, popped up on 2340.00 out of nowhere with an ad string and good ID right at TOH! (Mark Mohrmann, VT, *DX Listening Digest*)

NICARAGUA Personal letter of Sept. 13, 2001 from Evaristo Mercado P., Director, Radio Miskut, says they are now operating without problem on 5770 kHz and 104 MHz FM at 1200-0000 GMT. 3 kW amplifier has not been installed, because it interferes with telephones and TV around 50 sq.m. Now looking for new transmitter site at suburban area. They also operate radio stations in Sandy Bay Norte (10 watts on FM) and Waspan (110 watts on 1680 kHz), thanks to help from Dr. John Freeman (Tetsuya Hirahara, Japan, *Radio Nuevo Mundo*)

NIGERIA Voice of Nigeria heard on 15120 Oct 19 at 0910 with Arts programme, at 0915 news feature Nigerian letter. Strong signal on clear channel but some distortion (Mike Barraclough, UK, *DX Listening Digest*) Long awaited reactivation, as external service revives (gh) 15120 at 0700-0900, fair/good here in Germany (Thorsten Hallmann, Münster, *DXLD*) VON also scheduled 1900-2300 in English on 15120, but clashes with Cuba and WYFR (gh)

Photo Credit, Radio Netherlands

On 29 October VON officially commissioned three new 250 kW SW transmitters. Radio Netherlands' Eric Beauchemin has just visited the station, and shares his impressions at: **http://www.rnw.nl/realradio/features/html/nigeria011101.html** (*Media Network* via John Norfolk) With illustrations, captions, sidebars and links including some audio files! (gh)

Transmitters they just "officially commissioned" are in fact some five years old. The purchase of these Thomcast rigs was widely reported then, and 15120 returned to air temporarily, allegedly from one of these transmitters, so it seems they were indeed delivered and installed. I wonder if "the new Voice of Nigeria" is just the next short-lived passion (Kai Ludwig, Germany)

[non] New schedule received from Salama Radio: 12025 at 1900-2000: Sun, Mon, Wed, Fri, 1900-1930 Housa, 1930-2000 English; Tue, Thu, Sat 1900-1920 Hausa, 1920-1940 Fulfulde, 1940-2000 English (Jacob Abdalla, Saloma Radio via Erik Køie, *DXLD*)

PERÚ Radio Oriente, Yurimaguas at 2310, very strong signal but unclean and impossible to stabilize in SSB on 6410 // 6634, Maybe Oriente also on 6643 and 6423 where I have noted stations with similar problems. Listed on 6188v where it was off air. Announcing 6190 (Björn Malm, Quito, Ecuador, *SW Bulletin*)

Radio Altura, Cerro de Pasco, on new 5009.3 but announcing 5010, heard at 0020-0130 with folk music (Rafael Rodriguez, Colombia, *Conexión Digital*) 5009.46, 1020-1031, Andean vocals, canned announcements into live announcers with IDs at 1030. Fair to good (Mark Mohrmann, VT, *DX Listening Digest*)

POLAND R. Polonia, B-01 in English:

1300-1359	11820 9525 7270 6095
1800-1859	7285 5995
2030-2129	9540 7165 7290 5995

(Website via Alan Roe, *DX Listening Digest*)

Radio Polonia's media program announced that management has been considering shutdown of SW transmitters. Many complaints about quality of SW signals have been received. Transmitters are property of Polish Telecom so Radio Polonia has no influence on quality. Would be too expensive for PR to buy the transmitters and upgrade. Transmission costs are one third of budget anyway (Mike Barraclough, England, *DX Listening Digest*)

PORTUGAL RDP's new 300 kW transmitter plus two curtain arrays for Europe & Brazil is expected to be delivered in Jan 2002, and is due to start operation in June/July. Furthermore, 2 more 300 kW are planned to start operotion by 2003 (Carlos Gonçalves, Portugal, *BC-DX*)

ROMANIA RRI has made some more bad frequency choices. For 0200 English to NAm, 9550, heavy clash with Havana in Spanish, which has used that frequency for a long time, Havana on top here, but both unlistenable. At 1400, 17790 clear but weak and undermodulated; 15365 had ACI, and 11940 CCI. The domestic service relay in Romanian is back on 17720, now clashing with China via Cuba (gh) Great sounding transmission from RRI, English at 0400 on 11830; also to WNAm at 0600 on 9530, 11830 (Bob Thomas, CT, *DX Listening Digest*)

RUSSIA Have you noticed the "new" V.O.R. interval signal? It sounds like the old one played at half speed. Wait a minute... it IS the old one played at half speed. What's up with that? Heard on 12020 at 0258 (Dave Hughes, MO, *DX Listening Digest*)

SPAIN Radio Exterior de España, English: Africa 2000-2059 M-F, 2200-2259 Sunday on 9595; Europe 2000-2059 M-F, 2200-2259 S/S on 9680; America 0000-0159, 0500-0559 6055 (REE website via Daniel Sampson)

SUDAN [non] Really nice personal letter in English from Sudan National Alliance/Sudan Alliance Forces. Secretary Amir Babkir confirms 6985, 10 kW. Address: SNA/SAF, Culture and Information Office, Neguse St. No. 6/8, Asmara, Eritrea (P O Box 9257). New temporary e-mail: pmbsaf@gemel.com.er (Björn Fransson, Sweden, *DX Listening Digest*)

TAIWAN V of Asia will QRT Jan 1, 2002 (Miller de Taiwan, *WWDXC*, *BC-DX*)

TIBET [and non] I have been monitoring Voice of Tibet for a number of years and the Chinese have been getting more and more ruthless in their jamming. Unlike VOA or BBC, VOT changes frequencies to avoid jamming. A couple of years ago it took the Chinese a week to 10 days to find the new frequency and the first day it came on we moved. However, the Chinese have new jamming equipment and better guys on the job. Now they find the frequency within a few minutes. The VOT has been found transmitting in Tibetan at 1215-1245 and in Chinese 1245-1300, between 15600-15750, 17500-17900 and 21500-21600. Jamming is of three different types. Strong noise jammers, distorted Chinese domestic service, and cochanneling with the CPBS minority service and Chinese services. The VOT tuning signal is quite exotic (Victor Goonetilleke, Sri Lanka, *Clandestine Radio Watch*)

TURKEY V of Turkey in English, B-01:

0400-0450	6020*, 7240;
1330-1420	17690, 17815;
1930-2020	7125;
2130-2220	9525;
2300-2350	9655*, 9830 [*NAm]

(*Observer*, Bulgaria)

TURKMENISTAN Turkmen Radio in English found by Mauno Ritola, Finland on 5015 at 1300-1310: "Welcome to the English programme of Watan [Fatherland] Radio channel. Now I'll present the latest news around the nation." (Bernd Trutenau, Lithuania, *BC-DX*)

UKRAINE RUI has picked a poor frequency for its megawatt to NAm, 7375, a hefty mix with DGS Costa Rica, which has been on that frequency for years; low rumble caused by CR being slightly off frequency. RUI unlistenable (gh) Only two of all nine RUI transmitters put in operation Oct 28, Mykolaiv on 7285, 7375 kHz. Transmitters in Brovary (Kyiv) and in Taranivka (Khar'kiv) were turned off. Then some of them were switched to relay V. of Russia (A. Yegorov, RUI via *WWDXC* vio Kai Ludwig)

UAE Dubai, 21605, off-frequency to 21597.6 including English 1600-1633* with poor audio (Bill Westenhaver, QB, *DX Listening Digest*) 21597.63 with English news 1330-1334, then feature program (Wolfgang Büschel, *BC-DX*)

USA I asked the folks in Washington if I was OK to do QSLing for the whole VOA/IBB system. The answer was yes. So, I am free to handle reports for any site. The address is: John Vodenik, IBB/VOA Delano Transmitting Station, 11015 Melcher Road, Delano, CA 93215 (John Vodenik, CA, *DX Listening Digest*)

On WRNO's old frequency, 7354.4, contemporary Christian music, and IDs mentioning K-love 89.1 FM, New Orleans, before 0300, then het clashing for two hours with WYFR 7355.0 Russian (George Thurman, IL, *DX Listening Digest*)

USAF took 7460 away from WWCR, requiring schedule adjustment for Bro. Scare transmitter #4 to: 0400-0700 2390, 0700-0400 9475 [see EGYPT]; and consequently #1 to: 1100-2200 15685, 2200-0700 3215, 0700-1100 3210 (WWCR) Affects *Mundo Radial*, some WOR broadcasts

6520 Harmonic, KCJJ (4 x 1630), Iowa City, IA, at 1035 with positive audio match, numerous IDs. DX this one before Pyongyang occupies 6520 after 1100 (David Hodgson, TN, *DX Listening Digest*)

Second harmonics heard: 2260.00, WLBA Gainesville, GA (2 x 1130) 1040-1102 Spanish announcer with ID, "La Favorita" and "Música Mexicana" slogans. Fair signal with good peaks. On 2479.98, WGVA, Geneva, NY (2 x 1240) 1018 Talk and ads, mention of "Art Bell", "Finger Lakes News Network", 1100 ABC net news. Fair to good peaks.

On 2780.02, WRIV, Riverhead, NY, (2 x 1390), 0958-1138, Music, talk and ads, 1115 "Hometown Station" slogan, ID, local weather. Fair signal with good peaks (Mark Mohrmann, VT, *DX Listening Digest*)

UZBEKISTAN R. Tashkent heard in English on 25m until 2200* on a hombrew converter while riding my bicycle, Uzbek culture and traditional music (Steven Zimmerman, WI, *DX Listening Digest*) That would be 11905, also audible here on fixed receiver (gh, OK) English at 2030 and 2130 on new winter frequencies 7105, 5025, 11905 (Büschel, Germany, *DXLD*)

Radio Tashkent in English:

0100-0130 As	5.955 5.975 7.215
1200-1230 As	5.955 5.975 6.025 9.715
1330-1400 As	5.955 5.975 6.025 9.715
2030-2100 Eu	5.025 11.905
2130-2200 Eu	5.025 11.905

(© BBC Monitoring)

VIETNAM [non] VOV added relay via Merlin, Austria: 5955, 1800-2000, 100 kW, 320 degrees (via Wolfgang Büschel, *DXLD*)

YUGOSLAVIA R. "Yugoslavia" winter sked: ENAm 0100-0130 exc Sun on 7115; Daily: WNAm 0200-0230 on 7130. Au 1330-1400 11835. Eu 1930-2000 and 2200-2230 on 6100 (Bob Thomas, CT, *DX Listening Digest*)

The 0200 broadcast clashes with DW Wertachtal also on 7130 at 0000-0400 (gh)

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

Global Forum

Broadcast Logs

Gayle Van Horn
gayle@webworkz.com

0000 UTC on 9745
ECUADOR: HCJB. Station ID and frequency quotes, to evening devotional programming. (Tom Banks, Dallas, TX) Religious text on 21455 USB, 0645. (Zacharias Liangas, Thessoliniki, Greece/*Hard Core DX*) *Ham Radio Today* 17660 at 1945. (Bob Fraser, Cohasset, MA) Presumed Ecuadorian **Radio Federacion** 4960 at 2300-2310. SINPO 23222. (Michael Schnitzer, Hassfurt, Germany/*HCDX*)

0005 UTC on 13565.4
PERU: Ondas del Pacifico. Harmonic reception from normal 6782.7 frequency x 2. Music program and greetings to listeners. Announcement as, "como voy a hacer para olvidarte, por el grupo chocolate con leche" to time check. Peru's **Radio Cora** 2334 on 4914.8 with music program of cumbias and romantic ballads. **Radio La Hora** 4855.6 at 2325 with soccer commentary. Local ads, 24332 SINPO. (Arnaldo L. Slaen, Buenos Aires, Argentina)

0005 UTC on 7580
USA: WHRA. National news to *Unraveling the New World Order* segment. US stations audible; **VOA** 9455 at 0017 with Asian and Colombian news topics; **WHRI** 6040 at 1258 with IDs and *Politics & Religion*. **Radio Marti** in Spanish, 13820 at 1432. (Sue Wilden, Noblesville, IN). **VOA** newscast from **Sao Tome** relay 4960 at 1930. (Liangas, GRC/*HCDX*)

0135 UTC on 15425
LIBYA: Voice of Africa. News coverage on the *Leader of the Revolution* (Khadafi?) meeting with various envoys from Venezuela and Madagascar. Condemnations of Afghanistan bombings to Anthrax headlines. French service 0140 to 0148. (Bob Stewart, Hamilton, Ontario, Canada/*ODXA*)

0230 UTC on 9965
ARMENIA: Voice of Armenia. Closure of Armenian service. ID, national anthem to frequency quote and regional news. (William Mc Guire, Cheverly, MD)

0300 UTC on 9640
PORTUGAL: Deutsche Welle relay. ID and report on Middle East. (McGuire, MD) **DW-Rwanda** relay 0413 on 9765, news of international inquiry on police terror in Italy. (Howard Moser, Lincolnshire, IL)

0355 UTC on 15470
CZECH REP.: Radio Prague. Poetry from Michael Ajvas. (Mosler, IL) 11600 at 2245 with *Talking Point* on children's rights // 15545. (Fraser, MA)

1007 UTC on 15185
EQUATORIAL GUINEA: Radio Africa. Evangelical teachings from Hebrews. (Stewart/CAN/*ODXA*) 5002.5 at 1807 with ethnic music, S9 signal quality. (Liangas, GRC/*HCDX*)

1026 UTC on 9525
INDONESIA: Voice of Indonesia. Presumed political commentary of fair signal quality. Chinese service at 1030. (Stewart, CAN/*ODXA*) **VOI** noted 15150 at 2039. Music tune from Malay singer Siti Nuraliza to announcer's chat. Newscast to gamelan music. (Liangas, GRC/*HCDX*) **RRI-Ternate** 3344.7, 1955-2015. Indonesian service including station interval signal to identification. Qu'ran recitations to Indonesian music. SINPO 23432. (Duane Hadley, Bristol, TN)

1032 UTC on 6125
URUGUAY: SODRE. Uruguayan folk music to commercials of La Piedras, Montevideo and Santa Rosa. SINPO 34333. Uruguay's **Radio Montecarlo** 6140 at 1240. Program promo as, "aqui esta su disco" to commercials and time checks. (Slaen, ARG)

1132 UTC on 21670
SAUDI ARABIA: BSKSA. Indonesian service with program Acara Pacaran Islam, including references to Arab kings after 1140, 44444 signal, // 21740. (Liangas, GRC/*HCDX*)

1215 UTC on 5060
UZBEKISTAN: Radio Tashkent. Regional music to ten minutes of English news from announcer duo. Middle-eastern music to identification at 1230, "you are listening to Radio Tashkent from the Republic of Uzbekistan." Program pause to resumption in regional language. Station ID at 1231.Current affairs reporting with reference to Taliban. Reception via brief grayline propagation peaking by 1240. (David Hodgson, TN/*HCDX*) Tentative logging on 5025, 1615 in regional languages. Signal not heard at 1634 recheck. (Liangas/GRC/*HCDX*)

1420 UTC on 9505
JAPAN: NHK/Radio Japan. News on sending humanitarian aid for refugees. (Afghanistan?) Signal fair but steady. (Moser, IL)

1445 UTC on 17720
CUBA: Radio China Int'l relay. Interview and chat with Tai Chi instructor. (Moser, IL)

1605 UTC on 15605
FRANCE: Radio France International. French lesson using the poems of Charles Gounaire. (Fraser, MA)

1645 UTC on 7245
TAJIKISTAN: Radio Tajikistan. English news into Tajik folk music. Good signal quality at S9+. (Liangas, GRC/*HCDX*)

1804 UTC on 4820
BOTSWANA: Radio Botswana. National newscast. Station observed at 1642 with news and reports to ID, "Radio Botswana from Gaborone." Pop music tunes with S7 signal quality. Signal fade by 1652, SINPO 33323. (Liangas, GRC/*HCDX*)

1935 UTC on 5765USB
GUAM: Armed Forces Network. Pop tunes including *Unchain My Heart*. Signal S5 with slight interference observed. (Lianges, GRC) **AFN Puerto Rico** 6458.5 USB, 2346-000 with *Cross Fire* segment. (Frodge, MI) Additional AFN broadcast may be heard as; **Key West FL** 12689.5 USB, 12689.5 USB; **Signoella, Sicily** 4993 USB, 10940.5 USB; **Guam** 13362 USB; **Diego Garcia** 12579 USB, 4319 US8; **Hawaii** 10320 USB, 6350 USB. - *ed.*

1805 UTC on 11990
KUWAIT: Radio Kuwait. Discussion and comments relating to Iraq vs Kuwait. (Fraser, MA) Interesting pop music from the sub continent at 1655 on 15110, presumed Urdu service. Station ID at 1700. (Banks, TX)

2015 UTC on 9655
VATICAN STATE: Vatican Radio. Report on African refugee camps, // 11625. (Fraser, MA).

2045 UTC on 21590
NETHERLANDS ANTILLES: Radio Netherlands **Bonaire** relay. Several station IDs to program on food safety and quality. (David W. Weronka, Benson, NC; Wilden, IN)

2101 UTC on 11840
AUSTRALIA: Christian Voice Int'l. "CVI" identification at tune-in to religious music. "Good Morning Africa" from male host with IDs and program lineup in English/French. Signal best monitored in USB, // 9865 fair to poor. (Frodge, MI)

2109 UTC on 7410
INDIA: All India Radio. Newscast to 2110 into subcontinent music. Possible Hindi service at 2120 with commentary segment. (Frodge, MI) 11620 at 0205 with regional news. (McGuire, MD)

2124 UTC on 7935
CHINA: CPBS (Tent) Chinese talk to music at 2129, // 11740 with poor-fair quality. 7935 has been reported as CPBS1, 11740 as CPBS2. (Frodge, MI)

2203 UTC on 9736.2
PARAGUAY: Radio Nacional. (Tent.) Announcer's "happy talk" routine in Spanish, to commercial breaks that included Beatles and LaBamba music. No IDs noted, best to monitor in USB to avoid hetrodyne. (Frodge, MI)

2207 UTC on 5985
CONGO: Radio Congo. (Tent.) Africa, US soul and Latin tunes. Spanish ID as, "esta es Radio Congo." French announcements at 2249 into Afro music. Abrupt sign-off at 2259 in mid music. (Frodge, MI)

2257 UTC on 4980
VENEZUELA: Ecos del Torbes. Commercials to station promos. *Musica Romanitica* program to 2346 ID. Fair signal quality. (Frodge, MI)

Thanks to our contributors – Have you sent in YOUR logs? Send to Gayle Van Horn, c/o Monitoring Times (or e-mail gayle@webworkz.com)
English broadcast unless otherwise noted.

Gayle Van Horn
gayle@webworkz.com

Clear Channel QSLing

A great introduction to the broadcast band is DXing and QSLing the clear channels. As the name implies, clear channel stations operate on channels that are relatively "clear" of interference despite being shared with other stations during daytime.

Clear channels are allowed 50,000 watts of power and have large coverage areas at night, extending over many states or Canadian provinces. By their prominent "power house" signals, beginners find these stations an excellent introduction to the broadcast band.

QSLing the clear channels is relatively easy. All are excellent verifiers and if you ask, most will send you extra goodies with the station logo such as stickers, key chains and even T-shirts. Return postage is always appreciated and enclosing a postcard is an added courtesy to the staff.

The following stations offer excellent opportunities to begin your Clear Channel QSLing.

USA

640	KFI
650	WSM, KENI, KHNR
660	WFAN, KFAR
670	WMAQ, KDLG, KPUA
700	WLW
720	WGN, KOTZ, KDWN
750	WSB, KFQD, KXL
760	WJR, KFMB, KGU
770	WABC, KKOB
780	WBBM, KKOH
810	KGO, WGY
820	WBAP, KCBF
830	WCCO
840	WHAS
870	WWL
880	WCBS, KRVN
890	WLS
1020	KDKA, KTNQ, KCKN
1030	WBZ, KTWO
1040	WHO
1100	WTAM, KFAX
1120	KMOX, KPNW
1140	WRVA, KHTK
1160	KSL
1170	KVOO, WWVA
1180	WHAM, VOA
1200	WOAI
1210	WPHT

Mexico

540	XEWA
730	XEX
800	XEROK
900	XEW
940	XEQ
1050	XEG
1060	XEEP
1090	XEPRS
1140	XEMR
1190	XEWK
1220	XEB
1550	XERUV
1570	XERF

Canada

540	CBT, CBK
690	CBU, CIQC
740	CBX,
800	CKLW
860	CJBC
940	CKLV, CJJB
990	CBW, CBY, CKGM
1010	CBR, CFRB
1070	CFAX, CBA
1130	CKWX
1580	CBJ

Bahamas

1540	ZNS-1

AMATEUR RADIO

Hawaii Contest Station, NH7A, 20 Meters. Full data color antenna site card initialed by Al. Received in seven days for a SASE and N5FPW QSL card. QSL Manager address: Al Crespo, 3520 Keahi Place, Kihei, Hawaii 96753. (Larry Van Horn N5FPW, Brasstown, NC)

Morocco Contest Station, CN8WW, 20 & 15 Meters. Full data color antenna site card signed by DJ9MH. Received in one month via email request at station's website through the incoming bureau. Station website address: **http://www.dl6fbl.de/cn8ww**. (Van Horn NC)

St. Kitts-Nevis Contest Station, V47KP, 20, 15 & 10 Meters. Full data color operator's logo card signed by Alex Aimette K2SB. Received in seven days for an SASE and N5FPW QSL card. QSL Manager address: Alex (Doc) Aimette, P.O. Box 64-436, Souderton, PA 18964. (Van Horn, NC)

CZECH REPUBLIC

Radio Prague, 7345 kHz. Full data antique radio QSL card, signed with illegible initials. Received in 18 days for an English report. Station address: Vinohradska 12, 120 99 Prague, Czech Republic. Station website: **http://www.radio.cz**. (John Vercellino, Downers Grove, IL)

GREECE

The Voice of Greece, 17705 kHz. Full data card unsigned, plus stamps and program schedule. Received in 30 days for an English report. Station address: 432 Messoghion Av., 15342 Aghia Paraskevi, Athens, Greece. (Joe Squashic, Wake Forest, NC)

GUAM

KTWR, 15200 kHz. Full data QSL cards unsigned, depicting KTWR at sunset and photo of Pago Bay, plus handwritten note from Martha Hollis. Received in 180 days for an English report sent to former address of P.O. Box CC, Agat, Guam. KTWR mail department has transferred from Guam to Melbourne, Australia as; Trans World Radio Inc., P.O. Box 390, Box Hill, B.C. 3128, Victoria, Australia. (Lee Silvi, Mentor, OH)

JAPAN

Radio Japan, 11860 kHz. Full data Japanese scenery card unsigned, plus program schedule and station brochure. Received in 46 days for an English report and one IRC. Station address: NHK World, Nippon Hoso Kyokai, Tokyo 150-8001, Japan. (Frank Hillton, Charleston, SC)

Radio Tampa, 3925 kHz. Full data station logo card unsigned. Received in 25 days for an English report and mint postage (used for reply). Station address: Nihon Shortwave Broadcasting, 9-15 Akasaka 1-chome, Minato-ku, Tokyo 107-8373, Japan. (Hillton, SC)

JORDAN

Radio Jordan, 11690 kHz. Full data card signed by Al Haitham Shibli Atoom-Director, plus schedule and station sticker. Received in 243 days for an English report and two U.S. dollars. Station address: P.O. Box 909, Amman, Jordan. (George Clement, Powder Springs, GA)

MEDIUM WAVE

KKYN, 1090 AM kHz. Full data verification letter and QSL card signed by Chief Engineer. Received in 38 days for an English AM report. Station address: 3218 Quincy St., Plainview, TX 79072. (Tom Banks, Dallas, TX)

KSWV 810 AM kHz. Friendly letter on station letterhead signed by George A. Gonzales-Owner & General Manager, plus station literature. Received in 16 days for an AM report. Station address: P.O. Box 1088, Santa Fe, NM 87501. (Patrick Martin, Seaside, OR)

KUAT, 1550 AM kHz. Verification letter signed by Lyle E. Kesterson-Radio Program Manager. Received in 16 days for an AM report. Station address: University of Arizona, Tucson, AZ 85721. (Martin, CA)

KVNA, 600 AM kHz. Verification letter signed by Dave Wilson-Program Director. Received in six days for AM report. Station address: 2690 E. Huntington Dr., Flagstaff, AZ 86004. (Martin, OR)

WSB, 750 AM kHz. Full data verification letter signed by Greg Moceri-Program Director, plus key chain, fridge magnets, stickers and coverage map. Received in seven days for an AM report and return postage. Station address: 1601 West Peachtree, N.E., Atlanta, GA 30309-2663. Ph: 404-897-7500. Website: **http:www. wsbradio.com/** (Gayle Van Horn, Brasstown, NC)

WGSR, 2570 AM kHz. Full data verification letter signed by D. Boekeloo-Chief Engineer, plus station brochure and studio photo. Received in 14 days for an AM report, SASE and a souvenir postcard. Station address: 707 Dade St., Fernandina Beach, FL 32034. (Banks, TX)

SPAIN

Radio Exterior España, 9680 kHz. Full data scenery postcard unsigned, plus frequency schedule. Received in 75 days for an English report and one IRC. Station address: Apartado de Correos 156.202, E-28080 Madrid, Spain.

John Figliozzi
jfiglio1@nycap.rr.com

"I Was Just Thinking..."

Deep thoughts about deep subjects, shallow thoughts about shallow subjects, deep thoughts about shallow subjects and shallow thoughts about deep subjects...

Some reports say that, in the aftermath of the terrorist attacks and subsequent military action in Afghanistan, sales of multiband shortwave receivers are up as much as 500 percent. If you are one of these newcomers, please let me extend a warm welcome. As you page through this magazine, you will see that there are many different and interesting activities associated with this "hobby" of radio monitoring. By way of explanation, this is a monthly column that focuses on the *programming* of international shortwave broadcast stations and the myriad factors that influence it.

One of "My Favorite Things"

(With apologies to Julie Andrews, but it does fit the holiday theme.) If someone were to ask me, my favorite station is probably **Radio Australia**. I say "probably" only because there a number of broadcasters I like a great deal – **Radio Netherlands, Radio Canada International, Radio Sweden, Radio Prague, Radio New Zealand International** – even the **BBC**! (Read on...). I don't really believe there is a one best anything; but there are some aspects of RA that set it apart in my mind.

For one thing, RA remains a "full service, full time" broadcaster that maintains a prudent balance of news, information and entertainment programming. It's done so in resourceful ways, even as it's adjusted to consistently more pressing financial circumstances over the years. Today, **Radio Australia** relies on a mix of content; some it produces itself and some is produced by its sister domestic networks, primarily *ABC Radio National*. If the signature role of an international public broadcaster is to offer a panoramic view of its society to its listeners, no one does it better than RA. Just browse the station's program titles in **MT**'s *Shortwave Guide*.

Where else can one hear such an accessible and interesting program about the cultural and social significance of design, architecture, landscapes and food as on *The Comfort Zone*? Learn about life in the outback and other rural areas from *Rural Reporter* and *Bush Telegraph*. Hear what Australians are saying about the issues of the day on *Australia Talks Back*.

There are programs about health, the law, religion and spirituality, the media, sport, the arts, books and writing, history, politics, Australian society and family life, Aboriginal culture and issues. There are documentaries, educational series, interviews and an expansive array of music. The news of the day from an Aussie perspective is heard via the domestically produced news programs *AM*, *The World Today* and *PM*. As a self-professed "regional broadcaster," Radio Australia's flagship program *Asia Pacific* is unparalleled in its coverage of the Asian and Pacific regions, areas of the world usually left unexamined by others.

Unfortunately, **Radio Australia** is not always the easiest station to hear on shortwave in North America, especially as one moves east across the continent. Those persistent financial pressures forced RA to "officially" end its shortwave service to North America and Europe. Yet, it continues to advise listeners as to when frequencies for Asia and the Pacific are best heard in Europe and North America (9580 during local mornings is best) and has made the service available by alternative means – WRN (including *CBC Overnight* in Canada), satellite and the Internet **http://www.abc.net.au/ra**.

A Preoccupation with the BBC?

One thing that newcomers will learn quickly is that many longtime listeners have developed a sort of "love-hate" relationship with the **BBC World Service**. The only way that I can explain this attitude is that the **World Service** has done so many things so well for such a long time that listeners have come to feel a sense of entitlement to or ownership over whatever they find to be of value to them. When it is perceived that the **BBC** is not meeting those high expectations, the response can be sharp, to say the least. In that regard...

As I write this, it's November 12 and the **BBC World Service** has broken into its regular programming with news about yet another air disaster in New York City. It has stayed with the story for four hours now – too long – and, thereby, repeats the same mistake made by US-based news networks like CNN, MSNBC and Fox News. When new information about an event is steadily emerging, extra coverage is warranted. But when that coverage consists of the same information over and over, the urge for presenters to begin speculating about things seems to become overwhelming. As such, wall-to-wall coverage starts to become a disservice to its listeners.

We turn to the **BBC** for something different, something better than what we can get from our domestic sources. One of these is a greater sense of balance and proportion in reporting on events and issues. The **BBC** should remember that. It's also interesting to note that, in contrast to the **BBC**, *VOA* (**Voice of America**) *News Now* – which is more directly designed as a rolling 24 hour global news service – chose to continue with its regular schedule of reports and features.

Parenthetically, this is one more indication that the **BBC World Service** has apparently decided to emphasize news and current events over its equally renown and preeminent feature programming. At one time, **BBC** schedulers took great pains to ensure that listeners could hear their favorite programs. Today, when the decision to go with extended news is taken, features are unceremoniously dropped with no effort taken to reschedule them.

Abrupt Departures

15190 kHz, the **BBC World Service**'s omnibus morning frequency for the Americas (but not *really* for North America), just left the air at its appointed time in mid-sentence. It's hard to think of anything that indicates a greater lack of respect for an audience more than this practice, which is increasingly endemic to international shortwave broadcasting in general. A little extra effort to coordinate transmitter closedowns and programming breaks is all that is needed here, but there seems to be little interest in doing so. Thankfully, some stations like the **VOA** and **Radio Australia** still take the time to warn about frequencies that are closing and informing the listener where to retune to continue listening. (They do want us to keep listening, don't they?!) I always thought it was just polite to say good-bye when one is leaving...

Happy New Year! I resolve to try to complain less in 2002. (I said *I'll try*...)

How to Use the Shortwave Guide

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 page.

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 Ä 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

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

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

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

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

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

Target Areas	
af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
om:	omnidirectional
pa:	Pacific
sa:	South America
va:	various

Choose a program or station you want to hear.

Selected programs for prime listening hours appear following the frequencies – space does not permit 24 hour listings nor can every station be listed. However, listings for the most popular stations and selected lesser-known stations illustrate the variety available on shortwave. The format of the listings alternates among three different styles – by station, by genre and by day – month by month. Times listed are approximate and programs are subject to change.

The program listings emphasize broadcasts targeted to North America. In most cases, the stations and programs listed should be readily receivable in North America using a portable radio. Most broadcasters produce one broadcast in English per day that is repeated over a 24 hour period to all areas. If you are able to listen to transmissions to other areas of the world during "non-prime time" hours, referring to the prime time listings for those stations will likely be helpful in determining what programs will be broadcast.

Occasionally, a program or station listing may be followed by a reference to another listing for the same program or station at a different time. This is done to conserve space and make it possible to provide more listings.

MT Monitoring Team

Gayle Van Horn
Frequency Manager
gayle@webworkz.com

John Figliozzi
Program Manager
jfiglio1@nycap.rr.com

Mark Fine, VA
mark.fine@fineware-swl.com

Program Highlights

John Figliozzi

Radio Australia's "Silly Season"

You might have noticed that **Radio Australia**'s program schedule has been a little scrambled the last few weeks. "Silly Season" is the term Aussies give to this time of year – when the holiday and summer vacation seasons intersect. It makes Australia an especially relaxed and festive place for several weeks. That spirit also invades **RA** and numerous programs go on hiatus. Don't worry. They'll be back by mid to late January.

What's Going On At HCJB?

HCJB-The Voice of the Andes has been shrinking right before our very ears. First, there was the gradual loss of several programs that made **HCJB** truly unique – shows like:

- *What's Cooking in the Andes*, a regional culinary program;
- *You Should Know*, a unique program on contemporary issues and ethics.
- *El Mundo Futuro*, the station's one-time very popular science program.

Now, since November, time devoted to staples like *DX Partyline*, *Ham Radio Today* and *Musica del Ecuador* has been sharply diminished with a significant reduction in overall broadcast time to North America.

At one time, you could point to **HCJB** and say that this was the way to do missionary radio. That time seems to be passing. **HCJB** today is sounding more and more like just another religious broadcaster.

Trends and Contradictions

All the indications are that shortwave receiver purchases in North America have increased almost exponentially since September 11 and already had been increasing at a double digit percentage pace for several years. Yet, North American listeners continue to experience a wavering in commitment on the part of several international shortwave broadcasters.

The broadcasters so inclined tell us they are moving to other delivery platforms where the listeners are. But more and more it looks like it's these broadcasters that are trying to drag listeners to the platforms *they* (the stations) would like to see them prefer.

VOR for West Coast mornings

The **Voice of Russia** has added some hours to North America, namely 1500-1900 UT for western North America on 7260 kHz. See this month's program listings for details.

0000 UTC - 7PM E / 6PM C / 4PM P

0000	0015		Cambodia, National Radio Of	11940as				
0000	0015		Japan, Radio	13650as	17810as			
0000	0030		Australia, Radio	9660pa	12080pa	15240as	15415as	17580va
			17750os 17795va	21615as	21740va			
0000	0030		Austria, Christian Voice	17775as	17850as			
0000	0030		Egypt, Radio Cairo	9900na				
0000	0030		Sri Lanka, SLBC	4940do				
0000	0030		Thailand, Radio	9655af	9680af	11905af		
0000	0030		UK, BBC World Service	3915as	5965as	5975am	6195as	7105as
			9410as 9915sa	11945as	11955as	12095sa	15280as	15310as
			15360os 17615as	17790as	17615as	17790as		
0000	0045		India, All India Radio	9705as	9950as	13605as		
0000	0100		Anguilla, Caribbean Beacon		6090am			
0000	0100	vl	Australia, ABC/Alice Springs		4835do			
0000	0100	vl	Australia, ABC/Katherine		5025do			
0000	0100	vl	Australia, ABC/Tennant Creek		4910do			
0000	0100		Bulgaria, Radio	7400na	9400na			
0000	0100		Canada, CBC Northern Service		9625do			
0000	0100		Canada, CFRX Toronto ON		6070do			
0000	0100		Canada, CFVP Calgary AB		6030do			
0000	0100		Canada, CHNX Halifax, NS		6130do			
0000	0100		Canada, CKZN St John's NF		6160do			
0000	0100		Canada, CKZU Vancouver BC		6160do			
0000	0100		Canada, Radio Canada Intl		5960na	6175na	9590na	9750as
			9755na 11895as					
0000	0100		Costa Rica, R for Peace Intl		7455irr	15040va	21815	usb
0000	0100		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na					
0000	0100		Ecuador, HCJB	11785as				
0000	0100	a/monthly	Finland, Scandv Weekend Radio		5980va	11720va		
0000	0100		Germany, Voice of Hope	6040as				
0000	0100		Guyana, Voice of	3290do	5950do			
0000	0100		Japan, Radio	6145na				
0000	0100		Malaysia, Radio	7295do				
0000	0100		Malaysia, RTM Kota Kinabalu		5980do			
0000	0100		Malaysia, RTM Sarawak	7160do				
0000	0100	vl	Namibia, NBC	3270af	3290af	7215irr		
0000	0100		Netherlands, Radio	6165na	9845na			
0000	0100		New Zealand, Radio NZ Intl		17675pa			
0000	0100	vl	Papua New Guinea, NBC		9675do	11880irr		
0000	0100		Russia, University Network		9940as			
0000	0100		Singapore, SBC Radio One		6150do			
0000	0100	vl	Solomon Islands, SIBC	5020do	9545do			
0000	0100		Spain, R Exterior Espana	6055na				
0000	0100		USA, Armed Forces Radio		6458usb	12689usb		
0000	0100		USA, KAIJ Dallas TX	5755va				
0000	0100		USA, KTBN Salt Lk City UT		7510na			
0000	0100		USA, KWHR Naalehu HI	17510as				
0000	0100	twhfa	USA, Voice of America	5995me	6130am	7405am	9455am	9775am
			11695am 13790am					
0000	0100		USA, WBCQ Monticello ME		7415na	9335na	17495na	
0000	0100		USA, WEWN Birmingham AL		5825na	9355na	15745na	
0000	0100		USA, WHRA Greenbush ME		7580af			
0000	0100		USA, WHRI Noblesville IN		5745va	7315am		
0000	0100		USA, WINB Red Lion PA	12160am				
0000	0100		USA, WJCR Upton KY	7490am	13595as			
0000	0100		USA, WRMI Miami FL	9955am				
0000	0100		USA, WRNO New Orleans LA		7355am			
0000	0100		USA, WSHB Cyp Creek SC		9430na	15285sa		
0000	0100		USA, WTJC Newport NC	9370na				
0000	0100	sm	USA, WWBS Macon GA	11900na				
0000	0100		USA, WWCR Nashville TN		3215na	5070na	7520na	13845na
0000	0100		USA, WWFV McCaysville GA		6890va	9320va	12172va	
0000	0100		USA, WYFR Okeechobee FL		6085no	9505na		
0000	0100	vl	Vanuatu, Radio	3945do	4960do	7260do		
0000	0100		Zambia, Christian Voice	4965do				
0005	0010		Croatia, Croatian Radio	7285al	9925sa			
0030	0100		Australia, Christian Voice Intl		21680as			
0030	0100		Australia, Christian Voice Intl		17775as	17850pa		
0030	0100		Australia, Radio	9660pa	12080pa	15135as	15240as	15415as
			17580va 17750as	17795va	21740va			
0030	0100		Austria, Christian Voice	17775as	17850as	21680pa		
0030	0100		Iran, VO Islamic Rep. of Iran		6065am	6135na		
0030	0100		Lithuania, R Vilnius	7325am				
0030	0100		Sri Lanka, SLBC	4940do	6005as	9770as	15425as	
0030	0100		Thailand, Radio	9655as	11905as	13695as		
0030	0100		UAE, AWR Africa	6025as	6055as			
0030	0100		UK, BBC World Service	5965as	5975am	6195as	7105as	9410as
			11955as 12095sa	15280as	15310as	15360as	17790as	
0030	0100		USA, VOA Special English		7215as	9890as	11760as	15185as
			15290as 17740as	17820as				
0030	0100		USA, Voice of America	5995me	6015me	6105me	7215as	7265me
			9890as 11760as	15185as	15290as	17740as	17820as	
0030	0100		USA, Voice of America	5995me	6015me	6105me	7265me	
0055	0100		Italy, RAI Intl	9675na	11800na			

0100 UTC - 8PM E/ 7PM C / 5PM P

0100	0115		Italy, RAI Intl	9675na	11800na			
0100	0125		Netherlands, Radio	6165na	9845na			
0100	0127		Czech Rep, Radio Prague Intl		6200na	7345na		
0100	0127		Iran, VO Islamic Rep. of Iran		6065am	6135na		
0100	0127		Vietnam, Voice of	6175na				
0100	0130		Australia, Christian Voice Intl		17775as	21550pa	21680pa	
0100	0130		Austria, AWR Europe	6160as				
0100	0130		Austria, Christian Voice	17775as	21550as	21680pa		
0100	0130	s	Germany, Universal Life	9435as				
0100	0130		Germany, Voice of Hope	6040as				
0100	0130		Slovakia, R Slovakia Intl	5930na	7230ca	9440sa		
0100	0130	twhfa	USA, Voice of America	5995am	6130am	7405am	9455am	9775am
			13790am					
0100	0130		Uzbekistan, Radio Tashkent		5955as	5975as	7105as	7215as
			9540as					
0100	0130	mtwhfa	Yugoslavia, Radio	7115am				
0100	0145		Germany, Deutsche Welle		6040na	6145am	9640na	9700am
			9765na 11985na					
0100	0200		Anguilla, Caribbean Beacon		6090am			
0100	0200	vl	Australia, ABC/Katherine		5025do			
0100	0200	vl	Australia, ABC/Tennant Creek		4910do			
0100	0200		Australia, Radio	9660pa	12080pa	15240as	15415as	17580va
			17750as 17795va	21725as				
0100	0200		Canada, CBC Northern Service		9625do			
0100	0200		Canada, CFRX Toronto ON		6070do			
0100	0200		Canada, CFVP Calgary AB		6030do			
0100	0200		Canada, CHNX Halifax, NS		6130do			
0100	0200		Canada, CKZN St John's NF		6160do			
0100	0200		Canada, CKZU Vancouver BC		6160do			
0100	0200		China, China Radio Intl	9580na	9790na			
0100	0200		Costa Rica, R for Peace Intl		7455irr	15040va	21815usb	
0100	0200		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na					
0100	0200		Cuba, Radio Havana	6000na	9820na	11705usb		
0100	0200		Ecuador, HCJB	9745na	11840na	21455usb		
0100	0200	a/monthly	Finland, Scandv Weekend Radio		5980va	11720va		
0100	0200		Guyana, Voice of	3290do	5950do			
0100	0200		Indonesia, Voice of	9525pa	11785as	15150as		
0100	0200		Japan, Radio	11860pa	11870as	11880va	17810as	15325as
			17685pa 17835as	17845as				
0100	0200		Malaysia, Radio	7295do				
0100	0200		Malaysia, RTM Kota Kinabalu		5980do			
0100	0200		Namibia, NBC	3270af	7215irr			
0100	0200		New Zealand, Radio NZ Intl		17675pa			
0100	0200		North Korea, VO Korea	6195va	6520va	7140va	7580va	9345as
			11734va					
0100	0200	vl	Papua New Guinea, NBC		9675do	11880irr		
0100	0200		Russia, University Network		9940as			
0100	0200		Singapore, SBC Radio One		6150do			
0100	0200	vl	Solomon Islands, SIBC	5020do	9545do			
0100	0200		Spain, R Exterior Espana	6055na				
0100	0200		Sri Lanka, SLBC	6005as	9770as	15425as		
0100	0200		UK, BBC World Service	5965as	5975am	6195as	9410as	9525co
			9915sa 11955as	12095sa	15280as	15310as	15360as	17790as
0100	0200		Ukraine, R Ukraine Int	7375eu	7420as	9610as		
0100	0200		USA, Armed Forces Radio		6458usb	12689usb		
0100	0200		USA, KAIJ Dallas TX	5755va				
0100	0200		USA, KTBN Salt Lk City UT		7510na			
0100	0200		USA, KVOH Los Angeles CA		9975na			
0100	0200		USA, KWHR Naalehu HI	17510as				
0100	0200		USA, Voice of America	5995me	6015me	6105me	7115as	7200as
			7255me 9850as	11705as	11820as	15250as	15300as	17740as
			17820as					
0100	0200		USA, WBCQ Monticello ME		7415na	9335na	17495na	
0100	0200		USA, WEWN Birmingham AL		5825na	9355na	15745na	
0100	0200		USA, WHRA Greenbush ME		7580af			
0100	0200		USA, WHRI Noblesville IN		5745va	7315am		
0100	0200		USA, WINB Red Lion PA	12160am				
0100	0200		USA, WJCR Upton KY	7490am	13595as			
0100	0200		USA, WRMI Miami FL	9955am				
0100	0200		USA, WRNO New Orleans LA		7355am			
0100	0200		USA, WSHB Cyp Creek SC		9430na	15285sa		
0100	0200		USA, WTJC Newport NC	9370na				
0100	0200		USA, WWCR Nashville TN		3215na	5070na	5935na	7520na
0100	0200		USA, WWFV McCaysville GA		6890va	9320va	12172va	
0100	0200		USA, WYFR Okeechobee FL		6065na	9505na	15060as	
0100	0200	vl	Vanuatu, Radio	3945do	4960do	7260do		
0100	0200		Zambia, Christian Voice	4965do				
0130	0145	vl	Libya, Voice of Africa	15435irr	17725af			
0130	0200		Austria, Christian Voice	21550as	21680pa			
0130	0200		Sweden, Radio	9495va				
0130	0200		UK, RTE Radio	6155ca				
0130	0200	twhfa	USA, VOA Special English		7405am	9775am	13740am	
0130	0200	twhfa	USA, Voice of America	5995am	6130am	9455am		
0140	0200		Vatican City, Vatican Radio		7335au	9650au		

0200 UTC - 9PM E / 8PM C / 6PM P

0200	0227		Czech Rep, Radio Prague Intl		6200na	7345na		
0200	0230		Germany, Voice of Hope	11785as				
0200	0230	mtwhfa	Hungary, Radio Budapest		9835na			
0200	0230		Myanmar, Radio	7185do				
0200	0230		Yugoslavia, Radio	7130am				
0200	0245		Germany, Deutsche Welle		7285as	9615as	9765as	11965as
0200	0259		Canada, Radio Canada Intl		6040am	7235as	9755am	11725am
			11990am 15150as	17860as				
0200	0300		Anguilla, Caribbean Beacon		6090am			
0200	0300	twhfa	Argentina, RAE	6060am	11710am			

SELECTED PROGRAMMING BEGINS ON PAGE 55

0200	0300	vl	Australia, ABC/Alice Springs	4835do				
0200	0300	vl	Australia, ABC/Katherine	5025do				
0200	0300	vl	Australia, ABC/Tennant Creek	4910do				
0200	0300		Australia, Christian Voice Intl	21550as	21680pa			
0200	0300		Australia, Radio 9660pa 17750as 21725as	12080pa	15415as	15515va	17580va	
0200	0300		Austria, Christian Voice	21550os	21680pa			
0200	0300		Canada, CBC Northern Service	9625do				
0200	0300		Canada, CFRX Toronto ON	6070do				
0200	0300		Canada, CFVP Calgary AB	6030do				
0200	0300		Canada, CHNX Halifax, NS	6130do				
0200	0300		Canada, CKZN St John's NF	6160do				
0200	0300		Canada, CKZU Vancouver BC	6160do				
0200	0300		Costa Rica, R for Peace Intl	7455irr	15040va	21815usb		
0200	0300		Costa Rica, University Network 11870am 13749na 13749na	5030am	6150am	7375am	9724sa	
0200	0300		Cuba, Radio Havana 6000na	9820na	11705usb			
0200	0300		Ecuador, HCJB 9745na	11840na	21455usb			
0200	0300		Egypt, Radio Cairo 9475na					
0200	0300	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0200	0300		Guyana, Voice of 3290do	5950do				
0200	0300		Kenya, Kenya BC Corp 4885irr	4915irr				
0200	0300		Malaysia, Radio 7295do					
0200	0300		Malaysia, RTM Kota Kinabalu	5980do				
0200	0300		Namibia, NBC 3270af	3290af	7215irr			
0200	0300		New Zealand, Radio NZ Intl	17675pa				
0200	0300		North Korea, VO Korea 9325va	11335va				
0200	0300	vl	Papua New Guinea, NBC	9675do	11880irr			
0200	0300		Romania, R Romania Intl 15290as 15370pa	9550na	11740na	11830na	11940va	
0200	0300		Russia, University Network	9940as				
0200	0300		Russia, Voice of Russia 7180na	7250na	9765na	12020na	13655na	
0200	0300		Singapore, SBC Radio One	6150do				
0200	0300	vl	Solomon Islands, SIBC 5020do	9545do				
0200	0300		South Korea, R Korea Intl 15575na	7275na	9560na	11725sa	11810sa	
0200	0300		Sri Lanka, SLBC 6005as	6130do	9770as	15425as		
0200	0300		Taiwan, R Taipei Intl 5950na	9680na	11740ca	15320as	15345as	
0200	0300		UK, BBC World Service 5975am 11955as 12095sa	9410me	9525ca	9770af	9915sa	
				15280as	15310as	15360os	17790as	
0200	0300		USA, Armed Forces Radio	6458usb	12689usb			
0200	0300		USA, KAIJ Dallas TX 5755va					
0200	0300		USA, KJES Vado NM 7555na					
0200	0300		USA, KTBN Salt Lk City UT	7510na				
0200	0300		USA, KVOH Los Angeles CA	9975na				
0200	0300		USA, KWHR Naalehu HI 17510as					
0200	0300		USA, Voice of America 5995me 7255me 9850as	6015me	6105me	7115as	7200as	
				11705as	11820as	15250as	15300as	17740as
			17820as					
0200	0300		USA, WBCQ Monticello ME	7415na	9335na			
0200	0300		USA, WEWN Birmingham AL	5825na	9355na	15745na		
0200	0300		USA, WHRA Greenbush ME	7580af				
0200	0300		USA, WHRI Noblesville IN	5745va	7315am			
0200	0300		USA, WINB Red Lion PA 12160am					
0200	0300		USA, WJCR Upton KY 7490am	13595as				
0200	0300		USA, WRMI Miami FL 7385am					
0200	0300		USA, WRNO New Orleans LA	7355am				
0200	0300		USA, WSHB Cyp Creek SC	7535am	9430na			
0200	0300		USA, WTJC Newport NC 9370na					
0200	0300		USA, WWCR Nashville TN	3215na	5070na	5935na	7520na	
0200	0300		USA, WWFV McCaysville GA	6890va	12172va			
0200	0300		USA, WYFR Okeechobee FL	6065na	9505na			
0200	0300	vl	Vanuatu, Radio 3945do	4960do	7260do			
0200	0300		Zambia, Christian Voice	4965do				
0200	1215		Cambodia, National Radio Of	11940as				
0205	0210		Croatia, Croatian Radio	7285al	9925na			
0215	0220		Nepal, Radio	3230as	5005as			
0230	0257		Vietnam, Voice of 6175na					
0230	0300		Austria, Radio Austria Intl	7325na				
0230	0300		Iraq, Radio Iraq Intl 7157irr	9887irr	11787irr			
0230	0300	as	Philippines, Radio Pilipinas	12015me	15120me	15270me		
0230	0300		Slovakia, AWR 7235as					
0230	0300		Sweden, Radio 9495na					
0245	0300		Albania, Radio Tirana Intl	6110al	6115na	7160na		
0250	0300		Vatican City, Vatican Radio	7305am	9605am			

0300 UTC - 10PM E / 9PM C / 7PM P

0300	0310		Vatican City, Vatican Radio	7305am	9605am			
0300	0330	sm w fa	Belarus, Radio Belarus Intl	5970eu	7210eu			
0300	0330		Egypt, Radio Cairo 9475na					
0300	0330		S Africa, Channel Africa 9525af					
0300	0330		Thailand, Radio	9655am	11905am	15460na		
0300	0330	o	UK, Wales Radio Intl 9795na					
0300	0330		USA, KJES Vado NM 7555na					
0300	0330		USA, KVOH Los Angeles CA	9975na				
0300	0330	mtwhf	USA, Voice of America 4960af					
0300	0345		Germany, Deutsche Welle 9765na 11985na	6020na	6045na	9640am	9700na	
0300	0358		New Zealand, Radio NZ Intl	17675pa				
0300	0400		Anguilla, Caribbean Beacon	6090am				
0300	0400	vl	Australia, ABC/Alice Springs	4835do				
0300	0400	vl	Australia, ABC/Katherine	5025do				
0300	0400	vl	Australia, ABC/Tennant Creek	4910do				
0300	0400		Australia, Christian Voice Intl	21550as	21680pa			
0300	0400		Australia, Radio 9660pa 17580va 17750as 21725as	12080pa	15240as	15415as	15515va	
0300	0400		Austria, Christian Voice	21550as	21680pa			
0300	0400	vl	Botswana, Radio 3356do	4820do	7255do			
0300	0400		Bulgaria, Radio 7400na	9400na				
0300	0400		Canada, CBC Northern Service	9625do				
0300	0400		Canada, CFRX Toronto ON	6070do				
0300	0400		Canada, CFVP Calgary AB	6030do				
0300	0400		Canada, CHNX Halifax, NS	6130do				
0300	0400		Canada, CKZN St John's NF	6160do				
0300	0400		Canada, CKZU Vancouver BC	6160do				
0300	0400		China, China Radio Intl	9690na	9790na			
0300	0400		Costa Rica, R for Peace Intl	7455irr	15040va			
0300	0400		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa	
0300	0400		Cuba, Radio Havana 6000na	9820na	11705usb			
0300	0400		Ecuador, HCJB 9745na	11840na	21455usb			
0300	0400	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0300	0400	vl	Guatemala, Radio Cultural	3300do	5955do			
0300	0400		Guyana, Voice of 3290do	5950do				
0300	0400		Japan, Radio 17825ca					
0300	0400		Kenya, Kenya BC Corp 4885irr	4915irr				
0300	0400	vl	Lesotho, Radio 4800do					
0300	0400		Malaysia, Radio 7295do					
0300	0400		Malaysia, Voice of 6175as	9750as	15295pa			
0300	0400		Namibia, NBC 3270af	3290af	7215irr			
0300	0400		North Korea, VO Korea 6195va	7140va				
0300	0400		Oman, Radio 15355va					
0300	0400	vl	Papua New Guinea, NBC	9675do	11880irr			
0300	0400	as	Philippines, Radio Pilipinas	12015me	15120me	15270me		
0300	0400		Russia, University Network	17765as				
0300	0400		Russia, Voice of Russia 7180na	7250na	12020na	13665na		
0300	0400		Singapore, SBC Radio One	6150do				
0300	0400	vl	Solomon Islands, SIBC 5020do	9545do				
0300	0400		Sri Lanka, SLBC 6005as	9770as	15425as			
0300	0400		Taiwan, R Taipei Intl 5950na	9680na	15320as	11875as		
0300	0400		Uganda, Radio 5026do	7196do				
0300	0400		UK, BBC World Service 3255af 7160af 9410eu 15280as 15310as 21830as	5975am	6005af	6190af	6195eu	
				9525ca	11730af	11765af	12035af	12095me
				15360os	15575me	17760as	17790as	21660as
0300	0400		USA, Armed Forces Radio	6458usb	12689usb			
0300	0400		USA, KAIJ Dallas TX 5755va					
0300	0400		USA, KTBN Salt Lk City UT	7510na				
0300	0400		USA, KWHR Naalehu HI 17510as					
0300	0400		USA, Voice of America 6035af 7415af 9575af	6080af	7105af	7290af	7340af	
				9885af				
0300	0400		USA, WBCQ Monticello ME	7415na	9335na			
0300	0400		USA, WEWN Birmingham AL	5825na	7425na	15745na		
0300	0400		USA, WHRA Greenbush ME	7580af				
0300	0400		USA, WHRI Noblesville IN	5745va	7315am			
0300	0400		USA, WINB, Red Lion PA 12160am					
0300	0400		USA, WJCR Upton KY	7490am	13595as			
0300	0400		USA, WMLK Bethel PA 9465eu					
0300	0400		USA, WRMI Miami FL 7385am					
0300	0400		USA, WRNO New Orleans LA	7395am				
0300	0400		USA, WSHB Cyp Creek SC	7535eu				
0300	0400		USA, WTJC Newport NC 9370na					
0300	0400		USA, WWCR Nashville TN	3215na	5070na	5935na	7520na	
0300	0400		USA, WWFV McCaysville GA	6890va	12172va			
0300	0400		USA, WYFR Okeechobee FL	6065na	9505na			
0300	0400	vl	Vanuatu, Radio 3945do	4960do	7260do			
0300	0400		Zambia, Christian Voice	6065do				
0300	0400	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
0310	0340		Vatican City, Vatican Radio	9660af				
0330	0345	vl	Libya, Voice of Africa 15435irr	17725af				
0330	0350		UAE, Emirates Radio	12005na	13675na	15400no		
0330	0357		Vietnam, Voice of 6175na					
0330	0400		Albania, Radio Tirana Intl	6110al	6115na	7160na		
0330	0400	mtwhfa	Hungary, Radio Budapest	9835na				
0330	0400		Myanmar, Radio 9730do					
0330	0400		Sweden, Radio 9495na					
0330	0400		UAE, AWR Africa 11795os					
0345	0400	f	Seychelles, FEBA Radio 11885af					
0345	0400		Tajikistan, Radio 7245os					
0359	0400		New Zealand, Radio NZ Intl	15340pa				

