Scanning -- Shortwave -- Satellites -- Ham Radio -- Computers

Monitoring Times

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Tales from the Bush House

Also in this issue:

- Responders Learn from 9/11
- Bill Increases Penalties
- Colombian Phone Patches
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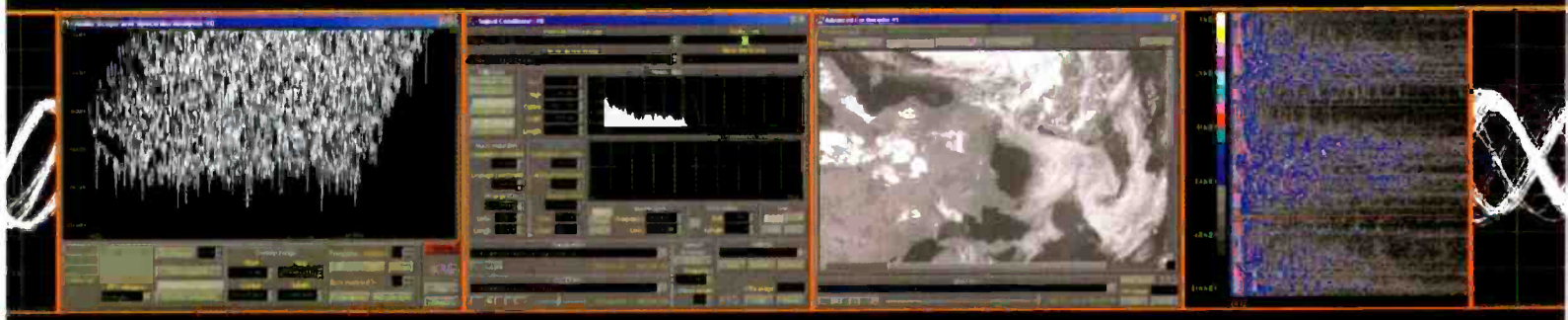

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- **plus much more!**

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Monitoring Times

Vol. 21, No. 9 September 2002

Cover Story

Tales from Bush House

By Chris Brand

Visitors to the labyrinth Bush House, home of the BBC World Service, will inevitably stop by the BBC World Information Centre and Shop – if for no other reason than because very little else at the BBC is open to the general public. They'd be surprised to know this entertaining and informative gateway to the World Service and its programs was supposed to be shut down following the year of its creation in 1982 – the Service's 50th anniversary.

The author was employed at the Center during its early years and these are some of the stories, people, and information he accumulated about the landmark Bush House ... which might not house the World Service much longer. Story starts on page 10.

Cover photo of Bush House, front entrance, by Chris Brand.

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

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Reviews:

The Icom IC-R75 is a popular communications receiver with proven worth. Bob Parnass tested and graphed the sensitivity of the unit across its 30kHz-60MHz range, and has also written control **software for the R75** which is not limited to Windows operating systems (p.80).

The more we get information from the internet, the more the internet gets information about us. John Catalano tests a computer-internet firewall program called **ZoneAlarm** to control outside access to his computer (p.82).

Jock Elliott tries out the **C Crane FM transmitter**. It's a full stereo FM transmitter that can be plugged into any electronic device with an audio output and used to transmit to any FM broadcast band device within about 70 feet (p.86).

The unlicensed frequency range 2400-2483.5 MHz has become flooded with wireless users. **AVCOM's PSA-2400A Spectrum Analyzer** is specifically designed to detect signals in this range, and Bob Grove puts it to use detecting co-channel interference (p.87).

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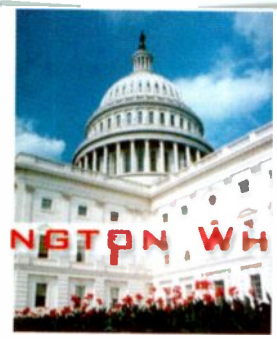


WASHINGTON WHISPERS

Guest feature by Jorge Rodriguez

CSEA Ups Penalties for Illegal Monitoring

Disclaimer: Material in this article is provided for its news and informational value and nothing here should be construed as legal advice. Persons wishing specific legal advice should consult a licensed attorney in their jurisdiction.

When Congressman Lamar Smith of Texas introduced his Bill to provide greater cybersecurity last December, he could never have imagined how hot the Bill would get by July of the following year. Along with one of the hottest summers on record, the Bill, H.R. 3284 titled the Cyber Security Enhancement Act (CSEA) of 2002 has become a hot topic of discussion among radio hobbyists. Scanner enthusiasts are opposed to a change made to Congressman Smith's original Bill that increases the penalties for some prohibited monitoring. That amendment would do away with the lenient treatment reserved for first time violators of the Electronic Communications Privacy Act (ECPA) of 1986, namely those who violate the prohibition on certain types of monitoring, especially those who listen to and monitor cellular phone calls.

In its original form, as introduced by Congressman Smith, CSEA didn't deal much with the parts of ECPA that concern radio hobbyists, except to add a prohibition on the advertising of illegal interception devices through the Internet as well as by other publications (18 USC Section 2512(1)(c)). This, however, changed after Congressional hearings were held on the Bill in February of this year.

One of the first endorsements of the CSEA changes to ECPA came in a letter to Congressman Smith from the Justice Department by Daniel J. Bryant, Assistant Attorney General. In the February 12, 2002 letter Bryant wrote, "Section 105 attempts to address a serious loophole in the statute prohibiting the distribution of advertisements for illegal interception devices. However, the language used refers to a 'publication' of some sort and we are concerned that a loophole might continue to exist. Today, one can advertise illegal interception devices through such means as e-mail spam that may not clearly constitute a 'publication.' Similarly, one could distribute advertisements on computer networks that are not part of the Internet (such as AOL's proprietary network). To ensure that these other means of distribution are covered, we propose the following language ..." The Justice Departments recommendation was for CSEA to prohibit any dissemination by electronic means. The Bryant letter did not comment on the more controversial modification to ECPA by CSEA because that amendment to the Bill was not made until later.

This second and more controversial recommendation to change ECPA also came from the Justice Department. Only this time, it appears it was not a recommendation in response to a part of the Bill already in existence, but rather to something else the Department wanted added to the Bill, in order to amend ECPA. After its introduction in December 2001, the House of Representative had referred CSEA to its Committee on the Judiciary, and they in turn referred it to their Subcommittee on Crime. On February 12, 2002, that Subcommittee held one day of hearings on H.R.3482.

During those hearings, John G. Malcom, Assistant Attorney General, Criminal Division of the Department of Justice, testified before the Subcommittee and submitted a prepared statement recommending the controversial change to ECPA. In his written statement, Malcom said, "[t]he Department has also been concerned for some time about the adequacy of the penalties imposed upon those who violate the privacy of others by intentionally intercepting their cellular phone calls. Today, such privacy invasions are treated as a minor infraction punished only by a fine. As cell phone use becomes more and more prevalent, however, it is increasingly important to protect the privacy of all wire and electronic communications without regard to the transmission technology used." The remarks seemed harmless to the casual listener, but to anyone who remembered the debates that had produced the compromise written into ECPA, it was cause to sit up and listen.

When given an opportunity to expand on his proposal by Congressman Coble, Malcom explained, "...I do believe that two changes are appropriate for this Committee to consider. Under current law, Congressman, illegal interceptions of cellular telephone conversations are treated as mere infractions, subject only to a fine. Now, this might have been appropriate back in 1986 when the law was enacted and cell telephones were seldom used. However, that is no longer the case, and the Department believes that it no longer makes sense to treat the interceptions – illegal interceptions of cell telephone conversations – any differently than illegal interceptions of any other electronic or wire communication.

"...At the moment a first offense is treated as a 6-month petty offense, and if somebody acts with a malicious intent, say, to—or an aggravated intent in order to gain financially or maliciously destroy property, it is still a misdemeanor, subject to a 1-year penalty.