0400 UTC - 11PM E / 10PM C / 8PM P

0400	0425		Belgium, RVI Flanders R Intl	11985na				
0400	0427		Czech Rep, Radio Prague Intl	7345na	7385na	9435na		
0400	0430		Austria, Christian Voice	21550as				
0400	0430		France Radio France Intl	11910af	11995af	13610af		
0400	0430	vl	Guatemala, Radio Cultural	3300do	5955do			
0400	0430	s twhfa	Mexico, Radio Mexico Intl	9705am	11770am			
0400	0430	vl	Nigeria, Radio/Kaduna	6090do	7275do			
0400	0430		S Africa, AWR Africa 9650af					
0400	0430		S Africa, Channel Africa	5955af				
0400	0430		Sri Lanka, SLBC 6005as	9770as	15425as			
0400	0445		Germany, Deutsche Welle	6015af	7195af	9565af	9710af	
0400	0445		USA, WYFR Okeechobee FL	6065na	9505na	9985eu	11550eu	
0400	0450		Turkey, Voice of 6020na	7240va				
0400	0500		Anguilla, Caribbean Beacon	6090am				
0400	0500	vl	Australia, ABC/Alice Springs	4835do				
0400	0500	vl	Australia, ABC/Katherine	5025do				
0400	0500	vl	Australia, ABC/Tennant Creek	4910do				
0400	0500		Australia, Christian Voice Intl	21550as				
0400	0500		Australia, Radio 9660pa 17580va 17750as 21725as	12080pa	15240as	15415as	15515va	
				21780as				
0400	0500	vl	Botswana, Radio 3356do	4820do	7255do			
0400	0500	vl	Cameroon, RTV 4850do	6005do				

Shortwave Guide

0400	0500		Canada, CBC Northern Service	9625do				
0400	0500		Canada, CFRX Toronto ON	6070do				
0400	0500		Canada, CFVP Calgary AB	6030do				
0400	0500		Canada, CHNX Halifax, NS	6130do				
0400	0500		Canada, CKZN St John's NF	6160do				
0400	0500		Canada, CKZU Vancouver BC	6160do				
0400	0500		China, China Radio Intl	9560na	9730na			
0400	0500		Costa Rica, R for Peace Intl	7455irr	15040va			
0400	0500		Costa Rica, University Network 11870am 13749na	5030am	6150am	7375am	9724sa	17645as
0400	0500		Cuba, Radio Havana	6000na	9820na	11705usb		
0400	0500		Ecuador, HCJB	9745na	11840na	21455usb		
0400	0500	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0400	0500		Guyana, Voice of	3290do	5950do			
0400	0500		Kenya, Kenya BC Corp	4885irr	4915irr			
0400	0500	vl	Lesotho, Radio	4800do				
0400	0500		Malaysia, Radio	7295do				
0400	0500		Malaysia, Voice of	6175as	9750as	15295pa		
0400	0500		Myanmar, Radio	9730do				
0400	0500		Namibia, NBC	3270af	3290af	7215irr		
0400	0500		New Zealand, Radio NZ Intl	15340pa				
0400	0500	vl	Nigeria, Radio/Enugu	6025do				
0400	0500	vl	Papua New Guinea, NBC	9675do	11880irr			
0400	0500		Romania, R Romania Intl	9550na	11830na	15335as	17735as	
0400	0500		Russia, University Network	17765as				
0400	0500		Russia, Voice of Russia 13665na 15595na	7125na	7180na	7330na	12010na	12020na 17595na
0400	0500		Singapore, SBC Radio One	6150do				
0400	0500	vl	Salomon Islands, SIBC	5020do	9545do			
0400	0500		Uganda, Radio	5026do	7196do			
0400	0500		UK, BBC World Service 6195eu 7160af 15310as 15420af	3255af	5975am	6005af	6135ca	6195eu 7160af 9410eu 11765af 12035af 12095me 15280as 15575me 17760as 17790as 21660as 21830as 619Caf
0400	0500		Ukraine, R Ukraine Intl	7285as	7375as	7420as	9610as	
0400	0500		USA, Armed Forces Radio	6458usb	12689usb			
0400	0500		USA, KAIJ Dallas TX	5755va				
0400	0500		USA, KTBN Salt Lk City UT	7510na				
0400	0500		USA, KWHR Naalehu HI	17780as				
0400	0500		USA, Voice of America 9775af 9885af	6080af	7170af	7290af	7415af	9575af 15205as
0400	0500		USA, WBCQ Monticello ME	7415na	9335na			
0400	0500		USA, WEWN Birmingham AL	5825na	7425na	15745na		
0400	0500		USA, WHRA Greenbush ME	7580af				
0400	0500		USA, WHRI Noblesville IN	5745va	7315am			
0400	0500		USA, WINB, Red Lion PA	12160am				
0400	0500		USA, WJCR Upton KY	7490am	13595as			
0400	0500		USA, WMLK Bethel PA	9465eu				
0400	0500		USA, WRMI Miami FL	7385am				
0400	0500		USA, WSHB Cyp Creek SC	7535eu	12020af			
0400	0500		USA, WTJC Newport NC	9370na				
0400	0500		USA, WWCR Nashville TN	3215na	5070na	5935na	7560na	
0400	0500		USA, WWFV McCaysville GA	6890va	12172va			
0400	0500		Zambia, Christian Voice	6065do				
0400	0500	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
0405	0410		Croatia, Croation Radio	7285al	9925na			
0427	0500	a	Liberia, Voice of Hope	12060af	15320af			
0430	0457		Czech Rep, Radio Prague Intl	9865va	11600va			
0430	0500		Australia, Christian Voice Intl	21680pa				
0430	0500		Austria, Christian Voice	21550as	21680pa			
0430	0500		Italy, IRRS	3980al	3985va			
0430	0500		Netherlands, Radio	6165na	9590na			
0430	0500	vl	Nigeria, Radio/Ibadan	6050do				
0430	0500	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0430	0500	vl	Nigeria, Radio/Lagos	3326do	4990do			
0430	0500		S Africa, AWR Africa	12080af				
0430	0500	mtwhfa	Swaziland, TWR	4775af	6035af			
0445	0500		Italy, RAI Intl	5965af	7235af			

0500 UTC - 12AM E / 11PM C / 9PM P

0500	0515		Canada, CBC Northern Service	9625do				
0500	0515		Israel, Kol Israel	9435va	11605va	17545va		
0500	0515		Zambia, National BC Corp	6265do				
0500	0525	a	Liberia, Voice of Hope	12060af	15320af			
0500	0530		Austria, Christian Voice	21550as				
0500	0530		France Radio France Intl	13610af	15155af	17800af		
0500	0530	s twhfa	Mexico, Radio Mexico Intl	9705am	11770am			
0500	0530		Netherlands, Radio	6165na	9590na			
0500	0530		S Africa, AWR Africa	5960af	6015af			
0500	0530		S Africa, Channel Africa	15215af				
0500	0530		Vatican City, Vatican Radio	9660af	11625af	15570af		
0500	0530	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
0500	0545		Germany, Deutsche Welle	5960na	6120na	9670na	11795na	
0500	0600		Anguilla, Caribbean Beacon	6090am				
0500	0600	vl	Australia, ABC/Alice Springs	4835do				
0500	0600	vl	Australia, ABC/Katherine	5025do				
0500	0600	vl	Australia, ABC/Tennant Creek	4910do				
0500	0600		Australia, Christian Voice Intl	21550as	21680pa			
0500	0600		Australia, Radio 17580va 17750as	9660pa	12080pa	15240as	15415as	155`5va 17865as 21725as
0500	0600	mtwhf	Bhutan, Bhutan BC Service	5030al	6035do			
0500	0600	vl	Botswana, Radio	3356do	4820do	7255do		
0500	0600	vl	Cameroon, RTV	4850do	6005do			
0500	0600		Canada, CFRX Toronto ON	6070do				
0500	0600		Canada, CFVP Calgary AB	6030do				
0500	0600		Canada, CHNX Halifax, NS	6130do				
0500	0600		Canada, CKZN St John's NF	6160do				
0500	0600		Canada, CKZU Vancouver BC	6160do				
0500	0600		Costa Rica, R for Peace Intl	7455irr	15040va			
0500	0600		Costa Rica, University Network 11870am 13749na	5030am	6150am	7375am	9724sa	17645as
0500	0600		Cuba, Radio Havana	9550na	9820na	9830usb		
0500	0600		Ecuador, HCJB	9745na	11840na	21455usb		
0500	0600	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0500	0600		Guyana, Voice of	3290do	5950do			
0500	0600		Japan, Radio 11760eu 15195as	5975eu	6110na	7230eu	9835na	11715eu 17810as 21755pa
0500	0600		Kenya, Kenya BC Corp	4885irr	4915irr			
0500	0600		Kuwait, Radio	15110as				
0500	0600	vl	Lesotho, Radio	4800do				
0500	0600		Malaysia, Radio	7295do				
0500	0600		Malaysia, RTM Sarawak	7160do				
0500	0600		Malaysia, Voice of	6175as	9750as	15295pa		
0500	0600		Myanmar, Radio	9730do				
0500	0600		Namibia, NBC	3270af	3290af	7215irr		
0500	0600		New Zealand, Radio NZ Intl	15340pa				
0500	0600	vl	Nigeria, Radio/Enugu	6025do				
0500	0600	vl	Nigeria, Radio/Ibadan	6050do				
0500	0600	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0500	0600	vl	Nigeria, Radio/Lagos	3326do	4990do			
0500	0600		Nigeria, Voice of	7255af	11770af	15120va		
0500	0600	vl	Papua New Guinea, NBC	9675do	11880irr			
0500	0600		Russia, University Network	17765as				
0500	0600		Russia, Voice of Russia 15595na 17595na	7125na	7180na	7330na	12010na	12020na
0500	0600		Singapore, SBC Radio One	6150do				
0500	0600	vl	Solomon Islands, SIBC	5020do	9545do			
0500	0600		Spain, R Exterior Espana	6055na				
0500	0600		Swaziland, TWR	6035af	7205af	9500af		
0500	0600		Uganda, Radio	5026do	7196do			
0500	0600		UK, BBC World Service 9410eu 11760me 15360as 15420af 21660as	6005af	6135ca	6190af	6195eu	7160af 11765af 11940af 11955as 15280as 15310as 15575as 17640af 17760as 17790as 17885af
0500	0600		USA, Armed Forces Radio	6458usb	12689usb			
0500	0600		USA, KAIJ Dallas TX	5755va				
0500	0600		USA, KTBN Salt Lk City UT	7510na				
0500	0600		USA, KWHR Naalehu HI	17780as				
0500	0600	mtwhf	USA, KWHR Naalehu H'	11565pc				
0500	0600		USA, Voice of America 9700af 11825eu	5970af	6035af	6080af	7170af	7295af 11835af 13710af 15205as
0500	0600		USA, WBCQ Monticello ME	7415na	9335na			
0500	0600		USA, WEWN Birmingham AL	5825na	7425na	15745na		
0500	0600		USA, WHRA Greenbush ME	7580af				
0500	0600		USA, WHRI Noblesville IN	5745va	7315am			
0500	0600		USA, WJCR Upton KY	7490am	13595as			
0500	0600		USA, WMLK Bethel PA	9465eu				
0500	0600		USA, WRMI Miami FL	7385am				
0500	0600		USA, WRNO New Orleans LA	7395am				
0500	0600		USA, WSHB Cyp Creek SC	7535eu	12020af			
0500	0600		USA, WTJC Newport NC	9370na				
0500	0600		USA, WWCR Nashville TN	3215na	5070na	5935na	7560na	
0500	0600		USA, WWFV McCaysville GA	6890va	12172va			
0500	0600		USA, WYFR Okeechobee FL	5810eu				
0500	0600	vl	Vanuatu, Radio	3945do	4960do	7260do		
0500	0600		Zambia, Christian Voice	6065do				
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915do			
0530	0550		UAE, Emirates Radio	15435eu	17830eu	21700eu		
0530	0600		Austria, Christian Voice	21550as	21680pa			
0530	0600		S Africa, AWR Africa	15345af				
0530	0600		Thailand, Radio	9655eu	11905eu	13780eu		
0530	0600	mtwhf	UK, BBC World Service	17885af				
0530	0600	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			

0600 UTC - 1AM E / 12AM C / 10PM P

0600	0620		Vatican City, Vatican Radio	4005eu	5885eu	7250eu		
0600	0630		France Radio France Intl	11710af	15155af	17800af	21620af	
0600	0630		S Africa, AWR Africa	15345af				
0600	0630		S Africa, Channel Africa	15215af				
0600	0630		S Africa, TWR	15345af				
0600	0630		USA, Voice of America 11825eu 11825af 15205as 15335me	5970af	6035af	6080af	7170af	7295af 11915me 11930af 11995af 12025af 13710af
0600	0645		Germany, Deutsche Welle	6140eu	7225af	9565af	11785af	
0600	0700		Anguilla, Caribbean Beacon	6090am				
0600	0700	vl	Australia, ABC/Alice Springs	4835do				
0600	0700	vl	Australia, ABC/Katherine	5025do				
0600	0700	vl	Australia, ABC/Tennant Creek	4910do				
0600	0700		Australia, Christian Voice Intl	21550as	21680pa			
0600	0700		Australia, Radio 17580va 17750as 21725as	9660pa	12080pa	15240as	`5415as	15515va
0600	0700		Austria, Christian Voice	21550as	21680pa			
0600	0700	vl	Botswana, Radio	7255do	9600do			
0600	0700	vl	Cameroon, RTV	4850do	6005do			
0600	0700		Canada, CFRX Toronto ON	6070do				
0600	0700		Canada, CFVP Calgary AB	6030do				
0600	0700		Canada, CHNX Halifax, NS	6130do				
0600	0700		Canada, CKZN St John's NF	6160do				
0600	0700		Canada, CKZU Vancouver BC	6160do				
0600	0700		Costa Rica, R for Peace Intl	7455irr	15040va			
0600	0700		Costa Rica, University Network 11870am 13749na	5030am	6150am	7375am	9724sa	17645as
0600	0700		Cuba, Radio Havana	9550na	9820na	9830usb		
0600	0700	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do			

0600	0700		Guyana, Voice of	3290do	5950do			
0600	0700	mtwhf/vl	Italy, IRRS 3980al	3985va				
0600	0700		Japan, Radio 21755pa	7230eu	9835na	11740as	15195as	17870pa
0600	0700		Kenya, Kenya BC Corp	4885irr	4915irr			
0600	0700		Kuwait, Radio	15110as				
0600	0700	vl	Lesotho, Radio	4800do				
0600	0700		Liberia, ELWA	4760do				
0600	0700		Liberia, R Liberia Intl	6100do				
0600	0700		Malaysia, Radio	7295do				
0600	0700		Malaysia, RTM Sarawak	7160do				
0600	0700		Malaysia, Voice of	6175as	9750as	15295pa		
0600	0700		Myanmar, Radio	9730do				
0600	0700		Namibia, NBC	3270af	3290af	7215irr		
0600	0700		New Zealand, Radio NZ Intl		15340pa			
0600	0700	vl	Nigeria, Radio/Enugu	6025do				
0600	0700	vl	Nigeria, Radio/Ibadan	6050do				
0600	0700	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0600	0700	vl	Nigeria, Radio/Lagos	3326do	4990do			
0600	0700		Nigeria, Voice of	7255af	11770af	15120va		
0600	0700	vl	Papua New Guinea, NBC		9675do	11880irr		
0600	0700		Romania, R Romania Intl		9530na	11830na		
0600	0700		Russia, University Network		17765as			
0600	0700		Russia, Voice of Russia	15470au	17655au	21790au		
0600	0700		Sierra Leone, SLBS	3316do				
0600	0700		Singapore, SBC Radio One		6150do			
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do			
0600	0700		Swaziland, TWR	6035af	7205af	9500af		
0600	0700		Uganda, Radio	7110		7196do		
0600	0700		UK, BBC World Service 11760me 11765af 15575as	6055af	6190af	6195eu	7160af	9410eu
				11940af	11955as	12095eu	15310as	15360as
				17640af	17760as	17790as	21660as	
0600	0700	os	UK, BBC World Service	17885af				
0600	0700		USA, Armed Forces Radio		6458usb	12689usb		
0600	0700		USA, KAIJ Dallas TX	5755va				
0600	0700		USA, KTBN Salt Lk City UT		7510na			
0600	0700		USA, KWHR Naalehu HI	17780as				
0600	0700	mtwhf	USA, KWHR Naalehu HI	11565pa				
0600	0700		USA, WBCQ Monticello ME		7415na	9335na		
0600	0700		USA, WEWN Birmingham AL		5825na	7425na	15745na	
0600	0700		USA, WHRA Greenbush ME		7580af			
0600	0700		USA, WHRI Noblesville IN		5745va	7315am		
0600	0700		USA, WJCR Upton KY	7490am	13595as			
0600	0700		USA, WMLK Bethel PA	9465eu				
0600	0700		USA, WRMI Miami FL	7385am				
0600	0700		USA, WRNO New Orleans LA		7395am			
0600	0700		USA, WSHB Cyp Creek SC		7435af			
0600	0700		USA, WTJC Newport NC	9370na				
0600	0700		USA, WWCR Nashville TN		3215na	5070na	5935na	7560na
0600	0700		USA, WWFV McCaysville GA		6980va	12172va		
0600	0700		USA, WYFR Okeechobee FL		7355eu	11550eu		
0600	0700	vl	Vanuatu, Radio	3945do	4960do	7260do		
0600	0700		Yemen, Rep of Yemen Radio		9780me			
0600	0700		Zambia, Christian Voice	9865do				
0600	0700	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
0605	0610		Croatia, Croatian Radio	9470au				
0610	0620	mtwhf	Greece, Voice of	9420eu	11900au	15630eu	17520pa	21530eu
0630	0700		Georgia, Georgian Radio		11805eu			
0630	0700		USA, Voice of America 12025af 15205as	5995af	7170af	11815eu	11915me	11930af
				15335me				
0630	0700	os	USA, Voice of America 11995af 13710af	5970af	6035af	6080af	7295af	11835af
0630	0700		Vatican City, Vatican Radio		11625af	13765af	15570af	
0632	0700		Austria, Radio Austria Intl		6155eu	13730eu	17870me	
0636	0653		Romania, R Romania Intl 11940eu		7145eu	9510eu	9570eu	11790eu

0700 UTC - 2AM E / 1AM C / 11PM P

0700	0705		New Zealand, Radio NZ Intl		15340pa			
0700	0705		USA, WWCR Nashville TN		5070na	5935na	7560na	
0700	0705	sm	USA, WWCR Nashville TN		3210na			
0700	0705	twhfa	USA, WWCR Nashville TN		3215na			
0700	0730	vl	Papua New Guinea, NBC		9675do	11880irr		
0700	0730		Slovakia, R Slovakia Intl	15460au	17550au	21705au		
0700	0730		USA, Voice of America	11915me	12025af	15335me		
0700	0730	a	USA, Voice of America	6873af				
0700	0745		USA, WYFR Okeechobee FL		7355eu	9985af	11580af	
0700	0800		Anguilla, Caribbean Beacon		6090am			
0700	0800	vl	Australia, ABC/Alice Springs		4835do			
0700	0800	vl	Australia, ABC/Katherine		5025do			
0700	0800	vl	Australia, ABC/Tennant Creek		4910do			
0700	0800		Australia, Christian Voice Intl		17820as	21680pa		
0700	0800		Australia, Radio 17750as 21725as	9660pa	12080pa	15240va	15415as	17580va
0700	0800		Austria, Christian Voice	17820as	21680pa			
0700	0800	vl	Botswana, Radio	7255do	9600do			
0700	0800	vl	Cameroon, RTV	4850do	6005do			
0700	0800		Canada, CFRX Toronto ON		6070do			
0700	0800		Canada, CFVP Calgary AB		6030do			
0700	0800		Canada, CHNX Halifax, NS		6130do			
0700	0800		Canada, CKZN St John's NF		6160do			
0700	0800		Canada, CKZU Vancouver BC		6160do			
0700	0800		Costa Rica, R for Peace Intl		7455irr	15040va		
0700	0800		Costa Rica, University Network 11870am 13749na 17645as		5030am	6150am	7375am	9724sa
0700	0800		Ecuador, HCJB	9780eu	11755pa	21455usb		
0700	0800	mtwhf	Eqt Guinea, Radio Africa		15185af			
0700	0800	os/vl	Eqt Guinea, Radio East Africa		15185af			
0700	0800	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
0700	0800		France Radio France Intl	15605af				
0700	0800		Germany, Voice of Hope	5975eu	21590me			
0700	0800		Germnay, Deutsche Welle		6140eu			
0700	0800	vl	Ghana, Ghana BC Corp		3366do	4915do		
0700	0800		Guyana, Voice of	3290do	5950do			
0700	0800	os/vl	Italy, IRRS 7120va	7125al				
0700	0800		Kenya, Kenya BC Corp	4885irr	4915irr			
0700	0800		Kuwait, Radio	15110as				
0700	0800	vl	Lesotho, Radio	4800do				
0700	0800		Liberia, ELWA	4760do				
0700	0800		Liberia, R Liberia Intl	6100do				
0700	0800		Malaysia, Radio	7295do				
0700	0800		Malaysia, RTM Sarawak	7160do				
0700	0800		Malaysia, Voice of	6175as	9750as	15295pa		
0700	0800		Myanmar, Radio	9730do				
0700	0800		Namibia, NBC	3270af	3290af	7215irr		
0700	0800	vl	Nigeria, Radio/Enugu	6025do				
0700	0800	vl	Nigeria, Radio/Ibadan	6050do				
0700	0800	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0700	0800	vl	Nigeria, Radio/Lagos	3326do	4990do			
0700	0800		Nigeria, Voice of	7255af	11770af	15120va		
0700	0800		Romania, R Romania Intl		15335af	17720af		
0700	0800		Russia, University Network		17765as			
0700	0800		Russia, Voice of Russia	15275au	15470au	17655au	17665au	21790au
0700	0800		Sierra Leone, SLBS	3316do				
0700	0800		Singapore, SBC Radio One		6150do			
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do			
0700	0800		Swaziland, TWR	6035af	7205af	9500af		
0700	0800		Taiwan, R Taipei Intl	5950na				
0700	0800		Uganda, Radio	5026do	7110do	7196do		
0700	0800		UK, BBC World Service 11955as 12095eu 15575as	6190af	9410eu	11760me	11765af	11940af
				15310as	15360as	15400af	15485eu	15565eu
				17640eu	17760as	17790as	17830af	21660as
0700	0800	as	UK, BBC World Service	15575as	17885af			
0700	0800		USA, Armed Forces Radio		6458usb	12689usb		
0700	0800		USA, KAIJ Dallas TX	5755va				
0700	0800		USA, KTBN Salt Lk City UT		7510na			
0700	0800		USA, KWHR Naalehu HI	11565pa	17780as			
0700	0800		USA, WBCQ Monticello ME		7415na			
0700	0800		USA, WEWN Birmingham AL		5825na	7425na	15745na	
0700	0800		USA, WHRA Greenbush ME		7580af			
0700	0800		USA, WHRI Noblesville IN		5745va	7315am		
0700	0800		USA, WJCR Upton KY	7490am	13595as			
0700	0800		USA, WMLK Bethel PA	9465eu				
0700	0800		USA, WRNO New Orleans LA		7395am			
0700	0800		USA, WSHB Cyp Creek SC		7535af			
0700	0800		USA, WTJC Newport NC	9370na				
0700	0800	vl	Vanuatu, Radio	3945do	4960do	7260do		
0700	0800		Zambia, Christian Voice	9865do				
0700	0800	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
0705	0800		USA, WWCR Nashville TN		3210na	5070na	5935na	7560na
0706	0800		New Zealand, Radio NZ Intl		11675pa			
0710	0715	mtwhf	Vatican City, Vatican Radio 9645eu 11740eu		4005eu	5885eu	6185eu	7250eu
				15595va				
0715	0800		Guam, KTWR/ TWR	15200as				
0720	0735	mtwhf	Swaziland, TWR	6035af	7205af	9500af		
0730	0758		Finland, YLE/Radio Finland		9510va	21670va		
0730	0800	t h	Georgia, Georgian Radio		6080me			
0730	0800	vl	Papua New Guinea, NBC		4890do	9675irr		
0730	0800		Switzerland, Swiss R Intl	9885af	13635af	17665af		
0745	0755	as	Armenia, TWR	12070eu				
0745	0755	as	Monaco, TWR	9870eu				
0745	0800	as	Albania, TWR	12070eu				
0750	0800	mtwhf	Greece, Voice of	9420eu	11900au	15630eu	17520af	21530as
0755	0800		Albania, TWR	12070eu				
0755	0800		Armenia, TWR	12070eu				
0755	0800	mtwhf	Monaco, TWR	9870eu				

0800 UTC - 3AM E / 2AM C / 12AM P

0800	0804		Pakistan, Radio	17510eu	21465eu			
0800	0815		Guam KTWR/ TWR	15200as				
0800	0825		Belgium, RVI Flanders R Intl		5985eu			
0800	0825		Malaysia, Voice of	6175as	9750as	15295pa		
0800	0827		Czech Rep, Radio Prague Intl		11600eu	15255eu		
0800	0830	vl	Australia, ABC/Alice Springs		4835do			
0800	0830	vl	Australia, ABC/Katherine		5025do			
0800	0830	vl	Australia, ABC/Tennant Creek		4910do			
0800	0830		Myanmar, Radio	9730do				
0800	0830		Sierra Leone, SLBS	3316do				
0800	0830		USA, Voice of America	11995as	13615as	15150as		
0800	0900	mtwhf	Albania, TWR	12070eu				
0800	0900		Anguilla, Caribbean Beacon		6090am			
0800	0900		Armenia, TWR	12070eu				
0800	0900		Australia, Christian Voice Intl		17820as	21680pa		
0800	0900		Australia, Radio 15240va 15415as	5995pa	9580va	9710as	12080pa	13605va
				17750as	21725as			
0800	0900		Austria, Christian Voice	17820as	21680pa			
0800	0900	mtwhf	Bhutan, Bhutan BC Service		5030al	6035do		
0800	0900	vl	Botswana, Radio	7255do	9600do			
0800	0900	vl	Cameroon, RTV	4850do	6005do			
0800	0900		Canada, CFRX Toronto ON		6070do			
0800	0900		Canada, CFVP Calgary AB		6030do			
0800	0900		Canada, CHNX Halifax, NS		6130do			
0800	0900		Canada, CKZN St John's NF		6160do			
0800	0900		Canada, CKZU Vancouver BC		6160do			

Shortwave Guide

0800	0900		Costa Rica, R for Peace Intl	7455irr	15040va			
0800	0900		Costa Rica, University Network 11870am 13749na 17645as	5030am	6150am	7375am	9724sa	
0800	0900		Ecuador, HCJB	9780eu	11755pa	21455usb		
0800	0900	mtwhf	Eqt Guinea, Radio Africa		15185af			
0800	0900	as/vl	Eqt Guinea, Radio East Africa		15185af			
0800	0900	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
0800	0900		Germany, Deutsche Welle		6140eu			
0800	0900		Germany, Voice of Hope	5975eu	21590me			
0800	0900	vl	Ghana, Ghana BC Corp		3366do	4915do		
0800	0900		Guyana, Voice of	3290do	5950do			
0800	0900		Indonesia, Voice of	9525pa	11785as	15150as		
0800	0900	as/vl	Italy, IRRS 7120va	7125al				
0800	0900		Kenya, Kenya BC Corp	4885irr	4915irr			
0800	0900	vl	Lesotho, Radio	4800do				
0800	0900		Liberia, ELWA	4760do				
0800	0900		Liberia, R Liberia Intl	6100do				
0800	0900		Malaysia, Radio	7295do				
0800	0900	mtwhf	Monaco, TWR	9870eu				
0800	0900		Namibia, NBC	7165af	7215af			
0800	0900		New Zealand, Radio NZ Intl	11675pa				
0800	0900	vl	Nigeria, Radio/Enugu	6025do				
0800	0900	vl	Nigeria, Radio/Ibadan	6050do				
0800	0900	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0800	0900	vl	Nigeria, Radio/Lagos	3326do	4990do			
0800	0900		Nigeria, Voice of	7255af	11770af	15120va		
0800	0900	vl	Papua New Guinea, NBC		4890do	9675irr		
0800	0900		Russia, University Network		17765as			
0800	0900		Russia, Voice of Russia	15275au	15470au	17495au	17525au	17655au
0800	0900		Singapore, SBC Radio One		6150do			
0800	0900	vl	Solomon Islands, SIBC	5020do				
0800	0900		South Korea, R Korea Intl		9570am	13670eu		
0800	0900		UK, BBC World Service 6190af 9410eu 11940af 11955as 12095eu 15310as 15360as 15400af 15485eu 15565eu 17640eu 17760as 17830af 17885af 21470af 21660as 21830as					
0800	0900	as	UK, BBC World Service	15575as				
0800	0900		USA, Armed Forces Radio		6458usb	12689usb		
0800	0900		USA, KAIJ Dallas TX	5755va				
0800	0900		USA, KNLS Anchor Point AK		11765as			
0800	0900		USA, KTBN Salt Lk City UT		7510na			
0800	0900		USA, KWHR Naalehu HI	9930as	11565pa			
0800	0900		USA, WBCQ Monticello ME		7415na			
0800	0900		USA, WEWN Birmingham AL		5825na	7425na	15745na	
0800	0900		USA, WHRI Noblesville IN		5745va	7315am		
0800	0900		USA, WJCR Upton KY	7490am	13595as			
0800	0900		USA, WMLK Bethel PA	9465eu				
0800	0900		USA, WRMI Miami FL	7385am				
0800	0900		USA, WRNO New Orleans LA		7395am			
0800	0900		USA, WSHB Cyp Creek SC		7535eu	9845au		
0800	0900		USA, WTJC Newport NC	9370na				
0800	0900		USA, WWCR Nashville TN		3210na	5070na	5935na	7560na
0800	0900	vl	Vanuatu, Radio	3945do	4960do	7260do		
0800	0900		Zambia, Christian Voice	9865do				
0800	0900	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
0805	0810		Croatia, Croatian Radio	13820au				
0815	0900		Guam KTWR/ TWR	15200as	15330as			
0830	0845	f	Seychelles, FEBA Radio	15460as				
0830	0900	vl	Australia, ABC/Alice Springs		2310do			
0830	0900	vl	Australia, ABC/Katherine		2485do			
0830	0900	vl	Australia, ABC/Tennant Creek		2325do			
0830	0900		Austria, AWR Europe	9660eu	17820af			
0830	0900		Georgia, Georgian Radio		11910eu			
0830	0900		Italy, AWR Europe	9765eu				
0830	0900		Switzerland, Swiss R Intl	21770af				
0830	0900		USA, Voice of America 11995as 13615as 15150as 15165me 15235me 17875af					

0900 UTC - 4AM E / 3AM C / 1AM P

0900	0915	vl	Ghana, Ghana BC Corp		3366do	4915do		
0900	0920	mtwhf	Albania, TWR	12070eu				
0900	0920		Armenia, TWR	12070eu				
0900	0920	mtwhf	Monaco, TWR	9870eu				
0900	0930	s	Armenia, Voice of	4810eu	15270eu			
0900	0930		Austria, AWR Europe	17820af				
0900	0930		Guam KTWR/ TWR	15330as				
0900	0945		Germany, Deutsche Welle 17800af 17820pa 17845pa		6160pa	7300as	11785af	15410af
					17860af	21560af		
0900	1000		Anguilla, Caribbean Beacon		6090am			
0900	1000	vl	Australia, ABC/Alice Springs		2310do			
0900	1000	vl	Australia, ABC/Katherine		2485do			
0900	1000	vl	Australia, ABC/Tennant Creek		2325do			
0900	1000		Australia, Christian Voice Intl		13775pa	17725pa		
0900	1000		Australia, Radio 5995pa 6020pa 9580va 9710as 11550as 12080pa 13605va 15400as 17750as 21820va					
0900	1000		Austria, Christian Voice	13775as	17725as			
0900	1000	vl	Botswana, Radio	7255do	9600do			
0900	1000	vl	Cameroon, RTV	4850do	6005do			
0900	1000		Canada, CFRX Toronto ON		6070do			
0900	1000		Canada, CFVP Calgary AB		6030do			
0900	1000		Canada, CHNX Halifax, NS		6130do			
0900	1000		Canada, CKZN St John's NF		6160do			
0900	1000		Canada, CKZU Vancouver BC		6160do			
0900	1000		China, China Radio Intl	11730pa	15210pa			
0900	1000		Costa Rica, R for Peace Intl		7455irr	15040va		
0900	1000		Costa Rica, University Network 11870am 13749na 17645as		5030am	6150am	7375am	9724sa
0900	1000		Ecuador, HCJB	11775pa	21455usb			
0900	1000	mtwhf	Eqt Guinea, Radio Africa		15185af			
0900	1000	as/vl	Eqt Guinea, Radio East Africa		15185af			
0900	1000	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
0900	1000		Germany, Deutsche Welle		6140eu			
0900	1000		Germany, Voice of Hope	21590me				
0900	1000		Guyana, Voice of	3290do	5950do			
0900	1000	as/vl	Italy, IRRS 7120va	7125al				
0900	1000		Kenya, Kenya BC Corp	4885irr	4915irr			
0900	1000	vl	Lesotho, Radio	4800do				
0900	1000		Liberia, ELWA	4760do				
0900	1000		Liberia, R Liberia Intl	5100do				
0900	1000		Malaysia, Radio	7295do				
0900	1000	s	Malta, VO Mediterranean	9840eu				
0900	1000		Namibia, NBC	7165af	7215af			
0900	1000		New Zealand, Radio NZ Intl	11675pa				
0900	1000	vl	Nigeria, Radio/Enugu	6025do				
0900	1000	vl	Nigeria, Radio/Ibadan	6050do				
0900	1000	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
0900	1000	vl	Nigeria, Radio/Lagos	3326do	4990do			
0900	1000		Nigeria, Voice of	7255af	11770af	15120va		
0900	1000		Palau, KHBN/ VO Hope	15725as				
0900	1000	vl	Papua New Guinea, NBC		4890do	9675irr		
0900	1000		Russia, University Network		17765as			
0900	1000		Russia, Voice of Russia	15275au	15470au	17495au	17525au	17665au
0900	1000		Singapore, SBC Radio One		6150do			
0900	1000	vl	Solomon Islands, SIBC	5020do				
0900	1000		UK, BBC World Service 6190af 11940af 11945as 12095eu 15485eu 15565eu 17885af 21470af	6195as	9605as	9740as	11760me	
				15190sa	15310as	15360as	15400af	
				17640eu	17760as	17790as	17830af	
				21660as				
0900	1000		USA, Armed Forces Radio		6458usb	12689usb		
0900	1000		USA, KAIJ Dallas TX	5755va				
0900	1000		USA, KTBN Salt Lk City UT		7510na			
0900	1000		USA, KWHR Naalehu HI	9930as	11565pa			
0900	1000		USA, Voice of America 11995as 17875af		13615as	15150as	15165me	15235me
0900	1000		USA, WBCQ Monticello ME		7415na			
0900	1000		USA, WEWN Birmingham AL		5825na	7425na	15745na	
0900	1000		USA, WHRA Greenbush ME		7580af			
0900	1000		USA, WHRI Noblesville IN		5745va	7315am		
0900	1000		USA, WJCR Upton KY	7490am	13595as			
0900	1000		USA, WRMI Miami FL	7385am				
0900	1000		USA, WSHB Cyp Creek SC		7535eu	9455sa		
0900	1000		USA, WTJC Newport NC	9370na				
0900	1000		USA, WWCR Nashville TN		3210na	5070na	5935na	7560na
0900	1000	vl	Vanuatu, Radio	3945do	4960do	7260do		
0900	1000		Zambia, Christian Voice	9865do				
0900	1000	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
0915	1000	vl	Ghana, Ghana BC Corp		6130do	4915do		
0915	1000	vl/as	Ghana, Ghana BC Corp		4915do			
0930	1000		Georgia, Georgian Radio		11910me			
0930	1000		Greece, Voice of	9420eu	15630va			
0930	1000		Lithuania, R Vilnius	9710eu				
0930	1000		Netherlands, Radio	7260va	9790va	12065va		

1000 UTC - 5AM E / 4AM C / 2AM P

1000	1005		New Zealand, Radio NZ Intl		11675pa			
1000	1027		Czech Rep, Radio Prague Intl		21745va			
1000	1027		Vietnam, Voice of	9840au	12019au			
1000	1030		Guam, KSDA/ AWR	11705as	11900as			
1000	1030		Palau, KHBN/ VO Hope	15725as				
1000	1030		UK, RTE Radio	11685au	15540au			
1000	1045		USA, KWHR Naalehu HI	9930as	11565pa			
1000	1056		North Korea, VO Korea	9335va	9850va	11710va	11735va	
1000	1100		Anguilla, Caribbean Beacon		6090am			
1000	1100	vl	Australia, ABC/Alice Springs		2310do			
1000	1100	vl	Australia, ABC/Katherine		2485do			
1000	1100	vl	Australia, ABC/Tennant Creek		2325do			
1000	1100		Australia, Christian Voice Intl		12775pa	17655pa	17725pa	
1000	1100		Australia, Radio 5995pa 6020pa 9580va 9710as 12080pa 13605va 15400as 17750va 21820va					
1000	1100		Austria, Christian Voice	13775as	17655as	17725as		
1000	1100	as	Bhutan, Bhutan BC Service		5030al	6035do		
1000	1100	vl	Botswana, Radio	7255da	9600do			
1000	1100		Canada, CFRX Toronto ON		6070do			
1000	1100		Canada, CFVP Calgary AB		6030do			
1000	1100		Canada, CHNX Halifax, NS		6130do			
1000	1100		Canada, CKZN St John's NF		6160do			
1000	1100		Canada, CKZU Vancouver BC		6160do			
1000	1100		Costa Rica, R for Peace Intl		7455irr	15040va		
1000	1100		Costa Rica, University Network 11870am 13749na 17645as		5030am	6150am	7375am	9724sa
1000	1100		Ecuador, HCJB	11755pa	21455usb			
1000	1100	mtwhf	Eqt Guinea, Radio Africa		15185af			
1000	1100	as, vl	Eqt Guinea, Radio East Africa		15185af			
1000	1100	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
1000	1100		Germany, Voice of Hope	21590me				
1000	1100		Germany, Deutsche Welle		6140eu			
1000	1100	vl	Ghana, Ghana BC Corp		6130do			
1000	1100	vl/as	Ghana, Ghana BC Corp		4915do			
1000	1100		Guyana, Voice of	5950do				
1000	1100		India, All India Radio 17585as 17800au 17895au		13700au	15020as	15260as	17510as
1000	1100	as/vl	Italy, IRRS 7120va	7125al				
1000	1100		Japan, Radio	9695as	15590as	21755pa		
1000	1100		Kenya, Kenya BC Corp	4885irr	4915irr			
1000	1100	vl	Lesotho, Radio	4800do				

1000	1100		Liberia, ELWA	4760do				
1000	1100		Liberia, R Liberia Intl	6100do				
1000	1100		Malaysia, Radio	7295do				
1000	1100		Namibia, NBC	7165af	7215af			
1000	1100		Netherlands, Radio	7260va	9790va	12065va		
1000	1100	vl	Nigeria, Radio/Enugu	6025do				
1000	1100	vl	Nigeria, Radio/Ibadan	6050do				
1000	1100	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1000	1100	vl	Nigeria, Radio/Lagos	4990do	7285do			
1000	1100	vl	Papua New Guinea, NBC		4890do	9675irr		
1000	1100		Russia, University Network		17765as			
1000	1100		Singapore, SBC Radio One		6150do			
1000	1100	vl	Solomon Islands, SIBC	5020do				
1000	1100		UK, BBC World Service	6190af	6195va	9605as	9740as	11760me
			11940af 11945as	12095eu	15310as	15360as	15485eu	15565eu
			15575as 17640eu	17760as	17790as	21470af	21660as	
1000	1100	as	UK, BBC World Service	15190sa	15400af	17830af		
1000	1100		USA, Armed Forces Radio		6458usb	12689usb		
1000	1100		USA, KAIJ Dallas TX	5755va				
1000	1100		USA, KTBN Salt Lk City UT		7510na			
1000	1100		USA, Voice of America	5745am	5985pa	7370am	9590am	11720as
			15165me 15235me	15250as	15425as	17895me		
1000	1100		USA, WBCQ Monticello ME		7415na			
1000	1100		USA, WEWN Birmingham AL		5825na	7425na	15395na	15745eu
1000	1100		USA, WHRI Noblesville IN		6040na	9495am		
1000	1100		USA, WJCR Upton KY	7490am	13595as			
1000	1100		USA, WRMI Miami FL	9955am				
1000	1100		USA, WRNO New Orleans LA		7395am			
1000	1100		USA, WSHB Cyp Creek SC		6095am	9455sa	11780as	
1000	1100		USA, WTJC Newport NC	9370na				
1000	1100		USA, WWCR Nashville TN		3210na	5070na	5935na	7560na
1000	1100		USA, WYFR Okeechobee FL		5950na			
1000	1100	vl	Vanuatu, Radio	3945do	4960do	7260do		
1000	1100	mt hfa	Vatican City, Vatican Radio		5885eu			
1000	1100		Zambia, Christian Voice	9865do				
1000	1100	vl	Zimbabwe, Zimbabwe BC Corp		5975da	6045do		
1006	1100		New Zealand, Radio NZ Intl		15175pa			
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9704do		
1030	1100		Guam, KSDA/ AWR	11900as				
1030	1100		Malaysia, RTM Sarawak	7160do				
1030	1100		Mongolia, Voice of	12085as				
1030	1100		Palau, KHBN/ VO Hope	9965as	15725as			
1030	1100		UAE, Emirates Radio	13675eu	15370eu	15395eu	21605eu	
1045	1100		USA, KWHR Naalehu HI	9930as				
1045	1100	as	USA, KWHR Naalehu HI	11565pa				

1100 UTC - 6AM E / 5AM C / 3AM P

1100	1104		Pakistan, Radio	17520eu	21465eu			
1100	1127		Vietnam, Voice of	7285as				
1100	1130	as	Bhutan, Bhutan BC Service		5030al	6035do		
1100	1130		Netherlands, Radio	7260va	9790va	12065va		
1100	1130	mtwhf	UK, BBC Caribbean Report		6195am	15190am		
1100	1130	as	UK, BBC World Service	6195am	15190am			
1100	1145		Germany, Deutsche Welle		15410af	17800af	21780af	
1100	1200		Anguilla, Caribbean Beacon		11775am			
1100	1200	vl	Australia, ABC/Alice Springs		2310do			
1100	1200	vl	Australia, ABC/Katherine		2485do			
1100	1200	vl	Australia, ABC/Tennant Creek		2325do			
1100	1200		Australia, Christian Voice Intl		13775pa	15530as	17655pa	17725pa
1100	1200		Australia, Radio	5995pa	6020va	9580va	11880as	12080pa
			13605va 15400as	21820va				
1100	1200		Austria, Christian Voice	13765as	17655as	17725as		
1100	1200	vl	Austria, Radio Africa Intl	17815eu				
1100	1200	vl	Botswana, Radio	7255do	9600do			
1100	1200		Canada, CBC Northern Service		9625do			
1100	1200		Canada, CFRX Toronto ON		6070do			
1100	1200		Canada, CFVP Calgary AB		6030do			
1100	1200		Canada, CHNX Halifax, NS		6130do			
1100	1200		Canada, CKZN St John's NF		6160do			
1100	1200		Canada, CKZU Vancouver BC		6160do			
1100	1200		Costa Rica, R for Peace Intl		7455irr	15040va		
1100	1200		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
1100	1200		Ecuador, HCJB	12005am	15115am	21455usb		
1100	1200	mtwhf	Eqt Guinea, Radio Africa		15185af			
1100	1200	as/vl	Eqt. Guinea, Radio East Africa		15185af			
1100	1200	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
1100	1200		Germany, Deutsche Welle		6140eu			
1100	1200		Germany, Voice of Hope	21590me				
1100	1200	vl	Ghana, Ghana BC Corp		6130do			
1100	1200	vl/as	Ghana, Ghana BC Corp		4915do			
1100	1200		Guyana, Voice of	5950do				
1100	1200		Iran, VO Islamic Rep of Iran		15385as	15480me	15575as	21470va
			21730va					
1100	1200	as/vl	Italy, IRRS 7120va	7125al				
1100	1200		Japan, Radio	6120na	9695as	15590as	21755as	
1100	1200		Jordan, Radio	11690eu				
1100	1200		Kenya, Kenya BC Corp	4885irr	4915irr			
1100	1200	vl	Lesotho, Radio	4800do				
1100	1200		Liberia, ELWA	4760do				
1100	1200		Liberia, R Liberia Intl	6100do				
1100	1200		Malaysia, Radio	7295do				
1100	1200		Malaysia, TRM Sarawak	7160do				
1100	1200		Namibia, NBC	7165af	7215af			
1100	1200		New Zealand, Radio NZ Intl		15175pa			
1100	1200	vl	Nigeria, Radio/Enugu	6025do				
1100	1200	vl	Nigeria, Radio/Ibadan	6050do				
1100	1200	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1100	1200	vl	Nigeria, Radio/Lagos	4990do	7285do			
1100	1200		Palau, KHBN/ VO Hope	9965as				
1100	1200	vl	Papua New Guinea, NBC		4890do	9675irr		
1100	1200		Russia, University Network		17765as			
1100	1200		Singapore, R Singapore Intl		6150as	9600as		
1100	1200		Taiwan, R Taipei Intl	7445as	11985as			
1100	1200		Taiwan, Voice of Asia	7445as				
1100	1200		UK, BBC World Service	6190af	6195as	9740as	11760me	11940af
			12095eu 15310as	15360as	15400af	15485eu	15565eu	15575as
			17640eu 17700as	17790sa	17830af	17885af	21470af	
1100	1200		USA, Armed Forces Radio		6458usb	12689usb		
1100	1200		USA, KAIJ Dallas TX	5755va				
1100	1200		USA, KTBN Salt Lk City UT		7510na			
1100	1200		USA, KWHR Naalehu HI	9930as				
1100	1200	as	USA, KWHR Naalehu HI	11565pa				
1100	1200		USA, Voice of America	5985pa	6110as	9645as	9760as	11705as
			11720as 15250as	15425as				
1100	1200		USA, WEWN Birmingham AL		5825na	7425na	15395na	15745eu
1100	1200		USA, WHRI Noblesville IN		6040na	9495am		
1100	1200		USA, WJCR Upton KY	7490am	13595as			
1100	1200		USA, WRMI Miami FL	9955am				
1100	1200		USA, WRNO New Orleans LA		7395am			
1100	1200		USA, WSHB Cyp Creek SC		6095am	11660am		
1100	1200		USA, WTJC Newport NC	9370na				
1100	1200		USA, WWCR Nashville TN		5070na	5935na	7560na	15685na
1100	1200		USA, WYFR Okeechobee FL		5950na	11830na		
1100	1200	vl/s	Vanuatu, Radio	3945do	4960do	7260do		
1100	1200		Zambia, Christian Voice	9865do				
1100	1200	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do		
1115	1127		Zambia, National BC Corp		6265do			
1115	1145		Nepal, Radio	3230as	5005as			
1130	1135		Israel, Kol Israel	15640va	17545va			
1130	1145	vl	Libya, Voice of Africa	15435irr	17725af			
1130	1155		Belgium, RVI Flanders R Intl		9865as			
1130	1157		Czech Rep Radio Prague Intl		11640eu	21745va		
1130	1200		Italy, AWR Europe	12020eu				
1130	1200		Netherlands, Radio	5965na	6045eu	9860eu		
1130	1200		South Korea, R Korea Intl		9650na			
1130	1200	a	UK, Wales Radio Intl	17625au				
1130	1200	f	Vatican City, Vatican Radio		15595va	17515va		

1200 UTC - 7AM E / 6AM C / 4AM P

1200	1205		New Zealand, Radio NZ Intl		15175pa			
1200	1220	fa	Kazakhstan, R Almaty	9620eu	11840eu			
1200	1220	mtwhf	UK, BBC Caribbean Report		6195am	15190am		
1200	1220	as	UK, BBC World Service	6195am	15190am			
1200	1227		Iran, VO Islamic Rep of Iran		15385as	15480me	15575as	21470va
			21730va					
1200	1230		France Radio France Intl	15540af	25820af			
1200	1230		South Korea, R Korea Intl		9650na			
1200	1230		Uzbekistan, Radio Tashkent		5955as	5975as	6025as	9715as
1200	1245		USA, WYFR Okeechobee FL		5950na	11830na	11970na	13695na
1200	1259		Canada, Radio Canada Intl		9660as	11730as		
1200	1300		Anguilla, Caribbean Beacon		11775am			
1200	1300	vl	Australia, ABC/Alice Springs		2310do			
1200	1300	vl	Australia, ABC/Katherine		2485do			
1200	1300	vl	Australia, ABC/Tennant Creek		2325do			
1200	1300		Australia, Christian Voice Intl		13775pa	15530as	17725pa	
1200	1300		Australia, Radio	5995pa	6020va	9580va	11650pa	11880as
			15400as 21820va					
1200	1300		Austria, Christian Voice	13775as	17725as			
1200	1300		Bangladesh, Bangla Betar		7185as	9550as		
1200	1300	vl	Botswana, Radio	7255do	9600do			
1200	1300		Bulgaria, Radio	15700eu	17500eu			
1200	1300		Canada, CBC Northern Service		9625do			
1200	1300		Canada, CFRX Toronto ON		6070do			
1200	1300		Canada, CFVP Calgary AB		6030do			
1200	1300		Canada, CHNX Halifax, NS		6130do			
1200	1300		Canada, CKZN St John's NF		6160do			
1200	1300		Canada, CKZU Vancouver BC		6160do			
1200	1300		China, China Radio Intl	9730as	9760pa	11760pa	11980as	15415pa
1200	1300		China, Voice of Hope	7460as				
1200	1300		Costa Rica, R for Peace Intl		15040va	21815usb		
1200	1300		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
1200	1300		Ecuador, HCJB	12005am	15115am	21455usb		
1200	1300	as/vl	Eqt Guinea, Radio East Africa		15185af			
1200	1300	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
1200	1300		Germany, Deutsche Welle		6140eu			
1200	1300		Germany, Voice of Hope	15715me				
1200	1300	vl	Ghana, Ghana BC Corp		4915do	6130do		
1200	1300		Guyana, Voice of	5950do				
1200	1300	as/vl	Italy, IRRS 7120va	7125al				
1200	1300		Kenya, Kenya BC Corp	4885irr	4915irr			
1200	1300	vl	Lesotho, Radio	4800do				
1200	1300		Liberia, R Liberia Intl	6100do				
1200	1300		Malaysia, Radio	7295do				
1200	1300		Namibia, NBC	7165af	7215af			
1200	1300		Netherlands, Radio	5965na	6045eu	9860eu		
1200	1300	vl	Nigeria, Radio/Enugu	6025do				
1200	1300	vl	Nigeria, Radio/Ibadan	6050do				
1200	1300	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1200	1300	vl	Nigeria, Radio/Lagos	4990do	7285do			
1200	1300		North Korea, VO Korea	9650va	9850va	9975va	11845va	13650va
1200	1300		Palau, KHBN/ VO Hope	9965as				
1200	1300	vl	Papua New Guinea, NBC		4890do	9675irr		

Shortwave Guide

1200	1300		Russia, University Network		17765as		
1200	1300		Singapore, R Singapore Intl		6150as	9600as	
1200	1300		Taiwan, R Taipei Intl	9610pa			
1200	1300		UK, BBC World Service	6190af	6195as	9740as	11760me 11940af
			12095eu 15310as	15360as	15485eu	15565eu	15575me 17640eu
			17700as 17830af	17885af	21470af		
1200	1300		Ukraine, R Ukraine Intl	11720eu	11825na	15520na	
1200	1300		USA, Armed Forces Radio		6458usb	12689usb	
1200	1300		USA, KAIJ Dallas TX	5755va			
1200	1300		USA, KTBN Salt Lk City UT		7510na		
1200	1300		USA, KWHR Naalehu HI	9930as			
1200	1300	as	USA, KWHR Naalehu HI	11565pa			
1200	1300		USA, Voice of America	6110as	9645as	9760as	11705as 11715as
			15170me 15250as	15260me	15425as	17630af	
1200	1300		USA, WEWN Birmingham AL		5825na	7425na	15375na 15745eu
1200	1300		USA, WHRI Noblesville IN		6040na	9495am	
1200	1300		USA, WINB Red Lion PA	13570am			
1200	1300		USA, WJCR Upton KY	7490am	13595as		
1200	1300		USA, WRMI Miami FL	9955am			
1200	1300		USA, WRNO New Orleans LA		7395am		
1200	1300		USA, WSHB Cyp Creek SC		5915as	6095am	9980as 11660am
1200	1300		USA, WTJC Newport NC	9370na			
1200	1300		USA, WWCR Nashville TN		5070na	5935na	7560na 15685na
1200	1300		USA, WWFV McCaysville GA		6890va	12172va	
1200	1300	vl/s	Vanuatu, Radio	3945do	4960do	7260do	
1200	1300		Zambia, Christian Voice	9865do			
1200	1300	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do	
1206	1300	occsnal	New Zealand, Radio NZ Intl		6095pa		
1215	1300		Egypt, Radio Cairo		17595as		
1220	1240	w	Kazakhstan, R Almaty	9620eu	11840eu		
1225	1300		Sri Lanka, SLBC		6005as	9770as	15425as
1230	1257		Vietnam, Voice of	9840as	12019as		
1230	1300		Austria, Radio Austria Intl		6155eu	13730eu	
1230	1300		Sweden, Radio	18960na			
1230	1300		Thailand, Radio	9655as	9810as	11905as	
1240	1300	t	Kazakhstan, R Almaty	9620eu	11840eu		
1245	1300	a	Seychelles, FEBA Radio	15535me			
1245	1300		USA, WYFR Okeechobee FL		11830na	11970na	13695na

1300 UTC - 8AM E / 7AM C / 5AM P

1300	1310		Turkmenistan, Turkmen Radio		5015as		
1300	1325		Netherlands, Radio	5965na	6045eu	9860eu	
1300	1330		Australia, Radio	5995pa	6020va	9580va	11650pa 11880as
			15400as 21820va				
1300	1330		Egypt, Radio Cairo	17595as			
1300	1330		Germnay, Voice of Hope	15715me			
1300	1330		Guam, KSDA/ AWR	15660as			
1300	1330		UAE, AWR Africa	17630as			
1300	1356		North Korea, VO Korea	4405va	7505va	9335va	11335va 11710va
1300	1359		Poland, Radio Polonia	6095eu	7270eu	9525eu	11820eu
1300	1400		Anguilla, Caribbean Beacon		11775am		
1300	1400	vl	Australia, ABC/Alice Springs		2310do		
1300	1400	vl	Australia, ABC/Katherine		2485do		
1300	1400	vl	Australia, ABC/Tennant Creek		2325do		
1300	1400		Australia, Christian Voice Intl		13660pa	13775pa	15155as
1300	1400		Austria, Christian Voice	13660as	13775as		
1300	1400	vl	Botswana, Radio	7255do	9600do		
1300	1400		Canada, CBC Northern Service		9625do		
1300	1400		Canada, CFRX Toronto ON		6070do		
1300	1400		Canada, CFVP Calgary AB		6030do		
1300	1400		Canada, CHNX Halifax, NS		6130do		
1300	1400		Canada, CKZN St John's NF		6160do		
1300	1400		Canada, CKZU Vancouver BC		6160do		
1300	1400	mtwhf	Canada, Radio Canada Intl		9515na	13655na	17710na
1300	1400		China, China Radio Intl	7405na	9570na	11760pa	11900pa 11980as
			15180as				
1300	1400		China, Voice of Hope	7460as			
1300	1400		Costa Rica, R for Peace Intl		15040va	21815usb	
1300	1400		Costa Rica, University Network		5030am	6150am	7375am 9724sa
			11870am 13749na	17645as			
1300	1400		Ecuador, HCJB	12005am	15115am	21455usb	
1300	1400	as/vl	Eqt. Guinea, Radio East Africa		15185af		
1300	1400	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va	
1300	1400		Germany, Deutsche Welle		6140eu		
1300	1400	vl	Ghana, Ghana BC Corp		4915do	6130do	
1300	1400		Guyana, Voice of	5950do			
1300	1400	as/vl	Italy, IRRS	7120va	7125al		
1300	1400		Jordan, Radio	11690eu	17680al		
1300	1400		Kenya, Kenya BC Corp	4885irr	4915irr		
1300	1400	vl	Lesotho, Radio	4800do			
1300	1400		Liberia, R Liberia Intl	6100do			
1300	1400		Malaysia, Radio	7295do			
1300	1400		Namibia, NBC	7165af	7215af		
1300	1400	occsr al	New Zealand, Radio NZ Intl		6095pa		
1300	1400	vl	Nigeria, Radio/Enugu	6025do			
1300	1400	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
1300	1400	vl	Nigeria, Radio/Lagos	4990do	7285do		
1300	1400		Palau, KHBN/ VO Hope	9965as			
1300	1400	vl	Papua New Guinea, NBC		4890do	9675irr	
1300	1400		Russia, University Network		17765as		
1300	1400	as	S Africa, Channel Africa	11720af	17780af	21725af	
1300	1400		Singapore, R Singapore Intl		6150as	9600as	
1300	1400		Sauth Korea, R Korea Intl		9570as	13670am	
1300	1400		Sri Lanka, SLBC	6005as	9770as	15425as	
1300	1400		Uganda, Radio	5026do	7196do		

1300	1400		UK, BBC World Service	6190af	6195va	9740as	11760me 11940af
			12095eu 15190am	15310as	15360as	15420af	15485eu 15565eu
			15575me 17640eu	17700as	17830af	17885af	21470af
1300	1400		USA, Armed Forces Radio		6458usb	12689usb	
1300	1400		USA, KAIJ Dallas TX	5755va			
1300	1400		USA, KNLS Anchor Point AK		9615as		
1300	1400		USA, KTBN Salt Lk City UT		7510na		
1300	1400		USA, KWHR Naalehu HI	9930as			
1300	1400	as	USA, KWHR Naalehu HI	11565pa			
1300	1400		USA, Voice of America	6110as	9645as	9760as	11705as 15170me
			15260me 15425as	17630af			
1300	1400		USA, W8CQ Monticello ME		17495na		
1300	1400		USA, WEWN Birmingham AL		11875na	11530na	11550na 15375na
			15745eu				
1300	1400		USA, WHRI Noblesville IN		6040na	15105am	
1300	1400		USA, WINB Red Lion PA	13570am			
1300	1400		USA, WJCR Upton KY	7490am	13595as		
1300	1400		USA, WRMI Miami FL	15725am			
1300	1400		USA, WRNO New Orleans LA		7395am		
1300	1400		USA, WSHB Cyp Creek SC		6095na	7460as	9455am
1300	1400		USA, WTJC Newport NC	9370na			
1300	1400		USA, WWCR Nashville TN		9475na	13845na	12160na 15685na
1300	1400		USA, WWFV McCaysville GA		9400va	12172va	
1300	1400		USA, WYFR Okeechobee FL		11550as	11740na	11830na 11970na
			17510sa 17575sa				
1300	1400		Zambia, Christian Voice	9865do			
1300	1400	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do	
1325	1400		Germany, Overcomer Ministries		6110eu		
1330	1350		UAE, Emirates Radio	13630eu	13675eu	15395eu	21605eu
1330	1357		Vietnam, Voice of	7145eu	9730eu		
1330	1359		Finland, YLE/Radio Finland		15400na	17660na	
1330	1400		Australia, Radio	5995pa	6020va	9475as	9580va 11650pa
			11660as 21820va				
1330	1400		Austria, Radio Austria Intl		17855as		
1330	1400		Germany, Voice of Hope	15675as	15715me	15775as	
1330	1400		Guam, KSDA/ AWR	11755as	11980as		
1330	1400		India, All India Radio	11620as	13710as		
1330	1400		Laos, Lao National Radio		7145as		
1330	1400		Sweden, Radio	9430va	17505va	18960na	
1330	1400		Turkey, Voice of	17690as	17815eu		
1330	1400		UAE, AWR Africa	15385as			
1330	1400		Uzbekistan, Radio Tashkent		5955as	5975as	6025as 9715as
1330	1400		Yugoslavia, Radio	11835au			

1400 UTC - 9AM E / 8AM C / 6AM P

1400	1425		Turkey, Voice of	17690as	17815eu		
1400	1427		Czech Rep, Radio Prague Intl		21745va		
1400	1430		Ecuador, HCJB	12005am	15115am	21455usb	
1400	1430		Thailand, Radio	9530as	9655as	11905as	
1400	1430	s	USA, Voice of America	18275as			
1400	1455	as	S Africa, Channel Africa	11720af	17780af	21725af	
1400	1500		Anguilla, Caribbean Beacon		11775am		
1400	1500	vl	Australia, ABC/Alice Springs		2310do		
1400	1500	vl	Australia, ABC/Katherine		2485do		
1400	1500	vl	Australia, ABC/Tennant Creek		2325do		
1400	1500		Australia, Christian Voice Intl		13660pa	13775pa	15155as
1400	1500		Australia, Radio	5995va	6080pa	9475as	9580va 11650pa
			11660as 15435as				
1400	1500		Austria, Christian Voice	13660as	13775as		
1400	1500	vl	Botswana, Radio	7255do	9600do		
1400	1500		Canada, CBC Northern Service		9625do		
1400	1500		Canada, CFRX Toronto ON		6070do		
1400	1500		Canada, CFVP Calgary AB		6030do		
1400	1500		Canada, CHNX Halifax, NS		6130do		
1400	1500		Canada, CKZN St John's NF		6160do		
1400	1500		Canada, CKZU Vancouver BC		6160do		
1400	1500		Canada, Radio Canada Intl		9515na	13655na	17710na
1400	1500		China, China Radio Intl	7405na	9700as	11675as	13685af 15110as
			15125af				
1400	1500		China, Voice of Hope	7460as			
1400	1500		Costa Rica, R for Peace Intl		15040va	21815usb	
1400	1500		Costa Rica, University Network		5030am	6150am	7375am 9724sa
			11870am 13749na	17645as			
1400	1500	as/vl	Eqt. Guinea, Radio East Africa		15185af		
1400	1500	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va	
1400	1500		France Radio France Intl	9580as	11600me	17620me	
1400	1500		Germany, Deutsche Welle		6140eu		
1400	1500		Germany, Overcomer Ministries		6110eu	13810af	
1400	1500	vl	Ghana, Ghana BC Corp		4915do	6130do	
1400	1500		Guyana, Voice of	5950do			
1400	1500		India, All India Radio	11620as	13710as		
1400	1500	as/vl	Italy, IRRS	7120va	7125al		
1400	1500		Japan, Radio	7200as	9505na	9845as	17755va
1400	1500		Jordan, Radio	11690eu	17680al		
1400	1500		Kenya, Kenya BC Corp	4885irr	4915irr		
1400	1500	vl	Lesotho, Radio	4800do			
1400	1500		Liberia, R Liberia Intl	6100do			
1400	1500		Malaysia, Radio	7295do			
1400	1500		Malaysia, RTM Sarawak	7160do			
1400	1500		Namibia, NBC	7165af	7215af		
1400	1500	occsnal	New Zealand, Radio NZ Intl		6095pa		
1400	1500	vl	Nigeria, Radio/Enugu	6025do			
1400	1500	vl	Nigeria, Radio/Ibadan	6050do			
1400	1500	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
1400	1500	vl	Nigeria, Radio/Lagos	4990do	7285do		
1400	1500		Oman, Radio	15140va			
1400	1500		Palau, KHBN/ VO Hope	9965as			

1400	1500		Romania, R Romania Intl	11940eu	15365eu	17790eu	
1400	1500		Russia, University Network	17765as			
1400	1500		Singapore, SBC Radio One	6150da			
1400	1500		Sri Lanka, SLBC 6005as	9770as	15425as		
1400	1500		Taiwan, R Taipei Intl 15265as				
1400	1500		Uganda, Radio 5026do	7196do			
1400	1500		UK, BBC World Service 6135as	6190af	6195as	9740as	11940af
			12095eu 15190am 15310as	15485eu	15565eu	15575me	17640eu
			17700as 17830af 21470af	21660af			
1400	1500		USA, Armed Forces Radio	6458usb	12689usb		
1400	1500		USA, KAIJ Dallas TX 13815va				
1400	1500		USA, KJES Vado NM 11715na				
1400	1500		USA, KTBN Salt Lk City UT	7510na			
1400	1500		USA, KWHR Naalehu HI 9930as				
1400	1500	as	USA, KWHR Naalehu HI 11565pa				
1400	1500		USA, Voice of America 6110as	7125as	9645as	9760as	11705as
			15205as 15395as 15425as				
1400	1500		USA, WBCQ Monticello ME	17495na			
1400	1500		USA, WEWN Birmingham AL	11875na	11530na	11550na	15375na
			15745eu				
1400	1500		USA, WHRI Noblesville IN	6040na	15105am		
1400	1500		USA, WINB Red Lion PA 13750am				
1400	1500		USA, WJCR Upton KY 7490am	13595as			
1400	1500		USA, WRMI Miami FL 15725am				
1400	1500		USA, WRNO New Orleans LA	7395am			
1400	1500		USA, WTJC Newport NC 9370na				
1400	1500		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1400	1500		USA, WWFV McCaysville GA	9400va	12172va		
1400	1500		USA, WYFR Okeechobee FL	11550as	11740na	11830na	17510sa
			17575sa 17760na				
1400	1500		Zambia, Christian Voice 9865do				
1400	1500	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1415	1420		Nepal, Radio 3230as 5005as				
1430	1500		Austria, Radio Austria Intl	6155eu	13730eu		
1430	1500		Germany, Voice of Hope 15715me	15775as			
1430	1500		Guam, KSDA/ AWR 15660as				
1430	1500		Guam. KTWR/ TWR 15330as				
1430	1500		Malaysia, RTM Kota Kinabalu	5980do			
1430	1500		Myanmar, Radio 5985do				
1430	1500		Netherlands, Radio 12070as	12080as	15220na	15595as	
1430	1500		Sweden, Radio 17505va	18960na			
1445	1500	f	Seychelles, FEBA Radio 11600as				

1500 UTC - 10AM E / 9AM C / 7AM P

1500	1530		Mexico, Radio Mexico Intl	9705am	11770am		
1500	1530		Mongolia, Voice of 12015as				
1500	1530		S Africa, Channel Africa 17770af				
1500	1530	h	Seychelles, FEBA Radio 11600as				
1500	1530		USA, Voice of America 7125as	9645as	15205as	15395as	
1500	1535		Germany, Voice of Hope 15715me	15775as			
1500	1556		North Korea, VO Korea 4405va	7505va	9335va	11335va	11710va
1500	1600		Anguilla, Caribbean Beacon	11775am			
1500	1600	vl	Australia, ABC/Alice Springs	2310do			
1500	1600	vl	Australia, ABC/Katherine	2485do			
1500	1600	vl	Australia, ABC/Tennant Creek	2325do			
1500	1600		Australia, Christian Voice Intl	13660pa	13775pa	15155as	
1500	1600		Australia, Radio 5995vc	6080pa	9475as	9580va	11650pa
			11660va 15435as				
1500	1600		Austria, Christian Voice 13660as	13775as			
1500	1600	vl	Austria, Radio Africa Intl 7895eu				
1500	1600	vl	Botswana, Radio 7255do	9600do			
1500	1600		Canada, CBC Northern Service	9625do			
1500	1600		Canada, CFRX Toronto ON	6070do			
1500	1600		Canada, CFVP Calgary AB	6030do			
1500	1600		Canada, CHNX Halifax, NS	6130do			
1500	1600		Canada, CKZN St John's NF	6160do			
1500	1600		Canada, CKZU Vancouver BC	6160do			
1500	1600		Canada, Radio Canada Intl	9515na	13655na	15360as	17710na
			17820as				
1500	1600		China, China Radio Intl 7160as	9785as			
1500	1600		China, Voice of Hope 7460as				
1500	1600		Costa Rica, R for Peace Intl	15040va	21815usb		
1500	1600		Costa Rica, University Network	5030am	6150am	7375am	9724sa
			11870am 13749na 17645as				
1500	1600	as/vl	Eqt. Guinea, Radio East Africa	15185af			
1500	1600	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va		
1500	1600		Germany, Deutsche Welle	6140eu			
1500	1600		Germany, Overcomer Ministries	6110eu	13810af		
1500	1600	vl	Ghana, Ghana BC Corp	4915do	6130da		
1500	1600		Guam. KTWR/ TWR 15330as				
1500	1600		Guyana, Voice of 5950do				
1500	1600		Italy, IRRS 7120va	7125al			
1500	1600		Japan, Radio 7200as	9505na	9750as	9845as	17755va
1500	1600		Jordan, Radio 11690eu	17680al			
1500	1600		Kenya, Kenya BC Corp 4885irr	4915irr			
1500	1600	vl	Lesotho, Radio 4800do				
1500	1600		Liberia, R Liberia Intl 6100do				
1500	1600		Malaysia, Radio 7295do				
1500	1600		Malaysia, RTM Kota Kinabalu	5980da			
1500	1600		Malaysia, RTM Sarawak 7160do				
1500	1600		Myanmar, Radio 5985do				
1500	1600		Namibia, NBC 7165af	7215af			
1500	1600		Netherlands, Radio 12070as	12080as	15220na	15595as	
1500	1600	occsnal	New Zealand, Radio NZ Intl	6095pa			
1500	1600	vl	Nigeria, Radio/Enugu 6025do				
1500	1600	vl	Nigeria, Radio/Ibadan 6050da				
1500	1600	vl	Nigeria, Radio/Kaduna 4770do	6090do	7275do	9570do	
1500	1600	vl	Nigeria, Radio/Lagos 4990da	7285da			
1500	1600		Russia, University Network	17765as			
1500	1600		Russia, Voice of Russia 6205as	7260na	7315as	15735am	
1500	1600		Russia, World Beacon 15340eu				
1500	1600		Singapore, SBC Radio One	6150do			
1500	1600		Sri Lanka, SLBC 6005as	9770as	15425as		
1500	1600		Uganda, Radio 5026do	7196do			
1500	1600		UK, BBC World Service 5975as	6135as	6190af	6195as	9410eu
			9740as 11860af 11940af	12095eu	15190am	15400af	15420af
			15485eu 15565eu 17700as	17830af	21470af	21490af	21660af
1500	1600		UK, World Beacon 15340eu				
1500	1600		USA, Armed Forces Radio	6458usb	12689usb		
1500	1600		USA, KAIJ Dallas TX 13815va				
1500	1600		USA, KJES Vado NM 11715na				
1500	1600		USA, KTBN Salt Lk City UT	7510na			
1500	1600		USA, KWHR Naalehu HI 9930as				
1500	1600	as	USA, KWHR Naalehu HI 11565pa				
1500	1600		USA, VOA Special English	6110as	9760as	12040as	15460as
1500	1600		USA, WBCQ Monticello ME	9335na	17495na		
1500	1600		USA, WEWN Birmingham AL	11875na	11530na	11550na	15375na
			15745eu				
1500	1600		USA, WHRI Noblesville IN	6040na	15105am		
1500	1600		USA, WINB Red Lion PA 13570am				
1500	1600		USA, WJCR Upton KY 7490am	13595as			
1500	1600		USA, WRMI Miami FL 15725am				
1500	1600		USA, WRNO New Orleans LA	7395am			
1500	1600		USA, WTJC Newport NC 9370na				
1500	1600		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1500	1600		USA, WWFV McCaysville GA	9400va	12172va		
1500	1600		USA, WYFR Okeechobee FL	6280as	11830na	15525as	17760na
1500	1600		Zambia, Christian Voice 4965do				
1500	1600	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1515	1545	twf	Seychelles, FEBA Radio 11600as				
1515	1600	m	Seychelles, FEBA Radio 11600as				
1530	1600	vl	Botswana, Radio 3356do	4820do	7255do		
1530	1600		Iran, VO Islamic Rep. of Iran	9605as	11775eu	11870as	
1530	1600	as	Seychelles, FEBA Radio 11600as				
1530	1600		USA, Voice of America 7125as	9575as	9645as	11955me	13735me
			15120me 15205as 15265me	15395as			
1535	1600		Germany, Voice of Hope 15715me				
1550	1600		Vatican City, Vatican Radio	9865au	13765au	15235au	

1600 UTC - 11AM E / 10AM C / 8AM P

1600	1610		Vatican City, Vatican Radio	9865au	13765au	15235au	
1600	1615		Pakistan, Radio 11570me	15100me	15725af	17750af	
1600	1625		Netherlands, Radio 12070as	12080as	15220na	15595as	
1600	1627		Iran, VO Islamic Rep. of Iran	9605as	11775eu	11870as	
1600	1627		Vietnam, Voice of 7145eu	9730eu			
1600	1630		Mexico, Radio Mexico Intl	9705am	11770am		
1600	1630		S Africa, Channel Africa 9525af				
1600	1630	vl	Zimbabwe, Zimbabwe BC Corp	5975da	6045do		
1600	1635		UAE, Emirates Radio 13630eu	13675eu	15395eu	21597al	21605eu
1600	1645	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va		
1600	1645		Germany, Deutsche Welle	6170as	7225as	9735af	11695as
			13605as 15455af 21840af				
1600	1650	occsnal	New Zealand, Radio NZ Intl	6095pa			
1600	1656		North Korea, VO Korea 9975va	11735va			
1600	1659	as	Canada, Radio Canada Intl	9515na	13655na	17710na	
1600	1700		Algeria, Radio Algiers Intl	11715eu	15160eu		
1600	1700		Anguilla, Caribbean Beacon	11775am			
1600	1700	vl	Australia, ABC/Alice Springs	2310do			
1600	1700	vl	Australia, ABC/Katherine	2485do			
1600	1700	vl	Australia, ABC/Tennant Creek	2325do			
1600	1700		Australia, Christian Voice Intl	7170pa	13660pa	15115as	
1600	1700		Australia, Radio 5995va	6080pa	9580va	9655va	11650pa
			11660va				
1600	1700		Austria, Christian Voice 7170as	13660as			
1600	1700	vl	Botswana, Radio 3356do	4820do	7255do		
1600	1700		Canada, CBC Northern Service	9625do			
1600	1700		Canada, CFRX Toronto ON	6070do			
1600	1700		Canada, CFVP Calgary AB	6030do			
1600	1700		Canada, CHNX Halifax, NS	6130do			
1600	1700		Canada, CKZN St John's NF	6160do			
1600	1700		Canada, CKZU Vancouver BC	6160do			
1600	1700		China, China Radio Intl 7190af	13650af			
1600	1700		Costa Rica, R for Peace Intl	15040va	21815usb		
1600	1700		Costa Rica, University Network	5030am	6150am	7375am	9724sa
			11870am 13749na				
1600	1700		Ethiopia, Radio 5990do	7110af	7165af	9560af	9704af
			11800af				
1600	1700		France Radio France Intl 11615af	11995af	12015af	15605af	17605af
			17850af				
1600	1700		Germany, Deutsche Welle	6140eu			
1600	1700		Germany, Overcomer Ministries	6110eu			
1600	1700		Germany, Voice of Hope 15715af				
1600	1700	vl	Ghana, Ghana BC Corp	4915do	6130do		
1600	1700		Guyana, Voice of 5950do				
1600	1700		Jordan, Radio 11690na				
1600	1700		Kenya, Kenya BC Corp 4885irr	4915irr			
1600	1700	vl	Lesotho, Radio 4800do				
1600	1700		Liberia, R Liberia Intl 6100do				
1600	1700		Malaysia, Radio 7295do				
1600	1700		Namibia, NBC 7165af	7215af			
1600	1700	vl	Nigeria, Radio/Enugu 6025do				
1600	1700	vl	Nigeria, Radio/Ibadan 6050do				
1600	1700	vl	Nigeria, Radio/Kaduna 4770do	6090do	7275do	9570da	

1600	1700	vl	Nigeria, Radio/Lagos	3326da	4990do			
1600	1700		Russia, University Network		17765as			
1600	1700		Russia, Voice of Russia	4940as	4965as	4975as	6005me	7260na
			7305as 9830me	15735am				
1600	1700		Russia, World Beacon	15340eu				
1600	1700		South Korea, R Korea Intl		5975am	9515af	9870af	
1600	1700		Taiwan, R Taipei Intl	11550as				
1600	1700		Uganda, Radio	5026do	7196do			
1600	1700		UK, BBC World Service	3915as	5975as	6190af	6195as	7160as
			9410eu 9740as	11940af	12095eu	15190am	15310as	15430af
			15565eu 17700as	17830af	21470af	21660af		
1600	1700		UK, World Beacon	15340eu				
1600	1700		USA, Armed Forces Radio		6458usb	12689usb		
1600	1700		USA, KAIJ Dallas TX	13815va				
1600	1700		USA, KJES Vado NM	11715na				
1600	1700		USA, KTBN Salt Lk City UT		15590na			
1600	1700		USA, KWHR Naalehu HI	9930as				
1600	1700		USA, VOA Special English		13600af	15445af	17640af	
1600	1700		USA, Voice of America	6035af	6110as	7125as	9575as	9645as
			9760as 11950me	13710af	13735me	15120me	15205as	15240af
			15395as 15485af	17715af	17895af			
1600	1700		USA, WBCQ Monticello ME		9335na	17495na		
1600	1700		USA, WEWN Birmingham AL		11530na	11550na	13615na	15375na
			15745eu					
1600	1700		USA, WHRA Greenbush ME		17650af			
1600	1700		USA, WHRI Noblesville IN		13760va	15105am		
1600	1700		USA, WINB Red Lion PA	13570am				
1600	1700		USA, WJCR Upton KY	7490am	13595as			
1600	1700		USA, WRMI Miami FL	15725am				
1600	1700		USA, WRNO New Orleans LA		7395am	15420am		
1600	1700		USA, WSHB Cyp Creek SC		18910af			
1600	1700		USA, WTJC Newport NC	9370na				
1600	1700		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
1600	1700		USA, WWFV McCaysville GA		9400va	12172va		
1600	1700		USA, WYFR Okeechobee FL		11830na	13855af	15525as	17760na
			18980eu 21455eu	21525af				
1600	1700		Zambia, Christian Voice	4965do				
1615	1700	as	UK, BBC World Service	11860af	15420af	21490af		
1630	1700		Austria, Radio Austria Intl		17865na			
1630	1700		Egypt, Radio Cairo	15255af				
1630	1700		Georgia, Georgian Radio		6180me			
1630	1700		Guam, KSDA/ AWR	11980as				
1630	1700		UAE, AWR Africa	9890eu				
1630	1700	as	UK BBC World Service	11860af	21490af			
1630	1700	vl	Zimbabwe, Zimbabwe BC Corp		4828do	6045do		
1645	1700	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
1645	1700		Tajikistan, Radio	7245as				
1650	1700		New Zealand, Radio NZ Intl		11725pa			

1700 UTC - 12PM E / 11AM C / 9AM P

1700	1725		Germany, Overcomer Ministries		6110eu			
1700	1727		Czech Rep, Radio Prague Intl		5930eu	17485eu		
1700	1727		Vietnam, Voice of	12070eu				
1700	1730	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
1700	1730		France Radio France Intl	11615af	15605af	17605af		
1700	1730		Israel, Kol Israel	11605va	17545va			
1700	1730		Jordan, Radio	11690na	17680al			
1700	1730	mtwhfa	Malta, VO Mediterranean		6110eu	9840eu		
1700	1730		S Africa, Channel Africa	17870af				
1700	1750		New Zealand, Radio NZ Intl		11725pa			
1700	1800		Anguilla, Caribbean Beacon		11775am			
1700	1800	vl	Australia, ABC/Alice Springs		2310do			
1700	1800	vl	Australia, ABC/Katherine		2485do			
1700	1800	vl	Australia, ABC/Tennant Creek		2325do			
1700	1800		Australia, Christian Voice Intl		7170pa	13660pa	15115as	
1700	1800		Australia, Radio	5995va	6080pa	9580va	9655va	9815os
			11880va					
1700	1800		Austria, Christian Voice	7170as	13660as			
1700	1800	vl	Botswana, Radio	3356do	4820do	7255do		
1700	1800		Canada, CBC Northern Service		9625do			
1700	1800		Canada, CFRX Toronto ON		6070do			
1700	1800		Canada, CFVP Calgary AB		6030do			
1700	1800		Canada, CHNX Halifax, NS		6130do			
1700	1800		Canada, CKZN St John's NF		6160do			
1700	1800		Canada, CKZU Vancouver BC		6160do			
1700	1800		China, China Radio Intl	7150af	9570af	9695af	11910af	15125af
1700	1800		Costa Rica, R for Peace Intl		15040va	21815usb		
1700	1800		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
1700	1800		Egypt, Radio Cairo	15255af				
1700	1800	mtwht	Eqt Guinea, Radio Africa		15185af			
1700	1800		Germany, Deutsche Welle		6140eu			
1700	1800		Germany, Unt. Methodist Church		11735af	13820af		
1700	1800		Germany, Voice of Hope	9815eu				
1700	1800	vl	Ghana, Ghana BC Corp		3366do	4915do		
1700	1800	a	Greece, Voice of	9420eu	11645eu	15630eu	17705na	
1700	1800		Guyana, Voice of	5950do				
1700	1800		Japan, Radio	9505na	11970eu	15355af		
1700	1800		Kenya, Kenya BC Corp	4885irr	4915irr			
1700	1800	vl	Lesotho, Radio	4800do				
1700	1800		Liberia, R Liberia Intl	6100do				
1700	1800		Namibia, NBC	3270af	3290af	7215irr		
1700	1800	vl	Nigeria, Radio/Enugu	6025da				
1700	1800	vl	Nigeria, Radio/Ibadan	6050do				
1700	1800	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1700	1800	vl	Nigeria, Radio/Lagos	3326do	4990do			
1700	1800		Romania, R Romania Intl		9625af	11830eu	11940eu	15245eu
1700	1800		Russia, University Network		17765as			
1700	1800		Russia, Voice of Russia	7260na	9470me	9830me	15735am	
1700	1800		Russia, World Beacon	9575eu				
1700	1800		Sierra Leone, SLBS	3316do				
1700	1800		Taiwan, R Taipei Intl	11550as				
1700	1800		Uganda, Radio	5026do	7196do			
1700	1800		UK, BBC World Service	3255af	3915as	5975as	6005af	6190af
			6195eu 7160as	9410eu	9510as	9630af	9740as	15400af
			15420af 15565as	17830af	21470af			
1700	1800		UK, World Beacon	9575eu				
1700	1800		USA, Armed Forces Radio		6458usb	12689usb		
1700	1800		USA, KAIJ Dallas TX	13815va				
1700	1800		USA, KTBN Salt Lk City UT		15590na			
1700	1800		USA, KWHR Naalehu HI	9930as				
1700	1800		USA, Voice of America	6040af	6110as	7125as	9645as	9760as
			13710af 15205as	15240af	15395as	15445af	17895af	
1700	1800	mtwhf	USA, Voice of America	5990as	6045as	9525as	9670as	9795as
			11955as 12005as	15255as				
1700	1800		USA, WBCQ Monticello ME		9335na	17495na		
1700	1800		USA, WEWN Birmingham AL		11530na	11550na	13615na	15745na
			17595eu					
1700	1800		USA, WHRA Greenbush ME		17650af			
1700	1800		USA, WHRI Noblesville IN		13760va	15105am		
1700	1800		USA, WINB Red Lion PA	13570am				
1700	1800		USA, WJCR Upton KY	7490am	13595as			
1700	1800		USA, WMLK Bethel PA	15265eu				
1700	1800		USA, WRMI Miami FL	15725am				
1700	1800		USA, WRNO New Orleans LA		7395am	15420am		
1700	1800		USA, WSHB Cyp Creek SC		18910af			
1700	1800		USA, WTJC Newport NC	9370na				
1700	1800		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
1700	1800		USA, WWFV McCaysville GA		9400va	12172va		
1700	1800		USA, WYFR Okeechobee FL		13855af	18980eu	21455eu	
1700	1800		Zambia, Christian Voice	4965do				
1700	1800	vl	Zimbabwe, Zimbabwe BC Corp		4828do	6045do		
1710	1725		Armenia, TWR	5855eu				
1715	1730		Vatican City, Vatican Radio		4005eu	5885eu	7250eu	9645eu
			15595eu					
1725	1745	mtwhf/vl	UK, United Nations Radio		6125af	15495me	17580af	
1730	1745	vl	Libya, Voice of Africa	15435irr	17725af			
1730	1745		Swaziland, TWR	9500af				
1730	1745	mtwhf	Swaziland, TWR	3200af				
1730	1800	a/monthly	Finland, Scandv Weekend Radio		6170va	11690va		
1730	1800		Guam, KSDA/ AWR	7455as	9385me	11560me		
1730	1800		Liberia, ELWA	4760do				
1730	1800		Netherlands, Radio	6020af	11655as			
1730	1800		Philippines, Radio Pilipinas		11730me	11890me	15190me	
1730	1800		S Africa, AWR Africa	12130af				
1730	1800		Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu		
1730	1800		Switzerland, Swiss R Intl	9605af	13790va	15555va		
1730	1800		Vatican City, Vatican Radio		13765af	15570af	17515af	
1735	1745	vl 4th	Paraguay, Radio Nacional		9739sa			
1745	1800		Bangladesh, Bangla Betar		7185eu	9550eu	15520eu	
1745	1800		India, All India Radio	7410eu	11620eu	11935va	13605af	15155af
			17670af					
1745	1800	smtwhf	Swaziland, TWR	3200af				
1751	1800		New Zealand, Radio NZ Intl		15160pa			

1800 UTC - 1PM E / 12PM C / 10AM P

1800	1810		Zambia, National BC Corp		6265do			
1800	1815		Bangladesh, Bangla Betar		7185eu	9550eu	15520eu	
1800	1827		Vietnam, Voice of	5955eu	7145eu	9730eu		
1800	1830		Azerbaijan, Voice of	6110eu	9155eu			
1800	1830		Egypt, Radio Cairo	15255af				
1800	1830		Germany, Deutsche Welle		3995eu			
1800	1830	s	Germany, Universal Life	11840af				
1800	1830		S Africa, AWR Africa	5960af	6100af			
1800	1830		S Africa, Channel Africa	17870af				
1800	1830		UK, RTE Radio	9895me				
1800	1857		Czech Rep, Radio Prague Intl		5930eu	7315va		
1800	1858		Yemen, Rep of Yemen Radio		9780me			
1800	1859		Poland, Radio Polonia	5995eu	7285eu			
1800	1900		Anguilla, Caribbean Beacon		11775am			
1800	1900	vl	Australia, ABC/Alice Springs		2310do			
1800	1900	vl	Australia, ABC/Katherine		2485do			
1800	1900	vl	Australia, ABC/Tennant Creek		2325do			
1800	1900		Australia, Christian Voice Intl		7170pa	9795pa		
1800	1900		Australia, Radio	6080as	7240pa	9580va	9655va	9815os
			11880va					
1800	1900		Austria, Christian Voice	7170as	9795as			
1800	1900	vl	Botswana, Radio	3356do	4820do			
1800	1900	vl	Cameroon, RTV	4850do	6005do			
1800	1900		Canada, CBC Northern Service		9625do			
1800	1900		Canada, CFRX Toronto ON		6070do			
1800	1900		Canada, CFVP Calgary AB		6030do			
1800	1900		Canada, CHNX Halifax, NS		6130do			
1800	1900		Canada, CKZN St John's NF		6160do			
1800	1900		Canada, CKZU Vancouver BC		6160do			
1800	1900		Costa Rica, R for Peace Intl		15040va	21815usb		
1800	1900		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
1800	1900	mtwhf	Eqt Guinea, Radio Africa		15185af			
1800	1900	a/monthly	Finland, Scandv Weekend Radio		6170va	11690va		
1800	1900		Germany, Deutsche Welle		6140eu			
1800	1900		Germany, Unt. Methodist Church		11735af	13820af		
1800	1900		Germany, Voice of Hope	9815eu				
1800	1900	vl	Ghana, Ghana BC Corp		3366do	4915do		

1800	1900		Guyana, Voice of	5950do				
1800	1900		India, All India Radio 17670af	7410as	11620eu	11935va	13605af	15155af
1800	1900	vl	Italy, IRRS 3980al	3985va				
1800	1900		Kenya, Kenya BC Corp	4885irr	4915irr			
1800	1900		Kuwait, Radio	11990va				
1800	1900	vl	Lesotho, Radio	4800do				
1800	1900		Liberia, ELWA	4760do				
1800	1900		Liberia, R Liberia Intl	5100do				
1800	1900		Namibia, NBC	3270af	3290af	7215irr		
1800	1900		Netherlands, Radio	6020af	11655af			
1800	1900		New Zealand, Radio NZ Intl	15160pa				
1800	1900	vl	Nigeria, Radio/Enugu	6025do				
1800	1900	vl	Nigeria, Radio/Ibadan	6050do				
1800	1900	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1800	1900	vl	Nigeria, Radio/Lagos	3326do	4990do			
1800	1900		Philippines, Radio Pilipinas	11730me	11890me	15190me		
1800	1900		Russia, University Network	17765as				
1800	1900	as	Russia, Voice of Russia	5940eu	6175eu			
1800	1900		Russia, Voice of Russia 11510af 15735am	7260na	7335af	7340eu	9775eu	9830af
1800	1900		Russia, World Beacon	3230af	9575eu	17850af		
1800	1900		S Africa, African Beacon	3230af				
1800	1900		Sierra Leone, SLBS	3316do				
1800	1900		Swaziland, TWR	3200af	9500af			
1800	1900		Taiwan, R Taipei Intl	3955eu				
1800	1900		Uganda, Radio	5026do	7196do			
1800	1900		UK, BBC World Service 9510as 9740me	3255af	5975as	6190af	6195eu	9410eu
				15400af	15420af	17830af	21470af	
1800	1900		UK, World Beacon	3230af	9575eu	17850af		
1800	1900		USA, Armed Forces Radio		6458usb	12689usb		
1800	1900		USA, KAIJ Dallas TX	13815va				
1800	1900		USA, KTBN Salt Lk City UT		15590na			
1800	1900		USA, KWHR Naalehu HI	9930as				
1800	1900		USA, Voice of America 13710af 15240af	6035af	6040af	9760as	9840as	11975af
				15580af	17895af			
1800	1900		USA, WBCQ Monticello ME		9335na	17495na		
1800	1900		USA, WEWN Birmingham AL 17595eu		11530na	11550na	13615na	15745na
1800	1900		USA, WHRA Greenbush ME		17650af			
1800	1900		USA, WHRI Noblesville IN		9495am	13760va		
1800	1900		USA, WINB Red Lion PA	13570am				
1800	1900		USA, WJCR Upton KY	7490am	13595as			
1800	1900		USA, WMLK Bethel PA	15265eu				
1800	1900		USA, WRMI Miami FL	15725am				
1800	1900		USA, WRNO New Orleans LA		7395am	15420am		
1800	1900		USA, WSHB Cyp Creek SC		15665eu	18910af		
1800	1900		USA, WTJC Newport NC	9370na				
1800	1900		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
1800	1900		USA, WWFV McCaysville GA		9400va	12172va		
1800	1900		USA, WYFR Okeechobee FL		18980eu			
1800	1900		Zambia, Christian Voice	4965do				
1800	1900	vl	Zimbabwe, Zimbabwe BC Corp		4828do	6045do		
1815	1900		Bangladesh, Bangla Betar		7185eu	9550eu	15520eu	
1830	1855		Belgium, RVI Flanders R Intl		9925eu	13685eu	13710va	
1830	1900	mtwhf	Georgia, Georgian Radio		6230eu			
1830	1900	as	Georgia, Georgian Radio		6080as			
1830	1900		Netherlands, Radio	9895af	17605af			
1830	1900	mtwhfa	Sweden, Radio	6065va				
1830	1900	s	Sweden, Radio	5840va				
1830	1900		UK, RTE Radio	13640na	21630af			
1830	1900	as	USA, Voice of America	13675af	15160af	17640af		
1845	1900		Congo, RTV Congolaise	4765af	5985af			

1900 UTC - 2PM E / 1PM C / 11AM P

1900	1915		Congo, RTV Congolaise	4765do	5985af			
1900	1927		Vietnam, Voice of	7145eu	9730eu			
1900	1930		Germany, Deutsche Welle		3995eu			
1900	1930		Philippines, Radio Pilipinas		11730me	11890me	15190me	
1900	1930		USA, VOA Special English		9785me	12015me	13640me	
1900	1945		Germany, Deutsche Welle 15390af 17810af		11765af	11810af	13780af	15275af
1900	1945		India, All India Radio 17670af	7410as	11620eu	11935va	13605af	15155af
1900	1956		North Korea, VO Korea	7505va	11335va			
1900	2000		Anguilla, Caribbean Beacon		11775am			
1900	2000	mtwhf	Argentina, RAE	9690va	15345va			
1900	2000	vl	Australia, ABC/Katherine		2485do			
1900	2000	vl	Australia, ABC/Tennant Creek		2325do			
1900	2000		Australia, Christian Voice Intl		7170pa	9795pa		
1900	2000		Australia, Radio 11880va	6080as	7240pa	9500as	9580va	9815as
1900	2000		Austria, Christian Voice	7170as	9795as			
1900	2000	vl	Botswana, Radio	3356do	4820do			
1900	2000	vl	Cameroon, RTV	4850do	6005do			
1900	2000		Canada, CFRX Toronto ON		6070do			
1900	2000		Canada, CFVP Calgary AB		6030do			
1900	2000		Canada, CHNX Halifax, NS		6130do			
1900	2000		Canada, CKZN St John's NF		6160do			
1900	2000		Canada, CKZU Vancouver BC		6160do			
1900	2000		Canada, CBC Northern Service		9625do			
1900	2000		China, China Radio Intl	9440af	9585af	9595af	13790af	
1900	2000		Costa Rica, R for Peace Intl		15040va	21815usb		
1900	2000		Costa Rica, University Network 11870am 13749na		5030am	6150am	7375am	9724sa
1900	2000	mtwhf	Eqt Guinea, Radio Africa		15185af			
1900	2000	o/monthly	Finland, Scandv Weekend Radio		6170va	11690va		
1900	2000	vl	Ghana, Ghana BC Corp		3366do	4915do		
1900	2000		Guyana, Voice of	5950do				
1900	2000	vl	Italy, IRRS 3980al	3985va				
1900	2000		Kenya, Kenya BC Corp	4885irr	4915irr			
1900	2000		Kuwait, Radio	11990va				
1900	2000	vl	Lesotho, Radio	4800do				
1900	2000		Liberia, ELWA	4760do				
1900	2000		Liberia, R Liberia Intl	5100do				
1900	2000		Namibia, NBC	3270af	3290af	7215irr		
1900	2000		Netherlands, Radio	6020af	9895af	11655af	17605af	
1900	2000		New Zealand, Radio NZ Intl		15160pa			
1900	2000	vl	Nigeria, Radio/Enugu	6025do				
1900	2000	vl	Nigeria, Radio/Ibadan	6050do				
1900	2000	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1900	2000	vl	Nigeria, Radio/Lagos	3326do	4990do			
1900	2000		Nigeria, Voice of	7255af	11770af	15120va		
1900	2000		Russia, University Network		17765as			
1900	2000		Russia, Voice of Russia 7360eu 9775eu	5940eu	5950eu	6175eu	7335af	7340eu
				9830af	11510af			
1900	2000		Russia, World Beacon	3230af	17850af			
1900	2000		S Africa, African Beacon	3230af				
1900	2000		Sierra Leone, SLBS	3316do				
1900	2000	vl	Solomon Islands, SIBC	5020da				
1900	2000		South Korea, R Korea Intl		5975am	7275eu		
1900	2000		Swaziland, TWR	3200af				
1900	2000		Thailand, Radio	9535eu	9655eu	11905eu		
1900	2000		Uganda, Radio	5026do	7196do			
1900	2000		UK, BBC World Service 9630af 12095af	3255af	6005af	6190af	6195eu	9410eu
				15400af	17830af			
1900	2000		UK, World Beacon	3230af	17850af			
1900	2000		USA, Armed Forces Radio		6458usb	12689usb		
1900	2000		USA, KAIJ Dallas TX	13815va				
1900	2000		USA, KJES Vado NM	15385au				
1900	2000		USA, KTBN Salt Lk City UT		15590na			
1900	2000		USA, KWHR Naalehu HI	9930as				
1900	2000		USA, Voice of America 9760as 11870pa 17895af 15580af	4950af	6035af	7415af	9525pa	9690as
				11975af	13710af	15180pa	15240af	15580af
1900	2000	mtwhf	USA, Voice of America 15205me 15410as	5965me	9840as	11720as	11970as	13725af
1900	2000		USA, WBCQ Monticello ME		9335na	17495na		
1900	2000		USA, WEWN Birmingham AL 17595eu		11550na	11530na	13615na	15745na
1900	2000		USA, WHRA Greenbush ME		17650af			
1900	2000		USA, WHRI Noblesville IN		9495am	13760va		
1900	2000		USA, WINB Red Lion PA	13570am				
1900	2000		USA, WJCR Upton KY	7490am	13595as			
1900	2000		USA, WMLK Bethel PA	15265eu				
1900	2000		USA, WRMI Miami FL	15725am				
1900	2000		USA, WRNO New Orleans LA		7395am	15420am		
1900	2000		USA, WSHB Cyp Creek SC		15665eu	18910af		
1900	2000		USA, WTJC Newport NC	9370na				
1900	2000		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
1900	2000		USA, WWFV McCaysville GA		9400va	12172va		
1900	2000		USA, WYFR Okeechobee FL		13855af	15565eu	18980eu	
1900	2000		Zambia, Christian Voice	4965do				
1900	2000	vl	Zimbabwe, Zimbabwe BC Corp		4828do	6045do		
1904	1930	s	Greece, Voice of	5865eu	7475eu	17705na		
1930	2000		Austria, Radio Austria Intl		5945eu	6155eu		
1930	2000		Georgia, Georgian Radio		11760eu			
1930	2000		Greece, Voice of	12110eu				
1930	2000	s	Greece, Voice of	5865eu	7475eu	17705na		
1930	2000		Iran, VO Islamic Rep of Iran		6110eu	9890eu	11695af	15140af
1930	2000	vl	Papua New Guinea, N8C		4890do			
1930	2000		Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu		
1930	2000		Switzerland, Swiss R Intl	9605af	13660af	15485af	17660me	
1930	2000		Turkey, Voice of		7125eu			
1930	2000		Yugoslavia, Radio		6100eu			
1935	1955		Italy, RAI Intl	5970eu	9760eu			
1945	2000		Albania, Radio Tirana Intl		7210eu	9510eu		

2000 UTC - 3PM E / 2PM C / 12PM P

2000	2015		Swaziland, TWR	3200af				
2000	2020		Turkey, Voice of	7125eu				
2000	2025		Netherlands, Radio	6020af	9895af	11655af	17605af	
2000	2027		Iran, VO Islamic Rep of Iran		6110eu	9890eu	11695af	15140af
2000	2030		Austria, Christian Voice	7170as	9795as			
2000	2030	mtwhfa	Hungary, Radio Budapest		6025eu	7135eu		
2000	2030		Israel, Kol Israel	9435va	11605va	15640af	15650va	
2000	2030		Mongolia, Voice of	12015as				
2000	2030		S Africa, AWR Africa	17695af				
2000	2030		Switzerland, Swiss R Intl	9605af	13660af	15485af	17660me	
2000	2030		USA, Voice of America 9760as 11855af 17895af	4950af	6035af	6095af	7415af	9690as
				11975af	13710af	15240af	15580af	17885af
2000	2030		Vatican City, Vatican Radio		9660af	11625af	13765af	
2000	2045		Germany, Deutsche Welle		6180eu			
2000	2100		Algeria, Radio Algiers Intl		11715eu	15160eu	15160va	
2000	2100		Anguilla, Caribbean Beacon		11775am			
2000	2100	vl	Australia, ABC/Alice Springs		2310do			
2000	2100	vl	Australia, ABC/Katherine		2485do			
2000	2100	vl	Australia, ABC/Tennant Creek		2325do			
2000	2100		Australia, Christian Voice Intl		7170pa	9795pa		
2000	2100		Australia, Radio 11880va 12080pa	6080as	7240pa	9500as	9580va	9815as
2000	2100	vl	Botswana, Radio	3356do	4820do			
2000	2100		Bulgaria, Radio	5800eu	7500eu			

2000	2100	vl	Cameroon, RTV	4850do	6005do			
2000	2100		Canada, CBC Northern Service		9625do			
2000	2100		Canada, CFRX Toronto ON		6070do			
2000	2100		Canada, CFVP Calgary AB		6030do			
2000	2100		Canada, CHNX Halifax, NS		6130do			
2000	2100		Canada, CKZN St John's NF		6160do			
2000	2100		Canada, CKZU Vancouver BC		6160do			
2000	2100		China, China Radio Intl	5965eu	9440af	9840eu	13640af	15125af
2000	2100		Costa Rica, R for Peace Intl		15040va	21815usb		
2000	2100		Costa Rica, University Network 11870am 13749na		5030am	6150am	7375am	9724sa
			17645as					
2000	2100		Ecuador, HCJB	11890eu				
2000	2100	mtwhf	Eqt Guinea, Radio Africa		15185af			
2000	2100	a/monthly	Finland, Scandv Weekend Radio		6170va	11690va		
2000	2100	vl	Ghana, Ghana BC Corp		3366do	4915do		
2000	2100		Guyana, Voice of	5950do				
2000	2100		Indonesia, Voice of	9525pa	11785as	15150as		
2000	2100	vl	Italy, IRRS 3980al	3985va				
2000	2100		Kenya, Kenya BC Corp	4885irr	4915irr			
2000	2100		Kuwait, Radio	11990va				
2000	2100	vl	Lesotho, Radio	4800do				
2000	2100		Liberia, ELWA	4760do				
2000	2100		Liberia, R Liberia Intl	5100do				
2000	2100	mtwha	Malta, VO Mediterranean		7440eu			
2000	2100		Namibia, NBC	3270af	3290af	7215irr		
2000	2100		New Zealand, Radio NZ Intl		15160pa			
2000	2100	vl	Nigeria, Radio/Enugu	6025do				
2000	2100	vl	Nigeria, Radio/Ibadan	6050do				
2000	2100	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
2000	2100	vl	Nigeria, Radio/Lagos	3326do	4990do			
2000	2100		Nigeria, Voice of	7255af	11770af	15120va		
2000	2100	vl	Papua New Guinea, NBC		4890do			
2000	2100		Russia, University Network		17765as			
2000	2100		Russia, Voice of Russia	5940eu	5950eu	6175eu	7340eu	9775eu
2000	2100		Russia, World Beacon	3230af	17850af			
2000	2100		S Africa, African Beacon	3230af				
2000	2100	vl	Salomon Islands, SIBC	5020do				
2000	2100	mtwhf	Spain, R Exterior Espana	9595af	9680eu			
2000	2100		Uganda, Radio	5026do	7196do			
2000	2100		UK, BBC World Service 9630af	3255af	6005af	6190af	6195eu	9410eu
			11835af	12095af	15400af	17830af		
2000	2100		UK, World Beacon	3230af	17850af			
2000	2100		USA, Armed Forces Radio		6458usb	12689usb		
2000	2100		USA, KAIJ Dallas TX	13815va				
2000	2100		USA, KJES Vado NM	15385na				
2000	2100		USA, KTBN Salt Lk City UT		15590na			
2000	2100		USA, KWHR Naalehu HI	9930as				
2000	2100		USA, WBCQ Monticello ME		9335na	17495na		
2000	2100		USA, WEWN Birmingham AL		11530na	13615na	15745na	17595eu
2000	2100		USA, WHRA Greenbush ME		17650af			
2000	2100		USA, WHRI Noblesville IN		5745va	9495am		
2000	2100		USA, WINB Red Lion PA	13570am				
2000	2100		USA, WJCR Upton KY	7490am	13595as			
2000	2100		USA, WMLK Bethel PA	15265eu				
2000	2100		USA, WRMI Miami FL	15725am				
2000	2100		USA, WRNO New Orleans LA		7395am	15420am		
2000	2100		USA, WTJC Newport NC	9370na				
2000	2100		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
2000	2100		USA, WWFV McCaysville GA		9400va	12172va		
2000	2100		USA, WYFR Okeechobee FL 17575sa		7580eu	13820af	13855af	15565af
2000	2100	vl	Vanuatu, Radio	3945do	4960do	7260do		
2000	2100		Zambia, Christian Voice	4965do				
2000	2100	vl	Zimbabwe, Zimbabwe BC Corp		4828do	6045do		
2000	2100		USA, WSHB Cyp Creek SC		11550eu	15665af		
2005	2100	vl	Syria, Radio Damascus	12085eu	13610eu			
2025	2045		Italy, RAI Intl 7220af	9710af	11880af			
2030	2045	vl	Libya, Voice of Africa	15435irr	17725af			
2030	2045		Thailand, Radio	9535eu	9655eu	11905eu		
2030	2055		Belgium, RVI Flanders R Intl		9925eu			
2030	2057		Vietnam, Voice of	7145eu	9730eu			
2030	2100		Austria, AWR Europe	5955eu				
2030	2100		Austria, Christian Voice	7170as	9795as	11935pa		
2030	2100	t h	Belarus, Radio Belarus Intl		7105eu	7210eu		
2030	2100		Cuba, Radio Havana	13660usb	13750eu			
2030	2100		Egypt, Radio Cairo	15375af				
2030	2100		Poland, Radio Polonia	5995eu	7165eu	7290eu	9540eu	
2030	2100		S Africa, AWR Africa	15295af				
2030	2100		Sweden, Radio	6065va	9445va			
2030	2100		USA, Voice of America 11975af	6035af	6095as	7415af	9690as	9760as
			13710af	15240af	15580af	17885af	17895af	
2030	2100	as	USA, Voice of America	4950af				
2030	2100		Uzbekistan, Radio Tashkent		5025eu	7105eu	11905eu	
2030	2130		Australia, Christian Voice Intl		11935pa			
2040	2100	mtwhfa	Armenia, Voice of	4810eu	9960eu			
2045	2100		India, All India Radio 11715au	7150va	7410eu	9650au	9910au	11620eu
2050	2100		Vatican City, Vatican Radio		4005eu	5885eu	7250eu	9645eu