"The Department believes that this does not provide adequate protection to individuals and believes that it would be appropriate in today's world if somebody accesses e-mail or stored communication improperly [violates ECPA], that a first offense should be treated as subject to a penalty of up to a year and that if somebody acts with an aggravated mental state seeking commercial or financial gain, seeking to maliciously destroy property, acting with a criminal or tortious—in furtherance of criminal and tortious conduct, that that person ought to be subject to a 5-year penalty."

When asked if such a change would affect the way the Department of Justice goes after persons who violate the law, Malcom had this to say:

Mr. SCOTT OF VIRGINIA. *Mr. Malcolm, did I understand you to say that the 5-year penalty, does that have any effect on the Department's enthusiasm about prosecution?*
Mr. MALCOLM. *I am sorry, Congressman—*
—
Mr. ***SCOTT.*** *The enthusiasm for prosecution, does the Department of Justice more likely to go after somebody if you can get 5 years rather than the maximum 6 months?*
Mr. ***MALCOLM.*** *Yes, Congressman*

The amendment proposed ultimately by Malcom was adopted by the subcommittee and incorporated into Congressman Smith's Bill. It became section 108 entitled "Protecting Privacy" and amends the ECPA by eliminating the safety valve treatment for first time offenders who listen to not only cellular

phone calls, but any other prohibited electronic communication (see Fig. 1a and b) since 1986 and the ECPA.

In 1986 ECPA for the first time made the mere listening of certain protected radio communications (electronic communications) illegal. The move was so controversial that this safety valve provision was put in place to provide lenient treatment to persons who broke the law but did so without any intent to do harm or use the information they heard for gain. Today's Department of Justice's recommendation adopted by the Subcommittee on Crime would eliminate the possibility of lenient treatment for hobbyists who accidentally or intentionally listen to protected communications, merely in the pursuit of their hobby.

H.R. 3482 is now before the Senate Judiciary Committee after passing the House by a roll-call vote of 385 to 3 with 46 Representatives not voting. Depending on the speed with which the Senate Committee handles the Bill, the Cyber Security Enhancement Act of 2002 may be submitted to a Senate vote this session. Persons wishing to comment on the Bill should call or write their elected representatives and let them know how they feel about this proposed new law and the changes it makes to ECPA.

FIG. 1a: Examples of Legal Listening According to ECPA:

- an electronic communication made through an electronic communication system that is configured so that such electronic communication is readily accessible to the general public;
-any radio communication which is transmitted by any station for the use of the general public, or that relates to ships, aircraft, vehicles, or persons in distress; by any governmental, law enforcement, civil defense, private land mobile, or public safety communications system, including police and fire, readily accessible to the general public; by a station operating on an authorized frequency within the bands allocated to the amateur, citizens band, or general mobile radio services; or by any marine or aeronautical communications system
-listening to intercept any wire or electronic communication the transmission of which is causing harmful interference to any lawfully operating station or consumer electronic equipment, to the extent necessary to identify the source of such interference;
-listening for other users of the same frequency to intercept any radio communication made through a system that utilizes frequencies monitored by individuals engaged in the provision or the use of such system, if such communication is not scrambled or encrypted.

FIG 1 b: Examples of Illegal Listening According to ECPA

-scrambled or encrypted communications;
-communications transmitted using modulation techniques whose essential parameters have been withheld from the public with the intention of preserving the privacy of such communication (ie. Spread Spectrum);
-communications carried on a subcarrier or other signal subsidiary to a radio transmission (eg. FM Subcarrier Audio (SCA);
-communications transmitted over a communication system provided by a common carrier, unless the communication is a tone only paging system communication (eg. Cell phones and audio and digital pagers);
-certain communications transmitted by satellite not intended for rebroadcast to the general public (eg. studio feeds, broadcast auxiliary feeds, microwave point-to-point, and paging)