2100 UTC - 4PM E / 3PM C / 1PM P

2100	2110		Kenya, Kenya BC Corp	4885irr	4915irr			
2100	2110		Vatican City, Vatican Radio		4005eu	5885eu	7250eu	
2100	2129		Poland, Radio Polonia	5995eu	7165eu	7290eu	9540eu	
2100	2130	vl	Australia, ABC/Alice Springs		2310do			
2100	2130	vl	Australia, ABC/Katherine		2485do			
2100	2130	vl	Australia, ABC/Tennant Creek		2325do			
2100	2130		Australia, Christian Voice Intl		11935pa			
2100	2130		Australia, Radio 12080pa 17715va	7240pa	9500as	9580va	9660pa	11880va
			21740va					
2100	2130		Austria, Christian Voice	7170as	11935pa			
2100	2130		China, China Radio Intl	13640af	15125af			
2100	2130		Cuba, Radio Havana	13660usb	13750eu			
2100	2145		Germany, Deutsche Welle 15410af	17560pa	17835af	9615af	9690af	9765as 15275pa
2100	2145		Iraq, Radio Iraq Intl	7157irr	9887irr	11787irr		
2100	2145		USA, WYFR Okeechobee FL 21525af		7580eu	13820af	15565af	17575sa
2100	2156		North Korea, VO Korea	7505va	11335va			
2100	2157		Czech Rep, Radio Prague Intl		5930va	9430va		
2100	2159		Canada, Radio Canada Intl 11600va		5995va	7235va	7425va	9805va
			13650va					
2100	2200		Anguilla, Caribbean Beacon		11775am			
2100	2200		Australia, Christian Voice Intl		7170pa			
2100	2200		Austria, AWR Europe	9660af				
2100	2200	vl	Botswana, Radio	3356do	4820do			
2100	2200	vl	Cameroon, RTV	4850do	6005do			
2100	2200		Canada, CBC Northern Service		9625do			
2100	2200		Canada, CFRX Toronto ON		6070do			
2100	2200		Canada, CFVP Calgary AB		6030do			
2100	2200		Canada, CHNX Halifax, NS		6130do			
2100	2200		Canada, CKZN St John's NF		6160do			
2100	2200		Canada, CKZU Vancouver BC		6160do			
2100	2200		China, China Radio Intl	5965eu	9840eu			
2100	2200		Costa Rica, R for Peace Intl		15040va	21815usb		
2100	2200		Costa Rica, University Network 11870am 13749na		5030am	6150am	7375am	9724sa
			17645as					
2100	2200		Ecuador, HCJB	11890eu				
2100	2200		Egypt, Radio Cairo	15375af				
2100	2200	mtwhf	Eqt Guinea, Radio Africa		15185af			
2100	2200	f/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
2100	2200	vl	Ghana, Ghana BC Corp		3366do	4915do		
2100	2200		Guyana, Voice of	5950do				
2100	2200		India, All India Radio 11715au	7150va	7410eu	9650au	9910au	11620eu
2100	2200	vl	Italy, IRRS 3980al	3985va				
2100	2200		Japan, Radio 17825pa 21670pa	6115eu	6180eu	11850as	11855af	11920as
2100	2200	vl	Lesotho, Radio	4800do				
2100	2200		Liberia, ELWA	4760do				
2100	2200		Liberia, R Liberia Intl	5100do				
2100	2200		Namibia, NBC	3270af	3290af	7215irr		
2100	2200		New Zealand, Radio NZ Intl		15160pa			
2100	2200	vl	Nigeria, Radio/Enugu	6025do				
2100	2200	vl	Nigeria, Radio/Ibadan	6050do				
2100	2200	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
2100	2200	vl	Nigeria, Radio/Lagos	3326do	4990do			
2100	2200		Nigeria, Voice of	7255af	11770af	15120va		
2100	2200	vl	Papua New Guinea, NBC		4890do			
2100	2200		Romania, R Romania Intl		5955eu	7105eu	7215eu	9690eu
2100	2200		Russia, University Network		17765as			
2100	2200		Russia, Voice of Russia	5940eu	5950eu	6175eu	7300eu	7340eu
2100	2200		Russia, World Beacon	3230af	17850af			
2100	2200		S Africa, African Beacon	3230af				
2100	2200	vl	Salomon Islands, SIBC	5020do	9545do			
2100	2200		South Korea, R Korea Intl		15575eu			
2100	2200	vl	Syria, Radio Damascus	12085eu	13610eu			
2100	2200		UK, BBC World Service 6190af	3255af	5965as	6005af	6110as	
			6195va	9410eu	11835af	12095sa	15400af	
2100	2200		UK, World Beacon	3230af	17850af			
2100	2200		USA, Armed Forces Radio		6458usb	12689usb		
2100	2200		USA, KAIJ Dallas TX	13815va				
2100	2200		USA, KTBN Salt Lk City UT		15590na			
2100	2200		USA, KWHR Naalehu HI	9930as				
2100	2200		USA, Voice of America 7415af	6035af	6040me	6095as	6160as	7140me
			13710af	9530me	9595as	9670as	9760me	11870pa 11975af
				15185pa	15240af	15580af	17735as	17820as 17895af
2100	2200		USA, WBCQ Monticello ME		7415na	9335na	17495na	
2100	2200		USA, WEWN Birmingham AL		11530na	13615na	15745na	17595eu
2100	2200		USA, WHRA Greenbush ME		17650af			
2100	2200		USA, WHRI Noblesville IN		5745va	9495am		
2100	2200		USA, WINB Red Lion PA	13570am				
2100	2200		USA, WJCR Upton KY	7490am	13595as			
2100	2200		USA, WRMI Miami FL	15725am				
2100	2200		USA, WRNO New Orleans LA		7395am	15420am		
2100	2200		USA, WSHB Cyp Creek SC		11550eu	15665af		
2100	2200		USA, WTJC Newport NC	9370na				
2100	2200		USA, WWCR Nashville TN		9475na	12160na	13845na	15685na
2100	2200		USA, WWFV McCaysville GA		9400va	12172va		
2100	2200	vl	Vanuatu, Radio	3945do	4960do	7260do		
2100	2200		Zambia, Christian Voice	4965do				
2100	2200	vl	Zimbabwe, Zimbabwe BC Corp		4828do	6045do		
2115	2130	mtwhf	UK, BBC Caribbean Report		5975am	11675am	15190am	
2115	2130	as	UK, BBC World Service	5975am				
2115	2200		Egypt, Radio Cairo	9990eu				
2118	2200	s	Greece, Voice of	9420pa	15650pa			
2130	2145	tf	UK, BBC Calling Falklands		11680sa			
2130	2200	vl	Australia, ABC/Alice Springs		4835do			
2130	2200	vl	Australia, ABC/Katherine		5025do			
2130	2200	vl	Australia, ABC/Tennant Creek		4910do			
2130	2200		Australia, Radio 12080pa 15415pa	7240pa	9660pa	11550as	11695as	11880va
			17715va	21740va				
2130	2200		Austria, Christian Voice	7170as				
2130	2200	th	Belarus, Radio Belarus Intl		7105eu	7210eu		
2130	2200		Guam, KSDA/ AWR	11960as	11980as			
2130	2200		Iran, VO Islamic Rep. of Iran		9780va	11740va		
2130	2200		Turkey, Voice of	9525as				
2130	2200	f	UK, Wales Radio Intl	6010eu				

2130	2200		Uzbekistan, Radio Toshkent	5025eu	7105eu	11905eu	
2145	2200		USA, WYFR Okeechobee FL	7580eu	15565af		

2200 UTC - 5PM E / 4PM C / 2PM P

2200	2205	vl	Syria, Radio Damascus	12085eu	13610eu			
2200	2215		New Zealand, Radio NZ Intl		15160pa			
2200	2218	s	Greece, Voice of	9420pa	15650pa			
2200	2227		Iran, VO Islamic Rep. of Iran		9780va	11740va		
2200	2230		Canada, Radio Canada Intl		6045va	9770va	9805va	11600va
2200	2230		India, All India Radio	7150va	7410eu	9650au	9910au	11620eu
			11715au					
2200	2230		Mexico, Radio Mexico Intl		9705am	11770am		
2200	2230	vl	Papua New Guinea, NBC		4890do			
2200	2230		South Korea, R Korea Intl		3955eu			
2200	2230		Turkey, Voice of	9525as				
2200	2230		USA, KWHR Naalehu HI	9930as				
2200	2230	mtwhf	USA, Voice of America	6035af	7415af	11655af	11975af	13710af
2200	2230		Yugoslavia, Radio	6100eu				
2200	2245		Egypt, Radio Cairo	9990eu				
2200	2245		USA, WYFR Okeechobee FL		7580eu	11740na	15565af	
2200	2259	as	Spain, R Exterior Espana	9595va	9680eu			
2200	2300		Anguilla, Caribbean Beacon		6090am			
2200	2300	vl	Australia, ABC/Alice Springs		4835do			
2200	2300	vl	Australia, ABC/Katherine		5025do			
2200	2300	vl	Australia, ABC/Tennant Creek		4910do			
2200	2300		Australia, Christian Voice Intl		13620pa	17850pa		
2200	2300		Australia, Radio	11550as	11695as	15240as	15415pa	17715va
			17795va 21740va					
2200	2300		Austria, Christian Voice	13620as	17850as			
2200	2300		Bulgaria, Radio	5800eu	7500eu			
2200	2300	vl	Cameroon, RTV	4850do	6005do			
2200	2300		Canada, CBC Northern Service		9625do			
2200	2300		Canada, CFRX Toronto ON		6070do			
2200	2300		Canada, CFVP Calgary AB		6030do			
2200	2300		Canada, CHNX Halifax, NS		6130do			
2200	2300		Canada, CKZN St John's NF		6160do			
2200	2300		Canada, CKZU Vancouver BC		6160do			
2200	2300		China, China Radio Intl	7175eu				
2200	2300		Costa Rica, R for Peace Intl		15040va	21815usb		
2200	2300		Costa Rica, University Network		5030am	6150am	7375am	9724sa
			11870am 13749na	17645as				
2200	2300	mtwhf	Eqt Guinea, Radio Africa		15185af			
2200	2300	f/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
2200	2300	vl	Ghana, Ghana BC Corp		3366do	4915do		
2200	2300		Guyana, Voice of	3290do	5950do			
2200	2300		Italy, IRRS	3980al	3985va			
2200	2300		Malaysia, Radio	7295do				
2200	2300		Namibia, NBC	3270af	3290af	7215irr		
2200	2300	vl	Nigeria, Radio/Enugu	6025do				
2200	2300	vl	Nigeria, Radio/Ibadan	6050do				
2200	2300	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
2200	2300	vl	Nigeria, Radio/Lagos	3326do	4990do			
2200	2300		Nigeria, Voice of	7255af	11770af	15120va		
2200	2300		Russia, University Network		17765as			
2200	2300	vl	Solomon Islands, SIBC	5020do	9545do			
2200	2300		Taiwan, R Taipei Intl	5810eu	9335eu			
2200	2300		UK, BBC World Service	5965as	5975am	6195va	7105as	9660as
			11685as 11835af	12080pa	15400af			
2200	2300		Ukraine, R Ukraine Intl	5905eu	7240eu	9560eu		
2200	2300		USA, Armed Forces Radio		6458usb	12689usb		
2200	2300		USA, KAIJ Dallas TX	13815va				
2200	2300		USA, KTBN Salt Lk City UT		15590na			
2200	2300		USA, Voice of America	6160as	7215as	7290me	9530me	9770as
			9880as 9890as	11760as	15185as	15290as	15305as	17735as
			17820as					
2200	2300		USA, WBCQ Monticello ME		7415na	9335na	17495na	
2200	2300		USA, WEWN Birmingham AL		9975eu	11530na	15745na	17595eu
2200	2300		USA, WHRA Greenbush ME		17650af			
2200	2300		USA, WHRI Noblesville IN		5745va	9495am		
2200	2300		USA, WINB Red Lion PA	13570am				
2200	2300		USA, WJCR Upton KY	7490am	13595as			
2200	2300		USA, WRMI Miami FL	15725am				
2200	2300		USA, WRNO New Orleans LA		7395am			
2200	2300		USA, WSHB Cyp Creek SC		7510va	15285sa		
2200	2300		USA, WTJC Newport NC	9370na				
2200	2300		USA, WWCR Nashville TN		3215na	7520na	12160na	13845na
2200	2300		USA, WWFV McCaysville GA		9400va	12172va		
2200	2300	vl	Vanuatu, Radio	3945do	4960do	7260do		
2200	2300		Zambia, Christian Voice	4965do				
2200	2359		Liberia, R Liberia Intl	5100do				
2205	2230		Italy, RAI Intl	9675as	11900as			
2216	2300		New Zealand, Radio NZ Intl		17675pa			
2230	2255		Belgium, RVI Flanders R Intl		13700na			
2230	2257		Czech Rep, Radio Prague Intl		7345na	9435af		
2230	2300	smtwhf	Austria, Radio Austria Intl		5945eu	6155eu		
2230	2300		Cuba, Radio Havana	9550am				
2230	2300	mtwhfa	Hungary, Radio Budapest		3975eu	7135eu		
2230	2300	vl	Papua New Guinea, N8C		4890do	11880irr		
2230	2300		Sweden, Radio	6065va	7325va			
2245	2300		India, All India Radio	9705as	9950as	13605as		
2245	2300		USA, WYFR Okeechobee FL		11740na			

2300 UTC - 6PM E / 5PM C / 3PM P

2300	0000		Anguilla, Caribbean Beacon		6090am			
2300	0000	vl	Australia, ABC/Alice Springs		4835do			
2300	0000	vl	Australia, ABC/Katherine		5025do			
2300	0000	vl	Australia, ABC/Tennant Creek		4910do			
2300	0000	vl	Cameroon, RTV	4850do	6005do			
2300	0000		Canada, CBC Northern Service		9625do			
2300	0000		Canada, CFRX Toronto ON		6070do			
2300	0000		Canada, CFVP Calgary AB		6030do			
2300	0000		Canada, CHNX Halifax, NS		6130do			
2300	0000		Canada, CKZN St John's NF		6160do			
2300	0000		Canada, CKZU Vancouver BC		6160do			
2300	0000		China, China Radio Intl	5990na	13680na			
2300	0000		Costa Rica, R for Peace Intl		15040va	21815usb		
2300	0000		Costa Rica, University Network		5030am	6150am	7375am	9925sa
			11870am 13749na	17645as				
2300	0000		Ecuador, HCJB	11785as				
2300	0000		Egypt, Radio Cairo	9900na				
2300	0000	f/monthly	Finland, Scandv Weekend Radio		6170va	11690va		
2300	0000	vl	Ghana, Ghana BC Corp		3366do	4915do		
2300	0000		Guyana, Voice of	3290do	5950do			
2300	0000		India, All India Radio	9705as	9950as	13605as		
2300	0000	fas	Italy, IRRS	7120va	7125al			
2300	0000		Liberia, R Liberia Intl	5100do				
2300	0000		Malaysia, Radio	7295do				
2300	0000		Malaysia, RTM Kota Kinabalu		5980do			
2300	0000		Namibia, NBC	3270af	3290af	7215irr		
2300	0000		New Zealand, Radio NZ Intl		17675pa			
2300	0000	vl	Papua New Guinea, NBC		4890do	11880irr		
2300	0000		Romania, R Romania Intl		7195eu	9510na	9570eu	11940na
2300	0000		Russia, University Network		17765as			
2300	0000		Singapore, SBC Radio One		6150do			
2300	0000	vl	Solomon Islands, SIBC	5020do	9545do			
2300	0000		UK, BBC World Service	3915as	5875eu	5965as	5975am	6035as
			7105as 11685as	11945as	12095sa	15280as		
2300	0000		USA, Armed Forces Radio		6458usb	12689usb		
2300	0000		USA, KAIJ Dallas TX	13815va				
2300	0000		USA, KTBN Salt Lk City UT		15590na			
2300	0000		USA, Voice of America	6160as	7215as	7290me	9530me	9770me
			9880as 9890as	11760as	15185as	15290as	15305as	17735as
			17820as					
2300	0000		USA, WBCQ Monticello ME		7415na	9335na	17495na	
2300	0000		USA, WEWN Birmingham AL		9355na	9975eu	11530na	17595eu
2300	0000		USA, WHRA Greenbush ME		7580eu			
2300	0000		USA, WHRI Noblesville IN		5745va	9495am		
2300	0000		USA, WINB Red Lion PA	12160am				
2300	0000		USA, WJCR Upton KY	7490am	13595as			
2300	0000		USA, WRMI Miami FL	15725am				
2300	0000		USA, WRNO New Orleans LA		7355am			
2300	0000		USA, WSHB Cyp Creek SC		7510va	15285sa		
2300	0000		USA, WTJC Newport NC	9370na				
2300	0000	as	USA, WWBS Macon GA	11900na				
2300	0000		USA, WWCR Nashville TN		3215na	5070na	7520na	13845na
2300	0000		USA, WWFV McCaysville GA		6890va	9400va		
2300	0000	vl	Vanuatu, Radio	3945do	4960do	7260do		
2300	0000		Zambia, Christian Voice	4965do				
2300	2305	vl	Nigeria, Radio/Enugu	6025do				
2300	2305	vl	Nigeria, Radio/Ibadan	6050do				
2300	2305	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
2300	2305	vl	Nigeria, Radio/Lagos	3326do	4990do			
2300	2330		Australia, Radio	9660pa	9730as	11550as	11695as	12080pa
			15240as 15415pa	17715va	17795va	21740va		
2300	2330		Austria, Christian Voice	13620as	17850as			
2300	2330		Canada, Radio Canada Intl		5960am	6040am	6175am	9590am
			9755am 11865am	13730am				
2300	2330		Cuba, Radio Havana	9550am				
2300	2330	mtwhf	Mexico, Radio Mexico Intl		9705am	11770am		
2300	2330		USA, VOA Special English		6045as	7140as	9545as	11925as
			15395as					
2300	2345		Germany, Deutsche Welle		9470as	9815as	13690as	21790as
2300	2345		USA, WYFR Okeechobee FL		11740na	15170sa	15400sa	
2300	2350		Turkey, Voice of	9655na	9830va			
2330	0000		Albania, Radio Tirana Intl		7130eu	9540eu		
2330	0000		Australia, Christian Voice Intl		11935pa	13620pa	17850pa	
2330	0000		Australia, Radio	9660pa	11695as	12080pa	15135as	15240as
			15415pa 17715va	17795va	21740va			
2330	0000		Austria, Christian Voice	11935pa	13620as	17850as		
2330	0000		Canada, Radio Canada Intl		5960na	6175na	9590na	9755na
2330	0000		Malaysia, RTM Sarawak	7160do				
2330	0000		Netherlandsss, Radio	6165na	9845na			
2330	0000		USA, VOA Special English		6045as	7130as	7140as	9545as
			9620as 11805as	11925as	13745as	15205as	15395as	
2330	2345	vl	Libya, Voice of Africa	15435irr	17725af			
2330	2357		Czech Rep, Radio Prague Intl		7345na	9435na		
2330	2357		Vietnam, Voice of	9840as	12019as			
2330	2359		Lithuania, R Vilnius	9875na				
2330	2359		Switzerland, Swiss R Intl	9885sa	11660sa			

Notes:

1. **BBCWS stream abbreviations: (am)=Americas; (eu)=Europe/N. Africa; (me)=Middle East, SW Asia, CIS (former Soviet Union); (wcaf)=West and Central Africa; (esaf)=East and Southern Africa; (af)=both (wcaf) and (esaf); (sas)=South Asia; (eas)=East Asia.**
2. **New this month** in the program listings are frequencies that are most likely to be usable in North America for hearing the various BBCWS program streams. The BBC gives no on-air indication as to which stream a listener is tuned; this additional listing here might reduce confusion for readers. As a general rule, the Asian streams will be better received in western North America and the other streams will be better received in eastern North America. More sophisticated equipment will have better success receiving these offshore streams. For a full listing of frequencies in use, refer to the frequency listing section of the SWG. Be advised also that there have been numerous reports of BBC frequencies being misprogrammed from time to time.
3. **Listings for the US-based independent commercial shortwave broadcasters** are limited to general interest programming that departs from their primary formats of religious and political fare.

0000 UTC/ 7pm E/4pm P - Page 43 Freqs

BBC World Service (am) - *5975, 9915, 12095*
0000 M World Briefing, T-S News; **0001** S Play of the Week (drama); **0005** T-A Outlook (magazine) **0020** M Sports Roundup; **0030** S Arts in Action, M The World Today; **0045** T Patterns of Faith (religion), W Radio History of the World, H Heart & Soul (spiritual matters), F What's the Problem? (advice), A It's a Girl! (women in societies).

BBC World Service (eas) - *6195, 15280, 15360*
0000 D World Briefing; **0020** D Sports Roundup; **0030** S Agenda (trends), M-A World Business Report; **0045** M Letter from America, T/W/F/A Analysis, H From Our Own Correspondent.

BBC World Service (sas) - *5965, 9410, 11955, 15310, 17790*
0000 D World Briefing; **0020** D Sports Roundup; **0030** S Agenda (trends), M-F The World Today, A Science in Action.

Radio Australia
0000 D News; **0005** S The Europeans, A Feedback (letters/station news); **0010** M AWAYE! (Aboriginal culture), T The Science Show, W The National Interest (Australian politics), H Background Briefing (documentary), F Hindsight (Australian history); **0030** A Country Breakfast (rural life).

Radio Bulgaria
0000 D News; **0010** S Views Behind the News, M Folk Studia (Bulgarian folk music), T-A Events and Developments (current affairs review); **0020** T Sports; **0025** T-A Timeout for Music; **0030** A Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places); **0035** T-S Keyword Bulgaria (Bulgaria and things Bulgarian), F Answering Your Letters; **0045** T Magazine Economy, W Arts and Artists; H History Club, F The Way We Live, A Radio Bulgaria Calling (for radio hobbyists).

Radio Canada International
0000 D CBC News; **0005** S Quirks & Quarks (science), M Global Village (world music), T-A As It Happens (interviews with newsmakers)[began at 2330]; **0030** H Dispatches (world events in Canadian perspective).

Radio Netherlands
0000 S/W Music 52-15 (international music), M Dutch Horizons, T Research File (science), H Documentary, F The Sound Fountain ("a torrent of ideas"), A A Good Life (global development); **0015** F From Sapphire to Laser (classical music); **0030** S Roughly Speaking (youth culture), M The Sound Fountain, T EuroQuest (Europe in context), W A Good Life, H Dutch Horizons, F Research File, A Documentary.

Radio Japan
0000 D News; **0010** S Hello from Tokyo (listener contact), M Weekend Square; **0015** T-A 44 Minutes (feature magazine).

Radio New Zealand International
0000 D RNZ News; **0006** S Film Show, M-F Cadenza (light classics), A Home Grown (NZ music, including Musical Chairs-artist feature 0030); **0030** S Bookmarks.

Radio for Peace International, Costa Rica
0000 S World of Radio, M Spiritual Awakening, T-A Freespeech Radio News (Pacifica Reporters Against Censorship daily newscast); **0030** S RFPI Mailbag, M One World—One Family (Bahai program), T/H/A Hightower Radio (commentary), W Radio Nation ("The Nation" magazine), F This Way Out (lesbian/gay magazine); **0035** T/H/A Earthwatch (ecology); **0040** T/H/A Earth & Sky (astronomy); **0045** T Tropical Conservation Newsbureau (rainforests), H World Citizen's Weekly Commentary, A Women (UN) program).

Voice of America (News Now)
0000 T-A World News; **0010** T-A Regional News; **0014** T-A USA News; **0018** T-A Sports; **0022** T-A Features; **0030** T-A World News; **0033** T Encounter, W Our World, H Kaleidoscope, F Best of 'Talk to America' A Press Conference USA.

WBCQ, Maine
7415 kHz.: **0000** S The Real Amateur Radio Show, M Le Show (humor/entertainment), F Goddess Irena 1 Music Show, A The Lost Discs Radio Show; **0030** S Fred Flintstone Music Show, H World of Radio, F Steppin' Out of Babylon.

WWCR, Tennessee
5070 kHz.: **0000** M Into the Blue.

0100 UTC/ 8pm E/5pm P - Page 43 Freqs

BBC World Service (am) - *5975, 9525, 9915, 12095*
0100 S/M The World Today, T-A News; **0105** T Meridian-Masterpiece, W Meridian-Screen, H Meridian-Music, F Meridian-Writing, A Omnibus (documentary); **0130** S Reporting Religion, T Music Mix, W UK Top 20, H/A Westway (drama serial), F World of Music; **0145** S Letter from America (Alistair Cooke comments), H UK Album Chart, A Music X-Press.

BBC World Service (eas) - *6195, 15280, 15360*
0100 S The World Today, M-A News; **0105** M Talking Point (global phone-in), T-A Outlook (magazine); **0130** S In Praise of God (religious service); **0145** M-F Off the Shelf (readings), A Write On or From Where I Stand (British views).

BBC World Service (sas) - *5965, 9410, 11955, 15310, 17790*
0100 D The World Today; **0130** S Assignment, A People and Politics.

China Radio International
0100 D News, **0110** S Report on Developing Countries, M-F Current Affairs, A Global Review; D120 S In the Spotlight (cultural magazine), A Listeners' Garden; **0130** M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China.

Deutsche Welle
0100 D News, **0105** S Talking Point (journalists), M Religion & Society, T-A Newslink (European current affairs); **0115** S Inside Europe, M Arts on the Air; **0130** T Insight (international affairs), W Man & Environment, H Living in Germany, F Hard to Beat: The World of Sport, A German by Radio.

HCJB, Ecuador
0100 S DX Partyline, M Musical Mailbag, T-A Latin American & World News; **0110** T-A Studio 9 (Latin American regional report including T Inside HCJB, W/F Did You Hear? (news comment), H Ham Radio Today, A Musica del Ecuador); **0130** S Saludos Amigos, M Mountain Meditations, T-A A New Beginning; **0145** T-A A Slice of Infinity.

Radio Australia
0100 D News, **0105** S Correspondents' Report, A Asia Pacific (regional current affairs); **0110** M-F Asia Pacific; **0130** S Oz Sounds (new music releases), M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor, A Arts Talk.
[Special service: 0105 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

Radio Habana Cuba
0100 D International News; **0110** M Weekly Review, T-S National News; **0115** T-S Viewpoint; **0130** M Mailbag Show, T-S News Bulletin; **0135** T-A Time Out (sports); **0140** S/W DXers Unlimited, T/F Caribbean Outlook, H Mailbag Show, A Weekly Review

Radio Netherlands
0100 S/M News, T-A Newsline; **0105** S Europe Unzipped, M Wide Angle (week in review)

Radio New Zealand International
0100 D RNZ News; **0105** S Eureka! (science)*, M-F In Touch with New Zealand (music/interviews/variety), A Home Grown (from 0006)*, **0130** S Health or Environment Matters.
[*may be preempted by live sport]

Radio for Peace International, Costa Rica
0100 S Making Contact, M Every Living Thing (nature), T Disability Radio Worldwide, W World of Radio, H A Public Affair, F Far Right Radio Review, A Continent of Media; **0130** S Alternative Radio (political/social analysis), T Earthspan (War & Peace Foundation), W RFPI Mailbag, A World of Radio.

Radio Prague
0100 D News; **0105** S Readings from Czech Literature, M Letter from Prague, T-A Current Affairs; **0110** S Saturday Music (classical/folk/jazz), M The Arts; **0115** M Mailbox, T Spotlight (Czech current events) or One on One (interview), H Czechs in History or Central Europe Today, A Magazine; **0120** W Talking Point, F Economic Report.

Radio Ukraine International
0100 D News; **0106** M Hello From Kiev (listener letters/music); **0010** T-S Ukraine Today (magazine); **0018** S Baroque (the arts), **0020** M Music from Ukraine; **0025** T-F Closeup (current issues).

Voice of America (News Now)
0100 T-A World News; **0110** T-A Regional News; **0114** T-A USA News; **0118** T-A Sports; **0122** T-A Features; **0130** T-A World News; **0133** A Communications World; **0136** T-F Dateline (news magazine), **0145** T-F Science; **0149** T-F Business; **0154** T-F Feature.

Voice of Vietnam
0100 D News; **0105** D Current Affairs; **0110** Su Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; **0115** T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam **0120** S Music, A Literature and Arts.

WBCQ, Maine
7415 kHz.: **0100** S A Different Kind of Oldies Show, M Radio New York International, F Everybody's Uncle, A Allan Weiner Worldwide

WHRI, Indiana
5745 kHz.: **0100** S DXing with Cumbre.

WWCR, Tennessee
5070 kHz.: **0105** W-F Golden Age of Radio Theatre; **0130** A New Horizons (science); **0145** S Ask WWCR (letters).

Radio Austria International
0130 D Report from Austria (magazine); **0135** S Week in Review, M Radio E; **0150** S Listener Letters.

RTE, Ireland
0130 S/M Sportsnews; T-A The News at Six.

Voice of America (Special English)
0130 T-A News; **0140** T Agriculture Today, W/H Science Report, F Environment Report, A In the News; **0145** T Science in the News, W Explorations, H Making of a Nation, F American Mosaic; A American Stories.

0200 UTC/ 9pm E/6pm P - Page 43 Freqs

BBC World Service (am)(me) - *5975, 9410, 9525, 9915, 12095*
0200 S The World Today, M-A News; **0205** M Wright Around the World (musical variety), T Health Matters, W Go Digital, H Sports International, F One Planet (ecology), A Discovery (science); **0230** S From Our Own Correspondent, T Everywoman, W Focus on Faith, H Pick of the World (BBC's best), F People & Places, A Essential Guide.

BBC World Service (eas) - *15280, 15360*
0200 S/T The World Today, M-F News; **0205** M Meridian-Masterpiece, T Meridian-Screen, W Meridian-Music, H Meridian-Writing, F Omnibus (documentary); **0230** S From Our Own Correspondent, M Music Mix, T UK Top 20, W/F Westway (drama serial), H World of Music, A Global Business, **0245** W UK Album Chart, F Music X-Press.

BBC World Service (sas) - *11955, 15310, 17790*
0200 D The World Today; **0230** S From Our Own Correspondent, A Global Business.

HCJB, Ecuador
0200 S Rock Solid, M Hour of Decision, T-A Insight for Living; **0228** T-A Money Minute; **0230** M Renewing Your Mind, T-A Back to the Bible, **0255** T-A Joni and Friends.

Radio Australia
0200 D News; **0205** S Margaret Throsby (interviews and music), A Background Briefing (documentary); **0210** M-F The World Today (ABC Radio flagship news program).
[Special service: 0205 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

Radio Budapest
0200 D News; **0210** S DX Blockbuster; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gatepost (letters), T-A Hungary Today (current events magazine).

Shortwave Guide

Radio Canada International
0200 O News; 0205 S Business Sense, M Maple Leaf Mailbag (w/CIOX report bimonthly); 0210 T-A Canada Today (current events magazine); 0235 S/A Canada in the World, M/H Spotlight (arts & culture), T Media Zone (journalists discuss), W Maple Leaf Mailbag (w/CIOX report bimonthly), F Business Sense.

Radio Habana Cuba
0200 O International News; 0210 M Top Tens (Cuban popular music), T-S Spotlight on the Americas; 0215 S World of Stamps, T-A Reports and music; 0230 M The Jazz Place, T-S News Bulletin; 0235 T-S Reports and music.

Radio Korea International
0200 O News; 0210 S Seoul Report (week in review), M Korean Pop Interactive (requests), T-A News Commentary; 0215 T-A Seoul Calling (magazine); 0230 S From Us to You (letters), M Multiwave Feedback (letters/DX news), T Korea Today & Tomorrow, W Cultural Promenade, H Economic Radar, F Korea & Its Splendors, A Notes of Nostalgia (traditional music).

Radio New Zealand International
0200 O RNZ News; 0205 S/A Music feature or series, M-F In Touch with New Zealand (cont'd from 0105); 0235 S The Band Programme (brass band music).

Radio for Peace International, Costa Rica
0200 S Alternative Radio (from 0130), M New Dimensions ("progressive" ideas), T University Forum (interviews), W Continent of Media, H WINGS (women's news), F RadioNation ('The Nation' magazine), A RFPI Mailbag; 0230 S Far Right Radio Review, T Honoring Mother Earth: Indigenous Voices, W TUC Radio, H Global Community Forum (interviews), F A Woman's Voice, A Disability Radio Worldwide.

Radio Prague
0200 O News; 0205 S Readings from Czech Literature, M Letter from Prague, T-A Current Affairs; 0210 S Saturday Music (classical/folk/jazz), M The Arts; 0215 M Mailbox, T Spotlight (Czech current events) or One on One (interview), H Czechs in History or Central Europe Today, A Magazine; 0220 W Talking Point, F Economic Report.

Radio Romania International
0200 O Radio Newsreel; 0210 S The Week, M Focus, T-A Commentary; 0215 S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate) or The Romanian Next to You (interview), A Challenge for the Future or Terra 2001; 0220 S RRI Encyclopedia, T Political Flash, W European Horizons; 0225 S Roots (culture/traditions), M Romanian by Radio, T/H/A Business Update, W Tourist News, F Listeners' Letterbox; 0230 S Radio Pictures, M Romanian Itineraries, T Pulse of Transition, W W Mother Nature (ecology), H Visit Romania, A Practical Guide; 0235 S Romanian Itineraries, M Listeners' Letterbox, T Performing Arts, W Youth Club, H Partners in a Changing World, A Cultural Survey; 0240 S, Bucharest Along the Centuries, T Pages of Romanian Literature, W/F Skylark (folk music), H Stage and Screen, A Spectator (voice of the people); 0245 S OX Mailbag, T Romanian Hits, H Romanian Musicians, A Romanian Folk Music At Its Best; 0250 M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

Radio Taipei International
0200 O News; 0215 S Great Wall Forum (discussing the mainland), M Jade Bells & Bamboo Pipes (traditional music), T Culture Express, W Taiwan Today, H Instant Noodles, F Taipei Magazine, A Groove Zone; 0230 S Mailbag Time, T Trends, W Confucius and Inspiration Beyond, H Life Unusual, F People; 0245 M-F Let's Learn Chinese (M/W elementary, T/H intermediate, W advanced), A Kaleidoscope (life in Taiwan).
[This schedule also airs at 0700 for western North America.]

Voice of Russia
0200 O News; 0211 S News & Views, M Sunday Panorama, T-A Commonwealth Update; 0224 M Russia: People & Events; 0230 O News in Brief; 0232 S Moscow Yesterday & Today, M Timelines, T Folk Box, W Jazz Show, H Musical Portraits of the 20th Century, F Yours for the Asking, A Christian Message from Moscow; 0146 F Music At Your Request; 0154 H Russia: People & Events.

WBCQ, Maine
7415 kHz.: 0200 S Marion's Attic (vintage recordings), A Tasha Takes Control.

WWCR, Tennessee
5070 kHz.: 0230 S New Horizons (science); 0245 S Ask WWCR (letters).

Radio Sweden
0230 S Weekend (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); 0245 T Sports Scan, W Close Up (profiles of Swedes-1st/3rd), H Money Matters, F Nordic Report (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

Voice of Vietnam
0230 O News; 0235 O Current Affairs; 0240 Su Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; 0245 T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; 0250 S Music, A Literature and Arts.

0300 UTC/ 10pm E/7pm P - Page 44 Freqs

BBC World Service (am) - *5975, 9525*
0300 O World Briefing; 0320 O Sports Roundup; 0330 S Science in Action, M Assignment, T-A World Business Report; 0345 T/W/F/A Analysis, H From Our Own Correspondent.

BBC World Service (me) - *6195, 9410, 12095, 15575*
0300 O World Briefing; 0320 O Sports Roundup; 0330 S Science in Action, M World Business Review, T-A World Business Report; 0345 M Write On or From Where I Stand (British views), T/W/F/A Analysis, H From Our Own Correspondent.

BBC World Service (af) - *7160, 11730, 11765, 12035, 15420**
0300 O World Briefing; 0320 O Sports Roundup; 0330 S Postmark Africa, M-F Network Africa, A African Quiz or This Week And Africa. *(*from 0330)*

BBC World Service (sas) - *15310, 17790, 21830*
0300 O World Briefing; 0320 O Sports Roundup; 0330 S Science in Action, M World Business Review, T-A World Business Report; 0345 M Letter from America (Alistair Cooke comments), T/W/F/A Analysis, H From Our Own Correspondent.

BBC World Service (eas) - *15280, 15360*, 17760, 21660*
0300 S World Briefing, M-A News; 0305 M One Planet (ecology), T Discovery (science), W Health Matters, H Go Digital, F Sports International, A Wright Around the World (music requests); 0320 S Sports Roundup; 0330 S Science in Action, M People & Places, T Essential Guide, W Everywoman, H Focus on Faith, F Pick of the World (BBC's best).

Channel Africa
0300 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

China Radio International
0300 O News; 0310 S Report on Developing Countries, M-F Current Affairs, A Global Review; 0320 S In the Spotlight (cultural magazine), A Listeners' Garden; 0330 M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China.

Deutsche Welle
0300 O News; 0305 S Saturday Review, M Sunday Review, T-A Newslink (European current affairs); 0315 S Spectrum (sci/tech), M Arts on the Air; 0330 T Insight (international affairs), W Man & Environment, H Living in Germany, F Hard to Beat: The World of Sport, A German by Radio.

HCJB, Ecuador
0300 S Inspirational Classics (liturgical classical music), M The Sower, T-A Stories of Great Christians; 0315 M The Word Today, T-A Rendezvous (inspirational music); 0330 S Did You Hear (news comment), M Unshackled (radio's oldest drama series), T Let My People Think (apologetics), W Words for Women, H Adventures in Odyssey (children), F Book & the Spade (religion & archaeology), A Walkin' in the Sunshine (country music); 0345 S Specialized English, W Wonderful Words of Life (hymns), F Science, Scripture & Salvation.

Radio Australia
0300 O News; 0305 S Feedback (letters/station news), A Rural Reporter; 0310 M-F Regional Sports Report; 0320 M-F Pacific Focus (M business, T health, W environment, H sport, F culture); 0330 S Ockham's Razor (a science issue), A Educational series; 0340 M Oz Music Show (rock), T Music Deli (diverse world/folk), W Blacktracker (contemporary Aboriginal music), H Australian Country Style, F Jazz Notes.
[Special service 0305 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

Radio Bulgaria
0300 O News; 0310 S Views Behind the News, M Folk Studio (Bulgarian folk music), T-A Events and Developments; 0320 T Sports; 0325 W-S Timeout for Music; 0330 T Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places); 0335 T Answering Your Letters, W-M Keyword Bulgaria (Bulgaria and things Bulgarian); 0345 S Radio Bulgaria Calling (for radio hobbyists), W Magazine Economy, H Arts and Artists, F History Club, A The Way We Live.

Radio Habana Cuba
0300 O International News; 0310 M Breakthrough (science magazine), T-S National News; 0315 T-S Viewpoint; 0330 M From Havana (Cuban musicians), T-S News Bulletin; 0335 T-A Time Out (sports); 0340 S/W OXers Unlimited, T/F Caribbean Outlook, H Mailbag Show, A Weekly Review.

Radio New Zealand International
0300 S/A RNZ News*, M-F Pacific Regional News; 0305 S Playhouse* (drama for radio), A Tagata o te Moana (Pacific culture); 0308 M Tagata o te Moana, T Top 5, W Pacific Report, H Mailbox (letters & OX news) or RNZI Talk (meet the RNZI staff), F Dateline Pacific; 0330 T New Releases, W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent. [*may be preempted by live sport].

Radio for Peace International, Costa Rica
0300 S Far Right Radio Review (from 0230), M Voices of Our World (Maryknoll program), T Honoring Mother Earth: Indigenous Voices (from 0230), W Living Enrichment Center, H Global Community Forum (from 0230), F A Woman's Voice (from 0230), A Earthspan (War & Peace Foundation); 0330 S Peace Forum, M Perspective (UN program), T In the Moment, W Peace Forum, H Scope (UN program), F Tropical Conservation Newshour (rainforests), A Newmaier Report; 0345 S/M Hightower Report (commentary), T-A UN Today; 0348 S/M Earthwatch (ecology); 0351 S/M Earth & Sky (astronomy); 0355 S/M World Opinion (on terorism).

Radio Taipei International
0300 O News; 0315 S Great Wall Forum (discussing the mainland), M Taiwan Economic Journal, T Culture Express, W New Music Lounge, H Instant Noodles, F Weekend Zoo, A Kaleidoscope (life in Taiwan); 0330 S Asia Pacific, M People, T Trends, H Life Unusual, F Business Chinese, A Mailbag Time; 0345 M-H Let's Learn Chinese (M/H elementary, T intermediate, W advanced), F Business Chinese.

Voice of Russia
0300 O News; 0311 S/M/H Moscow Mailbag, T/F Science & Engineering, W/A Newmarket (business); 0330 O News in Brief; 0332 S Songs from Russia, M This is Russia, T Koleidoscope (Russian events), W Musical Portraits of the 20th Century, H Moscow Yesterday & Today, F Russian by Radio, A Audio Book Club (Russian lit.); 0346 S You Write to Moscow; 0354 W Russia: People & Events.

WHRI, Indiana
17510 kHz.: 0300 OXing with Cumbre.

WWCR, Tennessee
3215 kHz.: 0300 A World of Radio.
5070 kHz.: 0300 S Communications World; 0330 S World of Radio.

Radio Budapest
0330 O News; 0340 S OX Blockbuster; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gotepost (letters), T-A Hungary Today (current events magazine).

Radio Sweden
0330 S Weekend (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); 0345 T Sports Scan, W Close Up (profiles of Swedes-1st/3rd), H Money Matters, F Nordic Report (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

Voice of Vietnam
0330 O News; 0335 O Current Affairs; 0340 Su Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; 0345 T Vietnam: Land & People, W Culture &

Hauser's Highlights

KOREA NORTH: VOK English:

0100-0200	NECHN	6195, 7140, 9345
0100-0200	CAm/SAm	6520, 7580, 11735
0200-0300	SEAs	9325, 11335
0300-0400	NECHN	6195, 7140, 9345
1000-1100	CAm/SAm	3560, 9335, 11710
1000-1100	SEAs	9850, 11735
1300-1400	WEu	4405, 7505, 11335
1300-1400	NAm	9335, 11710
1500-1600	WEu	4405, 7505, 11335
1500-1600	NAm	9335, 11710
1600-1700	ME/NAf	3560, 9975, 11735
1900-2000	WEu	4405, 7505, 11335
2100-2200	WEu	4405, 7505, 11335

(From: http://www.246.ne.jp/~abi/sked-nk.htm Asian Broadcasting Institute) includes feeders(?) 3560, 4405. So they broadcast 2 hpd of English to northeast China? (gh)

Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; 0350 S Music, A Literature and Arts.

0400 UTC/ 11pm E/8pm P - Page 44 Freqs

BBC World Service (am)(eu) - *5975, 6135, 6195, 9410*
0400 S/M The World Today, T-A News; 0405 T Just a Minute (panel game), W The Alternative (music), H Greenfield Collection (classical music), F Jazzmatazz, A Composer of the Month; 0430 S Global Business, M Westway Omnibus (drama serial), T It's a Girl! (women in societies), W Patterns of Faith (religion), H Radio History of the World, F Heart & Soul (spiritual matters), A Write On (letters) or From Where I Stand (British views), 0445 T-A Off the Shelf (book readings).

BBC World Service (me) - *12095, 15575*
0400 D The World Today; 0430 S In Praise of God, A Assignment; 0450 M-F Sports Roundup.

BBC World Service (af) - *6005, 7160, 11765, 15420*
0400 D The World Today; 0430 S African Perspective, M-F Network Africa, A Talkabout Africa.

BBC World Service (sas) - *15310, 17790, 21830*
0400 S The World Today, M-A News; 0405 M Talking Point, T-A Outlook; 0420 S Sports Roundup; 0430 S Science in Action; 0445 M-F Off the Shelf (book readings), A Write On or From Where I Stand (British views).

BBC World Service (eas) - *15280, 17760, 21660*
0400 D The World Today; 0430 S Just a Minute (panel game), A Assignment; 0450 M-F Sports Roundup.

Channel Africa
0400 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

China Radio International
0400 D News; 0410 S Report on Developing Countries, M-F Current Affairs, A Global Review; 0420 S In the Spotlight (cultural magazine), A Listeners' Garden; 0430 M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China.

HCJB, Ecuador
0400 S DX Partyline, M Musical Mailbag, T-A Latin American & World News; 0410 T-A Studio 9 (Latin American regional report including T Inside HCJB, W/F Did You Hear? (news comment), H Ham Radio Today, A Musica del Ecuador); 0430 S Saludos Amigos, M Mountain Meditations, T-A A New Beginning; 0445 T-A A Slice of Infinity.

Radio Australia
0400 D News; 0405 S/A Pacific Focus (S arts, A environment); 0410 M-F Margaret Throsby (interviews and music); 0430 S Arts Talk, A The Buzz (technology issues).
[Special service: 0405 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

Radio Habana Cuba
0400 D International News; 0410 M Weekly Review, T-S Spotlight on the Americas; 0415 S World of Stamps, T-A Reports and music; 0430 M Mailbag Show, T-S News Bulletin; 0435 T-S Reports and music; 0450 M Cuban music.

Radio Netherlands
0430 S/M News; T-A Newsline; 0435 S Europe Unzipped, M Sincerely Yours (letters); 0455 S Insight (commentary), M The Week Ahead (program previews).

Radio New Zealand International
0400 S/A RNZ News, M-F Checkpoint (major RNZ evening news magazine); 0410 S Religion feature or series, A Best of Kim Hill (top interviews of the week)

Radio for Peace International, Costa Rica
0400 S CounterSpin (media analysis), M Music Medicine, T-A Democracy Now! in Exile; 0430 S Freespeech Radio News (repeat of Fri. newscast).

Radio Prague
0400 D News; 0405 S Readings from Czech Literature, M Letter from Prague, T-A Current Affairs; 0410 S Saturday Music (classical/folk/jazz), M The Arts; 0415 M Mailbox, T Spotlight (Czech current events) or One on One (interview), H Czechs in History or Central Europe Today, A Magazine; 0420 W Talking Point, F Economic Report.

Radio Romania International
0400 D Radio Newsreel; 0410 S The Week, M Focus, T-A Commentary; 0415 S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate) or The Romanian Next to You (interview), A Challenge for the Future or Terra 2001; 0420 S RRI Encyclopedia, T Political Flash, W European Horizons; 0425 S Roots (culture/traditions), M Romanian by Radio, T/H/A Business Update, W Tourist News, F Listeners' Letterbox; 0430 S Radio Pictures, M Romanian Itineraries, T Pulse of Transition, W Mother Nature (ecology), H Visit Romania, A Practical Guide; 0435 S Romanian Itineraries, M Listeners' Letterbox, T Performing Arts, W Youth Club, H Partners in a Changing World, A Cultural Survey; 0440 S, Bucharest Along the Centuries, T Pages of Romanian Literature, W/F Skylark (folk music), H Stage and Screen, A Spectator (voice of the people); 0445 S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Romanian Folk Music At Its Best; 0450 M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

Radio Ukraine International
0400 D News; 0406 M Hello From Kiev (listener letters/music); 0410 T-S Ukraine Today (magazine); 0418 S Baroque (the arts); 0420 M Music from Ukraine; 0425 T-F Closeup (current issues).

Radio Vlaanderen Internationaal
0400 S Music from Flanders, M Radio World, T-A News; 0404 T-A Belgium Today; 0408 M Tourism in Flanders, T-A Press Review; 0413 T Focus on Europe, W Green Society (ecology), H/A Around the Arts, F Economics; 0414 M Brussels 1043 (letters); 0418 T Sports, H Around Town, F International Report, A Tourism in Flanders; 0424 M-A Soundbox (Flemish rock)

Voice of Russia
0400 D News; 0411 M Sunday Panorama, T-S News & Views; 0424 M Russia: People & Events; 0430 D News in Brief; 0432 S Kaleidoscope (Russian events), M Audio Book Club (Russian lit.), T/H/A 20th Century, W/F Russian history/culture.

WBCQ, Maine
7415 kHz.: 0400 S The Big Kaboom.

WHRI, Indiana
7315 kHz.. 0430 M DXing with Cumbre.

WWCR Tennessee
5070 kHz.: 0400 S Spectrum (communications discussion); 0430 M The Old Record Shop (vintage recordings).
3215 kHz.: 0405 M Bible's Greatest Heroes; 0445 S Money Matters.

0500 UTC/ 12am E/9pm P - Page 45 Freqs

BBC World Service (am) - *6135*
0500 S News, M-A The World Today; 0505 S Wright Around the World (music requests); 0530 A Arts in Action.

BBC World Service (eu) - *6195, 9410*
0500 D The World Today; 0530 S Reporting Religion, A Network Europe; 0545 S Letter from America (Alistair Cooke comments).

BBC World Service (me) - *11760*
0500 D The World Today; 0530 S Global Business, A Arts in Action.

BBC World Service (esaf) - *15420, 17885*
0500 D The World Today; 0530 S Artbeat, M-F Network Africa, A African Quiz or This Week And Africa.

BBC World Service (wcaf) - *7160, 11765*
0500 D The World Today; 0530 S Artbeat, M-F Network Africa, A Talkabout Africa.

BBC World Service (sas) - *15310, 17790*
0500 S The World Today, M-A News; 0505 M Meridian-Masterpice, T Meridian-Screen, W Meridian-Music, H Meridian Writing, F Omnibus (documentary), A Wright Around the World (music requests); 0530 S Reporting Religion, M Music Mix, T UK Top 20, W/F Westway (drama serial), H World of Music; 0545 S Letter from America (Alistair Cooke comments), W UK Album Chart, F Music X-Press.

BBC World Service (eas) - *11955, 15360, 17760, 21660*
0500 D The World Today; 0530 S Reporting Religion, M It's a Girl! (women in societies), T Patterns of Faith, W Radio History of the World, H Heart and Soul (spiritual matters), F What's the Problem? (advice), A Arts in Action; 0545 S Letter from America (Alistair Cooke comments), M-F Off the Shelf (readings).

Channel Africa
0500 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

China Radio International
0500 D News; 0510 S Report on Developing Countries, M-F Current Affairs, A Global Review; 0520 S In the Spotlight (cultural magazine), A Listeners' Garden; 0530 M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China.

Deutsche Welle
0500 D News; 0505 S Talking Point (journalists), M Religion & Society, T-A Newslink (European current affairs); 0515 S Marks & Markets, M COOL! (youth magazine); 0530 T Insight (international affairs), W Man & Environment, H Living in Germany, F Hard to Beat: The World of Sport, A German by Radio.

HCJB, Ecuador
0500 S Inspirational Classics (liturgical classical music), M Renewing Your Mind, T-S Family Life Today; 0530 S Did You Hear (news comment), M Unshackled (oldest drama on radio), T Let My People Think (apologetics), W Words for Women, H Adventures in Odyssey (children), F The Book & the Spade (religion and archaeology), A Walkin' in the Sunshine (country music); 0545 S Specialized English, W Wonderful Words of Life (hymns), F Science, Scripture & Salvation.

Radio Australia
0500 D News; 0505 S/A Pacific Focus (S business, A sport); 0510 M-F Pacific Beat (Pacific islands magazine with regional sports report @ 0530); 0530 S Fine Music Australia (classical), A Lingua Franca (about language); 0545 A Business Weekend.
[Special service: 0505 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

Radio Habana Cuba
0500 D International News; 0510 M Top Tens (Cuban popular music), T-S National News; 0515 T-S Viewpoint; 0530 M The Jazz Place, T-S News Bulletin; 0535 T-A Time Out (sports); 0540 S/W DXers Unlimited, T/F Caribbean Outlook, H Mailbag Show, A Weekly Review.

Radio Japan
0500 D News; 0510 S Pop Goes Asia, A Hello from Tokyo (listener contact); 0515 M-F 44 Minutes (feature magazine).

Radio Netherlands
0500 S Roughly Speaking (European youth culture), M Dutch Horizons, T Research File (science), W Music 52-15 (international music), H Documentary, F The Sound Fountain ("a torrent of ideas"), A A Good Life (global development).

Radio New Zealand International
0500 D RNZ News; 0507 S Whenua (Maori magazine), M-F What's Going On? (arts & entertainment calendar), A Focus on Politics; 0525 A In a Mellow Tone (jazz); 0530 M Letter from America (BBC), T-H Today in Parliament, F The Pacific Report; 0645 M-F Storytime.

Radio for Peace International, Costa Rica
0500 S TUC Radio, M Neumaier Report, T-A Democracy Now! in Exile (cont'd from 0400); 0515 M Living Enrichment Center; 0530 S Continent of Media

Voice of Nigeria
0500 S Reflections, M-F Wave Train (music), A African Safari (music); 0505 S Link-Up (music requests); 0530 S/A News, M-F VON Scope (news magazine).

Voice of Russia
0500 D News; 0511 S/M Musical Portraits of the 20th Century, T/F Moscow Mailbag, W/A Science and Engineering, H Newmarket (business); 0530 D News in Brief; 0532 S/A Timelines, M Jazz Show, T Yours for the Asking, W Moscow Yesterday and Today, H Folk Box, F Audio Book Club (Russian lit.); 0547 T Music At Your Request.

WBCQ, Maine
7415 kHz.: 0500 S Tom & Darryl (electronic media), M-A Amos 'n Andy

WHRI, Indiana
7580 kHz.: 0530 A DXing with Cumbre.

WWCR, Tennessee
5070 kHz.: 0500 S Cyber Line; 0530 M New Horizons (science/technology); 0545 M Ask WWCR (letters).

0600 UTC/ 1am E/10pm P - Page 45 Freqs

BBC World Service (eu)(me) - *6195, 9410, 11760, 12095, 15575*
0600 D The World Today; 0630 S Agenda (trends), A People and Politics.

BBC World Service (esaf) - *6190, 11940, 17640*
0600 S World Briefing, M-A News; 0605 M Talking Point, T-A Outlook; 0620 S Sports Roundup; 0630 S Agenda (trends); 0645 M-F Off the Shelf (book readings), A Write On or From Where I Stand (British views).

Shortwave Guide

BBC World Service (wcaf) - *6005, 7160, 11765*
0600 D World Briefing; 0620 D Sports Roundup; 0630 S Agenda (trends), M-F Network Africa, A African Quiz or This Week And Africa.

BBC World Service (eas) - *11955, 15360, 21660*
0600 S/A The World Today, M-F News; 0605 M Omnibus (documentary), T Meridian-Masterpiece, W Meridian-Screen, H Meridian-Music, F Meridan-Writing; 0630 S Westway Omnibus, M Composer of the Month, T Music Mix, W UK Top 20, H Just a Minute (panel game), F World of Music, A People and Politics.

BBC World Service (sas) - *15310, 17790*
0600 S/A The World Today, M-F News; 0605 M Omnibus (documentary), T Discovery (science), W Health Matters, H Go Digital, F Sports International; 0630 S Westway Omnibus, M People and Places, T Essential Guide, W Everywoman, H Focus on Faith, F Pick of the World (BBC's best), A People and Politics.

Channel Africa
0600 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

Radio Australia
0600 D News; 0605 S The Europeans, A Feedback (letters/station news); 0610 M-F Regional Sports Report; 0620 M-F Pacific Focus (M business, T health, W environment, H sport, F culture); 0630 A Oz Sounds (new releases); 0640 M Oz Music Show (rock), T Music Deli (diverse world/folk), W Blacktracker (contemporary Aboriginal music), H Australian Country Style, F Jazz Notes.
[Special service: 0605 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

Radio Habana Cuba
0600 D International News; 0610 M Breakthrough (science), T-S Spotlight on the Americas; 0615 S World of Stamps, T-A Reports and music; 0630 M From Havana (Cuban musicians), T-S News Bulletin; 0635 T-S Reports and music.

Radio Japan
0600 D News; 0610 S Weekend Square (Japanese life), A Pop Goes Asia; 0615 M-F Asian Top News (headlines from region's radio); 0625 M Unforgettable Musical Masterpieces, T Let's Learn Japanese, W Japan Music Log, H Brush Up Your Japanese, F Music Beat.

Radio New Zealand International
D600 D RNZ News; 0605 S Future Indicative (magazine for disabled), M Eureka (science), T Best of John Campbell (from weekend morning program), W Musical Choirs (artist feature), H Bookmarks, F Country Life, A Saturday Night (variety); 0630 M Health or Environment Matters, H Feature, F Dateline Pacific; 0635 S This Week in Parliament.

Radio for Peace International, Costa Rica
D600 S World of Radio, M Spiritual Awakening, T-A Freespeech Radio News (Pacifica Reporters Against Censorship daily newscast); 0630 S RFPI Mailbag, M One World—One Family (Bahai program), T/H/A Hightower Radio (commentary), W Radio Nation ("The Nation" magazine), F This Way Out (lesbian/gay magazine); 0635 T/H/A Earthwatch (ecology); 0640 T/H/A Earth & Sky (astronomy); 0645 T Tropical Conservation Newsbureau (rainforests), H World Citizen's Weekly Commentary, A Women (UN program).

Voice of Nigeria
0600 S This Week on VON, M Across the Ages, T Agenda for Peace, W Nigerian Newsletter, H West African Scene, F African Writers, A From the Rocks; 0615 S Listeners' Letters, M Nigeria & Politics, T Nigerian Scene, W Wheel of Progress, H World of the Arts, F Images of Nigeria, A Issues of the Moment; 0630 S/A Weekly Analysis, M-F World News; 0640 M-F Commentary & Press Review; 0645 M-F News about Nigeria.

WBCQ, Maine
7415 kHz.: 0600 S Tom and Darryl (electronic media-1st/3rd wk), H World of Radio.

WHRI, Indiana
5745 kHz.: 0600 A DXing with Cumbre.
7315 kHz.: 0600 A DXing with Cumbre.

WWCR, Tennessee
3210 kHz.: 0600 M World of Radio; 0605 A Rock the Universe (Christian rock music); 0630 M Communications World.
5070 kHz.: 0600 S Keen on Jazz, T Ask WWCR (letters)

1000 UTC/ 5am E/2am P - Page 47 Freqs

BBC World Service (am) - *6195*
1000 S/A World Briefing, M-F World Update; 1020 S/A Sports Roundup; 1030 S Agenda (trends), A Science in Action.

BBC World Service (eu) - *12095, 15485*
1000 S/A World Briefing, M-F News; 1005 M One Planet (ecology), T Discovery (science), W Health Matters, H Go Digital, F Sports International, 1020 S/A Sports Roundup; 1030 S Arts in Action, M People & Places, T Essential Guide, W Everywoman, H Focus on Faith, F Pick of the World (BBC's best), A Science in Action.

BBC World Service (me) - *11760, 15575, 17640*
1000 S/A World Briefing, M-F News; 1020 S/A Sports Roundup; 1030 S Agenda (trends), M-F World Learning (instructional series), A Science in Action.

BBC World Service (eas) - *6195, 9740, 15360*
1000 S/A News, M-F World Update; 1001 S Concert Hall; 1005 A Jazzmatazz; 1030 M-F World Business Report, A Greenfield Collection (classical music); 1045 M-F Sports Roundup.

Radio Australia
1000 D News; 1005 S The Buzz (technology issues), M-F Asia Pacific (regional current affairs), A Pacific Review; 1030 S Rural Reporter, M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor, A In Conversation.

R. New Zealand International
1000 D RNZ News; 1005 S Sportsworld, M-H Kim Hill (interviews), F Sports Story, A The World in Sport; 1030 F Top 5 (music), A NZ News; 1045 A Dateline Pacific.

Radio for Peace International, Costa Rica
1000 S CounterSpin (media analysis), M Music Medicine, T-A Democracy Now! in Exile; 1030 S Freespeech Radio News (repeat of Fri. newscast).

Voice of America (News Now)
1000 D World News; 1010 D Regional News; 1014 D USA News; 1018 D Sports; 1022 D Features; 1030 D World News; 1033 S On the Line (US foreign policy), A Best of 'Talk to America'; 1045 M-F Science, Medicine, Environment; 1049 M-F Business and Economic Report; 1053 M-F Music feature.

WWCR, Tennessee
9475 kHz.: 1030 W Communications World, F World of Radio; 1045 M Eca Watch, T Ask WWCR (letters).
5070 kHz.: 1000 A Big Backyard (Australian country music).

1100 UTC/ 6am E/3am P - Page 48 Freqs

BBC World Service (am) - *6195, 15190*
1100 D World Briefing; 1105 M-F Caribbean Morning Report; 1110 M-F Sports Caribbean; 1115 M-F Caribbean Magazine; 1120 D British News; 1130 S Arts in Action, M-F World Business Report, A World Business Review; 1145 M-H, A Sports Roundup, F Football Extra.

BBC World Service (eu) - *12095, 15485*
1100 D World Briefing; 1120 D British News; 1130 S Network Europe, M-F World Business Report, A World Business Review or The New Europe (4th wk); 1145 M-H Sports Roundup, F Football Extra.

BBC World Service (me) - *15565, 17640*
1100 D World Briefing; 1120 S British News; 1130 S Just a Minute (panel game), M-F World Learning, A Science in Action.

BBC World Service (wcaf) - *17830*
1100 D World Briefing; 1120 D British News; 1130 S Postmark Africa, M-F World Business Report, A Inside Track (African sport); 1145 M-H Sports Roundup, A Football Extra.

BBC World Service (eas) - *6195, 9740, 15360*
1100 S/A World Briefing, M-F News; 1105 M Health Matters, T Go Digital, W Sports International, H One Planet (ecology), F Discovery (science); 1120 S/A British News; 1130 S Play of the Week, M Everywoman, T Focus on Faith, W Pick of the World (BBC's best), H People and Places, F Essential Guide, A Science in Action.

BBC World Service (sas) - *15310, 17700*
1100 S News, M-A World Briefing; 1101 S Concert Hall; 1120 D British News; 1130 M-F World Business Report, A Write On or From Where I Stand (British views); 1145 M-H/A Sports Roundup, F Football Extra.

HCJB, Ecuador
1100 S Let My People Think, M-F Insight for Living, A We Kids; 1128 M-F Money Minute; 1130 S Encounter, M-F Morning in the Mountains (Christian breakfast show w/News 1131, Bible Minute 1134, Scriptural Reading 1142, Beyond the Call 1148), A Down Gilead Lane

Radio Australia
1100 D News; 1105 S Correspondents' Report, M-A Asia Pacific (regional current affairs); 1130 S Business Report, M-F Regional Sports Report, A Fine Music Australia (classical); 1135 M-F Life Matters (personal & social issues).

Radio Japan
1100 D News; 1110 S Hello from Tokyo (listener contact), A Pop Goes Asia; 1115 M-F Asian Top News (headlines from region's radio); 1125 M Unforgettable Music Masterpieces, T Let's Learn Japanese, W Japan Music Log, H Brush Up Your Japanese, F Music Beat.

Radio Korea International
1130 D News; 1140 S Seoul Report (week in review), M Korean Pop Interactive (requests), T-A News Commentary; 1145 T-A Seoul Calling (magazine).

Radio Netherlands
1130 S/A News, M-F Newsline; 1135 S Wide Angle (week in review), A Europe Unzipped; 1155 S The Week Ahead (program previews), A Insight (commentary).

Radio for Peace International, Costa Rica
1100 S TUC Radio, M Neumaier Report, T-A Democracy Now! in Exile (cont'd from 1000); 1115 M Living Enrichment Center; 1130 S Continent of Media.

Radio New Zealand International
1100 D RNZ News; 1105 S Mediawatch, M-F Late Edition (the day's news), A Deep Purple (relaxing music/nostalgia), 1130 S Sunday Supplement (NZ opinions).

WHRI, Indiana
9495 kHz.: 1100 A DXing with Cumbre.

WWCR, Tennessee
5070 kHz.: 1100 A The Old Record Shop (vintage recordings).
15685 kHz.: 1115 S Ask WWCR (letters).

1200 UTC/ 7am E/4am P - Page 48 Freqs

BBC World Service (am) - *6195, 15190*
1200 D Newshour; 1205 M-F Caribbean Business; 1210 M-F Caribbean Morning Report; 1215 M-F Newshour (cont'd.).

BBC World Service (eu)(wcaf) - *12095, 15485, 17830*
1200 D Newshour.

BBC World Service (me) - *15565, 15575, 17640*
1200 D News; 1205 S The Alternative (music), M Omnibus (documentary), T Meridian-Masterpiece, W Meridian-Screen, H Meridian-Music, F Meridian-Writing, A Wright Around the World (music requests); 1230 S Global Business, M Composer of the Month, T Music Mix, W UK Top 20, H Just a Minute (panel game), F World of Music.

BBC World Service (esaf) - *21470*
1200 S/A Newshour, M-F News; 1205 M-F Outlook (magazine); 1245 M A Radio History of the World, T Heart and Soul (spiritual matters), W What's the Problem? (advice), H It's a Girl (women in societies), F Patterns of Faith.

BBC World Service (eas) - *6195, 9740, 15360*
1200 S Play of the Week (cont'd. from 1130), M-A News; 1205 M-F Outlook (magazine), A Just a Minute (panel game); 1230 S Agenda (trends), A Assignment; 1245 M Patterns of Faith (religion), T Radio History of the World, W Heart and Soul (spiritual matters), H Best of 'The Edge', F It's a Girl (women in societies).

BBC World Service (sas) - *15310, 17700*
1200 D News; 1205 S Write Around the World (music requests), M-F Outlook (magazine), A Just a Minute (panel game); 1235 A Greenfield Collection (classical music); 1245 M Patterns of Faith (religion), T Radio History of the World, W Heart and Soul (spiritual matters), H Best of 'The Edge', F It's a Girl (women in societies).

HCJB, Ecuador
1200 S Moody Presents, M-F Morning in the Mountains (cont'd. from 1130 w/News & Sports 1200, Insights 1205, Mission Network News 1224, News 1230, Church Doctor 1233, Did You Hear? 1245), A Adventures in Odyssey; 1230 S The Living Word, A Toonz!.

Radio Australia
1200 D News; 1205 S Country Club (country music), M-H Late Night Live (discussion and interviews), F Sound Quality (innovative music), A The Spirit of Things (spiritual matters).

Radio Korea International
1200 S From Us to You (letters), M Multiwave Feedback (letters/DX news), T Korea Today & Tomorrow, W Cultural Promenade, H Economic Radar, F Korea & Its Splendors, A Notes of Nostalgia (traditional music).

Shortwave Guide

Radio Netherlands
1200 S The Sound Fountain ("a torrent of ideas"), M EuroQuest (Europe in context), T A Good Life (development issues), W Dutch Horizons, H Research File (science), F Documentary, A Roughly Speaking (youth culture); 1230 S Dutch Horizons, M Research File, T Music 52-15 (international music), W Documentary, H The Sound Fountain, F A Good Life, A The Sound Fountain.

Radio for Peace International, Costa Rica
1200 S World of Radio, M Spiritual Awakening, T-A Freespeech Radio News (Pacifica Reporters Against Censorship daily newscast); 1230 S RFPI Mailbag, M One World—One Family (Bahai program), T/H/A Hightower Radio (commentary), W Radio Nation ("The Nation" magazine), F This Way Out (lesbian/gay magazine); 1235 T/H/A Earthwatch (ecology); 1240 T/H/A Earth & Sky (astronomy); 1245 T Tropical Conservation Newsbureau (rainforests), H World Citizen's Weekly Commentary, A Women (UN program).

Radio Sweden
1230 S In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report)A Weekend (Europe magazine-1st week)/ Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); 1245 M Sports Scan, T Close Up (profiles of Swedes-1st/3rd), W Money Matters, H Nordic Report (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

WWCR, Tennessee
5070 kHz.: 1200 S Profiles; 1205 A This Week in Americana (antiques/collectibles).
15685 kHz.: 1200 T World of Radio; 1210 A A View from Europe; 1215 A Eco Watch (ecology); 1230 M We Believe, A World of Radio.

1300 UTC/ 8am E/5am P - Page 49 Freqs

BBC World Service (am) - *6195, 15190*
1300 D News; 1301 S Concert Hall; 1305 M-F Outlook (magazine), A Jazzmatazz; 1330 A People & Politics; 1345 M-F Off the Shelf (book readings).

BBC World Service (eu) - *12095, 15485*
1300 D News; 1305 S The Alternative (music), M-F Outlook (magazine), 1305 A Wright Around the World (music requests); 1330 S Global Business; 1345 M Radio History of the World, T Heart and Soul (spiritual matters), W What's the Problem? (advice), H It's a Girl (women in societies), F Patterns of Faith (religion).

BBC World Service (me) - *15565, 15575, 17640*
1300 D Newshour.

BBC World Service (weaf) - *17830*
1300 D News; 1305 S Concert Hall, M Omnibus (documentary), T Meridian-Masterpiece, W Meridian-Screen, H Meridian-Music, F Meridian-Writing, A Jazzmatazz; 1330 M Composer of the Month, T Music Mix, W UK Top 20, H Just a Minute (panel game), F World of Music, A Arts in Action.

BBC World Service (esaf) - *21470*
1300 D News; 1305 S Concert Hall, M Omnibus (documentary), T Meridian-Masterpiece, W Meridian-Screen, H Meridian-Music, F Meridian-Writing, A Jazzmatazz; 1330 M Composer of the Month, T Music Mix, W UK Top 20, H Just a Minute (panel game), F World of Music, A People and Politics.

BBC World Service (eas)(sas) - *6195, 9740, 15310, 15360, 17700*
1300 D Newshour; 1350 M-F World Business Report.

Channel Africa
1300 S/A Channel Africa Extra (weekend variety magazine).

China Radio International
1300 D News; 1310 S Report on Developing Countries, M-F Current Affairs, A Global Review; 1320 S In the Spotlight (cultural magazine), A Listeners' Garden; 1330 M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China.

HCJB, Ecuador
1300 S Viewpoint, M-F Precept, A Toonz! (from 1230); 1313 M-F Getting the Message; 1315 M-F Proclaim; 1330 S Mountain Meditations, M-F Family Life Today, A Rock Solid.

Radio Australia
1300 D News; 1305 S Country Club (cont'd. from 1205), A The Science Show; 1310 M-F Regional Sports Report; 1315 M-F The Planet (diverse music from around the world).

Radio Canada International
1300 M-F News; 1310 M-F This Morning (magazine)

Radio Netherlands
1300 S/A News, M-F Newsline; 1305 S Sincerely Yours (listener letters), A Europe Unzipped.

Radio for Peace International, Costa Rica
1300 S Making Contact, M Every Living Thing (nature), T Disability Radio Worldwide, W World of Radio, H A Public Affair, F Far Right Radio Review, A Continent of Media; 1330 S Alternative Radio (political/social analysis), T Earthspan (War & Peace Foundation), W RFPI Mailbag, A World of Radio.

WHRI, Indiana
6040 kHz.: 1300 A DXing with Cumbre.
15105 kHz.: 1330 A DXing with Cumbre.

WWCR, Tennessee
5070 kHz.: 1305 A Rock the Universe (Christian rock music).
15685 kHz.: 1330 H Communications World; 1345 M Eco Watch (ecology).

Radio Sweden
1330 S In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report)A Weekend (Europe magazine-1st week)/ Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); 1345 M Sports Scan, T Close Up (profiles of Swedes-1st/3rd), W Money Matters, H Nordic Report (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

YLE Radio Finland
1330 M-H Finland This Morning (magazine), F-S News; 1335 S/F Capitol Cafe (conversations), A Finland This Week (review); 1345 A Starting Finnish (language course).

1400 UTC/ 9am E/6am P - Page 49 Freqs

BBC World Service (am)(sas) - *15190, 15310, 17700*
1400 D News; 1405 S Talking Point (global phone-in), M Meridian-Masterpiece, T Meridian-Screen, W Meridian-Music, H Meridian-Writing, F Omnibus (documentary), A Sportsworld (live action); 1430 M Music Mix, T UK Top 20, W/F Westway (drama serial), H World of Music; 1445 W UK Album Chart, F Music X-Press.

BBC World Service (eu) - *12095, 15485*
1400 D News; 1405 S Talking Point (global phone-in), M Omnibus (documentary), T Meridian-Masterpiece, W Meridian-Screen, H Meridian-Music, F Meridian-Writing, A Sportsworld (live action); 1430 M Composer of the Month, T Music Mix, W UK Top 20, H Just a Minute (panel game), F World of Music.

BBC World Service (me)(weaf) - *15565, 17640, 17830*
1400 D News; 1405 S Talking Point (global phone-in), M Discovery (science), T Health Matters, W Science View, H Sports International, F One Planet (ecology), A Sportsworld (live action); 1430 M Essential Guide, T Everywoman, W Focus on Faith (religion), H Pick of the World (BBC's best), F People and Places.

BBC World Service (esaf) - *21470, 21660*
1400 S/A News, M-F World Briefing; 1405 S Talking Point (global phone-in), A Sportsworld (live action); 1420 M-F World Business Report; 1430 M-F British News; 1445 M-H Sports Roundup, F Football Extra.

BBC World Service (eas) - *6135, 6195, 9740*
1400 S/A News, M-F East Asia Today; 1405 S Talking Point (global phone-in), A Sportsworld (live action); 1430 M-F British News; 1445 M-H Sports Roundup, F Football Extra.

Channel Africa
1400 S/A Channel Africa Extra (cont'd from 1300).

China Radio International
1400 D News; 1410 S Report on Developing Countries, M-F Current Affairs, A Global Review; 1420 S In the Spotlight (cultural magazine), A Listeners' Garden; 1430 M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China.

HCJB, Ecuador
1400 S Renewing Your Mind, M-F Haven, A Rock Solid (from 1330).

Radio Australia
1400 D News; 1405 S Books & Writing, M-F The Planet (cont'd. from 1315), A New Dimensions ("progressive" ideas).

Radio Canada International
1400 D News; 1405 S The Sunday Edition (arts/ideas magazine), M-F This Morning (cont'd. from 1310), A The House (Canadian politics).

Radio Japan
1400 D News; 1410 S Pop Goes Asia, A Weekend Square (Japanese life); 1415 M-F 44 Minutes (feature magazine).

Radio for Peace International, Costa Rica
1400 S Alternative Radio (from 1330), M New Dimensions ("progressive" ideas), T University Forum (interviews), W Continent of Media, H WINGS (women's news), F RadioNation ('The Nation' magazine), A RFPI Mailbag; 1430 S Far Right Radio Review, T Honoring Mother Earth: Indigenous Voices, W TUC Radio, H Global Community Forum (interviews), F A Woman's Voice, A Disability Radio Worldwide.

Radio Prague
1400 D News; 1405 S Letter from Prague, M-F Current Affairs, A Readings from Czech Literature; 1410 S The Arts, A Saturday Music (classical/folk/jazz); 1415 S Mailbox, M Spotlight (Czech current events) or One on One (interview), W Czechs in History or Central Europe Today, F Magazine; 1420 T Talking Point, H Economic Report.

WWCR, Tennessee
15685 kHz.: 1415 A Ask WWCR (letters).

Radio Netherlands
1430 S/A News, M-F Newsline; 1435 S Wide Angle (week in review), A Europe Unzipped; 1455 S The Week Ahead (program previews), A Insight (commentary).

Radio Sweden
1430 S In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report)A Weekend (Europe magazine-1st week)/ Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); 1445 M Sports Scan, T Close Up (profiles of Swedes-1st/3rd), W Money Matters, H Nordic Report (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

1500 UTC/ 10am E/7am P - Page 50 Freqs

BBC World Service (am) - *15190*
1500 D News; 1501 S The Alternative (music); 1505 M One Planet (ecology), T Discovery (science), W Health Matters, H Go Digital, F Sports International, A Sportsworld (live action); 1530 S Composer of the Month, M People & Places, T Essential Guide, W Everywoman, H Focus on Faith, F Pick of the World (BBC's best).

BBC World Service (eu) - *9410, 12095, 15485*
1500 D News; 1505 S Assignment, M Discovery (science), T Health Matters, W Go Digital, H Sports International, F One Planet (ecology), A Sportsworld (live action); 1530 S People and Politics, M Essential Guide, T Everywoman, W Focus on Faith, H Pick of the World (BBC's best), F People & Places.

BBC World Service (me) - *15565*
1500 S/A News, M-F World Briefing; 1501 S Concert Hall; 1505 A Sportsworld; 1530 M-F British News; 1545 M-F Sports Roundup.

BBC World Service (weaf) - *15400, 17830*
1500 D News; 1501 S Play of the Week; 1505 M-F Focus on Africa, A Sportsworld; 1530 M-F World Learning (instructional series).

BBC World Service (esaf) - *21470, 21660*
1500 D News; 1501 S The Alternative (music); 1505 M-F Focus on Africa, A Sportsworld; 1530-M-F World Learning (instructional series).

BBC World Service (eas) - *6195, 9740*
1500 D News; 1501 S The Alternative (music); 1505 M Meridian-Masterpiece, T Meridian-Screen, W Meridian-Music, H Meridian-Writing, F Omnibus (documentary), A Sportsworld (live action); 1530 M Music Mix, T UK Top 20, W/F Westway (drama serial), H World of Music; 1545 W UK Album Chart, F Music X-Press.

BBC World Service (sas) - *15310, 17700*
1500 S/A News, M-F World Briefing; 1501 S Play of the Week (radio drama); 1505 A Sportsworld; 1530 M-F British News; 1545 M/T/H/F Analysis, W From Our Own Correspondent.

China Radio International
1500 D News; 1510 S Report on Developing Countries, M-F Current Affairs, A Global Review; 1520 S In the Spotlight (cultural magazine), A Listeners' Garden; 1530 M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China.

Radio Australia
1500 D News; 1505 S Encounter (religion in Australia), M-F Asia Pacific (regional current affairs), A Melisma (innovative music); 1530 M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor

Shortwave Guide

Radio Austria International
1530 D Report from Austria (magazine); 1535 S Radio E, A Week in Review; 1550 A Listener Letters.

Radio Canada International
1500 D News; 1505 S The Sunday Edition (cont'd. from 1410), M-F This Morning (cont'd. from 1310), A Vinyl Cafe (humor/music); 1530 F C'est La Vie (life in French Canada); 1545 M-H Out Front (short features by independent producers).

Radio Netherlands
1500 S Dutch Horizons, M Research File (science), T Music 52-15 (international music), W Documentary, H The Sound Fountain ("a torrent of ideas"), F A Good Life (development issues), A The Sound Fountain; 1530 S The Sound Fountain, M EuroQuest (Europe in context), T A Good Life, W Dutch Horizons, H Research File, F Documentary, A Roughly Speaking (European youth culture).

Radio for Peace International, Costa Rica
1500 S For Right Radio Review (from 1430), M Voices of Our World (Maryknoll program), T Honoring Mother Earth: Indigenous Voices (from 1430), W Living Enrichment Center, H Global Community Forum (from 1430), F A Woman's Voice (from 1430), A Earthspan (War & Peace Foundation); 1530 S Peace Forum, M Perspective (UN program), T In the Moment, W Peace Forum, H Scope (UN program), F Tropical Conservation Newshour (rainforests), A Newmaier Report; 1545 S/M Hightower Report (commentary), T-A UN Today; 1548 S/M Earthwatch (ecology); 1551 S/M Earth & Sky (astronomy); 1555 S/M World Opinion (on terrorism).

Voice of Russia
1500 D News; 1511 S Sunday Panorama, M-A News & Views; 1520 S Russia: People and Events; 1530 D News in Brief; 1532 S Kaleidoscope, M Folk Box, T/H Yours for the Asking, W Jazz Show, F Moscow Yesterday & Today, A Timelines, 1547 Music At Your Request.

WWCR, Tennesee
12160 kHz.: 1505 A Golden Age of Radio Theatre.

1600 UTC/ 11am E/8am P - Page 50 Freqs

BBC World Service (am) - *15190*
1600 S-F World Briefing, A News; 1605 A Sportsworld (live action); 1620 S British News; 1630 S Reporting Religion, M/T/H/F Analysis, W From Our Own Correspondent; 1645 M-F Sports Roundup.

BBC World Service (eu) - *9410*
1600 S/A News, M-F World Briefing; 1601 S Concert Hall; 1605 A Sportsworld (live action); 1620 M-F British News; 1630 M/T/H Analysis, W From Our Own Correspondent, F Analysis or The New Europe (4th wk); 1645 M-F Sports Roundup.

BBC World Service (me) - *12095, 15565*
1600 S World Briefing, M-A News; 1605 M-F Outlook (magazine), A Sportsworld (live action); 1620 S British News; 1630 S Reporting Religion; 1645 S Sports Roundup, M Patterns of Faith (religion), T Radio History of the World, W Heart and Soul (spiritual matters), H What's the Problem? (advice), F It's a Girl (women in societies).

BBC World Service (af) - *15420, 17830, 21470, 21660*
1600 S World Briefing, M-A News; 1605 M Meridian-Masterpiece, T Meridian-Screen, W Meridian-Music, H Meridian-Writing, F Omnibus (documentary), A Sportsworld (live action); 1620 S British News; 1630 S Reporting Religion, M/F Fast Track (African sport), T African Perspective, W Talkabout Africa, H Artbeat; 1645 S Sports Roundup.

BBC World Service (sas) - *15310, 17700*
1600 S World Briefing, M-A News; 1605 M Health Matters, T Go Digital, W Sports International, H One Planet (ecology), F Discovery (science), A Sportsworld (live action); 1620 S British News; 1630 S Reporting Religion, M Everywoman, T Focus on Faith, W Pick of the World (BBC's best), H People & Places, F Essential Guide; 1645 S Sports Roundup.

HCJB, Ecuador
1600 S Message of Truth, M-F Renewing Your Mind, A Words of Hope.

Radio Australia
1600 D News; 1605 S The National Interest (Australian politics), M Margaret Throsby (interview and music), T The Comfort Zone (Australian homes/gardens/food), W Verbatim (oral histories), H Hindsight (Australian history), F AWAYE! (Aboriginal culture), A Melisma (cont'd. from 1505); 1630 W Earshot (Australian voices).

Radio Canada International
1600 S/A News; 1605 S The Sunday Edition (cont'd. from 1410), A Quirks and Quarks (science).

Radio Netherlands
1600 S/A News, M-F Newsline; 1605 S Sincerely Yours (listener letters), A Europe Unzipped.

Radio for Peace International, Costa Rica
1600 S Music Medicine, M-F Democracy Now! in Exile, A CounterSpin (media analysis); 1630 A Freespeech Radio News (repeat of Fri. newscast).

Voice of Russia
1600 D News; 1611 S Moscow Mailbag, M-F Focus on Asia and the Pacific, A Newmarket; 1630 D News in Brief; 1632 S Russian by Radio, M This is Russia, T Moscow Yesterday & Today, W Audio Book Club, H Folk Box, F Songs from Russia, A Kaleidoscope; 1647 You Write to Moscow.

WWCR, Tennessee
5070 kHz.: 1600 M A View from Europe.

1700 UTC/ 12pm E/9am P - Page 51 Freqs

BBC World Service (eu) - *9410*
1700 S News, M-F Europe Today, A World Briefing; 1705 S Sportsworld (live action); 1720 A British News; 1730 M-F World Business Report, A Sportsworld; 1745 M-F Sports Roundup.

BBC World Service (me) - *15565*
1700 S-F News, A World Briefing; 1705 S Sportsworld (live action), M Meridian-Masterpiece, T Meridian-Screen, W Meridian-Music, H Meridian-Writing, F Omnibus (documentary); 1720 A British News; 1730 M Music Mix, T UK Top 20, W/F Westway (drama serial), H World of Music, A Sportsworld; 1745 W UK Album Chart, F Music X-Press.

BBC World Service (af) - *17830, 21470*
1700 D News; 1705 D Focus on Africa; 1745 S/A Sportsworld (live action), M-F Sports Roundup.

Radio Australia
1700 D News; 1705 S The Spirit of Things (spiritual matters), M-F Bush Telegraph (rural life), A New Dimensions ("progressive" ideas).

Radio Japan
1700 D News, 1710 S Hello from Tokyo (listener contact), A Pop! Goes Asia; 1715 M-F 44 Minutes (feature magazine).

Radio for Peace International, Costa Rica
1700 S Neumaier Report, M-F Democracy Now! in Exile (cont'd from 1600), A TUC Radio; 1715 S Living Enrichment Center; 1730 A Continent of Media.

Voice of Russia
1700 D News; 1711 S/T Science & Engineering, M/H Newmarket, W/F Moscow Mailbag, A Music & Musicians; 1730 S-F News in Brief; 1732 S Timelines, M/W/F 20th Century, T/H Cultural programs.

WWCR, Tennessee
15685 kHz.: 1700 M-F World Wide Country Radio (country music); 1745 A New horizons (science).

1800 UTC/ 1pm E/10am P - Page 51 Freqs

BBC World Service (eu) - *9410*
1800 D News; 1801 S Play of the Week (radio theatre); 1805 M-F Outlook (magazine), A Global Business; 1830 A Agenda (trends); 1845 M Patterns of Faith, T Radio History of the World, W Heart and Soul (religion), H What's the Problem? (advice), F It's a Girl (women in societies).

BBC World Service (wcaf) - *15400, 17830*
1800 D World Briefing; 1820 D British News; 1830 S Assignment, M-F World Business Report, A World Business Review; 1845 M/T/H/F Analysis, W From Our Own Correspondent, A Letter from America.

BBC World Service (esaf) - *9630, 21470*
1800 S/A World Briefing, M-F News; 1805 M Health Matters, T Go Digital, W Sports International, H One Planet (ecology), F Discovery (science); 1820 S/A British News; 1830 S Assignment, M Everywoman, T Focus on Faith, W Pick of the World (BBC's best), H People and Places, F Essential Guide, A World Business Review; 1845 A Letter from America

Radio Australia
1800 D News; 1805 S-H Pacific Beat (regional magazine), F Pacific Review, A Educational series, 1830 F Educational series.

Radio for Peace International, Costa Rica
1800 S Spiritual Awakening, M Steppin' Out of Babylon, T RadioNation ('The Nation' magazine), W A Better World, H Like It Is, F WINGS (women's news), A World of Radio; 1830 S One World—One Family (Bahai program), M/W/F Hightower Radio (commentary), T Radio Nation ("The Nation" magazine), H This Way Out (lesbian/gay magazine), A RFPI Mailbag; 1835 M/W/F Earthwatch (ecology); 1840 M/W/F Earth & Sky (astronomy); 1845 M Tropical Conservation Newsbureau (rainforests), W World Citizen's Weekly Commentary, F Women (UN program).

Voice of Russia
1800 D News; 1811 S Music & Musicians, M/H/S Moscow Mailbag, T/F Newmarket, W Science & Engineering; 1830 M-A News in Brief; 1832 M Kaleidoscope, T Yours for the Asking, W Moscow Yesterday & Today, H Russian Musical Portraits of 20th Century, F Folk Box, A Songs from Russia; 1846 T Music At Your Request, A You Write to Moscow; 1854 H Russia: People & Events.

1900 UTC/ 2pm E/11am P - Page 52 Freqs

BBC World Service (eu) - *9410*
1900 S/A World Briefing, M-F News; 1905 M Meridian-Masterpiece, T Meridian-Screen, W Meridian-Music, H Meridian-Writing, F Omnibus (documentary); 1920 S/A British News;
1930 S Science in Action, M Music Mix, T UK Top 20, W/F Westway (drama serial), H World of Music, A World Business Review; 1945 W UK Album Chart, F Music X-Press, A Letter from America (Alistair Cooke comments).

BBC World Service (wcaf) - *15400, 17830*
1900 D News; 1905 S From Our Own Correspondent, M-F Focus on Africa, A Westway Omnibus (drama serial); 1930 S It's a Girl (women in societies), M/F Fast Track (African sport), T Artbeat, W Talkabout Africa, H Postmark Africa; 1935 A Greenfield Collection (classical music requests).

BBC World Service (esaf) - *9630, 12095*
1900 S-F News, A World Briefing; 1905 S Wnght Around the World (music requests), M-F Focus on Africa; 1920 A Sports Roundup; 1930 M Music Mix, T UK Top 20, W/F Westway (drama senal), H World of Music, A Science in Action; 1945 W UK Album Chart, F Music X-Press.

Radio Australia
1900 D News; 1905 S-H Pacific Beat (regional magazine), F Pacific Focus (health), A Australia All Over; 1930 F In Conversation.

Radio for Peace International, Costa Rica
1900 S Every Living Thing (nature), M Disability Radio Worldwide, T World of Radio, W A Public Affair, H Far Right Radio Review, F Continent of Media, A Making Contact; 1930 M Earthspan (War & Peace Foundation), T RFPI Mailbag, F World of Radio, A Alternative Radio (political/social analysis).

Voice of Russia
1900 D News; 1911 S Sunday Panorama, M-A News & Views; 1924 S Russia: People & Events; 1930 D News in Brief: 1932 S/T This is Russia, M Moscow Yesterday & Today, W Kaleidoscope, H Audio Book Club, F Russian by Radio, A Christian Message from Moscow.

WHRI, Indiana
13760 kHz.: 1900 A DXing with Cumbre.

WWCR, Tennessee
12160 kHz.: 1945 A Money Matters.

2000 UTC/ 3pm E/12pm P - Page 52 Freqs

BBC World Service (eu) - *9410*
2000 S World Briefing, M-F News, A News; 2001 A From Our Own Correspondent; 2005 M Health Matters, T Science View, W Sports International, H One Planet (ecology), F Discovery (science); 2020 S Sports Roundup; 2030 S Science in Action, M Everywoman, T Focus on Faith, W Pick of the World (BBC's best), H People and Places, F Essential Guide, A Westway Omnibus (drama serial).

BBC World Service (af) - *9630, 12095, 15400, 17830*
2000 D Newshour; 2050 D Sports Roundup.

Radio Australia
2000 D News; 2005 S-H Pacific Beat (regional magazine), F Pacific Review, A Australia All Over (cont'd from 1905); 2030 F Country Breakfast (rural issues); 2045 A News; 2050 A Asia Sunday.

Radio for Peace International, Costa Rica
2000 S New Dimensions ("progressive" ideas), M University Forum (interviews), T Continent

of Media, W WiNGS (women's news), H RadioNation ('The Nation' magazine), F RFPI Mailbag, A Alternative Radio (from 1930); 2030 M Honoring Mother Earth: Indigenous Voices, T TUC Radio, W Global Community Forum (interviews), H A Woman's Voice, F Disability Radio Worldwide, A Far Right Radio Review.

Voice of Russia
2000 D News; 2011 S Music & Musicians, M/H Science & Engineering, T/F Moscow Mailbag, W/A Newmarket; 2030 M-A News in Brief; 2032 M Songs from Russia, T Yours for the Asking, W Musical Portraits of 20th Century, H Folk Box, F Jazz Show, A Russian by Radio; 2046 M Your Write to Moscow, T Music At Your Request; 2054 W Russia: People & Events.

2100 UTC/ 4pm E/1pm P - Page 53 Freqs

BBC World Service (am) - *5975, 12095*
2100 S/A Newshour, M-F News; 2105 M Discovery (science), T Health Matters, W Go Digital, H Sports International, F One Planet (ecology); 2130 M Essential Guide, T Everywoman, W Focus on Faith, H Pick of the World (BBC's best), F People and Places.
[**Special service to the Caribbean** on *5975, 11675, 15190 kHz.*: 2105 M-F Caribbean Report. **Special service to the Falklands** on *11680 kHz.*: 2130 T/F Calling the Falklands.]

BBC World Service (eu) - *9410*
2100 D Newshour.

BBC World Service (wcaf) - *11835, 15400*
2100 D News; 2105 S Wright Around the World (music requests), M Health Matters, T Science View, W Sports International, H One Planet (ecology), F Discovery (science), A Science in Action; 2130 M Everywoman, T Focus on Faith, W Pick of the World (BBC's best), H People and Places, F Essential Guide, A People and Politics.

Radio Australia
2100 D News; 2105 F Feedback (letters), A Australia All Over (cont'd from 1905); 2110 S-H AM (morning news magazine); 2130 S Educational series, M Health Report, T Innovations, W Religion Report, H Rural Reporter, F Oz Sounds (new music releases); 2145 A Asia Sunday.

Radio Japan
2100 D News; 2110 S Weekend Square, A Pop! Goes Asia; 2115 M-F Asian Top News (headlines from region's radio); 2125 M Unforgettable Music Masterpieces, T Let's Learn Japanese, W Japan Music Log, H Brush Up Your Japanese, F Music Beat.

Radio for Peace International, Costa Rica
2100 S Voices of Our World (Maryknoll program), M Honoring Mother Earth: Indigenous Voices (from 2030), T Living Enrichment Center, W Global Community Forum (from 2030), H A Woman's Voice (from 2030), F Earthspan (War & Peace Foundation), A Far Right Radio Review (from 2030); 2130 S Perspective (UN program), M In the Moment, T Peace Forum, W Scope (UN program), H Tropical Conservation Newshour (rainforests), F Newmaier Report, A Peace Forum; 2145 S/A Hightower Report (commentary), M-F UN Today; 2148 S/A Earthwatch (ecology); 2151 S/A Earth & Sky (astronomy); 2155 S/A World Opinion (on terrorism).

Radio Prague
2100 D News; 2105 S Letter from Prague, M-F Current Affairs, A Readings from Czech Literature; 2110 S The Arts, A Saturday Music (classical/folk/jazz); 2115 S Mailbox, M Spotlight (Czech current events) or One on One (interview), W Czechs in History or Central Europe Today, F Magazine; 2120 T Talking Point, H Economic Report.

WBCQ, Maine
7415 kHz.: 2100 H-S Radio Caroline.

WWCR, Tennessee
15685 kHz.: 2100 F Ask WWCR (letters); 2115 H Eco Watch, F New Horizons (science); 2130 H World of Radio, A Presidential Radio Address/Democratic Response.
12160 kHz.: 2100 H Keen on Jazz; 2105 S Golden Age of Radio Theatre, 2145 A Ask WWCR (letters).

2200 UTC/ 5pm E/2pm P - Page 54 Freqs

BBC World Service (am) - *5975, 12095*
2200 S/A The World Today, M-F News; 2205 M-F World Business Report; 2220 M-F British News; 2230 M-F Sports Roundup, A From Our Own Correspondent; 2245 M/T/H/ F Analysis, W From Our Own Correspondent.

BBC World Service (eu) - *6195 via UK*
2200 D News; 2205 S Meridian-Masterpiece, M-F World Business Report, A Jazzmatazz; 2220 M-F British News; 2230 S Agenda (trends), M-F Sports Roundup, A Composer of the Month; 2245 M-F Off the Shelf (book readings).

BBC World Service (wcaf) - *11835, 15400*
2200 D News; 2205 S Just a Minute (panel game), M-F Outlook (magazine), A Omnibus (documentary); 2230 S World of Music, A From Our Own Correspondent; 2245 M Patterns of Faith, T Radio History of the World, W Heart and Soul (religion), H What's the Problem? (advice), F It's a Girl (women in societies).

BBC World Service (eas) - *6195 via Singapore, 7105, 11685*
2200 D The World Today; 2230 F People and Politics, A From Our Own Correspondent.

Radio Australia
2200 D News; 2205 F Asia Pacific Weekend Edition (regional current affairs), A Correspondents Report; 2210 S-H AM (morning news magazine); 2230 F AM (morning news magazine), A Business Report; 2240 S Australian Music Show (rock), M Music Deli (international), T Blacktracker (Aboriginal contemporary music), W Country Style, H Jazz Notes.

Radio for Peace International, Costa Rica
2200 S Music Medicine, M-F Democracy Now! in Exile, A CounterSpin (media analysis); 2230 A Freespeech Radio News (repeat of Fri. newscast).

Radio Prague
2230 D News; 2235 S Letter from Prague, M-F Current Affairs, A Readings from Czech Literature; 2240 S The Arts, A Saturday Music (classical/folk/jazz); 2245 S Mailbox, M Spotlight (Czech current events) or One on One (interview), W Czechs in History or Central Europe Today, F Magazine; 2250 T Talking Point, H Economic Report.

Radio Vlaanderen Internationaal
2230 S Radio World, M-F News, A Music from Flanders; 2234 M-F Belgium Today; 2238 S Tourism in Flanders, M-F Press Review; 2243 M Focus on Europe, T Green Society (ecology), W/F Around the Arts, H Economics; 2244 S Brussels 1043 (letters); 2248 M Sports, W Around Town, H International Report, F Tourism in Flanders; 2254 S-F Soundbox (Flemish rock).

WBCQ, Maine
7415 kHz.: 2200 S Communications World, M Jean Shepherd, W Uncle Ed's Musical Memories, F Juliet's Wild Kingdom, A HarvZower; 2230 S The Planet, F Pab Sungenis Project; 2245 M Seldom Heard Radio.

WHRI, Indiana
5745 kHz.: 2200 S DXing with Cumbre.
9495 kHz.: 2200 S DXing with Cumbre.
17650 kHz.: 2200 F DXing with Cumbre; 2230 A DXing with Cumbre.

WWCR, Tennessee
9475 kHz.: 2215 F World of Radio.

2300 UTC/ 6pm E/3pm P - Page 54 Freqs

BBC World Service (am)(eu) - *5975, 6195 via UK, 12095*
2300 D The World Today; 2330 S Greenfield Collection (classical music), F Global Business, A Arts in Action.

BBC World Service (eas) - *6195 via Singapore, 7105, 11685*
2300 D The World Today; 2330 F Global Business, A Arts in Action.

China Radio International
2300 D News; 2310 S Report on Developing Countries, M-F Current Affairs, A Global Review; 2320 S In the Spotlight (cultural magazine), A Listeners' Garden; 2330 M People in the Know (China's leading citizens), T Sports World, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China.

Radio Australia
2300 D News; 2305 F Lingua Franca (about language), A Ockham's Razor (science issue); 2310 S-H Asia Pacific (regional current affairs); 2330 S Earthbeat (ecology), M The Buzz (technology issues), T Arts Talk, W Rural Reporter, H Media Report, F In Conversation, A Innovations (new products).

Radio Canada International
2300 S/A The World This Weekend, M-F The World at 6; 2330 S Inside Track (sports anthologies) M-F A- It Happens (interviews with newsmakers), A Madly Off in All Directions (comedy).

Radio Netherlands
2330 S/A News; M-F Newsline; 2335 S Sincerely Yours (letters), A Europe Unzipped; 2355 S The Week Ahead (program previews), A Insight (commentary).

Radio New Zealand International
2300 S-H Midday Report (including Rural News 2333, World Watch 2345), F/A RNZ News; 2312 F Focus on Politics, A This Week in Parliament; 2333 F The Sampler (latest CDs), A Spectrum (life in NZ).

Radio for Peace International, Costa Rica
2300 S Neumaier Report, M-F Democracy Now! in Exile (cont'd from 2200), A TUC Radio; 2315 S Living Enrichment Center; 2330 A Continent of Media.

Radio Prague
2330 D News; 2335 S Letter from Prague, M-F Current Affairs, A Readings from Czech Literature; 2340 S The Arts, A Saturday Music (classical/folk/jazz); 2345 S Mailbox, M Spotlight (Czech current events) or One on One (interview), W Czechs in History or Central Europe Today, F Magazine; 2350 T Talking Point, H Economic Report.

Radio Romania International
2300 D Radio Newsreel; 2310 S Focus, M-F Commentary, A The Week; 2315 S Sunday Studio, M Pro Memoria (history), T Business Club, W Society Today, H Cards on the Table (debate) or The Romanian Next to You (interview), F Challenge for the Future or Terra 2001, A World of Culture; 2320 M Political Flash, T European Horizons, A RRI Encyclopedia; 2325 S Romanian by Radio, M/W/F Business Update, T Tourist News, H Listeners' Letterbox, A Roots (culture/traditions); 2330 S Romanian Itineraries, M Pulse of Transition, T Mother Nature (ecology), W Visit Romania, F Practical Guide, A Radio Pictures; 2335 S Listeners' Letterbox, M Performing Arts, T Youth Club, W Partners in a Changing World, F Cultural Survey, A Romanian Itineraries; 2340 M Pages of Romanian Literature, T/H Skylark (folk music), W Stage and Screen, F Spectator (voice of the people), A Bucharest Along the Centuries; 2345 M Romanian Hits, W Romanian Musicians, F Romanian Folk Music At Its Best, A DX Mailbag; 2350 S Romanian Folk Music At Its Best, M Sports Roundup, T Athlete of the Week, W Sports Club, H Football Flash, F Sports Weekend.

WBCQ, Maine
7415 kHz.: 2300 M Seldom Heard Radio (occasional program), F Pab Sungenis Project (from 2230), A Radio Timtron Worldwide; 2330 F International World Beat Music.

WHRI, Indiana
9495 kHz.: 2330 A DXing with Cumbre.

WWCR, Tennessee
5070 kHz.: 2300 A Keen on Jazz.

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

John Babbis, Silver Spring, MD; Bob Fraser, Cohasset, MA; Harold Frodge, Midland, MI; Frank Hillton, Charleston, SC; Hans Johnson, WY/Ulis Fleming, MD /*Cumbre DX*/ BBCM; Michael Murray, UK; Zeke Russell, Williams, AZ; Daniel Sampson, Arcadia, WI; Harold Sellers, Lee Silvi, Mentor, OH; Larry Van Horn, Brasstown, NC; Sam Wright, Biloxi, MS; *DX Listening Digest; DX Ontario; Hard Core DX*; Radio Sweden/*Media Scan*; Bob Thomas, Bridgeport, CT; Usenet Newsgroups; *World of Radio; Worldwide DX Club.*

Lawrence Harris
Lawrence@itchycoo-park.freeserve.co.uk
http://www.itchycoo-park.freeserve.co.uk/wxsats.htm

Ups and Downs of Russian Birds

It seems that the Russian weather satellite (WXSAT) Resurs 01-N4 ceased operations permanently when it failed back in August. During following weeks, the satellite's ground controllers made a number of attempts to fix the problems, resulting in the 137.85 MHz carrier being heard occasionally for a few orbits, though with no modulation (picture detail). An e-mail from Eugene Flitman, the leading software engineer of the Russian Space Monitoring and Information Support Laboratory (operated by the Space Research Institute in Moscow), told me: "Currently it is dead. They tried to revitalize it last week but with no success, but there will be more attempts soon. However, no official statements about its complete failure have been made so far."

A few weeks after Resurs failed, NOAA-14 entered a fault mode similar to that which affected NOAA-15 some months back. At approximately 1955 UTC on October 18, the NOAA-14 AVHRR scan motor current suddenly increased, indicating a failure similar to the problem on NOAA-15. At 1205 UTC October 19, the NOAA-14 Manipulated Instrument Rate Processor (MIRP) was switched to internal synchronization so that instrument data – other than the AVHRR (the scanner that produces images) – could be processed. AVHRR will therefore be severely degraded most of the time. NOAA and NASA engineers continue to investigate the problem.

As of early November, NOAA-14 continues to transmit high and low resolution images, but they are unusable. Based on past successes, I anticipate that NOAA controllers will identify a procedure that rescues NOAA-14 from permanent failure.

❖ Okean-O active

The Okean series of Russian/Ukrainian oceanographic resources satellites are rarely heard transmitting away from Europe. The satellites – Okean-O, Okean 01-N4 and Sich-1 – carry different equipment from conventional WXSATs, but transmit at least one compatible image format – APT. Over recent years, information about the series has become available thanks to the Internet and Russian/Ukrainian scientists who seem keen to have their research become more widely known in the west, as well as in their home countries.

Earlier this year I received a package from Volodymyr Astapenko of Dnipropetrovsk in the Ukraine. He sent me an Okean calendar for 2001 that includes a large number of pictures of the Ukraine, together with some amazing pictures taken by the satellite as part of its resources imaging work. Another publication, devoted to the satellite's systems and operation, was included.

Unlike NOAA and Meteor constellations, Okean-O carries a dual radar system operating in the 3cm (0.03m) band designed to scan the earth from space and produce ground images independent of the weather. The radar comprises a right-side (of the ground track) and left-side looking system; the scanner's resolution is 2.5km along ground track, and 1.3km across it. Equipment onboard includes multi-spectral low, medium and high resolution scanning radiometers. A microwave scanning radiometer and polarization spectro-radiometer complete the systems. Some data is transmitted using the 8.2 GHz downlink.

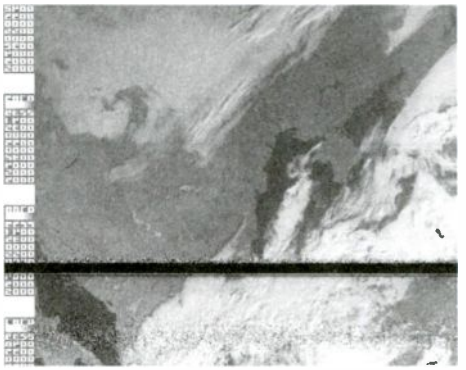


Fig 1 OKEAN-O image received on November 4, 2001 at 0742UTC by Mike Jupp in Britain

All VHF transmissions from these satellites have been on 137.40 MHz, though to be accurate, that from Sich-1 is often a little off frequency. Transmissions are scheduled during passes over Russia and Ukraine; monitors in western Europe occasionally record short transmissions from the spacecraft. In Britain, a number of people leave recording equipment active to catch early morning Okean passes. Although these are high over central Europe, they are almost always low over Britain, and the image recorded by Mike Jupp is typical in being of short duration and subject to noise bursts inherent at low elevations. Figure 1 shows a typical scan taken over the region of the Black Sea and Ukraine. The image is a visible light scan.

❖ New to the hobby

Russell Hall e-mailed me his first APT image, received with a home-built quadrifilar helix antenna (QFH), a GRE Super preamp, and an Icom R10 receiver. Russell is still experimenting to find an optimum position for the antenna, and finding the best software settings to produce the best images.

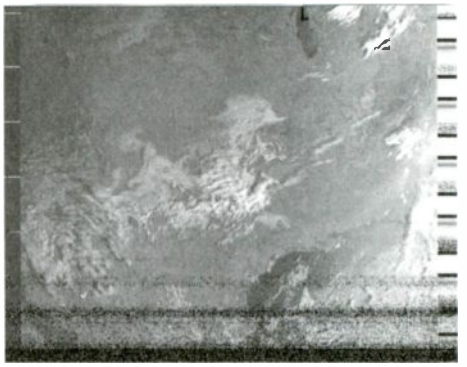


Fig 2: NOAA-15 APT image early November from Russell Hall

I would like to thank those readers who have corresponded with information during the past year, and to wish everyone a very Happy Christmas and Peaceful New Year.