FIG. 2: CSEA Section that would change some penalties under ECPA

SEC. 108. PROTECTING PRIVACY.
(a) Section 2511- Section 2511(4) of title 18, United States Code, is amended—
(1) by striking paragraph (b); and
(2) by redesignating paragraph (c) as paragraph (b).
(b) Section 2701- Section 2701(b) of title 18, United States Code, is amended—
(1) in paragraph (1), by inserting ", or in furtherance of any criminal or tortious act in violation of the Constitution or laws of the United States or any State" after "commercial gain";
(2) in paragraph (1)(A), by striking "one year" and inserting "5 years";
(3) in paragraph (1)(B), by striking "two years" and inserting "10 years"; and
(4) so that paragraph (2) reads as follows:
"(2) in any other case—
"(A) a fine under this title or imprisonment for not more than one year or both, in the case of a first offense under this paragraph; and
"(B) a fine under this title or imprisonment for not more than 5 years, or both, in the case of an offense under this subparagraph that occurs after a conviction of another offense under this section.".

FIG. 3: ECPA section that would be eliminated by CSEA Section 108

18 USC 2511

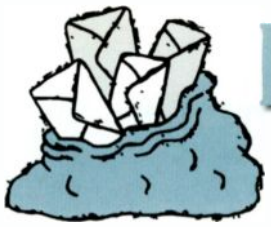
Section (4)(a) Except as provided in paragraph (b) of this subsection or in subsection (5), whoever violates subsection (1) of this section shall be fined under this title or imprisoned not more than five years, or both.

(b) If the offense is a first offense under paragraph (a) of this subsection and is not for a tortious or illegal purpose or for purposes of direct or indirect commercial advantage or private commercial gain, and the wire or electronic communication with respect to which the offense under paragraph (a) is a radio communication that is not scrambled, encrypted, or transmitted using modulation techniques the essential parameters of which have been withheld from the public with the intention of preserving the privacy of such communication, then —

(i) if the communication is not the radio portion of a cellular telephone communication, a cordless telephone communication that is transmitted between the cordless telephone handset and the base unit, a public land mobile radio service communication or a paging service communication, and the conduct is not that described in subsection (5), the offender shall be fined under this title or imprisoned not more than one year, or both; and
(ii) if the communication is the radio portion of a cellular telephone communication, a cordless telephone communication that is transmitted between the cordless telephone handset and the base unit, a public land mobile radio service communication or a paging service communication, the offender shall be fined under this title.

(c) Conduct otherwise an offense under this subsection that consists of or relates to the interception of a satellite transmission that is not encrypted or scrambled and that is transmitted —

(i) to a broadcasting station for purposes of retransmission to the general public; or
(ii) as an audio subcarrier intended for redistribution to facilities open to the public, but not including data transmissions or telephone calls, is not an offense under this subsection unless the conduct is for the purposes of direct or indirect commercial advantage or private financial gain.



LETTERS TO THE EDITOR

Frequencies and a Request

"In reference to John Myers' letter in the June 2002 issue of *Letters to the Editor*, I do understand how it is hard to find good active frequencies while traveling. During the summer months a lot of people from D.C., northern Virginia, and other areas like to visit a four-county area called the Northern Neck.

"The Northern Neck is a large peninsula with the Potomac River to the North, the Chesapeake Bay to the East, and the Rappahannock River to the South. Since this is a rural type area, frequencies for this area aren't always readily found, so I'll list the following:

Virginia State Police	
158.9850	Base
154.9050	Car
154.9350	Car
154.6650	Tac
154.6850	Tac
154.6950	Tac
153.8950	Air
County Sheriff Departments	
39.8600	Richmond Co/Westmoreland Co
155.1000	Northumberland Co.
159.2100	Lancaster Co.
Fire/Rescue	
45.2800	Westmoreland Co Fire
154.3100	Richmond Co Fire
155.2950	Richmond Co/Westmoreland Co Rescue
155.3400, 155.400	Rescue to Hospital
155.7450	Lancaster Co Fire-Rescue
156.2100	Northumberland Co Fire-Rescue
Other Law Enforcement	
39.5400	SIRS
45.8600	SIRS
151.2800	Marine-Inland Fisheries
154.3900	Game Warden
155.0100	Sheriff net
155.4750	National PD/Sheriff net
159.4350	Game Commission
Miscellaneous	
156.3200	Marine Ch 66 (Reedville Fish Derby Control)
162.4000	NOAA weather

"I hope that helps for any of you visiting this area I call home.