Frequencies

NOAA-14 transmits APT on 137.62 MHz (currently in fault condition)
NOAA-12 and -15 transmit APT on 137.50 MHz
Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight
Resurs 1-4 transmits APT on 137.85 MHz (currently failed)
Okean-O, Okean-4 and Sich-1 sometimes transmit APT briefly on 137.40 MHz
GOES-8 and GOES-10 use 1691 MHz for WEFAX

Satellite Service Guide

Robert Smathers
roberts@nmia.com
www.grove-ent.com/mtssg.html

All Frequencies MHz

Loral Skynet Telstar 6 - C-Band

93 degrees West longitude

1(V)	3720	Occasional video
2(H)	3740	Data Transmissions
3(V)	3760	(none)
4(H)	3780	Occasional video
5(V)	3800	Fox Network feeds (analog and digital)
6(H)	3820	(none)
7(V)	3840	Occasional video
8(H)	3860	Occasional video
9(V)	3880	Occasional video
10(H)	3900	Fox News Edge
11(V)	3920	Occasional video
12(H)	3940	Occasional video
13(V)	3960	Fox Network - West (LEITCH) / 20th Century Fox Syndication
14(H)	3980	Occasional video
15(V)	4000	Occasional video
16(H)	4020	Occasional video
17(V)	4040	Occasional video
18(H)	4060	CBS Network feeds (anclog and digital)
19(V)	4080	CBS Network feeds (anclog and digital) / Occasional video
20(H)	4100	CBS Network (digital)
21(V)	4120	Occasional video
22(H)	4140	Occasional video
23(V)	4160	CBS Network (digital)
24(H)	4180	Occasional video

Loral Skynet Telstar 6 - Ku-Band

93 degrees West longitude

1(V)	11728.5	CBS Newsnet (digital) / CBS news feeds (digital)
2(H)	11735.0	Reuters news feeds (digital)
3(V)	11789.5	CBS news feeds (digital)
4(H)	11796.0	Occasional video
5(V)	11836.0	Data Transmissions
6(H)	11842.5	Data Transmissions
7(V)	11867.0	Occasional video
8(H)	11873.5	WSNet (digital)
9(V)	11898.0	WSNet (digital)
10(H)	11904.5	WSNet (digital)
11(V)	11929.0	CBS news feeds (digital and analog)
12(H)	11935.5	Occasional video
13(V)	11960.0	Occasional video
14(H)	11966.5	Occasional video
15(V)	11991.0	WSNet (digital)
16(H)	11997.5	Occasional video
17(V)	12022.0	Occasional video
18(H)	12028.5	WSNet (digital)
19(V)	12053.0	Occasional video
20(H)	12059.5	Occasional video
21(V)	12084.0	Data Transmissions
22(H)	12090.5	WSNet (digital)
23(V)	12115.0	Occasional video
24(H)	12121.5	Learning Satellite Network (digital)
25(V)	12146.0	Occasional video
26(H)	12152.5	Data Transmissions
27(V)	12177.0	WSNet (digital)
28(H)	12183.5	Occasional video

Panamsat Galaxy 3R - C-Band

95 degrees West longitude

1(H)	3720	Occasional video
2(V)	3740	Occasional video
3(H)	3760	Occasional video
4(V)	3780	Occasional video
5(H)	3800	Occasional video
6(V)	3820	Occasional video
7(H)	3840	Occasional video
8(V)	3860	Occasional video / Horse Racing (digital)
9(H)	3880	Occasional video
10(V)	3900	Occasional video
11(H)	3920	Horse Racing (digital)
12(V)	3940	Horse Racing (digital)
13(H)	3960	Horse Racing (digital)
14(V)	3980	Horse Racing (digital)
15(H)	4000	Occasional video
16(V)	4020	HBO Plus (East) (VC2+)
17(H)	4040	MoreMax (East) (VC2+)
18(V)	4060	Occasional video
19(H)	4080	HBO Signature (East) (VC2+)
20(V)	4100	HBO Plus (West) (VC2+)
21(H)	4120	Occasional video
22(V)	4140	Horse Racing (digital)
23(H)	4160	Occasional video
24(V)	4180	Gem Shopping Network (digital) / Horse Racing (digital)

Panamsat Galaxy 3R - Ku-band

95 degrees West longitude

T01(H)	11720	Data Transmissions
T02(V)	11750	Data Transmissions
T03(H)	11750	FM2 services Data transmissions .06, 2.93, 3.01, 3.07 and 3.15 MHz In-Store audio network ads (various companies) .62, .71, .81, .88, 1.05, 1.15, 1.26, 2.06, 3.25, 3.44, 3.62, 3.76, 3.88, 3.97 4.20, 4.55 and 4.64 MHz Muzak Services .15, .27, .39, .51, .98, 1.36, 1.48, 1 60, 1.72, 1.84, 1.96, 2.19, 2.31, 2.44, 2.56, 2.68, 2.80, 3.34, 3.53, 3.69, 4.08, 4.32, and 4.45 MHz
T04(H)	11780	(none)
T05(V)	11810	Data Transmissions
T06(H)	11810	Data Transmissions
T07(H)	11840	Data Transmissions
T08(V)	11870	Data Transmissions
T09(H)	11870	(none)
T10(H)	11900	Data Transmissions
T11(V)	11930	Data Transmissions
T12(H)	11930	Occasional video / Channel 1 / STN: Student Television Network
T13(H)	11960	Data Transmissions
T14(V)	11990	Data Transmissions
T15(H)	11990	Data Transmissions
T16(H)	12020	FM2 services Data transmissions .06, .53, .47, .64, 1.95, 2.18, 2.45, 2.52, 2.82, 2.92, 3.20, 3.38, 3.73, 3.97, 4.14, and 4.24 MHz In-Store audio networks .15, .27, .39, .99, 1.11, 1.59, 1.71, and 1.83 MHz
T17(V)	12050	Occasional video / Data Transmissions
T18(H)	12050	(none)
T19(H)	12080	Data Transmissions
T20(V)	12110	Data Transmissions
T21(H)	12110	(none)
T22(H)	12140	Data Transmissions
T23(V)	12170	Data Transmissions
T24(H)	12170	CCTV-4 China

Loral Skynet Telstar 5 - C-Band

97 degrees West longitude

1(V)	3720	(none)
2(H)	3740	Data Transmissions
3(V)	3760	Occasional video
4(H)	3780	Nebraska Educational TV (digital)
5(V)	3800	Occasional video
6(H)	3820	Occasional video
7(V)	3840	Occasional video
8(H)	3860	ABC NewsOne Channel
9(V)	3880	Occasional video
10(H)	3900	Fox Network feeds (LEITCH) / 20th Century Fox Syndication
11(V)	3920	LDS Television (digital)
12(H)	3940	Occasional video
13(V)	3960	Fox Network - East (LEITCH) / 20th Century Fox Syndication
14(H)	3980	Occasional video
15(V)	4000	Globecast feeds / Paramount Syndication / UPN Network (digital)
16(H)	4020	Occasional video / Paramount Syndication (occasional)
17(V)	4040	SCOLA (digital)
18(H)	4060	Armed Forces Radio and Television Service (digital)
19(V)	4080	America's Collectibles Network
20(H)	4100	Occasional video
21(V)	4120	ABC Network - West (LEITCH)
22(H)	4140	ABC Network - East (LEITCH)
23(V)	4160	Occasional video
24(H)	4180	Occasional video/North Carolina Open Public Events Network (occasional)

Loral Skynet Telstar 5 - Ku-Band

97 degrees West longitude

1(V)	11728.5	Data Transmissions / Bob Jones University Homesat (digital)
2(H)	11735.0	Data Transmissions
3(V)	11789.5	Occasional video / Fox news feeds (digital)
4(H)	11796 0	Data Transmissions
5(V)	11836.0	Occasional video
6(H)	11842.5	Data Transmissions
7(V)	11867.0	Data Transmissions
8(H)	11873.5	DVB Globecast World Television services
9(V)	11898.0	DVB Palestine Satellite Channel, Dubai EOTV, Dubai Sports, BVN-TV, Nile Variety Channel, Jordan Satellite Channel, Nile International, Saudi Channel 1
10(H)	11904.5	Data Transmissions
11(V)	11929.0	Occasional video
12(H)	11935.5	DVB Globecast World Television services
13(V)	11960.0	Data Transmissions
14(H)	11966.5	Data Transmissions
15(V)	11991.0	DVB Williams PAC Network services
16(H)	11997.5	Data Transmissions
17(V)	12022.0	Data Transmissions
18(H)	12028.5	Data Transmissions
19(V)	12053.0	Occasional video
20(H)	12059.5	Data Transmissions
21(V)	12084.0	DVB Taipei International Satellite Television services
22(H)	12090.5	DVB ABS-CBN International services
23(V)	12115.0	DVB C Sky Net services
24(H)	12121.5	Occasional video
25(V)	12146.0	Occasional video
26(H)	12152.5	DVB Globecast World Television services
27(V)	12177.0	DVB Varsity TV, Maharishi Open University, Thai TV 5, AFN Farsi Radio, VTV4, Haitian Satellite Television, Samanyolu TV World, Kuwait TV, TRT-TV, Israeli TV, Back to Health TV, WRN (also look for WRN under Globecast services)
28(H)	12183.0	Spacecom FM2/FM3/Hypercube Services Data Transmissions .046, .08, .15, .19, .23, .30, .35, .38 .50, .65, .89, .93, .96, 1.05, 1.12, 1.22, 1.35 MHz

Larry Van Horn, N5FPW
larry@grove-ent.com

9-11 Aftermath Monitoring

Harry Marnell in California posted the frequency list below to the *Fedcom* newsgroup shortly after the 9-11 terrorist attacks. Where there are two frequencies, the first is the repeater input, second is the repeater output.

FEMA HF Nationwide nets
5.711 MHz night and 10.493 MHz days (USB)

FEMA Urban Search & Rescue Cache

418.050	FEMA Command 1
406.450	FEMA SAR Team 1
415.950	FEMA SAR Team 1 Tactical 3
416.275	FEMA SAR Team 1 Tactical 4
407.125	FEMA SAR Team 2 Tactical 5
416.475	FEMA SAR Team 2 Tactical 6
416.725	FEMA SAR Team 3 Tactical 7

Federal Emergency Administrative Radio System FEARS

170.200/169.250	Los Angeles 1
173.800	San Pedro Hill Emergency
170.200/189.250	Los Angeles 2

San Pedro Hill Administration

143.000/142.425	San Francisco 3

Mount Tamalpais Administration

170.200/169.250	San Francisco 4

FEMA National Preparedness Directorate

140.025/143.000	Region 1 Boston repeaters 1
140.900	Boston Simplex 2
139.825/143.000	Region 2 New York repeaters 3
142.925	New York Simplex 4
139.950/143.250	Region 3 Philadelphia repeaters 5
142.925	Philadelphia Simplex 6
139.450/142.425	Region 4 Atlanta repeaters 7
142.400	Atlanta simplex 8 142.400
138.575/141.950	Region 5 Chicago repeaters 9
140.925	Chicago simplex 10 140.925
139.950/142.975	Region 6 Denton TX repeaters 11
143.625	Denton TX simplex 12
140.025/143.000	Region 7 Kansas City Missouri repeaters 13
140.900	Kansas City MO simplex 14
138.575/141.950	Region 8 Denver repeaters 15
140.925	Denver simplex 16
139.825/143.000	Region 9 San Francisco repeaters 17
142.375	San Francisco simplex 18
139.950/143.250	Region 10 Bothell WA repeaters 19
142.375	Bothell WA simplex 20

FEMA Siren Control Nationwide
173.1875 Siren Control 173.1875

❖ Post Office in the Milair Band?

Also in the aftermath of 9-11, Kevin O'Rourke passed along this interesting intercept by an unidentified member of the Chicago-area monitoring group (CARMA) on their listserver.

"I work at O'hare, and directly across the street from our place is the USPS Military and International facility. In the two days since the bombing, they had been blocking the entrances to the docks with cars and vans – US Government types, and I noticed a small mag mount antenna on the roofs of the vehicles. I got out my trusty PRO 43 and started to search the 200 MHz band. I got them using very low power on 229.675 MHz FM. Today, as I was leaving, I went up to one of the cars and asked the driver if he knew what freq he was using. Of course, he didn't know, so I showed him the scanner with the freq on it, and asked him to key up his microphone, which he did. This finally confirmed it for me. He found this so interesting that he also wrote down the frequency."

Has anyone previously seen reports of land mobile, narrowband FM use of the frequencies the UHF military air range? Anyone familiar with the radios the USPS might have been using in this range?

❖ Correction and Report

Popular Communications magazine's senior editor, Tom Kneitel, K2AES, found an error in my September 2001 *MT Fed File* column. We mentioned the U.S. Coast Guard facility at Governors Island, New York. Tom says this facility has been decommissioned. The island is abandoned and up for sale. It is being sought after by real estate developers for use as a park.

Tom also passes along the following Federal frequency intercepts from his neck of the woods.

164.9375 Active on Long Island, presumed by the Health and Human Services. Transport buses taking patients to medical facilities. Several bases, including one at Riverhead, New York. [*My notes indicate this is a Veteran Administration net with KJN 946 in Brooklyn, KCB 576 in Northport, and KLM 555 in Saint Albans-LVH*]

165.8375 Active in New York metro area. Unknown agency, fully scrambled (same scrambling method as U.S. Customs Service).

169.4500 U.S. Customs Service, New York metro area, clear and scrambled communications [*Operation Alliance repeater output and simplex channel, input is 171.075 MHz-LVH*]

172.2750 Active on Long Island by the New York State Dept of Environmental Conservation.

❖ Austin Federal Trunk Systems

MT feature writer John Mayson has discovered a new Motorola Astro federal trunk system in the Austin, Texas, area. Here is what is currently known about the system. If anyone has any additional information on this system please pass it along to the email address in the masthead.

System: Motorola Astro
Base/Offset Frequencies: 406.000 MHz/Offset: 25 kHz
Frequencies: 406.800 (control channel) 406.525 408.525 407.025 409.025

❖ Anaheim/Orange County Trunk System

Another regular *Fed Files* reporter, Chris Parris, has discovered a new trunk system in the Anaheim/Orange County, California, area. The data channel is on 406.425 MHz. This trunk system is a Motorola SmartZone with a system identification of 6a34. Trunk software indicated that the above frequency is part of site zero in this trunk network. He also notes little activity on the system with only one repeater in operation in addition to the data channel. Anyone know who this system belongs to?

❖ South Florida Customs Service

MT's *Scanning Report* columnist, Robert Wyman, passes along his comments on the loadout of U.S. Customs Service radio used in South Florida (See Table One).

Robert says, "The federal frequencies are still pretty good, although I don't have any current channel designations or interdiction program information. For example, channels listed as being 'BLOC' were used for the Blue Lightning Operations Center, one of the many specially-funded interdiction programs of the '80s and '90s. 'IC' channels are still good, as they are the Inspection and Control units at Ports of Entry like MIA and the Port of Miami.

"The other USCS channels for alternate repeaters and simplex operations are probably good enough to keep in a scanner, although actual usage may be different than the reserved uses illustrated on the list. Regular USCS monitors will recognize many of the simplex frequencies as being current.

"As for the interagency channels, certainly all the MDPD, BSO, FHP, Hialeah and Gables info have changed. Intercity is still a good channel, of course, as are all the INS, USSS, Marshals, Marine Channels and NOAA weather channels

that are illustrated. I found some numbers that are new to me, including a 'SURVL' freq in the 153s...Very interesting allocation there and one I guess I missed through the years!

"Also of interest are the inclusion of Business Band itinerant channels...just goes to show that the feds can hide anywhere! This list also illustrates another point: the new radios have enormous memories, just like other electronic/consumer products, and agencies like to 'fill 'em up' just because they can. Don't ever expect USCS or anyone else to come up on another agency's channels on a regular basis. For a raid or local emergency, perhaps, but rarely on a day-to-day, shift-to-shift basis. Most likely, USCS used to monitor the 'locals' on radios such as this while conducting other operations. That is, if USCS was in a neighborhood doing something, they'd probably monitor the local MDPD district just to know what's going on around them."

I would like to thank all our reporters this month – Tom Kneitel, Harry Marnell, John Mayson, Jack NeSmith, Kevin O'Rourke, Chris Parris and Robert Wyman. Until next month 73 and good hunting.

Table One: U.S. Customs Service Radio Loadout, S. Fla

TX Freq	RX Freq	PL Tone	Zone	Chan	Name
Nationwide and Area Tactical					
165.2375	165.2375	100.0 1Z	A	1	SECTR [Sector-LVH]
166.4375	165.2375	100.0 1Z	A	2	SECTR
166.4625	166.4625	CSQ	A	3	TREAS [Treasury Common-LVH]
166.5875	166.5875	CSQ	A	4	FLSIM
166.200	166.200	CSQ	A	5	IC [South Florida only-LVH]
166.4875	165.2375	100.0 1Z	A	6	ALT R [Backup repeater at Brickell-LVH]
164.9625	164.9625	100.0 1Z	A	7	ALT S [Also repeater out/in 166.300-LVH]
169.550	166.5875	100.0 1Z	A	8	TAC 1
164.775	164.775	100.0 1Z	A	9	BLOCS [Blue Lightning Ops Simplex-LVH]
165.975	164.775	100.0 1Z	A	10	BLOCR [Blue Lightning Ops Repeater-LVH]
158.835	155.985	103.5 1A	A	11	HQ
Blank	162.550	CSQ	A	12	WX 1 [NOAA Weather-LVH]
Operation Alliance and Civilian LE					
164.775	164.775	100.0 1Z	B	1	BLOC [Blue Lightning Ops-LVH]
165.975	164.775	100.0 1Z	B	2	BLOC
158.910	155.970	103.5 1A	B	3	MDTAC
158.940	154.115	103.5 1A	B	4	MD PD
158.790	156.090	131.8 3B	B	5	CG PD
155.370	155.370	CSQ	B	6	CITY1
155.475	155.475	CSQ	B	7	CITY2
164.300	165.5125	100.0 1Z	B	8	GLNCO [Glynco LE Training-LVH]
169.450	169.450	100.0 1Z	B	9	CARIB [Operation Alliance-LVH]
171.075	169.450	100.0 1Z	B	10	CARIB [Operation Alliance-LVH]
166.5875	165.2375	100.0 1Z	B	11	PRALT [Puerto Rico USCS repeater-LVH]
USCS District and Secret Service					
166.200	166.200	100.0 1Z	C	1	IC
165.4125	166.200	100.0 1Z	C	2	IC
165.2375	165.2375	100.0 1Z	C	3	SETOR
166.4375	165.2375	100.0 1Z	C	4	SETOR
166.4875	165.2375	100.0 1Z	C	5	ALT R
164.775	164.775	100.0 1Z	C	6	BLOCS
165.975	164.775	100.0 1Z	C	7	BLOCR
165.7875	165.7875	CSQ	C	8	USSS1
165.375	165.375	CSQ	C	9	USSS2
165.2125	165.2125	CSQ	C	10	USSS3
166.400	165.375	CSQ	C	11	USSS4
164.9875	165.7875	CSQ	C	12	USSS5
Interagency, Weather and Marshals					
168.8625	164.550	CSQ	D	1	OCDE
164.550	164.550	CSQ	D	2	OCDE
166.4625	166.4625	CSQ	D	3	OCDE
Blank	162.400	CSQ	D	4	WX 1
Blank	162.475	CSQ	D	5	WX 2
Blank	162.550	CSQ	D	6	WX 3
Blank	164.4625	CSQ	D	7	ALPHA
Blank	164.8625	CSQ	D	8	BRAVO
163.8125	163.200	127.3 3A	D	9	USMS1
163..200	163.200	CSQ	D	10	USMS2
163.8125	164.600	146.2 4B	D	11	USMS3
170.850	162.7875	136.5 4Z	D	12	USMS5
Civilian Law Enforcement					
158.745	155.730	103.5 1A	E	1	LAKES
158.970	155.190	103.5 1A	E	2	NSIDE
159.090	155.700	103.5 1A	E	3	DORAL
158.895	156.210	103.5 1A	E	4	RIDGE
158.805	156.015	103.5 1A	E	5	OCB
158.730	155.910	103.5 1A	E	6	NE
158.865	155.955	103.5 1A	E	7	KENDL
158.800	156.150	103.5 1A	E	8	MUNC
158.835	155.985	103.5 1A	E	9	HQ
159.030	155.790	103.5 1A	E	10	RECDS
158.910	155.970	103.5 1A	E	11	TACTL
158.820	156.030	103.5 1A	E	12	DATA
Civilian Law Enforcement					
155.370	155.370	103.5 1A	F	1	INCT
155.295	155.295	103.5 1A	F	2	HOSP
154.085	154.085	103.5 1A	F	3	B3
155.895	155.895	103.5 1A	F	4	B4
155.625	155.625	103.5 1A	F	5	B5
155.655	155.925	103.5 1A	F	6	B6
155.685	155.685	103.5 1A	F	7	B7
155.115	155.115	103.5 1A	F	8	OCB 1
155.925	155.925	103.5 1A	F	9	OCB 2
158.850	154.770	103.5 1A	F	10	HIA 1
158.760	154.995	103.5 1A	F	11	HIA 2
158.955	155.880	103.5 1A	F	12	HIA 3
Civilian Law Enforcement					
155.610	155.610	103.5 1A	G	1	HIA 4
153.935	155.145	103.5 1A	G	2	MEDLY
154.895	154.895	103.5 1A	G	3	PT 3
155.505	154.665	186.2 7Z	G	4	FHP 1
155.460	154.695	186.2 7Z	G	5	FHP 3
155.445	154.680	186.2 7Z	G	6	FHP 2
154.920	154.920	CSQ	G	7	FHP S
156.030	156.030	103.5 1A	G	8	SAO
158.790	156.090	131.8 3B	G	9	CG 1
158.940	154.115	131.8 3B	G	10	CG 2
155.850	155.850	103.5 1A	G	11	SRT
154.025	154.025	103.5 1A	G	12	SMIA
Civilian Law Enforcement					
155.655	155.655	103.5 1A	H	1	LOCAL
159.090	155.700	103.5 1A	H	2	DORAL
166.4375	165.2375	100.0 1Z	H	3	SECTR
155.895	155.895	103.5 1A	H	4	16 B4
154.085	154.085	103.5 1A	H	5	15 B3
158.955	155.880	103.5 1A	H	6	MAP
153.750	153.750	100.0 1Z	H	7	SURVL
159.030	155.790	103.5 1A	H	8	RECDS
158.910	155.970	103.5 1A	H	9	TACTL
Blank	167.35625	CSQ	H	10	AID
154.570	154.570	82.5 YZ	H	11	MSSH
155.100	155.100	CSQ	H	12	PB WK
Civilian Law Enforcement					
155.250	154.710	179.9 6B	G	1	BSO 1
155.415	154.740	179.9 6B	G	2	BSO 2
155.640	154.950	179.9 6B	G	3	BSO 3
155.685	155.130	179.9 6B	G	4	BSO 4
155.670	155.070	179.9 6B	G	5	BSO 5
155.535	154.800	179.9 6B	G	6	BSO 6
155.595	154.860	179.9 6B	G	7	BSO 7
155.625	154.890	179.9 6B	G	8	BSO 8
154.950	154.950	179.9 6B	G	9	BSO 9
155.070	155.070	179.9 6B	G	10	BSO10
151.625	151.625	CSQ	G	11	RANG1
154.570	154.570	CSQ	G	12	RANG2
Civilian Law Enforcement and INS					
155.490	154.725	110.9 2Z	H	1	MCSO1
155.430	154.725	110.9 2Z	H	2	MCSO2
155.520	154.785	156.7 5A	H	3	MCSO3
154.650	154.650	110.9 2Z	H	4	MCSO5
156.150	158.925	110.9 2Z	H	5	MCSO6
163.650	163.650	CSQ	H	6	KROME
162.950	163.750	123.0 3Z	H	7	K 236
162.925	163.625	100.0 1Z	H	8	USBP
162.925	163.675	123.0 3Z	H	9	INS A
163.725	163.725	CSQ	H	10	INS 5
159.150	155.010	103.5 1A	H	11	HMST2
156.075	151.070	103.5 1A	H	12	HMSTD
Civilian Law Enforcement					
155.490	154.725	110.9 2Z	PD	1	KW SO
155.430	154.755	110.9 2Z	PD	2	KV SO
155.520	154.785	156.7 5A	PD	3	PK SO
155.370	155.370	110.9 2Z	PD	4	INCTY
154.650	154.650	110.9 2Z	PD	5	CTOC
155.490	156.150	110.9 2Z	PD	6	COJOE
155.550	154.815	110.9 2Z	PD	7	KW PD
155.505	154.665	186.2 7Z	PD	8	HP 1
155.445	154.680	186.2 7Z	PD	9	HP 2
155.580	154.680	186.2 7Z	PD	10	HP 2A
155.460	154.695	186.2 7Z	PD	11	HP 3
154.920	154.920	186.2 7Z	PD	12	HP 4

VHF Marine Frequencies					
156.300	156.300	CSQ	MARINE	1	CH 6
156.450	156.450	CSQ	MARINE	2	CH 9
156.500	156.500	CSQ	MARINE	3	CH 10
156.550	156.550	CSQ	MARINE	4	CH 11
156.600	156.600	CSQ	MARINE	5	CH 12
156.800	156.800	CSQ	MARINE	6	CH 16
156.900	156.900	CSQ	MARINE	7	CH 18
157.100	157.100	CSQ	MARINE	8	CH 22
156.425	156.425	CSQ	MARINE	9	CH 68
156.575	156.575	CSQ	MARINE	10	CH 71
156.625	156.625	CSQ	MARINE	11	CH 72
156.925	156.925	CSQ	MARINE	12	CH 78

Dan Veeneman
dan@signalharbor.com

Encryption for Security

Most Americans are much more security conscious now than they were before the terrorist attacks on September 11, 2000. A number of new laws have been passed in the wake of the attacks, many geared toward giving government agencies further latitude in pursuing persons suspected of criminal activity. In such an environment it shouldn't be a surprise that the following message appeared in Internet news groups:

The National Security Council and the FCC quietly asked Uniden to cease production of an APCO 25 digital scanner for the time being. The National Security Council cited security issues in the request due to the fact that many military and police agencies, border patrol and INS are unencrypted APCO 25. Uniden representatives will not even discuss the issue for fear that the NSC might also pressure Uniden to halt production of the BC-780...

By way of background, in early 2001 Uniden reported that they were working on a scanner that could monitor the digital voice transmissions from APCO 25 radios. Although Uniden's intended use for such a device is the legal monitoring of public safety agencies, many federal police and some military units also use APCO 25 equipment. Since no such scanner is currently available to the public, APCO 25 users have a modicum of privacy from the casual listener. (It should be noted that a dedicated hobbyist could monitor APCO 25 signals for well under $2000, a small amount of money even for a poorly funded terrorist organization.)

In response to this note and numerous requests, Uniden issued this statement:

Uniden America Corporation is developing an APCO 25 digital scanner model, which is slated for distribution in the fourth quarter of 2002. To date, and contrary to industry rumor, Uniden has received no requests from the FCC or any federal, state, or local authority asking the company to delay or halt development of this or any other Uniden product.

It is important that the public understand the nature of APCO 25 scanner technology, which allows users to pick up ordinary digital signals such as those now used by police and emergency officials in a few large US cities including, for example, Los Angeles. Scanners such as the APCO 25 model in development by Uniden do not facilitate the decoding of any encrypted transmissions including transmissions by national security and law enforcement authorities such as the CIA, DEA and U.S. Special Forces Units.

Uniden at this time does not anticipate receiving any requests to alter its product-development schedule on any APCO 25 digital scanner units.

Jennifer Ainsworth
Media & Trade Show Manager
Uniden America Corporation
4700 Amon Carter Blvd.
Fort Worth, TX 76155

❖ Encoding Versus Encryption

While it is generally against federal law in the United States to monitor *encrypted* transmissions, at the moment it remains legal to monitor most *encoded* signals (some signals are strictly off-limits regardless of their characteristics – for example, anything in the cellular telephone frequency bands is forbidden).

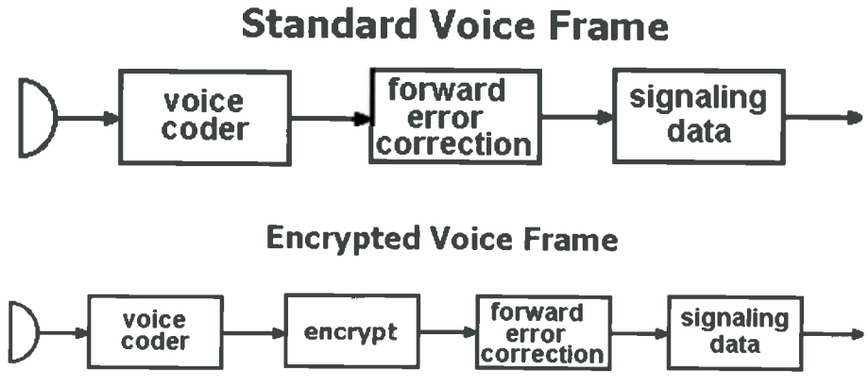
At first blush, encoded and encrypted signals sound the same coming from an ordinary scanner. You may have heard the harsh grinding or "hash" noise from an open squelch when tuned to a digital signal, such as the control channel of a trunked radio system. Not all digital signals sound the same, of course, but no one can tell by ear whether an APCO 25 transmission, for instance, carries voice that has been encrypted. The only way to find out is to *decode* the transmission as far as possible and see if what remains is encrypted or not.

A code is simply a way of representing something, and all digital messages transmitted over radio use some kind of *encoding*. Digital implies that the message is made up of a sequence of binary 1's and 0's, and the way in which that sequence is transmitted is the encoding method. Some code representations are very simple, such as the signal from your garage door opener, and some are rather complex, such as APCO 25.

Newer garage door openers have a "security setting" that is encoded in the transmission from your car to the garage. The transmission itself is a representation of the security setting. The receiver inside the garage *decodes* the transmission, translating the representation back into the security setting. Encoding and decoding are necessary to get the message from the transmitter to the receiver in a reliable and efficient manner. There is nothing hidden or secret going on, so all of this is separate and distinct from encryption.

APCO 25 messages are much more complicated than garage door opener signals, but at a fundamental level they follow the same process. The message to be sent, a snippet of digitized voice, is wrapped with error correction and signaling information before being transmitted. At the receiver, the signaling information is peeled off and the error correction data is used to eliminate the effects of any interference that may have occurred. The result is the original digitized voice, which was encoded but never encrypted, and should be legal to monitor.

Of course, the owner of an APCO 25 system may choose to encrypt the snippets of digitized voice within the encoded transmission. This adds cost and complexity to each radio but in many systems is already in place for sensitive talkgroups such as detectives and SWAT teams. In these cases the hobbyist listener is out of luck.



Encrypted Voice

APCO 25 isn't the first type of system to have encryption.

Many early systems offered a cheap, easily defeated analog method known as voice inversion scrambling. In this scheme the band of audio frequencies used for human speech is split into two parts, a lower block and an upper block. The blocks are inverted before transmission and inverted once again (restoring the original arrangement) at the receiver. Anyone overhearing the transmission just hears the "Donald Duck" noises as the user speaks. Both hardware and computer software to undo this type of scrambling are available to hobbyists these days, and it is even possible (with practice) to understand inverted speech with no mechanical aids at all.

Motorola Voice Encryption

Since the 1970s Motorola has offered digital voice encryption on their two-way radio products, either built-in or as an add-on device. The first capability was termed Digital Voice Privacy (DVP), which at the time was intended to provide a basic level of privacy for businesses and local governments. The method of encryption used in DVP is based on a proprietary algorithm kept secret within Motorola. It uses a 32-bit key, which these days doesn't provide much protection.

For a higher level of security the DVP algorithm could be replaced by the Data Encryption Standard (DES), which follows the federal standard put out by the National Bureau of Standards (now the National Institute of Standards and Technology, or NIST). DES is a well-known and publicly available algorithm that uses a 56-bit key, although for modern uses it has recently been replaced by the Advanced Encryption Standard (AES).

These two early capabilities, DVP and DES, suffered from a smaller geographic operating range than the analog voice product, meaning that if you wanted DVP or DES you had to be closer to the repeater (or you needed more repeaters) than if you were using an analog radio. In the early 1980s a technical report was issued by the Federal Bureau of Investigation that indicated the range loss for the DVP and DES products would require nearly double the number of repeaters to match the coverage area of an equivalent analog system.

In response to this and other complaints, Motorola introduced the XL modifications to each of the DVP and DES products. They also produced the Digital Voice International (DVI), which was designed for export outside of the United States and was much weaker than the domestic privacy systems.

To summarize, the five voice privacy offerings for standard Motorola radios are DES, DES-XL, DVP, DVP-XL and DVI-XL. Remember that no matter which product might be in use, the control channel of a Type I or Type II trunked system remains unencrypted and can be monitored.

EDACS Voice Encryption

Enhanced Digital Access Communications System (EDACS) is a trunking system originally developed by General Electric. Technically, EDACS itself is a radio trunking format capable of supporting several types of digital voice traffic in addition to analog. Some systems may even have a mix of different voice transmissions on the same system as users upgrade from older radios to newer digital units.

The first generation, from the mid-1980s, is termed Voice Guard and uses either DES encryption or a proprietary algorithm called VGE.

The second generation from the early 1990s has much better voice quality and is called AEGIS. Again, either DES or VGE could be used as the encryption algorithm, or AEGIS could be run with no encryption at all. Although running without encryption doesn't provide any additional protection, the mere fact that it is digital prevents scanner listeners from overhearing conversations.

The current generation, called ProVoice, has even better voice quality than AEGIS and can either be encrypted with VGE or DES, or run unencrypted.

Results from GE's digital voice systems show that their range is farther than analog voice, due primarily to the error detection and correction methods in use.

On-Line Scanner Manuals

I have a Radio Shack PRO-35 scanner that works fine but I lost the manual. Do you have any idea where I can find the instructions or a user guide for it?

Thanks, Ray

If you've picked up a scanner at a hamfest or flea market, it probably came without a user manual. Fortunately, the Internet is a good resource to locate information about that "vintage" receiver.

Radio Shack has support information for more than 100 scanners on their website, including all of their trunk-tracking units. You can find the master index at **support.radioshack.com/support_electronics/2849.htm**

Besides having manuals for all three variants of the PRO-92 (200-0522, 200-0522A and 200-0522B), they even have documentation going as far back as the crystal-controlled PRO-20.

The Hobby Radio Stop in Ohio offers numerous manuals from a variety of manufacturers, including one of my favorite old handhelds, the Bearcat 200XLT. The website can be found at **www.bearcat1.com/owner.htm.**

Tallahassee, Florida

The Tallahassee Fire Department responds to fire, rescue, and medical calls in and around the Tallahassee, Florida area. Over the last few years, the City of Tallahassee has instituted an 800 MHz Trunking System Motorola Type II-i), with the Fire Department as a regular user. The 800 system was built for coverage across Leon County, as the TFD is the primary countywide fire department. Volunteer Fire Departments dot the county's landscape, with some responding just inside the city limits.

I enjoy listening to the TFD on 154.190, as well as talkgroup 1200 (Dispatch). With my PRO-92, I set the VHF simulcast as my priority channel and then I am free to listen to other public safety agencies on 800 MHz. The 800 system is growing, due to Florida Highway Patrol having talkgroups on the system, as well as the recent addition of the Leon County Sheriff's Department (requiring more frequencies).

Anyway, I just finished reading your article on simulcasting and thought I would add my thoughts.

Jay from Florida

Thanks for writing, Jay. I'm interested in hearing from other readers who are listening to simulcasts of systems that are currently or will be going digital.

That's all for this month. I welcome your electronic mail at *dan @ signalharbor.com*, and as always more information is available on my website at **http://www.signalharbor.com**. Until next month, happy monitoring!

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

MILCOM

Larry Van Horn
larry@grove-ent.com

Military Callsigns and More

❖ Florida Cruise Missile Launch

Veteran Milcom reporter Allan Stern recently monitored a cruise missile launch down in Florida. The missile was sea launched from off the Florida east coast to a target at Eglin AFB, Florida.

Stern heard this activity on UHF 254.2 MHz (AM mode), identified as Tac-1, which is normally a Miami ARTCC frequency. Stations monitored during this mission included:

Astro 80	U.S. Air Force KC-135 tonker from Foirchild AFB, Washington (Refueling comms heard on 296.850 MHz)
Bravery Mike-7	Possibly the ship which launched the cruise missile Ground Stotion at Tyndall AFB, Florida, aka Oakgrove (NORAD).
Ribby 5#	F-15 C Chase aircraft from Tyndall AFB
Widget # #	DHC-8 support aircraft from Tyndall AFB

Other callsigns heard during the mission included: Quebec 08, Quebec Charlie, Romeo Mike 20, and Sierra 7 November. Allan also reported a new discrete E-8C JStars aircraft frequency on 235.250 MHz. Thanks for the report, Allan.

In addition to the frequency above, here are some of the other JStars discrete frequencies I have in my database:

HF:	13204.0 13909.0 kHz
VHF:	123.200 MHz
UHF:	225.575 227.925 228.225 228.975 231.750 238.350 250.900 (Tentative) 271.100 276.050 308.850 313.650 345.000 351.025 380.850 382.600 MHz

❖ Vandenberg Spy Satellite Launch

Our veteran west coast reporter Mark Zurovski was monitoring a National Reconnaissance Office (NRO) Titan IV satellite launch in October and reported a new discrete frequency for callsign Frontier (30th Space Wing Command Post at Vandenberg AFB, California).

During the launch Mark caught Frontier working Bloundhound 335 (a NP-3 aircraft from Point Mugu) on 349.300 MHz about range issues. He also noted a King Air flight out of Santa Maria doing real time weather reconnaissance on 132.750 MHz. This was directly conflicting with callsign Sport Control out of Edwards AFB heard on the same frequency. Mark also reports that 390.750 MHz was silent again for this launch. This frequency has had some unidentified data activity on it in the past.

Here is my list of Frontier Control frequencies from the *Grove Military Frequency Directory*:

121.400 127.650 156.300 (VHF Marine Range Safety/Clearance) 156.425 156.600 156.800 157.100 256.000 266.600 280.800 286.400 296.500 304.900 336.000 349.100 349.300 351.300 357.150 384.800 386.600

Other milair frequencies used at Vandenberg AFB (KVBG) include:

119.050	Approach/Departure Service (Los Angeles ARTCC via San Luis Obispa Remote)
121.750	Ground Control/Clearance Delivery
124.950	Tower
126.200	Pilot-to-Dispatcher
133.875	AWOS-3
269.500	Approach/Departure Service (Los Angeles ARTCC via San Luis Obispo Remote)
275.800	Ground Control/Clearance Delivery
311.000	Command Post (Callsign Spaceport)
321.000	Command Post (Callsign Spacepart)
326.200	Tower
342.400	PMSV
372.200	Pilot-to-Dispatcher

❖ Tyndall AFB Frequency Changes

Speaking of Tyndall Air Force Base, the following new frequencies are now in use:

139.900	VHF Pilot-to-Dispatcher
228.000	Compass Lake MOA Monitor
254.400	ATIS
255.900	Carabelle MOA Monitor
259.300	Ground Control
290.625	PMSV
290.800	IATF
318.200	RAPCON Discrete
354.150	RAPCON Discrete
381.300	Command Post
388.200	Departure Control

❖ Metaphor HF Frequencies

The Air Mobility Command at Ramstein AB, Germany, has been very active during Operation Enduring Freedom. Another of our Florida reporters, Jack (the Grunt) NeSmith passed along the following NOTAM regarding this station:

AIR/GROUND FACILITY CHANGED BANN-B HF STATION (CALL SIGN: METAPHOR) PROVIDES HF VOICE FREQUENCY SUPPORT TO ALL US AIRCREWS, GROUND STATIONS, ON 6730 KHZ AND 9022 KHZ. HOURS OF OPERATION ARE 0500 - 2100Z DAILY. PHONE PATCH SUPPORT WILL BE SUPPORTED AS WELL.

Jack also caught the following information regarding the RAF Cyprus station supporting the U.S. Air Force Global HF System (GHFS) network comms:

AIR/GROUND FACILITY CHANGED EFFECTIVE IMMEDIATELY, CYPRUS FLIGHTWATCH WILL PROVIDE HF VOICE FREQUENCY SUPPORT TO ALL US AIRCREWS, GROUND STATIONS, AND SHIPS IN SUPPORT OF OPERATION ENDURING FREEDOM ON 8992 MHZ AND 11175 MHZ UNTIL FURTHER NOTICE. CYPRUS FLIGHTWATCH WILL BROADCAST HF ADVISORY TRAFFIC VIA 8992 MHZ, 11175 MHZ, AND 11244 MHZ WHEN REQUIRED BY THE APPROPRIATE RECONNAISSANCE OPERATIONS CENTER. PHONE PATCH SUPPORT WILL BE SUPPORTED AS WELL.

And if anyone was wondering whether the Combat Air Patrol missions being flown over the cities of the United States aren't serious, check out this NOTAM warning:

SPECIAL NOTICE ... RESTRICTED/PROHIBITED AREA ENFORCEMENT EFFECTIVE IMMEDIATELY, COMMERCIAL AND PRIVATE AIRCRAFT FLYING INSIDE, OR IN CLOSE PROXIMITY TO, NEWLY ESTABLISHED OR CURRENTLY EXISTING RESTRICTED OR PROHIBITED AREAS OF THE UNITED STATES WILL BE SUBJECT TO BEING FORCED DOWN BY ARMED MILITARY AIRCRAFT. IF NECESSARY, THE MILITARY HAS INDICATED THAT DEADLY FORCE WILL BE USED TO PROTECT THESE AREAS FROM UNAUTHORIZED INCURSIONS. THESE MEASURES ARE NECESSARY IN RESPONSE TO THE TERRORIST ATROCITIES OF SEPT 11, 2001, WHICH CAUSED THOUSANDS OF INNOCENT CIVILIAN CASUALTIES. THE MILITARY WILL USE DEADLY FORCE ONLY AS A LAST RESORT, AFTER ALL OTHER MEANS ARE EXHAUSTED. THIS NEW POLICY IS IN EFFECT UNTIL FURTHER NOTICE. OFFICIAL CHARTS OUTLINING THE NEW RESTRICTED OR PROHIBITED AREAS WILL BE MADE AVAILABLE AS SOON AS POSSIBLE. THESE AREAS WILL BE PERIODICALLY REVISED AND WILL THEREFORE REQUIRE THAT EACH PILOT RECEIVE AN UP TO DATE BRIEFING ON THE STATUS OF THESE AREAS PRIOR TO EVERY FLIGHT. IN ADDITION, ALL AIRCRAFT OPERATING IN THE U.S. NATIONAL AIRPSACE AND IN CLOSE PROXIMITY TO THE SUBJECT AREAS, IF CAPABLE, WILL MAINTAIN A LISTENING WATCH ON VHF GUARD 121.5 OR UHF 243.0. IT IS INCUMBENT ON ALL AVIATORS TO KNOW AND UNDERSTAND THEIR RESPONSIBILITIES IF INTERCEPTED. REVIEW AERONAUTICAL INFORMATION MANUAL SECTION 6, 5-6-2 FOR INTERCEPT PROCEDURES.

❖ Pacific Northwest Government Trunk Systems

Chris Parris has noted a change in the Fort Lewis, Washington, trunk system. The last time he monitored the system, they were only using six frequencies. During a recent monitoring session Chris noted 11 frequencies in use.

Ft. Lewis, WA – Motorola Type II UHF
System ID - 3b38
Frequencies: 406.125 406.950 407.125 407.250 407.300 407.475 408.100 408.550 409.150 409.350 410.150

Chris notes that the 410.150 frequency shows up as a part of the trunked system, but it doesn't get used in the normal rotation of repeaters for radio traffic and only seems to carry phone patches. Parris has also found a Motorola Astro trunk system in the Seattle area.

Seattle Federal Trunk System – Motorola Astro
Base/Offset Frequencies: 406.000 MHz/25 kHz.
System ID - 711E
System Frequencies: 406.625 406.775 407.350 407.600 408.000 408.200 408.350

Does anyone in the Pacific Northwest have a positive identification on this system? Could this possibly be a portion of the military trunk system setup by the Navy in the Puget Sound area?

❖ Havoc on HF

Matt Cawby, who also resides in the Pacific Northwest, recently caught a couple of Havoc callsigns (Probably 7th Bomb Wing, Dyess AFB, Texas, C-130 aircraft) on the HF bands. He monitored them with casual chit chat on 7772.0, 7919.0, and 13110.0 kHz (all Upper Sideband USB). It is interesting to note that 7919.0 kHz is a known Air Mobility Command Post discrete and also used nationwide for the Tactical Air Control System support.

Matt also reported that Aegis 10/20 were utilizing the drop zone at Fort Lewis, Washington, for training and he caught their communications on 314.200 MHz. This is a known 7th Bomb Wing C-130 tactical airlift air-to-air frequency.

❖ Military Callsign List

Table one is a list of military callsigns that have been recently reported and identified by our readers. Reporters this time around are Allan Stern, Mike Heightchew, Roland, McCormick, Sandy in Denver, and your editor.

And that will do it for this edition of *The Milcom Report*. Until next month, 73 and good hunting.

Table One: Military Callsigns

Avalon # #	USAF C-9A aircraft, Scott AFB, Illinois
Basco # #	USAF C-17, Charleston AFB, South Carolina
Berry 540	USAF Contractor SW-4
Blade # #	USMC F/A-18A, VMFA-115
Dawg # #	USAF C-130H, 165AW Georgia ANG, Dobbins AFB, Georgia
Dolphin # #	US Navy VFA-203 Blue Dolphins, NAS Atlanta, Georgia
Doom # #	USAF B-52H Barksdale AFB, Louisiana
FAB # #	Bolivian Air Force C-130
Fang # #	USAF F-15A Florida ANG
Fiddle	US Navy TSC NAS Jacksonville, Florida
Foxy # #	USAF T-38A Sheppard AFB, Texas
Goldenhawk	US Navy TSC NAS Brunswick, Maine
Hawk # #	USMC F/A-18D VMFA (AW)-533
Joguar 01	C-130 aircraft
Jolly 11/21	USAF HH-60G USAF Pave Hawk Helicopter
JOSA 418	USAF C-21A Colorado ANG
King 33	USAF C-130N # 69-5833, 920th RQG/39th RQS Patrick AFB, Florida
Mace # #	USAF F-16 South Carolina ANG
Magic # #	NATO E-3 AWACS aircraft
Misty # #	US Navy S-3B, VS-41, NAS North Island, CA
Mojo # #	C-21A aircraft
N72472	US Customs Service A-200 Beechcraft KingAir, Air Interdiction Division, Oklahoma City, OK
NASA 03	NASA Gulfstream I (G-159), Marshall Space Flight Center, Alabama
NASA 910	NASA T-38N # 66-10352 Johnson Space Flight Center, Texas
NASA 915	NASA T-38N # 60-0585 Johnson Space Flight Center, Texas
NASA 919	NASA T-38N # 66-8385 Johnson Space Flight Center, Texas
NASA 948	NASA Gulfstream II (G-1159) Johnson Space Flight Center, Texas
NASA 966	NASA T-38N # 66-10357 Johnson Space Flight Center, Texas
Navy JV-180	C-9B VR-58 NAS Jacksonville, Florida
Navy LF 64	US Navy P-3C Orion, VP-16 NAS Jacksonville, Florida
Navy YD# # #	US Navy P-3C Orion, VP-4 MCAS Kaneohe, Hawaii
Nickel # #	USMC F/A-18A VMFA-122
PAT 131	U.S. Army C-23 Fresno, California
Pelican 7# #	P-3C Orion, VP-45 NAS Jacksonville, Florida
Phoenix 96	USAF contractor LJ-35 Learjet, Flight International
Puget #	US Navy EA-6B, VAQ-129 NAS Whidbey Island, Washington
Razor # #	USAF E-8C Jstars (Front-end callsign)
Reach JHL3/4	USAF contractor DC-8 Air Transport International
Redeye 01	USAF F-16 aircraft Buckley ANGB, Colorado
Rocket 251	US Navy T-2C VT-86 NAS Pensacola, Florida
Rocket 504	US Navy T-39G VT-86 NAS Pensacola, Florida
Search 03	NASA-KSC UH-1 Helicopter
Smoky 06	USAF C-21A 84ALF Peterson AFB, Colorado
Stealth	USAF 117 ACS Georgia ANG Ground Controller
Strike # #	US Navy F-14 NAS Fallon, Nevada
Strikestar	USAF E-8C JStars (back-end mission callsign) 934ACW/16ACCS Robins AFB, Georgia
Stinger #	US Navy EA-6B, VAQ-140, NAS Whidbey Island, Washington
Utah # #	USAF KC-135 151ARW, Salt Lake City IAP, Utah
Warcat #	US Navy EA-6B, VAQ-139, NAS Whidbey Island, Washington
Zapper # #	USAF EC-130H, 41ECS Davis Monthan AFB, Arizona

U.S. Navy MARS callsigns
assigned to deployed US Army Special from Fort Bragg, North Carolina.

NNNONAT	3RD SFG(A) COMMUNICATIONS CENTER -BOPP
NNNONAW	1ST BN 3RD SFG(A)-FOB 31
NNNONAX	2ND BN 3RD SFG(A)-FOB 32
NNNONAY	3RD BN 3RD SFG(A)-FOB 33
NNNONJA	A CO 1ST BN 3RD SFG(A)-AOB 310
NNNONJB	A CO 1ST BN 3RD SFG(A)-ODA 311
NNNONJC	A CO 1ST BN 3RD SFG(A)-ODA 312
NNNONJD	A CO 1ST BN 3RD SFG(A)-ODA 313
NNNONJE	A CO 1ST BN 3RD SFG(A)-ODA 314
NNNONJF	A CO 1ST BN 3RD SFG(A)-ODA 315
NNNONJG	B CO 1ST BN 3RD SFG(A)-AOB 320
NNNONJH	B CO 1ST BN 3RD SFG(A)-ODA 321
NNNONJI	B CO 1ST BN 3RD SFG(A)-ODA 322
NNNONJJ	B CO 1ST BN 3RD SFG(A)-ODA 323
NNNONJK	B CO 1ST BN 3RD SFG(A)-ODA 324
NNNONJL	B CO 1ST BN 3RD SFG(A)-ODA 325
NNNONJM	A CO 2ND BN 3RD SFG(A)-AOB 340
NNNONJN	A CO 2ND BN 3RD SFG(A)-ODA 341
NNNONJO	A CO 2ND BN 3RD SFG(A)-ODA 342
NNNONJP	A CO 2ND BN 3RD SFG(A)-ODA 343
NNNONJQ	A CO 2ND BN 3RD SFG(A)-ODA 344
NNNONJR	A CO 2ND BN 3RD SFG(A)-ODA 345
NNNONJS	B CO 2ND BN 3RD SFG(A)-AOB 350
NNNONJT	B CO 2ND BN 3RD SFG(A)-ODA 351
NNNONJU	B CO 2ND BN 3RD SFG(A)-ODA 352
NNNONJV	B CO 2ND BN 3RD SFG(A)-ODA 353
NNNONJW	B CO 2ND BN 3RD SFG(A)-ODA 354
NNNONJX	B CO 2ND BN 3RD SFG(A)-ODA 355
NNNONEA	C CO 2ND BN 3RD SFG(A)-AOB 360
NNNONEB	C CO 2ND BN 3RD SFG(A)-ODA 361
NNNONEC	C CO 2ND BN 3RD SFG(A)-ODA 362
NNNONED	C CO 2ND BN 3RD SFG(A)-ODA 363
NNNONEE	C CO 2ND BN 3RD SFG(A)-ODA 364
NNNONEF	C CO 2ND BN 3RD SFG(A)-ODA 365
NNNONEG	A CO 3RD BN 3RD SFG(A)-AOB 370
NNNONEH	A CO 3RD BN 3RD SFG(A)-ODA 371
NNNONEI	A CO 3RD BN 3RD SFG(A)-ODA 372
NNNONEJ	A CO 3RD BN 3RD SFG(A)-ODA 373
NNNONEK	A CO 3RD BN 3RD SFG(A)-ODA 374
NNNONEL	A CO 3RD BN 3RD SFG(A)-ODA 375
NNNONEM	B CO 3RD BN 3RD SFG(A)-AOB 380
NNNONEN	B CO 3RD BN 3RD SFG(A)-ODA 381
NNNONEO	B CO 3RD BN 3RD SFG(A)-ODA 382
NNNONEP	B CO 3RD BN 3RD SFG(A)-ODA 383
NNNONEQ	B CO 3RD BN 3RD SFG(A)-ODA 384
NNNONER	B CO 3RD BN 3RD SFG(A)-ODA 385
NNNONES	C CO 3RD BN 3RD SFG(A)-AOB 390
NNNONET	C CO 3RD BN 3RD SFG(A)-ODA 391
NNNONEU	C CO 3RD BN 3RD SFG(A)-ODA 392
NNNONEV	C CO 3RD BN 3RD SFG(A)-ODA 393
NNNONEW	C CO 3RD BN 3RD SFG(A)-ODA 394
NNNONEX	C CO 3RD BN 3RD SFG(A)-ODA 395

Doug Smith, W9WI
w9wi@w9wi.com

Domestic-band radio in Afghanistan

The events of September 11 have caused many of us to pay extra attention to Southwest Asia, and especially Afghanistan. The story of domestic-band broadcasting in Afghanistan is a short one, but there are other interesting things going on in that part of the world.

According to the 2001 *World Radio-TV Handbook* (*WRTH*), only four domestic-band transmitters exist in this troubled country. Transmitters on 657 and 1107 kHz near Kabul broadcast to an audience within Afghanistan; transmitters on 1278 and 1600 kHz at the same site broadcast in English and Urdu to adjacent countries. In fact, DXers believe 1107 kHz was the only of these frequencies operating before the attacks, though another unlisted transmitter was reported operating on 864 kHz in another part of the country. *WRTH* lists ten TV transmitters scattered throughout the country, but it's widely reported in the media that the Taliban government has banned television and the stations are no longer operating.

In any case, broadcast transmitters have long been a priority target of U.S. and NATO air attacks. Gun camera video showing the destruction of a Kabul transmitter site has been widely shown on American TV. No specific information has been released, but one can probably assume that no large AM transmitters are operating in Afghanistan – at least not in Taliban-controlled areas.

U.S. action to eliminate the Taliban's broadcast facilities does not leave Afghans with nothing to listen to. A Pennsylvania Air National Guard unit, the 193rd Special Operations Wing, has been deployed to the region. The 193rd (the most-deployed unit in the Air National Guard, according to its website) was formed in the late 1960s to broadcast to civilians (and enemy military personnel) in areas where the U.S. military is operating.

This unit uses modified EC-130E airplanes, with antennas mounted under the wings and on the tail. *(See aircraft on our cover - ed.)* The planes can transmit on any VHF or UHF TV channel, with any of the video systems used around the world. They're also capable of AM, FM, and shortwave radio broadcasts. Past deployments of this unit have included Grenada, Panama, Kuwait, Haiti, and Yugoslavia. 10kW of power is available for AM and TV broadcasts, and 1kW for FM. (The AM power is relatively limited, especially given the relatively poor antenna possible. However, the extreme antenna height means the FM and TV broadcasts "get out" very well!)

Frequencies used vary according to local conditions. It seems channels previously used by ground-based stations in the target countries are often chosen. Over Yugoslavia, 92.5 FM was used; this was the frequency used by independent station B-92 before the Milosevic government shut it down. Pamphlets dropped over Afghanistan indicate three frequencies are being used in connection with Operation Enduring Freedom. AM frequencies in use are 1107 and 864; in addition, a shortwave frequency of 8700 kHz is reported. (Many believe this transmission is *not* from the aircraft – that indeed it may be *to* the plane.) As there was no widespread use of FM, and no TV at all, in Afghanistan at the time of the attacks, the 193rd is not reported to be broadcasting on either of these bands.

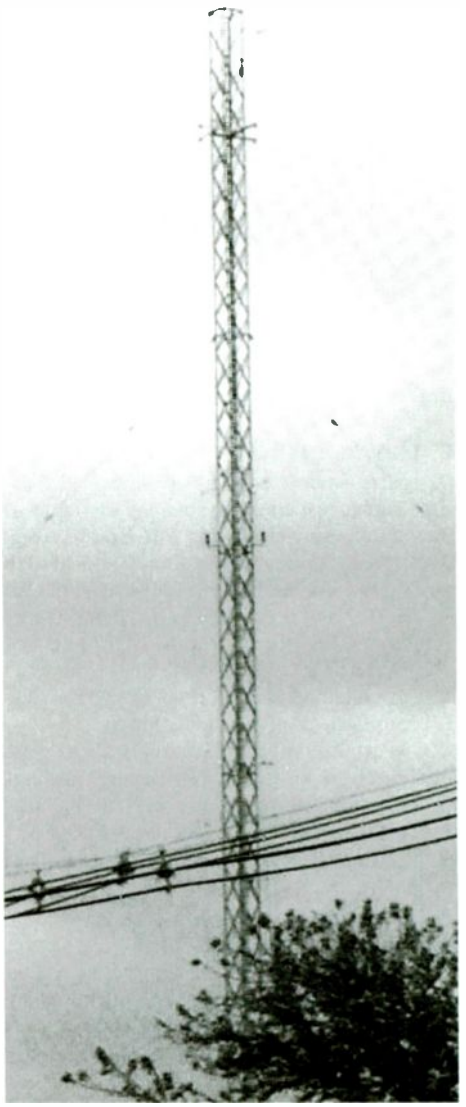
An official fact sheet on this "Commando Solo" unit is available on **http://sites.state.pa.us/PA_Exec/Military_Affairs/air_national/corsolo.htm** .

Broadcasts from neighboring countries are also possible. Pakistan has powerful transmitters at Islamabad (1260 kHz, 500kW, 200mi. from Kabul) and Quetta (756 kHz, 150kW, 120mi. from Kandahar). Since the U.S. military has been known to establish temporary stations in cooperating neighboring countries, it is very possible some such stations are already operating. Or, we could be leasing time on civilian stations in these neighboring countries, notably Pakistan. Any of these special stations would be an unforgettable DX catch.

❖ Bits and Pieces

We have two new AM stations to report this month. A permit has been issued for a station at Manchester, New Hampshire, on 750; it will run 500 watts daytime and 260 watts at night. For many years, WHEB operated on this frequency in nearby Portsmouth, before surrendering its license for cancellation in the mid-1990s. Another new station is now on the air; KVRI-1600 is located at Blaine, Washington. Blaine is on the Canadian border and directional north; it beams religious programming to Vancouver, British Columbia.

There are also five stations gone, at least temporarily, from the airwaves. WBOW-640, WBUZ-1230, KFMZ-98.3, KBMX-101.9, and a Terre Haute, Indiana, FM whose callsign escapes me right now lost their licenses in early October. The two AM stations are also in Terre Haute, and the FMs in central Missouri. Michael Rice, licensee of all five stations, was convicted of serious felonies in state court – and then lied to the FCC about the degree to which he continued to control the stations. The frequencies will be auctioned to new licensees in December.



This is the tower of WILO-1570, Frankfort, Indiana.

I noticed the WILO-1570 tower while stopped for gas in Indiana. Note the X-shaped object near the top; this supports four wires which run back from the top of the tower to the ground. This is a "folded unipole" antenna design.

Here's hoping the need for Operation Enduring Freedom is already over by the time you read this. Whether it is or not, there will be plenty of interesting signals on the air. What are you hearing? Write me at Box 98, Brasstown NC 28902-0098, or by email to *w9wi@w9wi.com*. Good DX!

OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

George Zeller
georgez@nacs.net

Violence Hits Clandestine Radio

Our unlicensed radio coverage is dominated by a blizzard of pirate loggings this month, but we can't ignore the impact of violence on clandestine radio. As reported in *MT* last month, **United Patriot Radio** has left the air after a shooting match between operator Steve Anderson and local Kentucky police. A $5,000 reward remains outstanding for Anderson's capture. In a similar but unrelated incident, **WWCR**'s longtime militia radio host William Cooper was shot and killed early in November during a shootout with Apache County sheriff's deputies in Arizona.

Meanwhile, plenty of DXers have been hearing the USA-sponsored anti-Taliban broadcasts on 8700 kHz, always in upper sideband mode.

What We Are Hearing

A deluge of pirates were logged by *MT* readers this month. The stations all operate near 6955 kHz, but frequencies are variable to 5 or 10 kHz around that spot.

All Your Base Radio- Music produced by a computer is the staple on this pirate. Sometimes they broadcast in Morse code. (Uses aybradio@yahoo.com e-mail)

Betty Boop Radio- The 1930s and 1940s are gone, but their old radio music lives on here. (Providence)

Blind Faith Radio- Dr. Napalm's classic rock music has been supplemented with music contests lately. (Uses blindfaithradio@yahoo.com e-mail)

Ground Zero Radio- The station has announced future plans for a documentary on the history of pirate radio. In the meantime, rock music is their normal prog. (Blue Ridge Summit)

Iron Man Radio- This new one features Pirate Pete with music and pirate radio news from Chico. (None)

KIPM- They still produce the most elaborate drama programs on shortwave radio today. Some like them, but some are frustrated. (Elkorn)

KRMI- Using their Radio Michigan International slogan, their programming usually changes with the current holiday season. Sometimes the call letters change to WRMI. (Uses KRMI6955@hotmail.com e-mail)

Mystery Science Radio- So far music has been a lot more common on the station than either mystery or science has been. (None, asks for logs in *The ACE*)

Paragon Radio- Although rock and blues music has dominated their programming so far, this pirate shows signs of a discussion format as well. (None)

Psyco Radio- An eclectic selection of music is supplemented by a touch of comedy on this by now veteran pirate, but they still don't communicate with their listeners despite an electronic address. (Uses psycoradiodh@yahoo.com)

Radio Azteca- Bram Stoker has returned with the funniest parody of shortwave listening on the air today. (Belfast)

Radio Forty- Pirates naming themselves after numbers are apparently experiencing inflation. (Uses radio_forty@hotmail.com e-mail)

Radio Three- Sal Amoniac often uses a "3 Rock" slogan on his station, which now plays less insipid pop and more hard rock music. (None, asks for logs in *The ACE*)

Radio USA- Mr. Blue Sky may be the oldest active pirate on the air today. His punk rock and comedy sketch format helped design the classic pirate radio format. (Belfast)

Take It Easy Radio- Their signature theme music is from the Eagles, but during the last couple of months there has been plenty of commentary about the war. (Belfast)

The New Voices of the Purple Pumpkin- This classic pirate radio ID from the 1970s has resurfaced with rock music and barking dogs for an interval signal. (None)

The Purple Nucleus of Creation- Here's a pirate that features only music by the group mentioned in the ID. (None)

The Voice of Aargh- The familiar pirate "aargh" growl now has a station representing it. Captain Greenbeard's shows are mainly rock music. (Wellsville)

United Patriot Militia Bingo- As we see here this month, the demise of Steve Anderson's United Patriot Radio clandestine has not killed its parody station. (Merlin)

Voice of Captain Ron Shortwave- Ron has become a leading force on the pirate radio scene, both on his station and on others. (Uses captainronswr@yahoo.com e-mail)

WAIR- Another All India Radio parody has materialized, this time with Robert and Ravi Yardbrown using an All Indy Radio slogan. (None)

WHYP- James Brownyard's old small town programming on his tiny North East, PA, medium wave station continues to be the inspiration for one of the most active pirate stations on the air. (Providence)

WLIS- They remain the only radio station in the world with programming exclusively consisting of intervol signals from shortwave broadcasters. (Blue Ridge Summit)

WMFQ- In between their rock music selections, a chanting male chorus always asks about where their QSLs are. (Providence)

WMOE- The call letters come from Moe of the Three Stooges, but their shows are dominated by rock music. (Belfast)

Z-100- Among all currently active pirates, this one is the closest imitation of commercial FM broadcasting outlets. (Uses bigz100fm@yahoo.com e-mail)

United Patriot Militia Bingo QSL

QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations. The cash defrays postage for a souvenir QSL to your mailbox. Letters go to these addresses: PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 109; Blue Ridge Summit, PA 17214; PO Box 422, Wellsville, NY 14896; PO Box 69, Elkorn, NE 68022; and PO Box 293, Merlin, Ontario N0P 1W0, Canada. A few pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. Reports to the *Free Radio Network* (FRN) go to **http://www.frn.net/** on the web. *Free Radio Weekly* loggings go via **niel@ican.net** e-mail. Sample copies of *The ACE* bulletin are $2 via the Belfast maildrop.

Thanks

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We thank all of our contributors: Jerry Berg, Lexington, MA; Beze Z. Bromo, Hl; Ed Cummings, Philadelphia, PA; Rich D'Angelo, Wyomissing, PA; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Captain Ganja, Belfast, NY; William Hassig, Mount Prospect, IL; Vince Havrilko, Beale AFB, CA; Harry Helms, San Diego, CA; John Herkimer, Caledonia, NY; Ed Kusalik, Coaldale, Alberta; Harald Kuhl, Germany; Chris Lobdell, Stoneham, MA; Larry Magne, Penn's Park, PA; Greg Majewski, Oakdale, CT; Bill McClintock, Minneapolis, MN; Bob Montgomery, Levittown, PA; Gary Neal, Sugar Land, TX; Mike Prindle, New Suffolk, NY; Lee Reynolds, Lempster, NH; Martin Schoech, Merseburg, Germany; Tom Sevart, Frontenac, KS; Lee Silvi, Mentor, OH; Chris Smolinski, Maryland; Bud Stacey, Setsuma, AL; Ken Stout, Louisville, KY; and Niel Wolfish, Toronto, Ontario.

BELOW 500 kHz

DXING THE BASEMENT BAND

Kevin Carey, WB2QMY
wb2qmy@arrl.net

Try Something New in '02

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

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

Resources and Tips

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

While websites can be helpful tools, I prefer to have a *printed* booklet handy for serious DXing. Besides, a noisy computer is a liability when trying for that elusive 25-watt beacon four states away. I began publishing *BeaconFinder* for hobbyists in 1998. It lists the majority of longwave stations that can be heard in North America. (See ad elsewhere in *MT*.)

Here are some other tips for success on longwave, offered in no particular order:

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

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

What I Use

From time to time, readers ask me what I use for listening to longwave. A straightforward answer is difficult, because it depends on what part of the spectrum I'm listening to, and what my goals are. For general purpose work from 100 to 535 kHz, I use a Drake R8 receiver. The audio quality, adjustable notch filter, and narrow bandwidth setting make the R8 ideal for all around DXing.

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

For DXpeditions, I always grab my Sony ICF-2010. A friend encouraged me to invest in one of these, and I'm glad I did. The '2010 provides about 90 percent of the features I could ask for in a longwave receiver, and you can't beat the convenience of a portable set for on-the-road listening.

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

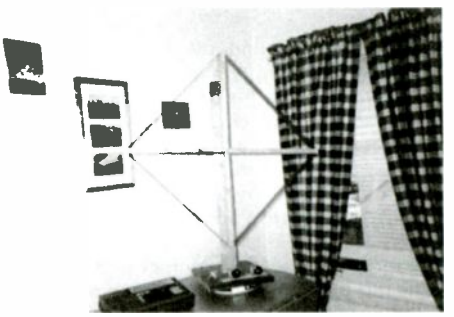
As you can see, my lineup does not include any truly exotic equipment. I believe the best tools for monitoring success are a good antenna, and some experience tuning the band. Knowing when and where to look for a particular signal is worth at least 10 dB.

Mailbag

Dan Wanchic (MN) wrote to say that he enjoyed the retrospective piece we ran on A/N Range systems in the November 2001 issue. Although these stations were discontinued in the 1970s, Dan was able to locate an old technical manual for them, and gave some more details on their operation. He notes that there were actually two antenna systems commonly used at A/N Range stations. The tower type we described included a fifth antenna at the center of the array that was fed with an offest signal to produce the 1020 Hz modulation. In addition, there was another antenna style that used two rectangular, vertical loops placed at right angles to each other and a separate symmetrical "T" vertical antenna.

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

See you next month.



Homebrew tabletop loop used by Lou Rossetti (N1PUX). A turntable is used under the loop for easy rotation and base support.

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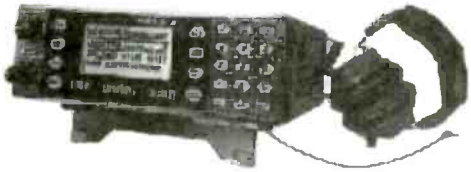

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ON THE HAM BANDS

THE FUNDAMENTALS OF AMATEUR RADIO

T.J. "Skip" Arey, N2EI
tjarey@home.com

New Year in Ham Radio

Well, here we are in 2002. If you are interested in making New Year's resolutions, we can make them fairly simple in the world of amateur radio:

- If you're not licensed... Get licensed!
- If you are licensed... Upgrade!
- Find somebody new to get licensed and help them do it!
- Repeat the number three!

One good tradition for starting off the New Year is to get things off your chest from last year. Sort of like starting things off with a clean slate. It's hard for a curmudgeon to completely clean his slate off, but I think I can make a good stab at it. Here goes.

❖ The New Novice Band?

Let me tell you a story. Back in 1976 when I was a newly minted ham, my callsign was WN2GHA. The "N" in there stood for Novice. Back then, in our country's bicentennial year, folks who passed the most basic of amateur radio tests had their own little chunk of frequencies to use, the Novice Bands. There was 50 kHz on 80 meters, 50 kHz on 40 meters, 100 kHz on 15 meters and 100 kHz on 10. (Back then I often got the feeling that we weren't even supposed to *listen* to 20 meters.) We were also limited to 75 watts and CW only. Not much to work with.

Now let's tack on a few more practical facts. Most Novices were teenagers or college students, all fairly short on the kind of cash it takes to get really high quality equipment. This would mean a receiver would have a rather generous selectivity, usually in the range of 5 –10 kHz. Now picture your average Saturday night with several *thousand* folks on that teeny chunk of 40 meters trying to sort out one signal from another with those barn door wide IF filters. (The first time I heard a high quality receiver with a 250 Hz CW filter I thought the radio was broken! I couldn't hear all those signals at once.) Throw in a drifty third-hand transmitter with stale tubes and a couple of spurs, and you've got a sense of the real adventure of amateur radio.

The Novice bands were a lot of fun. Most of us had little idea about what we were doing. Those tiny chunks of radio real estate gave us all a place to mess up gracefully. We could develop our skills without facing any serious ridicule because, face it, everybody was just about as bad as everybody else. We honed our skills while we studied for the General Class. It was a bit wild at times, but it sure was fun.

Well the FCC has put the old Novice Class license up on the shelf. More than a few folks think this is a good thing. By making the Technician Class ticket the entry-level license, a person can experience all of amateur radios modes on any legal frequency above 50 MHz. It has been this way for almost two years as you read this. During that time, I've run across more than a few allegedly *higher class* folks who have not been all that kind and helpful to newcomers in amateur radio's midst. Left without a place of their own to hone their basic radio skills, beginners now have to jump in with both feet. It's hard to believe that there are a few folks in our hobby who would not take a few extra moments to help a newcomer along when they first break squelch on a local 2 meter repeater. Folks need to recall their early days on the old Novice portions of the spectrum. The new license structure, regardless of your personal feelings about it, has essentially created an environment where the 2 meter repeater band *is* the "new" novice band. But there is one very important difference.

Unlike the old Novice bands where most of the folks were raw recruits operating in a blind leading the blind situation, the 2 meter repeater band is populated with a majority of folks possessing years and years of ham radio experience. Instead of stumbling around on his or her own, learning from their mistakes or those of others, experienced hams have the opportunity to help newcomers along. I am by nature an *Elmer*. When I near a new callsign and those more or less obvious signs of *mike shyness*, I go out of my way to be as friendly and as helpful as I can. We've all been there at one time or another and we've all wished for a helping hand. Besides, you may even make a new friend who can come over and help hold the ladder the next time you need to climb up to do some antenna work.

Incidentally, the Novice Bands are still around. (Although there is much talk of refarming their use.) They currently are places where lower speed code operators go to learn their CW skills. You'll still find them fairly friendly places to begin Morse Code operation. If your license allows for it (the old Tech Plus, the new General or even one of the few remaining valid Novice tickets) jump on in!

❖ Real No Code?

By now most folks have heard that the International Amateur Radio Union (IARU) Administrative Council is calling for an end to the Morse Code testing requirement worldwide. This is another issue that has cause a lot of strong feelings in the ham community. In a way, it relates to the abovementioned new ham/novice band issues.

I wonder if anyone has done a true study of the number of newly licensed Technicians that stay Techs without upgrading? Further, has there ever been a good study of the number of hams, old and new, who may have passed the various code requirements but never actively pursued the CW mode in their normal daily ham opera-

tions? I think we would quickly discover that voice modes dominate ham operation. It begs the question, especially given the difficulties and challenges for those new operators first keying their microphones on 2 meters: Shouldn't we test phone procedures instead of CW practices?! Come to think of it, my ability to pass the CW tests (and I've taken them all up through 20 wpm) *never* reflected the quality of my *fist* or my true operating habits.

If you have been involved lately in PSK31 operations, the *waterfall display* on your software package has probably revealed quite a few folks who are overdriving their signal to the point of unintelligibility. Further, these wide-signaled folks are taking up 'way too much bandwidth and defeating the whole purpose and promise of digital amateur radio communications. (Need we mention that they are also breaking the rules?) Maybe we need a test that checks out a person's ability to use this mode as well.

Okay, the point I'm trying to make is that, in the long run, it's probably impractical to test people in *any* particular mode, especially those that wax and wane in popularity. It would seem the best practice would be to make sure that the written tests for any license support questions concerning good amateur practice using *all* bands and modes. With that understood, then self-policing and government monitoring can adequately do their job.

Does a lack of CW testing mean that the CW mode is dying or going to go away? Not very likely. We still have CW portions of the bands. On any of those CW frequencies you can always find a QSO and often find a pile-up that will challenge your narrowest filter setting. I personally operate over 95% CW based upon my logs. I'm not planning on changing my operating habits based upon the presence or lack of any testing requirement.

The fact is that I barely ever operated CW back when I was going through the various CW tests. I only really fell head over heels for CW operation when the burden of passing those code tests was behind me. I'd rather see rules and tests that encourage and train people in all modes of amateur radio communication. I also wonder if, being freed from the testing requirement, folks will have the same experience I did and come down to the CW frequencies out of a love for the challenge and fun of CW operation.

◆ Contest Weekends

I would call myself a casual contester. When one of the big events is on the air I like to dig around for new countries or test the ability of my station to get through to a particular place on a particular band, usually using the lowest power possible (I enjoy QRP operation). But mostly I'm a ragchewer by nature. The quick contest exchanges leave me a bit cold. So I'm one of a growing number of folks who wishes that all the major contest events would set some reasonable frequency limits. Believe it or not, there are quite a few DX stations that do not enjoy having thousand of signals coming at them all at once. There are DX ragchewers, too. They sit down to their radios to meet people and learn about the world, just like I do. These folks should have a safe haven on the bands during contests where they can do what they want to do.

I'll never forget one exchange I had during a major contest weekend some years back. A DX station was on the air and I could tell right off the bat by his slower code speed he simply wasn't in the game. (Contests code speeds tend to run in the 30+ wpm range, this OM was operating at around 12 wpm.) I came back to him at his speed and discovered that he was just a guy who had come home from work and was looking for a chat. We had a good path and we talked for almost an hour. A lot of *serious* contesters probably were unhappy about this, especially when this guy signed to go to dinner after we had said our 73's. Had they read the mail they would have understood that this particular DX station just wasn't interested in contesting.

What I would propose (as if anyone would listen), would be a 30 kHz minimum, *No Contest* window (within the normal DX portions of each band) on all bands. Failing to abide by this would result in disqualification. The reply that is so often returned to this request is that non-contesters can always use the WARC bands during contests, because these are considered contest-free bands. Well, that is fine and dandy *if* you own equipment that covers these bands. (30, 17 and 12 meters). There are still a lot of rigs, especially in the hands of budgeted DX operators, that only cover the traditional 80, 40, 20, 15 and 10 meters bands. These folks should still get a little bit of consideration during contest weekends.

Well, there you have it. Now I can get back to working folks on 40 meters (and lately I'm spending a lot of time on 30 meters). CU down the log. Have fun!

UNCLE SKIP'S CONTEST CORNER JANUARY 2002

Jan 5, 2002
ARRL RTTY Roundup
1800 UTC, Jan 5 – 2400 UTC, Jan 6

Jan 11, 2002
Japan International DX Contest, 160-40m
2200 UTC, Jan 11- 2200 UTC, Jan 13

January 12, 2002
North American QSO Party, CW
1800 UTC, Jan 12- 0600 UTC, Jan 13

January 19, 2001
MI QRP January CW Contest
1200 UTC, Jan 19- 2359 UTC, Jan 20

North American QSO Party, SSB
1800 UTC, Jan 19 – 0600 UTC, Jan 20

ARRL January VHF Sweepstakes
1900 UTC, Jan 19- 0400 UTC, Jan 21

January 25, 2002
CQ 160-Meter Contest, CW
2200 UTC, Jan 25- 1600 UTC, Jan 27

January 26, 2002
Kansas QSO Party
1800 UTC, Jan 26 – 1800 UTC, Jan 27

Marc Ellis
mfellis@enteract.com

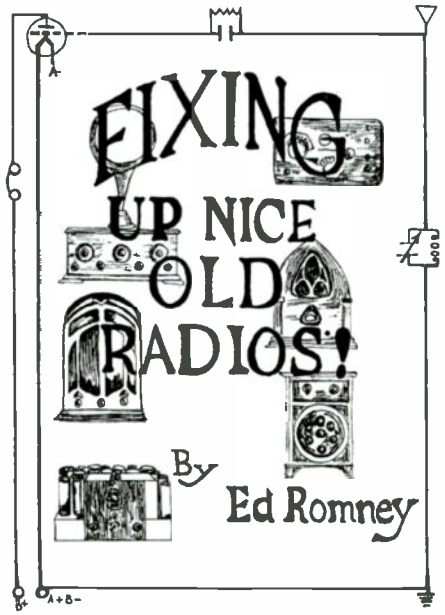
Books About Restoring Radios

Although we are now working on some World War II surplus command sets, a number of events have converged this last month to preempt most of my bench time. So this seemed to be a perfect opportunity to do a column on radio servicing and restoration books. As mentioned last month, it's a topic near the top of my priority list.

We won't be covering general books on collecting here; the emphasis will be on references to help you with the process of radio fixing. Some of the books to be mentioned are still in print and available from antique radio hobby supply suppliers; others can be found by scouting radio meets and flea markets. In the latter group, I'll try to stick with titles that I know to be worthwhile and reasonably easy to find.

❖ Recent Books

These are books you'll, mostly, be able to order today from such sources as Antique Radio Classified Magazine (978-371-0512; ARC@antiqueradio.com; **http://www.antiqueradio.com**) or Antique Electronic Supply (480-820-5411; **http://www.tubesandmore.com**). Prices are as listed in the AES 2001 Catalogue and do not include their shipping/handling charges.



Cover of Romney's book has an engaging homemade appearance.

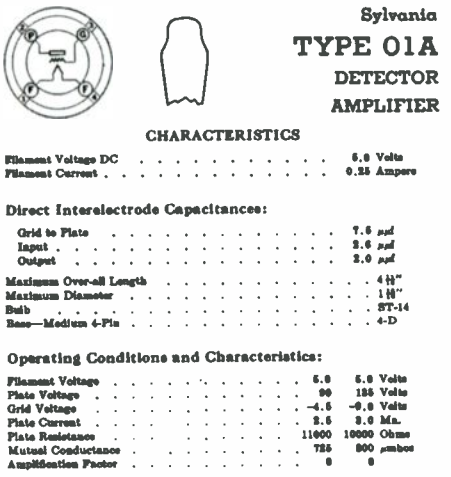
I'll cover ones with titles I've read and can recommend. All are soft cover.

Fixing Up Nice old Radios by Ed Romney. This plastic spiral bound reference is profusely illustrated and fun to read. After suggesting tools and test instruments and giving a smattering of radio theory and radio history, Ed discusses approaches to troubleshooting various early radio circuits. Specific classic receivers are used as case histories to illustrate various approaches to restoration. the book closes with useful tips on cabinet restoration and other cosmetic issues. 185 pages. $33.00.

Old Time Radios! Restoration and Repair by Joseph J. Carr. The late Joe Carr was arguably the most prolific recent writer of both hobby- and commercial-oriented electronics articles and texts. He does not write about antique radios from the point of view of a lover and collector. It's fairly obvious that this text was written to fill a market niche. Carr breaks down various radio designs into their key circuits and discusses their operation. In the final chapters he discusses test equipment, troubleshooting, alignment techniques, electrical safety and, for some reason, repairing radios damaged by water. There's not much warm fuzzy stuff about our hobby – but when Joe Carr talks technical, it's wise to listen! 256 pages. $19.95

How to Repair Old-Time Radios by Clayton L. Hallmark. Regretfully, this 1979 publication seems to have disappeared from booksellers' shelves. The 249-page volume is Tab Books #1148. ISBN 0-8306-9737-3 (hardbound) ISBN 0-8306-1148-7 (softbound). You may be able to find a copy through a book locating service or by keeping your eyes open at hamfests and radio meets. Hallmark's approach is somewhat a blend of Romney's and Carr's. He takes a modular look at radio restoration problems, focusing on circuitry and, to a larger extent, repair of individual parts. He discusses repair problems generically without often referring to specific radios. His troubleshooting approaches are very useful, as is his guide to alignment procedures. This is a man who enjoys working with and restoring old sets, and his enthusiasm shows in his writing. My copy is very well thumbed – try to find one for yourself!

1937 Sylvania Tube Manual, as published by the king of technical reprinters, Lindsay Publications. Every radio restorer needs a tube manual so that he can identify



Sylvania
TYPE 01A
DETECTOR
AMPLIFIER

CHARACTERISTICS

Filament Voltage DC	5.0 Volts
Filament Current	0.25 Ampere

Direct Interelectrode Capacitances:

Grid to Plate	7.5 μμf
Input	3.6 μμf
Output	3.0 μμf
Maximum Over-all Length	4 11/16"
Maximum Diameter	1 11/16"
Bulb	ST-14
Base—Medium 4-Pin	4-D

Operating Conditions and Characteristics:

Filament Voltage	5.0	5.0 Volts
Plate Voltage	90	135 Volts
Grid Voltage	-4.5	-9.0 Volts
Plate Current	2.5	3.0 Ma.
Plate Resistance	11000	10000 Ohms
Mutual Conductance	725	900 μmhos
Amplification Factor	8	9

CIRCUIT APPLICATION

Sylvania 01A is a general purpose tube of the triode type for use in battery operated receivers. This tube may be employed as a detector, radio frequency and audio frequency amplifier. Type 01A is now used primarily for replacement of tubes in old receivers.

The 1937 Sylvania tube manual provides plenty of data, even for older tubes relegated to the "Supplementary" section.

tube pinouts and operating parameters. Most of the manual reprints now available were originally published in the 1960s or later. They have more tubes in them than earlier editions, but the tubes that had become obsolete (in other words the ones of greatest interest to us) are apt to be hard to look up – often relegated to special tables providing minimal data. This edition is early enough so that most tubes of interest to us are located in their proper numerical spot in the book and full data is given. *Some* older tubes are located in a "supplementary" (thankfully not tabular) section – but even here the data given is more than adequate. 183 pages. $12.95.

❖ Out of the Past – Servicing

One of my favorite pastimes at radio meets is looking for classic books on radio servicing and theory. I have many in my library, but there are just a few I'd like to recommend highly for any new restorer's library. Look for these first!

Modern Radio Servicing by Alfred A Ghirardi published 1935 by Murray Hill Books, Inc. Mine is the fifth impression, dated 1943. This large (1318 page) volume was authored by one of the deans of radio service writing. I think it should be in every restorer's library because it is practical, au-

CONTROLS						CONDENSERS				VIBRATORS		No. Tubes	Complete Tube Complement	I. F. Peak	Rider's Reference
Use	Circuit	Correct Replacement	Switch	Bias	*Note	Original Part	Circuit	Correct Replacement	*Note	Replacement	*Note				
Continued															
Vol.	13	N	6			22538	25	WE850				8	56,[*]58, 55, 57, 47, 80	130	3-137
Sil.	12	A20MP													
Vol.	17	N				27592	1/15	35579	B111			6	2A7,[*]58, 2A6, 2A5, 80	472.5	5-15
						22538	1	WE850							
Vol.	18	N				28403	39	2N516	B11			6	[*]78, 6A7, 85,[*]43	472½	7-17
Vol.	18	N	6			29691	1	RS216				8	[*]6K7, 6A8, 6R7,[*]6F6, 57A	472½	7-19
						27583	1	RS216							
						25379	15	BB12							
Vol.	19	N	6			26995	1	2N517	B23	F297	C3	5	6A7, 78, 75, 43, 84	264	6-7
						22538	1	WE850							
						.05-.05		Buffer	B14						
Vol.	18	N	6			28031	1	WE851				6	[*]6D6, 6A7, 75, 42, 80	472½	7-21
						27592	1/14/15	35579	B111						
Vol.	55	N	6			22538/25168	1	WE850				7	[*]58, 55, 56, 2A5, 80	264	4-4
						25379	15	BB12							
Vol.	55	N	6			23981	39	2S562	B11			7	[*]78, 75,[*]43, 37	264	4-6
Vol.	13	N	6			22538	4	WE850				8	27, 24,[*]35, 47, 80	130	3-139
Vol	13	N	6			20049	12	ST593				6	[*]36,[*]37, 33	130	3-143
Vol.	13	N	6			22538	4	WE850				8	[*]35, 24,[*]27, 47, 80	130	3-141
						23397	4	CS133							
Vol.	15	L				19728	12	WE851				7	[*]32,[*]30, 33	130	3-145
						23146	12	WE851							
						22538	12	WE850							
Vol.	18	N	6			26381	1	ST595				6	[*]58, 56, 2A6, 2A5, 80	125	7-23
						25379	15	BB12							
Vol.	18	N	6			31558	1	2N516		294	C3	7	1C6,[*]34, 1B5, 30, 19 6Z4	472.5	6-12
						29529	13	ST585							
						.015-.015		Buffer	B14						
Vol.	55	N	6			24099	1	RM262				6	56, 57, 58, 55, 47, 80	262.5	3-147
Vol.	19	TRP611				22538	25	WE850				5	6A8, 6K7, 75, 6F6, 80	450	7-25
						27583	25	RS216							
Vol.	15	N	6			22538	2	WE850				10	[*]58,[*]56,[*]47, 80	130	3-149
Tone B'm	‡	M15MP													
Vol.	18	N	6			22538	2	WE850				10	57,[*]58, 55, 56,[*]47, 80	130	3-153
Tone B'm	‡	M15MP													
Sil.	12	A20MP													
Vol.	18	N	6			22538	1	WE850				6	57, 58, 55, 56, 47, 80	262.5	4-6
Vol.	15	N	6			8-8	39	2N516	B11			3	1A6,[*]34	‡	7-86
Vol.	55	N	6			26158	39	UR190	B72			5	6A7, 44, 75, 43, 2S25	264	4-7
Vol.	45	N	13		A13	29529	12	ST585				5	1C6, 34, 32, 33, 30	450	6-13

Listings from Mallory Radio Service Encyclopedia, Third Edition. *Note that the tube complement, i.f. peak and Rider's volume are given in the three right-hand columns.*

thoritative, and written when many of the sets we're interested in were new and problems in fixing them were fresh.

Part I deals with testing and testing equipment and contains much of value. However, there is an emphasis on building your own equipment, and that's not much use to us today. Commercial equipment of far better design and quality is available, at low cost, at most radio meets. Part II covers troubleshooting and alignment, and contains the content most helpful to us. Part III is a devoted to miscellany of varying interest. But the section on servicing allwave receivers is very useful. And if you haven't found yourself a tube manual yet, you'll be glad to have the tube characteristics and basing chart in the appendix (Part IV), Though the data is tabular and brief.

This fat, navy blue volume shows up frequently at radio meets and is easy to spot. Some still have their deep blue dust jackets with bold graphics in white. The price is usually in the $15.00 range.

Another Ghirardi book, ***Radio Physics Course*** (Radio Technical Publishing Co., 1933) is largely theoretical, as its name implies. I don't use it much, but am happy to have it in the library as another example of this famous author's work. On the other hand, a more modern book co-authored by Ghirardi and J. Richard Johnson (***Radio and Television Receiver Troubleshooting and Repair***, Rinehart Publishing, 1952) has a nice mix of practical and theoretical information and gives us the benefit of Ghirardi's later thinking on servicing issues.

The books co-authored by William Marcus and Alex Levy show up in bewildering profusion at the radio meets. In my library are ***Practical Radio Servicing, Practical Radio Troubleshooting***, and ***Elements of Radio Servicing***. They were published in the late forties through mid fifties by McGraw Hill. Both authors bring to these books a strong background in vocational teaching at the junior high and high-school level. As you might expect, content is quite hands-on and practical. I enjoy these volumes and sometimes find their problem solving approach useful in areas where other references fail. There is much overlapping content among the books, but I still pick up new variations every time I see them for sale.

Just to confuse the issue, I've also found and enjoyed books by Abraham Marcus (***Radio Servicing***, Prentice Hall, *1948, 1954*) and John Markus (***Television and Radio Repairing***, McGraw Hill, 1953, 1961,). Abraham and William have written servicing books together and I would think the men must be brothers or otherwise related. I can't guess about John (note difference in spelling of last name). John's book has a practical approach quite similar to William's publication.

◆ Out of the Past – Reference

Speaking of tube manuals, RCA regularly updated and republished its pocket-book-sized ***RCA Receiving Tube Manual*** over the years. They show up regularly at meets and seem to come in at about 5 bucks now. Keep your eyes open for years that will fill gaps in your library.

If you can find editions of the ***Mallory Radio Service Encyclopedia***, pick them up! I have a 1937 first edition (hardbound) 1939 third edition (softbound) and 1948 sixth edition (1948). All three books contain encyclopedic listings of virtually every set made up to the publishing date. The listings include Mallory numbers for replacement parts, but of more interest to us are the tube complements, which are very helpful in identifying sets with missing model numbers, the i.f. frequency and (in my third and sixth editions) the ***Rider's Manual*** volume in which the set appears. Very helpful if you have some Rider's volumes but no Rider's index.

Speaking of Rider's, no reference listing would be complete without mentioning the famous Rider's manuals. These manuals cover most receivers made in this country from the beginning of broadcast radio manufacturing to the mid 1950s. The 23 massive tomes occupy several feet of shelf space but are well worth having. I use mine all the time. A definitive article on Rider's would probably take up more space than I have in a whole column, so I'll have to be satisfied with brief overview.

Collecting Rider's at radio meets can be a fun and rewarding activity. The early volumes (maybe 1-4) tend to be high priced; the middle volumes (maybe 5-15) can be quite reasonable, sometimes as low as $10; fewer and fewer copies were published over the later years as Rider lost business to competing publications so, following the law of supply and demand, prices get higher again for the later numbers. I had to pay $40 some ten years ago to get a volume 21 to complete my set.

Rider's supplied sets to be given away as part of tube deals by major tube manufacturers, and some of my volumes carry their logos. I was fortunate enough to find a one-volume, complete compendium of volumes one through three sponsored by RCA. This became the seed of my collection. There are also volume one and two combinations, sometimes abridged – so watch out! You can buy a complete collection of Rider's on CD, but cost is fairly substantial and you should be sure the scanning resolution was adequate to show all of the fine (sometimes tiny) print. Of major importance to a Rider user is a complete set of Rider indexes. Originals are rare, but reprints are available through antique radio hobby outlets.

Clem Small, KR6A
clemsmall@hotmail.com

Some Ways in which Antennas Differ

Although all antennas serve to either receive or launch radio signals, there are important differences in how they get those jobs done.

❖ Resonant and Non-resonant Antennas

An antenna is resonant when its electrical characteristics tune that antenna to the operating frequency of the antenna. This aspect of antennas qualifies as "tuning" just as much as the process which separates stations when we tune our receiver from station to station.

An antenna's tuning is less selective than is the receiver's tuning, but the selectivity which it has is useful at times. It will help, to some degree, in rejecting interfering, off-frequency signals. Resonance will also increase the antenna's signal output to the receiver from signals at its resonant frequency. Common resonant antenna designs are the halfwave dipole, the quarterwave groundplane, and the Yagi-Uda beam. Well-known, non-resonant designs include the terminated Beverage, terminated rhombic, and the T2FD.

❖ Antennas May Utilize Standing Waves or Traveling Waves

When an antenna is resonant, the energy of the EM signal which it receives traverses the antenna element in such a way that each succeeding received cycle reinforces the energy already oscillating in the element from previously received cycles. This sets up standing waves of voltage and current in the antenna.

In non-resonant antennas each cycle of received energy traverses the element only once, and what it not transferred to the receiver's feedline, reradiated, or converted to heat in the ohmic resistance of the antenna element, flows to a terminating resistance and is converted to heat there. Because they do not support standing waves, such terminated antennas lack a resonant frequency. Thus they are usually called something like "broad-band," or "all-band" antennas.

❖ Electric, Capacitive, and Magnetic Antennas

An electromagnetic (EM) wave traveling (propagating) through space exists alternately as an electrical field, and then as a magnetic field. The wave continually changes between these states as it propagates. A receiving antenna can be configured such that it responds primarily either to the electric field or to the magnetic field of the waves which encounter the antenna. No antenna is completely magnetic or completely electric, but linearly constructed antennas such as long wires, dipoles, and groundplane antennas are much more responsive to the electric field of an oncoming wave than to its magnetic field. Most commonly available antenna designs produce electric antennas.

Some receiving-antenna elements, such as motor-vehicle, AM-broadcast receiver antennas, are very short compared to the wavelengths which they receive. Although these antennas respond to the electric field, their functioning is not based on traveling waves or standing waves. It may be most appropriate to think of these antennas as "capacitive antennas," or one plate of an "antenna-vehicle body" capacitor which is charged by the passing wave.

Loop antennas, such as table-top loops, which are very small in relation to the wavelength received, respond primarily to a wave's magnetic field. They are known as "magnetic antennas."

❖ Linear, Elliptical, and Circular Polarization

The electrical and magnetic fields of an EM wave are oriented at right angles to each other, and to the direction of wave travel. The term "polarization" is used to describe the orientation of the wave's electrical field. Waves whose electrical field is parallel to the earth are called "horizontally polarized." Those waves whose electrical field is perpendicular to the earth are called "vertically polarized." Waves at angles between vertical and horizontal can be described as having "slanted" polarization.

There also are antenna designs which produce "elliptical" or "circular" polarization. These types of polarization show an apparent rotation of the electric field orientation as they travel through space.

Depending on its design an antenna can have any one of the polarizations described above (fig. 1). An antenna will give maximum output in response to waves of the same polarity as the antenna. Differences in polarity between the wave and the antenna can cause very significant losses in received signal strength.

❖ Directional, Non-Directional, and Omni-Directional Antennas

As a standard of comparison for antenna designs, antenna engineers utilize a theoretical antenna called an "isotropic" antenna. The isotropic antenna is said to radiate its EM waves equally in all directions. Thus a wavefront leaving the isotropic antenna in space would be a sphere which grows larger as the wave travels farther away from the antenna. Obviously this antenna is non-directional: it launches and receives waves equally from all directions: upward, downward, all angles in between up and down, and to all directions of the compass.

In our real world no practical antenna is completely non-directional. But some antennas perform relatively equally in all horizontal directions from the antenna. A quarterwave

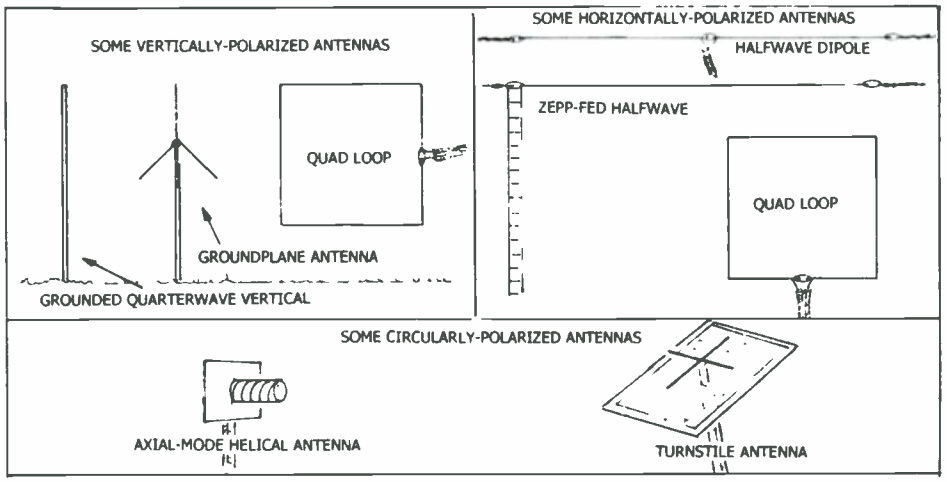


Figure 1: Examples of antennas with different polarizations.

This Month's Interesting Antenna-Related Web site:

Want an antenna-theory course designed for non-engineers? Check out:
http://www.ewh.ieee.org/soc/cpmt/newsletter/200103/ant.html.
Or a refresher for engineers? Try:
http://www.ieeeaps.org/080598.html

groundplane antenna is good example of this. Because of this, the groundplane antenna is commonly called "non-directional," although it has no significant radiation in the directly-upward direction. And even when this antenna is high above the ground it has no significant directly-downward radiation. Actually, an antenna with a pattern like the quarterwave groundplane antenna is more properly called "omni-directional."

Designing antennas to shape their radiation and reception pattern and thus to concentrate radiation and reception at desired directions, makes possible highly-directional antennas called "beams." Examples of popular beam antennas are the Yagi-Uda, the LPDA, antennas with parabolic reflector dishes, and the cubical quad.

❖ Antenna Gain

When an antenna is made directional it yields greater output to its receiver from signals coming from the antenna's favored direction. Thus we say that the antenna has more "gain" in the directions which it favors. Sometimes, such as in UHF weak-signal work, it is important to have high gain in an antenna. Sometimes, as in HF work, when the level of received noise is high, gain level is much less important than the directional characteristics, or the noise-responsiveness of the antenna.

❖ Feedpoint Impedance

There is a wide range of values in the feedpoint impedances of different antennas. Feedpoint impedance changes with such variables as type of antenna, point on the antenna at which the feedline is attached to the antenna, height of the antenna above ground, and proximity of the antenna to other conductors. When the impedance of the chosen feedpoint and the impedance of the feedline are not similar, some form of matching between the two is usually required to obtain good performance from the antenna.

RADIO RIDDLES

Last Month:

I asked: "In discussions of the grounded, quarterwave, vertical antenna, mention is sometimes made of a mirror image of the antenna. In technical discussions of this antenna we sometimes see this drawn as an image of the actual antenna and positioned upside down in the earth directly below the above-ground antenna. This image is used to explain how the radiated waves interact with the ground to shape the antenna's vertical-radiation pattern. Does this image act as an underground antenna and transmit underground?"

No, there is no image antenna under the earth radiating as the antenna above-ground is doing. The image is only a geometrical technique for explaining formation of the antenna's radiation pattern. On the other hand, it is true that some antennas located a few inches, or even a few feet, underground are, at times, utilized for communication using waves that propagate to and from them through the atmosphere and the earth above them.

This Month:

In this article I've hopefully kept things relatively simple by concentrating mainly on receiving antennas. But did you know that most antenna measurements, such as reception pattern, gain, resonant frequency, and feedpoint impedance, are the same when the antenna is transmitting as when the antenna is receiving? What is this commonality between reception and transmission with antennas called?

You'll find an answer for this month's riddle, another interesting, antenna-related web site, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Bob Parnass, AJ9S
parnass@megsinet.com
http://www.megsinet.com/parnass

Notch Filters Fight Interference

There are now over 600 NWR (NOAA Weather Radio) transmitters in the US, up from about 425 in 1999 (**http://www.nws.noaa.gov/nwr**). The government's goal is "to expand the reach of the weather radio broadcasts to 95% of the US population." However, the NWR transmitters can interfere with reception of police, fire, and other signals either by desensitizing a scanner or by mixing with signals on other frequencies and causing intermodulation. The mixing can take place either inside a scanner or externally, e.g., in a corroded joint in an outdoor antenna.

Some of my receivers experience intermodulation from both a new NWR transmitter and a commercial FM broadcaster.

Notch Filters

A notch filter tuned to the proper frequency and placed between the antenna and scanner can attenuate an offending signal unless the problem exists outside the scanner. Notch filters are passive devices so they require no power source. There are a few commercial notch filters available and you can even build your own filter provided you have well calibrated test equipment.

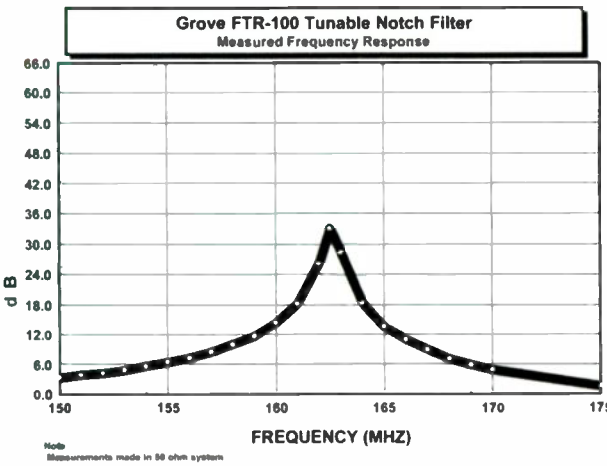
Frequency response is the most important characteristic that distinguishes one filter from another. How much does a filter attenuate the offending signal and to what extent does it attenuate desirable signals on other frequencies?

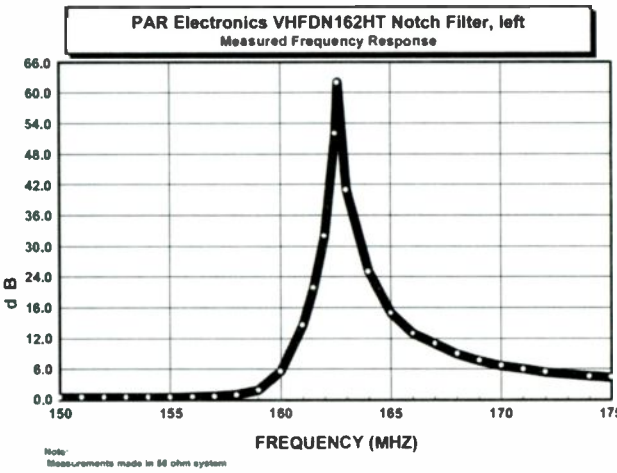
I constructed and tested simple 1/4 wave coax stub filters in July 1998 *MT*. Unfortunately, they are a poor choice for modern-day scanning because they have a high insertion loss and exhibit additional, undesired notches at odd multiples of their design frequency. In other words, a simple 1/4 wave coax stub filter will attenuate both the signals you want to reject and the signals you want to hear.

Grove Enterprises FTR-100

The FTR-100 (fig. 1) is a tunable notch filter that employs a single pole circuit to attenuate signals. The notch frequency is adjustable by means of a front panel knob and calibrations from 90 to 174 MHz. The FTR-100, which sells for about $50, is supplied with a BNC "T" adapter and a short length of RG-58/U coax cable fitted with BNC plugs. The adapter attaches to a single BNC jack on the rear panel, and the coax jumper connects the filter to the receiver. The antenna feedline connects to the other side of the adapter.

I was impressed with the FTR-100's construction. The resonant circuitry is built in a rigid metal box inside a solid wood cabinet, reminiscent of fine furniture. Rubber feet on the bottom prevent scratches to the table surface.





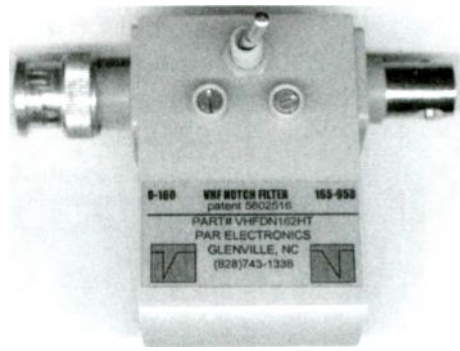
PAR Electronics VHFDN162HT

I contacted PAR Electronics to borrow two filters; one to reject NWR signals in the 162 - 163 MHz range and another to reject commercial 88 - 108 MHz broadcasters. PAR sent their VHFDN162HT filter (fig. 2) and a model VHFFM filter (fig. 3). The street price for these filters is about $70 apiece.

Each filter is housed in a rugged metal case. The smaller VHFDN162HT looks just like PAR's 152 and 454 MHz models reviewed in July 1998 *MT*. Each PAR filter is fitted with a BNC plug and jack so it can be mounted directly to a scanner without using a coax cable jumper.

The PAR filters are not designed to be tunable by the user, though the VHFDN162HT is fitted with a 2-position switch that changes the filter response.

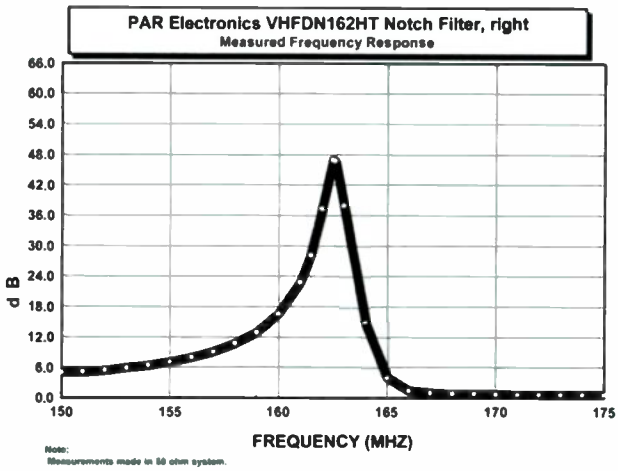
Grove Enterprises FTR-100

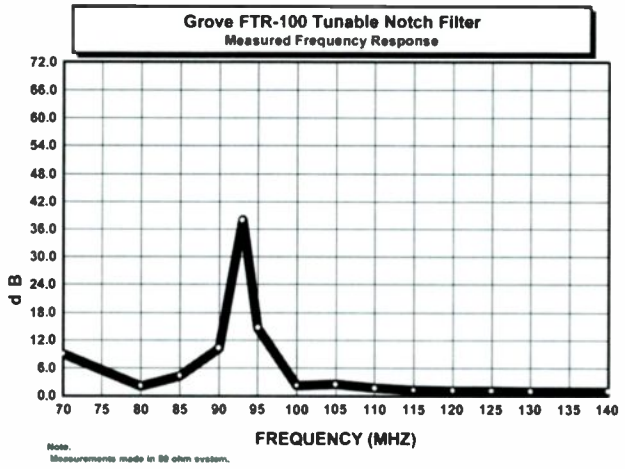


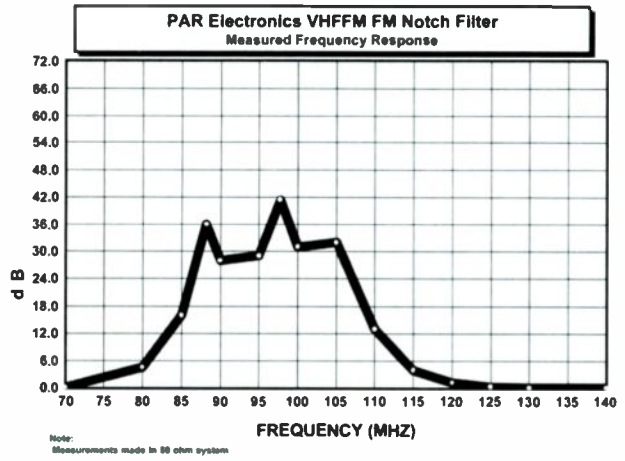
PAR Electronics VHFDN162HT

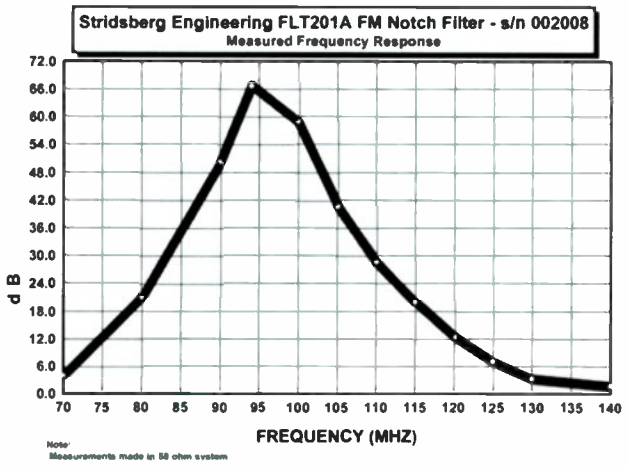
Performance

I tested the Grove and PAR Electronics filters in the lab, employing a digitally tuned









HP spectrum analyzer and tracking generator, and in actual use, with a Yaesu VR-500 portable scanner connected to an outdoor Antenna Specialists AV-801 antenna.

The first goal was to knock out interference near 145.73 and 156.93 MHz from WSPY, a 107.1 MHz commercial FM broadcaster. Both the Grove FTR-100 and the PAR VHFFM filters eliminated the interference completely. The FTR-100 adjusted easily despite my initial concern that it might have hair trigger tuning.

The next problem was on 156.83 and 157.05 MHz, where the VR-500 heard a mixture of 162.4 MHz NWR and digital paging signals. Both the PAR VHFDN162HT and Grove FTR-100 filters eliminated the mess.

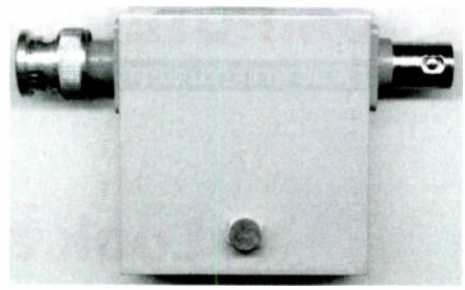
As the accompanying graphs illustrate, the PAR VHFDN162HT filter is sharper than the FTR-100. The PAR filter is the more appropriate choice for attenuating NWR interference while monitoring the 160 MHz railroad allocations, for example.

The FTR-100 had under 4 dB insertion loss in other parts of the 30 - 800 MHz spectrum. However, it had 10 dB loss in the 855 - 870 MHz range and more in the 870 - 920 MHz area, so I recommend you disconnect it for listening to weaker signals above 800 MHz where NWR and FM broadcast interference is usually not a problem.

When the VHFDN162HT's 2-position switch is in the left setting, there was an undesirable 35 dB notch at 231.1 MHz and greater than 4 dB loss in the 200 - 258 MHz range and above 974 MHz. With the switch in the right position, there was more than 4 dB loss below 100 and above 974 MHz and a 10 dB loss in the 30 - 50 MHz range. I measured the insertion loss at less than 2 dB from 858 - 870 MHz in either switch position. I recommend you keep the switch in the right position except when monitoring below 100 MHz.

Our PAR VHFFM filter measured less than 4 dB loss from 30 - 80 MHz and 115 - 1000 MHz.

I measured the frequency response of a Stridsberg Engineering FLT201A FM notch filter in January 2000 *MT* and



reprint the graph here for comparison with the VHFFM and FTR-100 filters. The $42 Stridsberg filter was best at attenuating FM broadcast signals, but was wider than the other two filters, so it impacted aeronautical signals below 125 MHz.

Overall

The FTR-100 filter is the most flexible because it is tunable from 90 -174 MHz. The more expensive PAR filters exhibit less insertion loss and may be kept in line when listening above 800 MHz. The Stridsberg Engineering FLT201A FM notch filter is considerably cheaper than the PAR VHFFM, attenuates FM broadcasters more deeply, but can impact VHF aero monitoring below 125 MHz.

CONTACT INFO

Grove Enterprises
7540 Highway 64 West
Brasstown, NC 28902-0098
Tel. (800)438-8155
http://www.grove-ent.com

Par Electronics
P. O. Box 645
Cullowhee, NC 28723-7435
Tel. (828)743-1338
http://www.parelectronics.com

Stridsberg Engineering
354 Albert Ave.
Shreveport, LA 71105
Tel. (318)861-0660
http://www.stridsberg.com

John Catalano, PhD
j_catalano@conknet.com

A Look at Bonito's RadioCom 5.1

Almost a decade ago, when I first started the Computers & Radio column, I proposed a "Total Radio Environment." Simply put, the concept was for a single piece of software which could provide all the functions a shortwave monitor would require. Keep in mind, ten years ago 35 MHz was considered a blazing CPU clock speed and state of the art. Meanwhile, I boldly proposed that this Total Radio Environment should provide radio control, logging and digital signal decoding, as a ***minimum***.

If you can remember back to the PCs of 1990, you'll know that this was a very tall order; in fact, too tall. Brave software manufacturers that tried to achieve this basic combination of monitoring functions found how poorly developed the PC hardware was for these tasks. More than one software package I reviewed seemed to stop for painful periods while the hardware fought to keep up. It was not a pretty picture, and made for frustrating and unreliable computer-assisted radio monitoring.

Now, fast forward to the year 2002.

The Year We Make Contact

Borrowing shamelessly from an Arthur C. Clarke novel, in this year of 2002, inexpensive computer hardware is now up to the tasks of the Total Radio Environment. HP, E Machine and other PC manufacturers are offering quality products with processor speeds which were just dreams a few years ago – so high we associated them with UHF frequencies!

Now that a PC of this power is commonly available, Bonito has introduced their latest version of RadioCom 5.1 (release 2), which does everything I imagined a decade ago ... and much, much more! All this power comes at a price that is higher than usual, but may be justified.