"If there's anyone out there that could help me with the following I would surely appreciate it. I have a used BC-210 scanner that was given to me. I have noticed a problem: While in the scanning mode it will at times pick up a signal *very briefly* with only a blip sound and continue to scan. As long as the signal is present this action continues (even if the signal is strong). Is there an adjustment I can make, an inexpensvie fix, or is this just a flaw I will have to accept? Please send any advice or answers to my address below."

Richard Bowles
1147 Planters Road (D-120)
Lawrenceville, VA 23868

DXing on Mediumwave

"Congrats on your 20th anniversary at *MT*. Your editorial 'fingerprints' show through each edition, month after month. Always a 'good read' – a good source of the latest radio news and data. Always next to the radio and used on a daily basis.

"Referring to Ken Reitz' article '*Catching Baseball on the AM Band*' (July 2002), one remark requires a 'correction.' He suggests, 'you might also consider running two longwire antennas at right angles to each other and using an MFJ-1025 noise canceling signal enhancer...' The problem with an MFJ-1025 is that, while it works well on HF, it *does not* work on MF (without considerable modifications, and why work on a brand new device?)

"A better choice for a 'phaser' unit would be something made for MW AM DXing, such as Gary Thomas' Radio Plus+ Quantum Phaser. As a mediumwave DXer, I've seen impressive reception reports using this unit. Personally, I use two 300-ft longwires, unterminated – one running North, the other West. In the shack I use a Radio Plus+ Electronics Quantum Loop QX Pro with excellent results. (*Radio Plus+ can be found at* ***http://www.dx-tools.com***, *email* radioplus@pcola.gulf.net *or write Gerry Thomas KB4JFM, 3635 Chastain Way, Pensacola, FL 32504 - ed.*)

"In this part of the country, my most dominant flagship station is WSB750, Atlanta, with the Braves. I've used two radios to help ID the affiliates by having WSB on 'in the background' and tuning for the affiliates on the second radio. Have positively IDed most Georgia and Alabama affiliates. Also enjoy opportunities when, for example, Atlanta plays St. Louis; have WSB on one radio and KMOX on the other – the experience is 'interesting' to say the least!

"Keep up the good work, *all of you*!"

– Herb Newberry, Newborn, GA

" Dear Ken, As a kid, I used to be a somewhat rabid fan of the Cincinnati Reds, especially when we lived close enough to Cincy that my grandfather would occasionally take my brother and me to see a home game! The rest of the time, we listened to most, if not all, of the Reds' games on WLW.

"I also followed (also by radio) the individual 'stars' of the day (Musial, McCovey, Spahn, et al) rather than specific teams or leagues. This was also via radio, since it was about the same time that I discovered that wonderful phenomenon known as propagation (though I had no idea what it was at the time) and marveled at my ability to listen to AM stations from faraway places like New York, Chicago, and St. Louis from my bedroom in rural Kentucky!

Van Horn a Winner in ARRL Contest

Assistant Editor Larry Van Horn N5FPW participated in the ARRL November Sweepstakes in the Single Operator, QRP (low power 5 watts or less) phone category. He scored first in the ARRL Southeast Region (Delta, Roanoke and Southeastern Divisions) and 14th overall with a personal best 52,500 points, 350 contacts and 75 of 80 possible ARRL sections worked over 20 hours. Congratulations, Larry! And thanks to plaque sponsors Northern Virginia QRP Group.

"I must confess that in recent years I haven't been faithful to any particular team, league, or players. Although I still prefer radio to TV for baseball games, my baseball listening tends to be very sporadic, when I happen onto a game while in the car, or casually indulge in a little nighttime BCB DX.

"Regardless, your articles on the subject have had the effect of pleasantly reminding me of those misspent nights of my youth, fighting with my brother over who should control the radio volume, and arguing about whether Maris was better than Mantle, or whether Willie Mays could ever break the home run record. So, thanks for the memories."

– Dave White

"The URL in the article on listening to baseball in the July issue has apparently been closed. It comes up as 'this page unavailable.'

"The official web sites of all Major League teams have been provided with space to list their radio affiliates. Ten American League teams have done so, the exceptions being Anaheim Angels, Minnesota Twins, New York Yankees, and Texas Rangers. Toronto lists the cities and the frequencies but does not give the call signs. Ten National League teams have included their radio affili-

ates lists, the exceptions being Arizona Diamondbacks, Los Angeles Dodgers, Milwaukee Brewers, New York Mets, Pittsburgh Pirates, and San Diego Padres, who only have two stations, both of which are listed on the schedule.

"If a reader is not sure of a particular team's web site go to **http:www.mlb.com** and at the bottom will be a 'pop up' screen revealing the complete list of MLB teams. Simply click on the team you want, when it loads, click on 'schedule' at the top of the page and then click on 'radio affiliates' or 'radio network' etc.

"For the other teams not carrying lists a good starting place is my *Baseball Listener's Guide* at **http://www.monitoringtimes.com/mt-bball.html** even though it's not been fully updated.

– Ken Reitz

❖ Blue Angels, In and On the Air

"I live just north of Denver, CO. I haven't been to an airshow in years, but my family and I went to the Loveland, CO, Airshow, Sunday, July 28th, 2002. I brought along my scanner along with your '*Monitoring Military Demonstration Groups*' article (**http://www.monitoringtimes.com/html/mtairshows.html**). I was intrigued by what I might be able to pick up. I programmed the frequencies for the Navy's Blue Angels into my Realistic Pro-26 (which has always been a great scanner for me).

"Many people saw my scanner, asking if I would be able to listen to the pilots. I replied, saying that I was hoping to be able to listen in, once the Blue Angels were airborne. The typical aircraft freq's were not being used at the time of the airshow.

"The Blue Angels finally were off the ground and I watched their performance in awe. To my amazement, 307.700 MHz kept coming in as one of the pilots (perhaps the Capt.?) would say in a sing-song fashion, as they flew in formation: "Here we go.....Pull....." or as they climbed skyward: "More powerrrr!!!!!" This went on for a while but the lingo was usually the same. I realized then that I was actually picking up something much different than expected. These guys had a language all their own!

"It was an absolute thrill listening in, as the Navy's finest roared overhead! Thank you for the wonderful insight into a rare scanner experience!"

– Michael B. Massa, Thornton, CO

❖ GPS

"If hadn't seen the heading [of the June and July *Easy Access* column], I would think you were telling us about the Garmin eTrex Legend, which I use for geocaching. The 330 sounds just as easy to use as the Legend. Now give it a good try: wait till it rains, overcast skies, and heavy tree cover in deep woods. Anyone can receive 8 or 9 satellites with nothing in the way. I received 3 and four 4 satellites and in the rain; went out and found three caches. (Oh by the way, I like to brag a little: I'm 76 yrs young.)"

– Henry Mc Gann, Dover, PA

"I have been having a ball with my 330. Now after reading what you did, I will get my nerve up and download. I am new to computers, and I hate to make a mess of the download.

"Many thanks for informing me and the masses, you have done a bunch of us, a real favor! Since I carry mine everywhere, it will be handy for the lat/long of any accident which I can pass on to police, and then the air ambulance will know exactly where the incident is. This is rugged NW Oregon area, and there are many roads with no markings."

– Howard Ragan

We welcome your ideas, opinions, corrections, and additions in this column. Please mail to ***Letters to the Editor,*** 7540 Highway 64 West, Brasstown, NC 28902, or email *editor@monitoringtimes.com.* Letters may be edited for length and clarity. Happy monitoring!

-Rachel Baughn, KE4OPD, editor

Radio Honor Roll

Saving Lives

When two teenage girls were abducted in California this summer, it was an animal control officer listening to her scanner who spotted the Ford Bronco after hearing the broadcast regarding the suspect vehicle. Her call to law enforcement led police to the location. Had it been an Astro digital system, observed Steve Rutledge of the Central Florida Listener's Group, those women would be dead.