RadioCom 5.1's minimum requirements are not all that tough in 2002: Intel Pentium / Celeron with 200 MHz or better, Color Graphic min.16 Bit Colors, Screen Resolution: 1024x 768, 16 bit bi-directional Soundcard with Line In and Windows 95/98 /ME /2000 or NT 4.0 SP/3. However, if you want to display all the various screens and tools simultaneously, I suggest a Pentium 300 MHz as the minimum CPU. I used RadioCom 5.1 on a Pentium II 300 MHz machine with 64 MEG of RAM.

Since the program comes on a CD-ROM, your system will also need to include a CD drive. A free serial port is required for receiver control. The number of radios that RadioCom can control is around eighty! The ICOM list alone is over twenty. For this overview I used it with an ICOM IC-PCR 1000 receiver.

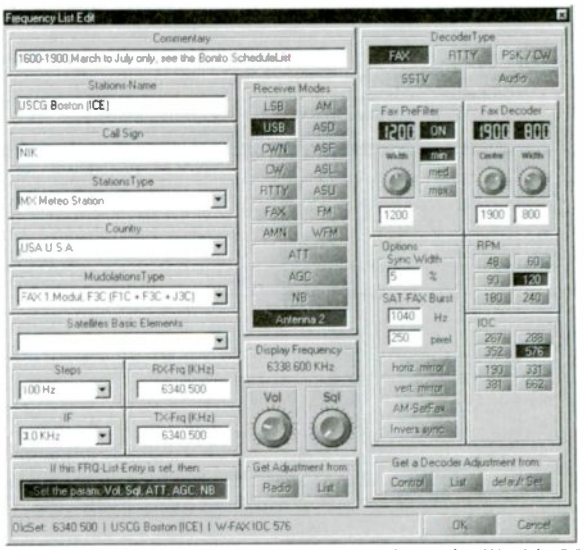


Figure 2 – A Logging "Card". Just Look At The Wealth Of Data; Much Computer Controlled!

No Jolly Rogers, Please

Loading is fast and effortless. However, I recommend you write down the number printed on the CD. This number must be typed into the opening screen correctly before you will be allowed to load the program on to your hard drive. This is Bonito's first level of software protection.

A hardware dongle is another level of security that safeguards RadioCom from unauthorized users. A dongle is a hardware device, which can range from a microcontroller to a few resistors, that is attached to the serial port. When the program is loaded it "looks" for a "coded" output, or specific arrangement of these devices on the serial bus. If it does not find the hardware, the program will not run.

RadioCom's dongle, which they call a "switchbox," is connected to the computer's serial port. The receiver's serial control line is then connected to the other side of the switchbox.

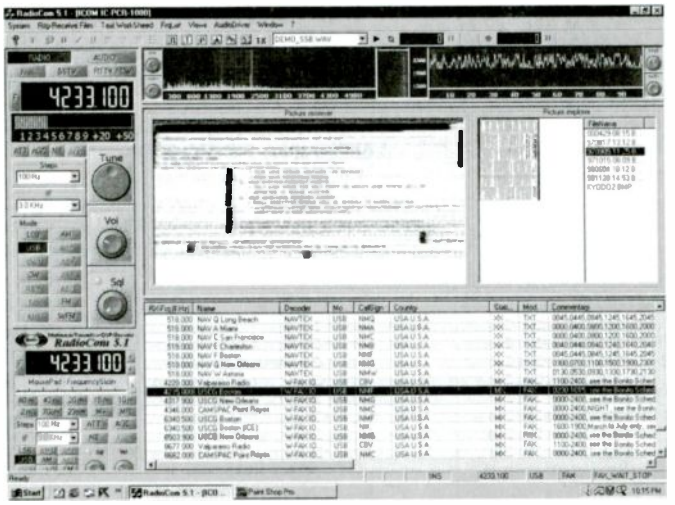


Figure 1 – RadioCom 5.1 Screen Displaying Radio Control Function on Left, FAX Decoding on Right & Logged Stations At Bottom.

Navigating the Screens

Figure 1 shows the impressive RadioCom 5.1 screen in one of many user selectable modes. The left side of Figure 1 is configured using the "Radio" format. On the top left side we can control all of the basic receiver functions such as frequency, mode, IF width, tuning step, volume and squelch, if the radio is so equipped.

The lower left side repeats some of the same controls but is geared to ham applications with preset buttons for quick tuning to the ham bands, such as the ever popular 20 meters.

Lots of Ways to Tune

Receiver tuning can be achieved in a number of ways. The first is using the Up/Down buttons to the right of the digits of the frequency display. You can also use the mouse to select and change digits. Or, you can click the "F" to the left of the digits and then enter the frequency via the keyboard. Finally, the "MousePad-Frequency Slider is a unique tuning method that takes a little practice to use.

Seamless Signal Decoding

The right side of RadioCom 5.1 can be set independently of the left side. The right is tailored to decoding different types of signals.

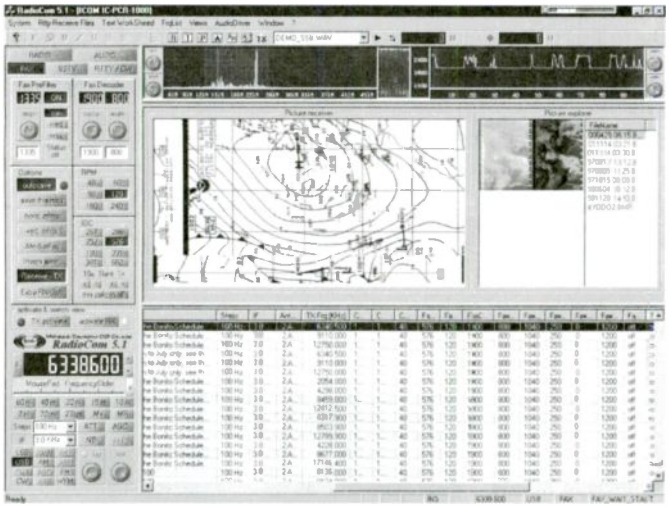


Figure 3 – Off Air FAX Being Received by RadioCom 5.1

RadioCom 5.1 is capable of decoding RTTY, CW, FAX, SSTV, PSK (PSK31, Q- and B-PSK), NAVTEX, SITOR B, SSTV and Synop signals. No additional hardware or software is required. It's all built into RadioCom (as it should be).

Six different pre-programmed right-side views are selectable from the top menu depending on the type of monitoring that is being performed. In Figure 1 the Typical Image Receiver View is being displayed on the right side of the screen.

The bottom section of this screen displays the station log. In this case we can tune our receiver to USCG Boston on 4235.000 kHz just by left clicking on this entry.

Complete Logging and Control

Let's take a closer look at exactly what data can be logged and controlled via a user entry. Figure 2 shows the very comprehensive data that is stored for recall for each log entry. RadioCom comes preloaded with a nice log of worldwide digital signal stations.

For this entry we are looking at USCG Boston as seen from the logging edit entry screen. Since it is a FAX station, we have chosen FAX as the Decoder Type. Now all the FAX parameters, IOC, RPM, Center Frequency and more can be set and logged. Once all this station and decoder data is logged, clicking on the entry not only tunes your receiver, but it also chooses the decoder type and decoder parameters. It makes digital signal monitoring so automatic and easy: I love it!

Just the FAX

Figure 3 shows the RadioCom 5.1 set up for serious FAX monitoring. It's again USCG Boston. But this time it's a FAX transmission on 6338.600 kHz.

Since we have chosen the FAX mode, the top left side now shows all the user-controlled FAX decoder settings as entered in the log for this station. The resulting FAX can be seen as it is being received in the center of Figure 3, above the log entries.

Completing this configuration of the FAX station display, at the top center-left is the received audio spectrum of this FAX signal. Note the peak, centered about 2200 Hz. To its right we can see the audio scope clearly showing the pulses of FAX signal.

I must say that I have never used software that made FAX monitoring so easy and enjoyable.

The RTTY and CW decoders have their own screen with parameters unique to these modes. Their operation was just as easy and pleasurable as the FAX decoder. A nice feature of the RTTY decoder is its ability to "translate" weather reports in the SYNOP format to plain language.

Digital Audio Filters and Analysis

RadioCom 5.1 has a built-in suite of digital audio filters. In Figure 4 we have selected the Audio configuration. On the left side of Figure 4 we can see filters for the audio, including an equalizer capability. The user can choose to place the equalizer before or after the decoder and manipulate the filters in other ways.

A very nice group of audio instrument displays, such as the Dual Channel Audio Oscilloscope and the Audio and Frequency Analyzers, round out the capabilities of RadioCom 5.1.

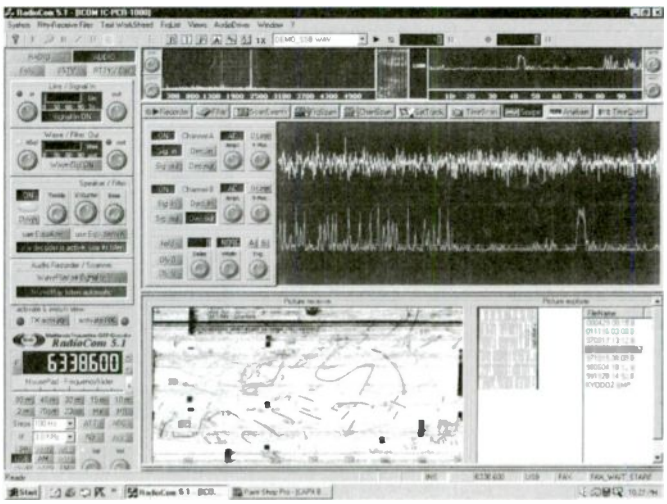


Figure 4- A Look at Some of the Received Audio Analysis Tools

What Have We Missed

RadioCom 5.1 has many other features, such as an audio recorder, graphical satellite tracking screen and 3D scanner, to name a few. All were tried and worked flawlessly.

Summary

Teamed with a typical low-end personal computer for year 2002, RadioCom 5.1 surpasses all the expectations I had ten years ago for the Total Radio Environment. If you are an HF utility monitor, you should take a serious look at RadioCom 5.1.

The program comes in two versions: one for monitoring only and a second for hams with transmit capability. The U.S. price for the SWL version is $169.96 plus shipping from Grove Enterprises (**http://grove-ent.com** or 800-438-8155). It's also available in the U.S. from Computer International at **http://www.computer-int.com**, or overseas from Bonito at **http://www.bonito.net**.

Now, just imagine what the next decade of electronic development will bring us. Let's hope the next decade also brings peace and justice to all the people of Earth. Happy 2002 to all.

Build a Scanner Repeater

by Jerry Reed

One of the most frustrating things for the scanner enthusiast is finding time to actually sit down and listen in these busy times. If you have a shiny new handheld scanner, you can squeeze in a few minutes more listening while working around the house or tinkering in the garage. But, if you're like me and your main scanner is as old (and as heavy) as my beloved PRO-2004, you know portable scanning isn't always an easy option.

Fortunately, there's an easy way to make even boat-anchor scanners portable. Here's how to modify an inexpensive wireless "baby monitor" to make a practical repeater for your scanner. A conventional ham repeater listens on one frequency and retransmits what it hears on another. This scanner repeater listens to the audio from one or more scanners and retransmits it to any location in your house. All that's required is a little soldering and a handful of readily available parts.

This scheme has advantages even if you have a portable, high-tech scanner, since repeating scanner audio over the wireless monitor link lets you station the scanner near outside antenna connections and away from interference sources. It also lets you combine scanners and listen in more than one location simultaneously, if needed.

How it works

Commonly sold as wireless room monitors, these devices connect a sensitive condenser microphone to a low-power FM transmitter. These operate license-free in the 49 MHz band, share frequencies with walkie-talkies and transmit to a portable receiver. In theory you could just turn up the volume on your scanner, place one of these room monitors alongside it, and listen in on the receiver from any other room. However, bypassing the microphone and forging a direct connection from your scanner's audio output to the input of the room monitor has a number of advantages.

First, a direct connection from scanner to the transmitter input avoids problems with ambient noise. This works two ways. With the modified room monitor fed directly from the earphone jack of the scanner, room noise doesn't enter the link. Nor does the scanner audio blast out into whatever room contains the scanner. This is particularly useful if your scanner is located in the bedroom and you're doing some late night listening in the garage.

Second, I don't know about you, but I don't particularly want to bug my home with an open mike. Those of you who have ever monitored these frequencies in the 49 MHz band know how this works. Disconnecting the built-in mike and replacing it with a simple patch cable to the scanner audio output avoids this problem.

Materials

Obviously you need the room monitor. Luckily these are inexpensively available lots of places. The monitor pictured in this article was a clearance item I picked up at a local Radio Shack for about $10. Other monitors can be acquired on sale from major retailers, or they can often be found at garage or yard sales for pennies on the dollar. Features to look for include AC adapters as well as battery power, rechargeable batteries and perhaps earphone jacks on the receiver.

Table 1 details the parts and tools you'll need.

The resistor and capacitor are used to isolate the monitor from the scanner; the patch cable to connect the scanner audio to the monitor and the attenuator may be needed to adjust the comparatively high output level of the scanner earphone jack to the sensitive monitor input. An assortment of heat shrink tubing helps do a neat and reliable job. Get an audio cable with "pig-tail" leads on one end, since we'll need to solder that end to the PC board.

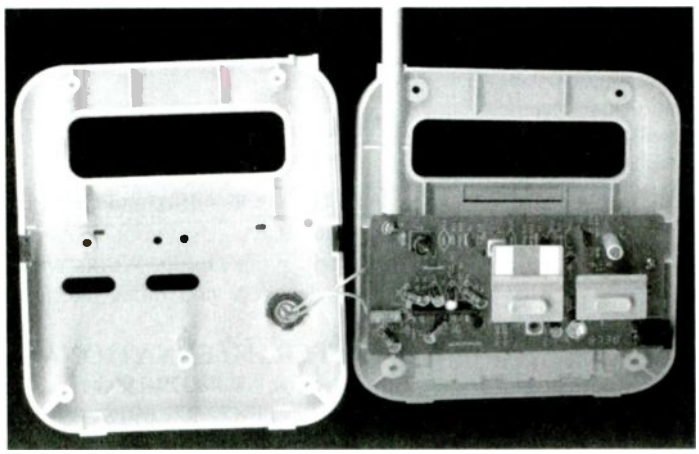


Fig 1: Inside view of the room monitor. The mic is the small circular object on the left half of the photo. Note the wires running to the PC board at right.

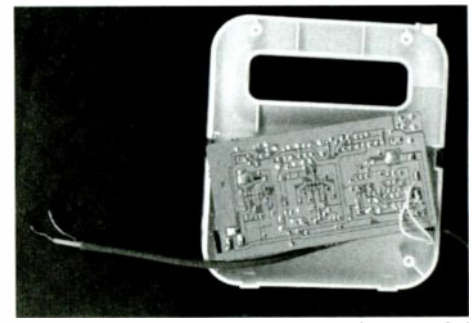


Fig 2: PC board removed, and audio cable fed through housing.

Step by Step

Open the room monitor case. (Save the screws.) *Figure 1* shows a typical configuration. The microphone is the small circular object in the left-hand shell. On some monitors the microphone may be soldered directly to the circuit board, on others it may be connected by colored wires, as in the model illustrated in this figure.

Now drill a small hole in the case, and feed the patch cable through. Choose the location so that there will be room to replace the circuit board without crimping the cable unduly. If there is sufficient room, tie a single knot in the cable on the inside of the hole to provide strain relief. *Figure 2* shows how this may look.

Locate the point on the printed circuit board where the microphone connects. *Figure 3* shows a typical arrangement. Note which one of the two wires from the microphone goes to the ground portion of the printed circuit board. This can best be accomplished by following the traces to see which of the two connections eventually leads to the negative battery lead. Knowing which of the microphone connection points leads to the "ground" portion of the monitor circuit board is useful for determining where to

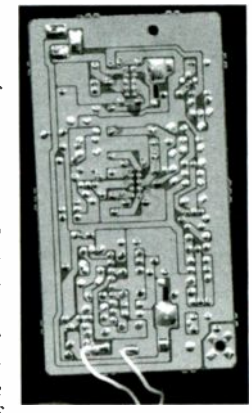


Fig 3: Typical PC board. Note the mic connections at the bottom.

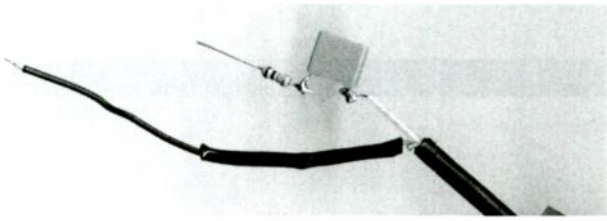


*Fig 4: **The resistor, capacitor and ground lead extension soldered to the audio cable. Note the use of heat shrink tubing to insulate the braided ground lead from the center conductor and resistor/capacitor combination.***

connect the ground braid from the patch cable.

Desolder the microphone leads. No elaborate technique is required – just heat each connection with the soldering iron, and gently tug the wire free with your pliers. If any solder bridges to an adjacent trace, just reheat the connection and use a wooden toothpick to brush away the excessive solder.

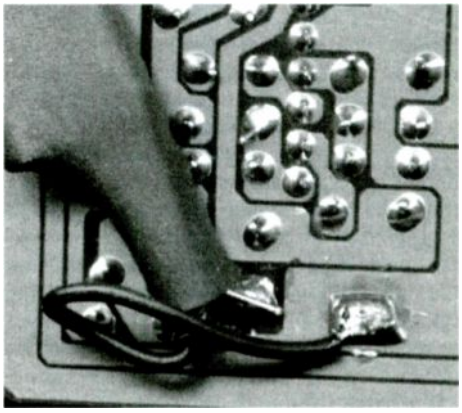


*Fig 5: **Close-up of the PC board, showing the audio cable connection replacing the mic leads. The resistor/capacitor connection has been completely insulated with heat shrink tubing before soldering.***

Now it's time to prepare the business end of the patch cable. First, slip a larger diameter piece of heat shrink over the patch cable inside the monitor housing. This will be used to insulate the entire connection from accidental contact with the printed circuit board after assembly is complete.

Next, slip a smaller diameter piece of heat shrink tubing over the braided conductor of the patch cable. This will be used to insulate the bare braid from accidental contact with the resistor and capacitor on the other conductor. It may be useful to attach a short piece of insulated wire to the bare braid to allow easier eventual connection to the printed circuit board.

Solder the resistor and capacitor in series with the center conductor of the patch cord. Keep the leads as short as you can. *Figure 4* shows how this will look.

Slide all the heat-shrink tubing pieces into place and use your heat gun or hair dryer to shrink them down. Correctly positioned, only the tip of the resistor wire and of the braid should extend beyond the tubing.

Solder the prepared leads from the patch cable to the microphone connections on the printed circuit board. Connect the braid or the braid wire to the terminal that leads to the negative battery terminal, if this can be determined. *Figure 5* shows the result.

Test the transmitter before assembling the case. Put in the battery, turn on the receiver that came with the monitor, and bridge a wire across the other end of the patch cable. You should be rewarded with loud clicks in the receiver. If this doesn't work, check carefully for cold soldered joints, solder bridges, or shorts within your cable at the connections between the resistor, the capacitor, the braid and the wire.

Carefully routing the cable within the enclosure, reassemble the monitor.

Now test it again. Connect the scanner to the input cable through the attenuator. Tune the scanner to an available signal (NOAA weather works well), turn down the squelch and gradually increase the volume. You should hear the scanner audio in the room monitor receiver.

Operation

One of the most flexible things about the scanner repeater is that it's easy to combine the output of two (or more) scanners and feed the composite signal to your remote monitor. *Figure 6* shows how I have two of my old scanners hooked up.

One scanner is an old Radio Shack PRO-33 that scans the local intercity law enforcement channels. These channels don't get a lot of traffic, but when they do activate, it is always interesting, as something big is usually going on if the local jurisdictions need to interoperate.

The second scanner is the venerable PRO-2004 and is programmed to scan local air and rail frequencies. These get quite a bit of traffic during the daylight hours. When listening to the combined feed, most of the time you get the output from the second scanner, but if something does happen on the intercity channels, you can find out quickly.

Shown at *a* in *Figure 6* is an attenuator that matches the earphone output from the PRO-33 into the relatively sensitive input of the modified room monitor. Since I'm combining scanners, a simple "Y" cable is shown at *b*, and the connection to the modified room monitor is shown at *c*. Because the PRO-2004 has a line-level output, it doesn't need an attenuator to connect to the transmitter.

Remember not to program the scanner to either of your room monitor output frequencies (49.860 and 49.890 MHz in this case) unless you want to hear some really ugly feedback.

Whether you're remoting one scanner or several, I think you'll find the flexibility and convenience of the scanner repeater will add to your listening enjoyment. Happy scanning.

Materials

10k resistor, 1/4 or 1/2 watt. (Brown/Black/Orange/Gold)
.1 mfd capacitor, 25 WVDC or greater.
Audio patch cable, RCA Male to pigtails, any length. (Radio Shack #42-2372 or similar)
Heat shrink tubing (variety of sizes)
6 inch piece of #18 insulated wire (actual length and gauge approximate)
Rosin core electronic solder
Audio attenuator (Radio Shack #274-300 or similar)

Tools

Pencil-type soldering iron (about 15-30 watts)
Pair of wire pliers for cutting and stripping
Small drill
Hot air paint stripping gun or hairdryer for shrinking the tubing
Small Phillips head screwdriver for opening the room monitor

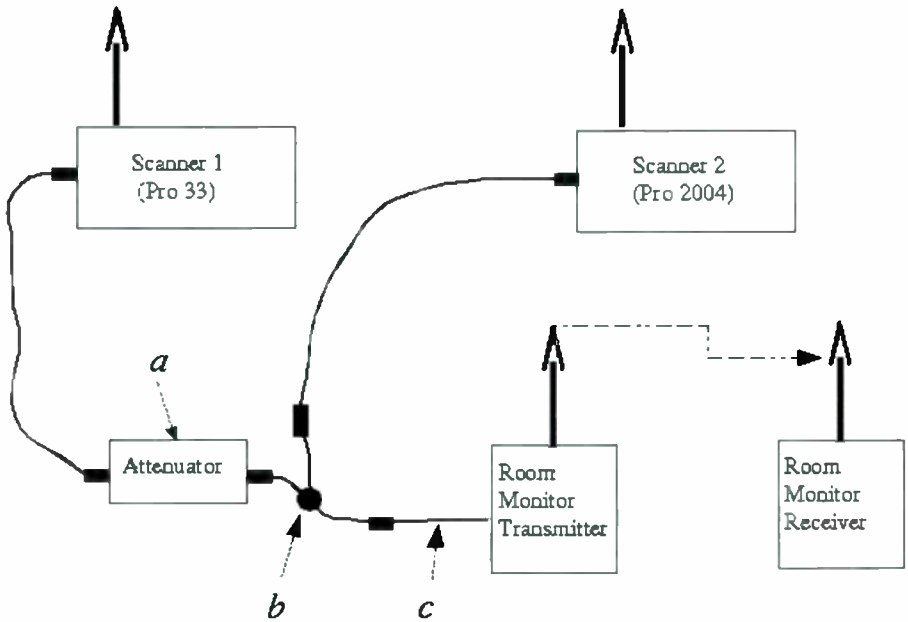


*Fig 6: **Connecting the scanner repeater to multiple scanners. If you're only using a single scanner input, the "Y" cable can be omitted. Scanners with line-level outputs will not need the attenuator.***

Jock Elliott
lightkpr@nycap.rr.com

Midland's Neat WR-10 AM/FM Weather Radio

To paraphrase a scatological bumper sticker: "Stuff" Happens. Sometimes, *very bad* stuff happens. When it does, whether it is caused by people with evil intent or an occurrence of nature, it is always good to have as much warning as possible.

For that reason, in January 1975, a White House policy statement designated NOAA (National Oceanic and Atmospheric Administration) Weather Radio as the sole government-operated radio system to provide direct warnings into private homes for both natural disasters and nuclear attack.

NOAA currently broadcasts weather information 24-hours a day on more than 480 FM transmitters in 50 states, Puerto Rico, the Virgin Islands, Guam, and Saipan. NOAA Weather Radio also broadcasts warnings, as well as post-event information, for all types of hazards – both natural (such as earthquakes, tornados, or volcanic activity) and technological (such as chemical releases or oil spills). While, to my knowledge, NOAA Weather Radio has not yet been used to provide warning of terrorist attacks, it certainly wouldn't surprise me to see it employed for that purpose. (Such a change in the "tasking" of Weather Radio might even be in place by the time you read this. The email version has already been used to carry such national warnings.)

Seven frequencies are used: 162.550, 162.400, 162.475, 162.425, 162.450, 162.500, and 162.525 MHz. NOAA's goal is to provide weather radio coverage for 95 percent of the U.S. population. Right now, an estimated 70-80 percent of the population is within range of a NOAA weather radio station. No matter how you slice it, NOAA Weather Radio is one of the very best returns we get from our tax dollars.

The bottom line is that you owe it to yourself – and the people that you care about – to have a NOAA Weather Radio receiver in your house. If you don't have one, get one. If your Mom or your Dad or Grandma or your significant other doesn't have one, give them one. Make sure you get one with alert capability. It can sit there silently monitoring for an alert signal from the NOAA transmitter. When it gets the alert tone, it will let you know that "something's up."

Midland's All-in-One

Another essential piece of gear that every household should have is a portable AM/FM radio that can operate off battery power. That's where the Midland's new weather radio comes in. Its official title is a mouthful: "Model WR-10 7 Channel Weather/Hazard Alert Monitor with AM/FM Radio."

The WR-10 allows you to listen to your favorite AM or FM radio broadcast as it continues to silently monitor the local NOAA Weather Service broadcast in the background. The instant that it receives a thunderstorm, tornado, flood, fire or other severe weather or hazard alert, it automatically turns on a flashing LED and/or high volume warning tone, then switches reception to the NOAA broadcast for more details.

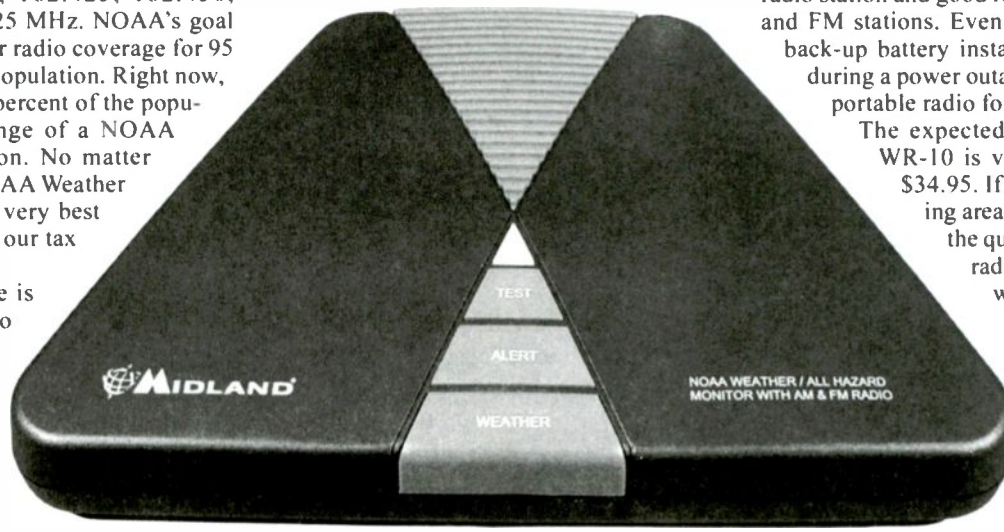
The WR-10 measures 8-5/8" W x 1-1/2" H x 6-1/4"D. The case is an attractive gray plastic. On the top of the case, there is a grill for a top-firing speaker, a red light-emitting-diode, and three buttons. The WEATHER bar button activates the weather receiver so you can listen to NOAA's 24-hour weather broadcasts. The ALERT bar button turns off the weather radio broadcasts and turns on monitoring of the emergency alert system. It also acts as the ON switch for the AM/FM radio. The alert TEST bar button allows you to make sure that the WR-10 can receive an emergency alert broadcast.

On the left side of the WR-10, you find a switch for selecting weather, AM or FM tuning and a slide-rule tuner for AM and FM broadcasts. On the back of the WR-10 is a telescoping antenna that extends about 12-1/2 inches. On the right side of the case is a ON/OFF/VOLUME thumbwheel, a jack for an external antenna, a jack for an external alert device such as a strobe light, and a jack for the 110 V wall adapter (included.) The WR-10 can also be operated from an optional extra-cost vehicle adapter. On the bottom of the unit, you discover a switch for selecting one of the seven NOAA weather frequencies to receive, a switch for selecting alert mode (LED, siren, or voice-only), a reset button, and a hatch for the 9V DC back-up battery.

If you want the WR-10 to silently monitor for alerts without listening to AM or FM broadcasts, there's a trick: set the tuning switch on the left side to WX and press the ALERT button. Do NOT turn the thumbwheel on the right side to OFF – that turns everything off, including the ALERT function.

I liked the WR-10 a whole lot. It offered clear reception of my local NOAA weather radio station and good reception of local AM and FM stations. Even better, with the 9V back-up battery installed, it will operate during a power outage or as a temporary portable radio for six to eight hours.

The expected street price of the WR-10 is very reasonable: just $34.95. If you live in an outlying area and want to improve the quality of your weather radio reception, or if you want to take advantage of the WR-10 in a vehicle, the 18-259W Thru Glass VHF Weather Antenna is available for a street price of around $19.95.



The Midland WR-10 offers NOAA Weather Radio, alert capability, and AM/FM reception in a neat package.

MT REVIEW

Magnetic-Mount Scanner Antennas....

A Comparison by Bob Grove

I recently discovered that a storage shelf in my radio repair shop bristled like a porcupine with whip antennas of various sizes that I had accumulated over the past couple of years from yard sales, flea markets, and dealer samples. I had single- and dual-band ham whips, cellular antennas, and even scanner models. How would they compare for general purpose scanner monitoring? I wondered.

With my car in an open driveway and an AVCOM PS37D spectrum analyzer at my disposal, I decided to sweep the major monitoring bands, measuring relative signal strengths as I alternately placed each antenna in the center of my car roof. The results were quite surprising.

Admittedly, this is not a consummate scientific test, but it does show that there are differences among antennas, some subtle and some profound. And price is not always a consideration.

I discovered, for example, that some grades of coaxial cable are worse than others, with inadequate shielding causing erratic readings caused by nearby conductors like me or the car body. And predictably, antennas using thin RG-174/U coax will suffer 2-4 dB more loss at UHF than if they used RG-58/U.

It became quite obvious that the best antenna by far was the Nil-Jon "Super M"; we chose it as the standard of comparison, rating the competitors with + or- dB readings at specific frequencies.

The competitors were assigned numbers for ease of reference on the chart; here are their identifications and descriptions:

Antenna Performance Against Nil-Jon Super M

(1) Generic 13" cellular center-loaded gain antenna with RG-174/U cable
(2) Everhardt "Tiger" B5 14" cellular center-loaded gain antenna with RG-58/U cable
(3) CTI Pro-Am MM144B 19" slim whip with RG-174/U cable
(4) CTI Pro-Am MM3B 12-1/2" tri-band scanner antenna with RG-174/U cable
(5) Grove ANT-30 19" Stealth whip with RG-174/U cable
(6) Austin Spectra 25" dual-coil whip with RG-58/U cable
(7) Generic 20" dual-coil high-gain cellular antenna with RG-174/U cable
* Erratic reading, possibly due to defective or inadequate shielding.
— means reading too low to measure, or signal not present.
0 means equal to Nil-Jon antenna.

The Bottom Line

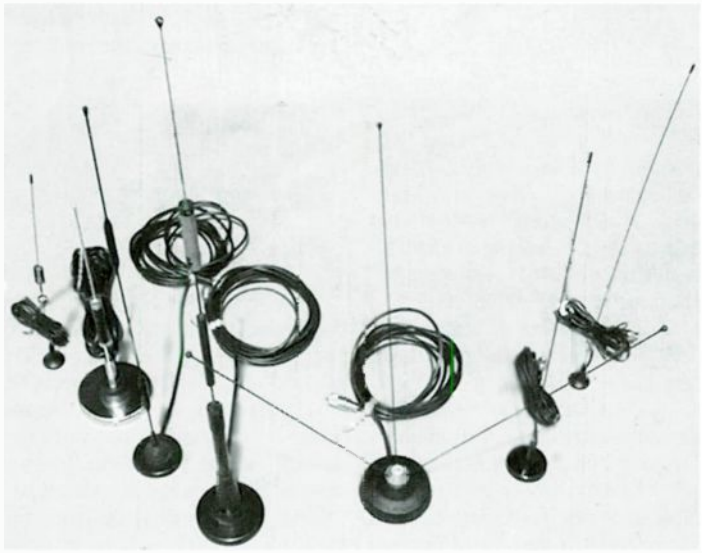
On low band, the only antenna that performed somewhat better than the Nil-Jon was the high-gain cellular antenna, most likely due to the aperture (electrical length) delivering more signal voltage at this frequency range.

Better 800/900 MHz performance by the first two cellular antennas could be expected since they are band-specific gain antennas. But how does this all equate to actual differences in perceptible reception?

Generally speaking, a 1-2 dB difference can only be discerned under the most carefully controlled conditions, not what we hear while driving down the highway! It takes several dB – as much as 4 or 5 – to notice a difference, and then only when signals are weak enough to be competing with prevalent background noise.

For those readers fortunate enough to have S meters on their receiving equipment, one S unit is equivalent to a 6 dB change in signal level. If you are already receiving S9 signals, another 6 or 10 or 100 dB won't make it sound any better!

But when fringe signals are breaking up in background noise, a few dBs help a lot, often meaning the difference between readable copy and static-covered speech.



The contenders. The Nil-Jon Super-M, a three-element angled array, is front right.

Freq MHz	Model & dB (1)	(2)	(3)	(4)	(5)	(6)	(7)
8	-3	-3	-8	-3	-6	-4	+4
50	-4	-4	-9	-5	-8	-5	+3
82	-9	—	-5	-6	-7	-9	0
102	-6	-5	-12	*	-9	-5	+3
152	-9	-9	-3	-2	-3	-2	-8
162	-5	-6	-2	-9	-3	-2	-8
410	—	-8	-9	-8	-7	-2	—
462	-14	-14	-10	-10	-10	-3	-25
494	-9	-7	-5	-3	-9	-4	—
570	+1	+1	+1	-7	-5	-13	-8
880	-2	+3	-4	0	-8	-2	-4
949	-1	+1	0	+1	-7	-9	0
992	-3	+2	—	-2	-8	—	-2

What's NEW

Tell them you saw it in Monitoring Times

Multifunction Clock/Timer Kit

It's a clock, a calendar, a scoreboard, a thermometer, and that's not all! There's a lot you can do with this kit. With its 6 x 1.4" LED digits, not only does it tell the time, it also tells the date. It can count down the time to a specific date (retirement, schools out, wedding, etc.), it can display the temperature from -20 to + 70°C (or the equivalent in °F). It generates random numbers from 1 to 99, it does a dice thing, it's a chronometer with a lap function. It is a two player/team scoreboard which counts up to 199. It has a relay output (1A/24V max.) for either temperature or time alarm.

If that wasn't enough, it has a keychain remote control which is included, and memory backup with a 9V battery. Order a second remote so teams can keep their own score. Add the case for a finished look, build it into your own housing, or leave it "naked" if you like the circuit board look. This is a cool kit!

The unit measures 10" x 3.1", power supply is 12 Vdc, and it weighs a scant 0.50 pounds. The Clock/Timer Kit is $89.95 from Ramsey Electronics (793 Canning Parkway, Victor NY 14564; 800-446-2295; **http://www.ramseyelectronics.com**).

GPS Location-Finding

The new Garmin International GPS 16 series receivers make use of precise positioning correction data derived from the Wide Area Augmentation System (WAAS) to provide accuracy of less than 3 meters.

Packaged in a low profile, waterproof housing, the GPS 16 comes in a low voltage (3.3 to 6Vdc) or high voltage (6 to 40Vdc) version. The unit comes with a programmable RS-232 output port and serial input for integration into mobile computing devices or wireless communications equipment. The GPS 16 LVS or HVS is $149 list. Contact Garmin International (1200 East 151st St, Olathe, KS 66062; 913-397-8200; **http://www.garmin.com**), for more information.

Radio Direction-Finding

WiNRADiO is offering some bold, new products. The WD3000 series radio direction finder (RDF) should have considerable impact on the government and military agencies. It is a stand-alone package which can be used with any receiver in its frequency range, although it is primarily designed for WR receivers. It will be in three versions to match the three frequency ranges of the WR3150, WR3500, and WR3700.

The first one to be released will be a mobile unit for the highest frequency range, 100 MHz-4000 MHz (4 GHz). Later versions will be for fixed base installations. The last step is to integrate GPS reception for pinpoint accuracy; it is expected that this will be a software upgrade, backward-compatible with existing radios. The fixed base system will be networkable so that it can integrate information from other RDF sites in order to triangulate signals for absolute location rather than simply taking directional bearings.

For more information, contact Grove Enterprises (7540 Hwy 64 W, Brasstown, NC 28902; 800-438-8155; **http://www.grove-ent.com**)

IRCA Mexican Log

The *IRCA Mexican Log*, 7th Edition, lists all AM stations in Mexico by frequency, including call letters, state, city, day/night power, slogans, schedule in UTC/GMT, formats, networks and notes. The call letter index gives call, frequency, city and state. The city index (listed by state, then city) includes frequency, call and day/night power. The log has been completely updated from the 2000 edition and carefully cross-checked. This is an indispensable reference for anyone who hears Mexican radio stations.

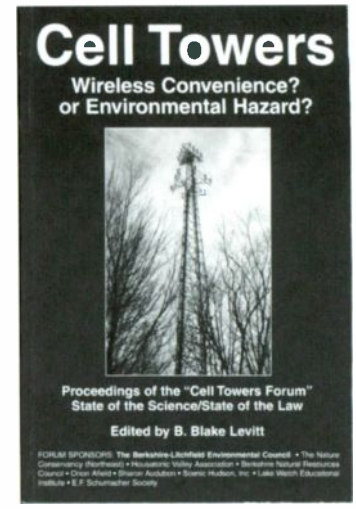
Size is 8-1/2" x 11" and three hole punched for easy binding. Prices: IRCA/NRC members - $9.00 (US/Canada/Mexico/sea mail), $10.00 (rest of the Americas airmail), $10.50 (Europe/Asia airmail), $11.00 (Australia/New Zealand airmail). Non-members: add $2.50 to the above prices. To order the IRCA Mexican Log from the IRCA Bookstore, send the correct amount (in US funds payable to Phil Bytheway) to: IRCA Bookstore, 9705 Mary NW, Seattle WA 98117-2334

Latin American Radiostations

Max van Arnhem shared highlights of his 31 years of DXing to the Benelux DX Club in the Netherlands. Many audience members asked if he would consider producing a CD with audio files of some of the stations he had received over the years. Max decided to focus on radio stations from Latin American counties, as he had a large collection of recordings from this area.

The CD consists of 371 wav-files, which can be opened in Mediaplayer or Realplayer. These include station identifications, announcements and jingles, received and recorded during DX sessions in the Netherlands and on location between 1975 and 2001. Many of these stations are no longer audible on the tropical bands, at least not at large distances.

The CD Rom can be ordered by sending 30 Dutch Guilders, 15 Euro, or the equivalent for delivery within Europe; outside Europe send



15 US Dollars (includes postage), to Max van Arnhem, Brink 9, 6852EE Huissen, the Netherlands. For questions and/or remarks, email *mvarnhem@wxs.nl*

Cell Towers

Wireless Convenience? or Environmental Hazard? That is the question posed by a new book offered as a resource to zoning boards and local neighborhoods as they struggle with making decisions about cellular tower siting. The 350-page, soft-bound book contains reports from the "Cell Towers Forum" State of the Science/State of the Law conference sponsored by the Berkshire-Litchfield Environmental Council, which was successful in attracting leading scientists and legal experts not often available at the local level. Unlike the forum the Council hosted in 1997 on planning and zoning regulations, this forum focused on health and safety issues and other concerns swept under the rug by Congress in the 1996 Telecommunications Act.

Following an introduction outlining the history of the problem and the current state of affairs by editor Blake Levitt, the book includes chapters by members of the Environmental Protection Agency, The Federal Communications Commission, the U.S. Fish and Wildlife Service, RF engineers, and noted researchers, such as Henry Lai, PhD. There is also a detailed roundup of telecom legal cases, suggestions for sensitive siting issues, and sample language for zoning regulations. The appendices provide

What's NEW

Tell them you saw it in Monitoring Times

scientific abstracts, proposed federal legislation, websites, and additional zoning information.

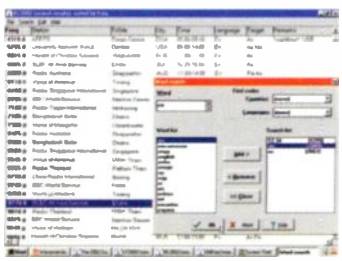
An excellent resource which is intended for the lay-person, *Cell Towers* is recommended reading for anyone concerned with the issue of cellular towers. For those involved in local government, it is an excellent way to become educated on the issues and to discover that you may not be as powerless as you feel when faced with a cell tower siting request.

Cell Towers, edited by B. Blake Levitt, ISBN 1-884820-62-X, is printed by New Century Publishing 2000 (60 Bullock Dr Unit 6, Markham, ON L3P 3P2, Canada; or 561 Shunpike Rd, Sheffield, MA 01257). Cover price is $19.95 US or $29.95 Canada.

New Klingenfuss Publications

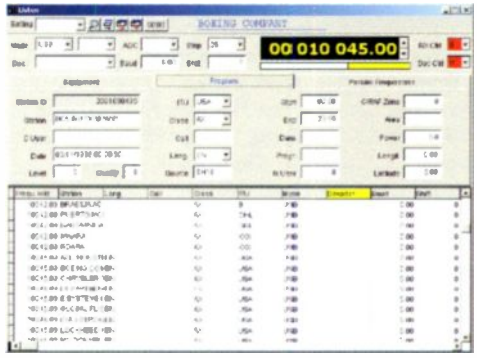
It's time for DXers to be thinking about updating their favorite reference books and CDs from Klingenfuss Publications. The 2002 guides will be available in December; do you have yours yet? The *Guide to Utility Radio Stations* and the *Shortwave Frequency Guide* are old stand-bys but the contents keep up with the times. The *2002 Super Frequency List* on CD-ROM combines three frequency lists of broadcast and utility radio stations with nearly 40,000 entries (CD-ROM $24.95 from Grove Enterprises 1-800-438-8155).

We'll review these in more detail in a later issue. Meanwhile, for more information, visit **http://www.klingenfuss.org** or write for a free 24-page catalogue to Klingenfuss Publications, Klingenfuss Radio Monitoring, Hagenloher Str. 14, D-72070 Tuebingen, Germany



More than just Software

RadioSpectrumManager (formerly RadioManager) is a sophisticated program and database from the Swiss radio monitoring company, shoc(r). Their latest version, RSM5, is a database and receiver, transceiver and decoder control program. Scanning, automatic station identification, memory (channel) manager, decoder control and many other applications are possible. Together with a computer-controllable receiver and decoder the shoc(r) RadioSpectrumManager offers you a very powerful listening and monitoring tool, even for those with little experience in operating with communications equipment.



RSM comes with a complete database of about 124,000 records, which can be manipulated, filtered, imported and exported. The software includes a professional HF broadcast and utility database with 37,000 records, VHF/UHF, with 69,200 records, TVSAT, with 8,800 records, and broadcast AM (0-1.6 MHz) with 8,700 records. Updates are available at for a reasonable fee. Even if the databases turn out to be somewhat Euro-centered, they can be customized by importing other dBase or commercial databases and through the user's own logging records.

There is simply no comparison between selecting frequencies for monitoring from a database and tuning from books. The database allows you to search criteria such as name of station, call sign, modulation type, country, language, type of transmission, time and others. Stations fulfilling the criteria are displayed in a window. With a "mouse-click" you set the receiver and decoder to the selected stations. A second window displays any parallel frequencies to the station selected in the first window, which may also be selected.

Scanning in the database is also possible. During monitoring, new information may entered, changed or deleted in the database. When doing a manual search from the receiver, the software will display information when a database entry is found close to the frequency selected. You can also control your receiver directly from the computer. Data coming from the decoder can be saved on hard disk in a text file.

RSM requires at least 64 MB RAM, Windows NT2000 (or NT4, W98), 50 MByte free hard disk space if you install all databases. Radio equipment must be equipped with RS232 connection.

RSM is available in a variety of configurations: RSM5E (Economic) Version for shortwave listeners with no decoder ($152 US); RSM5S (Standard) for receivers and decoders (such as Wavecom) for recreational use ($285 US); RSM5P (Professional) covers multiple receivers and decoders, includes propagation analysis, allows networking and web control, and many other features ($2,280).

For more information, visit **http://www.shoc.ch** or write shoc(r) RSM RadioSpectrumManager, R. Haenggi , Gfell, 8499 Sternenberg, Switzerland; Phone:+41-52-394 1255; FAX:+41-52-394 1256

News and Notes

- Jack Thurston located a website for replacement LCDs for the popular, but discontinued, Radio Shack PRO-2004 scanner, the first of the wideband series that continued through the PRO-2005 and last the PRO-2006. The website is **http://home.cfl.rr.com/scan/Backlight.html** and the contact name is Robert Cummings, 635 Buttonwood Drive, Merritt Island, Florida 32953-4608.
- Robert Felton sent this information: The National Criminal Justice Reference Service has a set of books available for free download over the Internet at **http://virlib.ncjrs.org/LawEnforcement.asp**. The documents of most interest to *MT* readers are probably those entitled Antenna System Guide, NIJ Guide 202-00 (Chapter x), where x is chapters 1 through 14, issued in 6 volumes. The book arrives in PDF format, but paper versions are available on request.
- The Electronic DX Press, Melbourne, Australia, invites you to *Shortwave Radio Log* – an on-line service via the Internet, where anyone anywhere in the world can share news, logs, discussions, and messages about any aspects of shortwave radio broadcasting. There are no passwords and you do not have to subscribe to, or join anything.
- *Electronics Australia Today*, Australia's longest-running electronics magazine recently ceased publication. The decision by the Federal Publishing Company will sadden many amateurs, generations of whom built equipment from circuits published in the magazine. EA traces its history back to *Wireless Weekly*, which started in 1922.

Books and equipment for announcement or review should be sent to " What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to mteditor@grove-ent.com.

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- Charles (Chuck) Boehrke
Keaau, Hawaii

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- Don Nauer

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EDITORIAL STAFF

Correspondence to columnists may be mailed c/o Monitoring Times; any request for a reply should include an SASE.

Frequency Manager	Gayle Van Horn	gayle@webworkz.com
Frequency Monitors	Mark J. Fine	mark.fine@fineware-swl.com
Program Manager	John Figliozzi, KC2BPU	jfiglio1@nycap.rr.com
American Bandscan	Doug Smith, W9WI	w9wi@bellsouth.net
Antenna Topics	W. Clem Small, KR6A	clemsmall@hotmail.com
Ask Bob	Bob Grove	bgrove@grove-ent.com
Beginner's Corner	Ken Reitz, KS4ZR	ks4zr@firstva.com
Below 500 kHz	Kevin Carey, WB2QMY	wb2qmy@arrl.net
Bright Ideas	Gary Webbenhurst	ab7ni@arrl.net
Closing Comments	Bob Grove	bgrove@grove-ent.com
Communications	Rachel Baughn	mteditor@grove-ent.com
Computers and Radio	John Catalano	j_catalano@conknet.com
Digital Digest	Stan Scalsky	sscalsk@mail.ameritel.net
	Mike Chace	mike@chace-ortiz.org
Easy Access Radio	Jock Elliott KB2GOM	lightkpr@nycap.rr.com
Federal File	Larry Van Horn, N5FPW	larry@grove-ent.com
Letters to the Editor	Rachel Baughn	mteditor@grove-ent.com
Milcom	Larry Van Horn, N5FPW	larry@grove-ent.com
On the Ham Bands	T.J. Arey, N2EI	tjarey@home.com
Outer Limits	George Zeller	georgez@nacs.net
Plane Talk	Jean Baker, KIN9DD	jeanieandbob@earthlink.net
Programming Spotlight	John Figliozzi, KC2BPU	jfiglio1@nycap.rr.com
QSL Corner	Gayle Van Horn	gayle@webworkz.com
Radio Restorations	Marc Ellis	mfellis@enteract.com
Satellite Radio Guide	Robert Smathers	roberts@nmia.com
Scanning Canada	John Corby, VA3KOT	johndavidcorby@yahoo.com
Scanning Equipment	Bob Parness, AJ9S	parnass@megsinet.net
Scanning Logs	Larry Van Horn, N5FPW	larry@grove-ent.com
Scanning Report	Robert Wyman	wymanent@bellsouth.net
SW Broadcasting	Glenn Hauser	wghauser@yahoo.com
SW Broadcast Logs	Gayle Van Horn	gayle@webworkz.com
The Fed Files	Larry Van Horn, N5FPW	larry@grove-ent.com
The Launching Pad	Ken Reitz, KS4ZR	ks4zr@firstva.com
Tracking the Trunks	Dan Veeneman	dan@signalharbor.com
Utility World	Hugh Stegman, NV6H	utilityworld@ominous-valve.com
View from Above	Lawrence Harris	Lawrence@itchycoo-park.freeserve.co.uk
Washington Whispers	Fred Maia, W5YI	fmaia@texas.net
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Ads for **Stock Exchange** must be received 45 days prior to publication date. All ads must be paid in advance to *Monitoring Times*.
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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.

Monitoring Times assumes no responsibility for misrepresented merchandise.

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Closing Comments

Emergency Communications "Will Anyone Be Listening?"

Guest Editorial by Ken Windyka

Let's face it: the cellular/PCS wireless revolution has arrived. With growth of over 400 percent, government emergency services have embraced this growth with various public announcements via press releases, signs, communications providers "bill stuffers," etc. about how to call in an emergency. Most users of these services believe that in an emergency a cellular or PCS phone is going to work for them; in the year 2000 users made over 13.5 million emergency calls. Sixty-five percent of all purchasers consider the emergency calling aspect as very important.

Meanwhile, we've seen a wide variety of old and new "easy access" radio communications systems being used by consumers *not being adequately addressed* by public safety officials for reporting emergency conditions. These services are used by consumers on a regular basis and have the potential of handling emergency communications requests. Citizen Band (CB), Family Radio Service (FRS), Multi-User Radio Service (MURS) – if it ever gets off the ground – and Marine Radio all have either a government-mandated monitoring (Marine Radio) or have the potential for a "voluntary" monitoring component (CB, FRS, MURS). If the cellular/PCS wireless systems were to fail, the average consumer *may* have one of these other radio systems available for their use.

However, we have cause to wonder if anyone will be monitoring these other services to provide needed assistance or to relay emergency assistance requests to proper authorities. Many areas of the country no longer monitor CB channel 9, neither officially nor unofficially. REACT's FRS channel 1 proposal was never adopted by the manufacturers or any public safety agency. MURS could be a strong contender for obtaining emergency assistance, if it could escape from its state of limbo at the FCC; it's not even listed on their website.

Whether we are active in a voluntary rescue group or not, as long as we have the technical capability to monitor these frequencies, shouldn't we radio hobbyists take it upon ourselves as a civic duty to monitor these potential emergency frequencies? We should also take the initiative to educate our federal, state, county, and local government public safety officials and the average consumer (our neighbors) about developments in low cost radio communications equipment such as CB, FRS, and MURS. We can also support efforts to get appropriate government funding for base and mobile monitoring equipment. Many agencies may already have radio systems on that particular frequency range that can be easily adapted via an additional channel programming to monitor these personal radio service frequencies.

Furthermore, we need some official designations for emergency calling frequencies in both the FRS and MURS radio systems – not as a restriction to use of a particular frequency, but as an aid in focusing emergency monitoring resources. Additionally, the public should be educated as to the capabilities and limitations of all radio/wireless systems and any particular channels or frequencies which may have been designated for potential emergency communications. Equipment manufacturers should also be recruited to help educate the consumer regarding the use of emergency channels on the radio equipment they have purchased.

I personally have programmed my base/mobile scanner to scan all emergency frequencies (aircraft, marine, CB, FRS channel 1, and MURS frequencies). I also have a portable cellular/PCS phone and an FRS radio that scans all FRS channels while I am mobile. Furthermore, I keep a CB radio and antenna in the trunk of the car, just in case the wireless cellular/PCS system fails.

No communications system is perfect, but with standardization of emergency frequencies and a host of alert radio volunteers monitoring these frequencies, then perhaps in someone's dire time of need "someone will be listening" to provide or at least relay the emergency call for appropriate public safety agency assistance.

(*See Ken's related feature story in this issue - ed.*)

Protection for All

By Bob Grove

Ken's comments are well considered concerning monitoring for emergency communications. There is another public service aspect of radio monitoring, and that is reporting suspicious two-way communications (*not* cellular and cordless telephones!).

A good example is in my own backyard. Poachers often invade a local bear sanctuary, illegally tracking and killing these animals during protected seasons. While they have used CB in the past, their current – and growing – preference is hand-held VHF marine radios (156-157 MHz).

Since very few land mobile licensees are assigned inland, the illicit unlicensed communicators stick out like a sore thumb. *"Bandit, I've got tracks here; where are the dogs?"*

Wildlife officials are appreciative of any help they can get in curbing the killing of protected game. It's another avenue of legitimizing our hobby. And while an argument could be made that revealing the contents of a radio transmission not intended for you to hear is a violation of both the Communications Act and the Electronic Communications Privacy Act, it is unlikely that a law enforcement officer receiving such information would want to prosecute the reporting citizen!

Experienced listeners with an educated ear are an excellent resource whether they are organized or not. Any public-minded hobbyist can be of value to his or her community, especially if a good relationship has already been established with local agencies.

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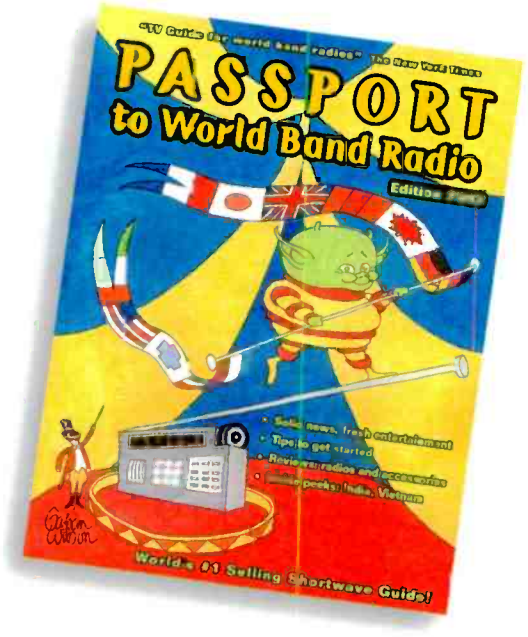

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