This was the first time California authorities used the "Amber Alert" – the plan named for Amber Hagerman, a 9-year-old who was kidnapped in 1996 and later found dead in Texas – said *Fox News*. This time, with radio and TV bulletins and electronic freeway signs announcing the abduction, even citizens without scanners were in the know and on the lookout. Forty-one similar plans exist around the nation.

Enhancing Lives

This September, Neil Carleton will be starting his 10th after-school radio club. The students have learned how to use scanners, shortwave receivers, and amateur radio transceivers. Last year R. Tait McKenzie Public School was only the second school in Canada to have students speak directly to an astronaut on the International Space Station. 400 parents, students, and community residents were on hand at 5:46 in the morning on November 23rd for the event, gaining good publicity for amateur radio. Neil Carleton – whose students have been interviewed by radio stations around the world – was honored with the Teacher Innovation Award by the Upper Canada District School Board.

This year's class members, l-r: Ryan, Chris, Nik, Jesse, Joey, Aaron and Chris.

Australia Abandons Digital System

Police in Western Australia have been upgrading to a digital trunked radio system networked with a sophisticated computer-aided dispatch system and in-car computers. However, when testing began last October it was evident there were problems with interoperability between all the high-tech components.

On July 19th, Assistant Commissioner Karl O'Callaghan said police had decided to abandon the network system, tear up part of its contract with BAe Systems and continue with the old, unsecured analog radio system.

"On a worldwide basis, the technology involved in the digital trunked radio network has not matured as fast as expected," Dr O'Callaghan said. Even if police managed to resurrect the project immediately with a new supplier, the system would not be ready until October 2004 – three years behind schedule, he said.

Spotting a Plane Spotter

In *MT*'s June issue we reported on the travails of a group of British and Dutch hobbyists who were arrested in Greece and charged with spying when they were practicing their hobby of plane spotting. U.S. airport security staff have also become understandably more nervous about such activities after the events of September 11th. An article in the *Washington Post* this summer did an excellent job of describing the hobby and its appeal, as well as the varying attitudes toward it by different airports.

Plane spotting paraphernalia often includes not only binoculars and notebooks, but also laptop computers and hand-held scanners – a combination sure to arouse suspicion by uninitiated security officers. Tara Hamilton, spokeswoman for the Metropolitan Washington Airports Authority, which operates Dulles and National, said spotters should expect to be questioned. She suggested that spotters use parking lots or nearby public parks but not approach fence lines. Hobbyist Sunil Gupta said, "They tolerate us, but there is always the cop who just doesn't understand and doesn't want to understand."

Post writer Paul Glader says plane spotting has been around since aviation began, but it really developed after World War II, when civilians recorded enemy plane movements. Spotters now practice their hobby and network with thousands of others around the world at internet sites such as **http://www.airliners.net**.

Troops in Bosnia Adopt FRS Radios

We've reported in previous issues about Family Radio Service radios being purchased for use in intrasquad communications. To avoid such use of civilian frequencies, the Army approved the purchase of the Icom F3S system, and the Marines use the Icom IC-4008M – both similar to FRS units. However, National Guard and Reserve units were not included in such purchase orders, says an article in *European Stars and Strips*, so troops in Bosnia have been buying FRS radios out of their own pockets, with approval of their officers. However, Bosnia has expressed interest in controlling radio frequencies. Should that happen and the FRS frequencies are restricted, the US government could be fined if the soldiers use the radios.

Let me step into my phone tooth...

Two students at the Royal College of Art in London have invented a phone that fits inside a tooth. The device picks up signals from a radio receiver which "transmits " the audio by vibrating against the jawbone and hence to the ear. The "telephone tooth" is for reception only; you can't talk back! The wavelength is unclear; one article mentioned "low frequency" and oth-

BULLETIN BOARD

September 7: Ballston Spa, NY
Saratoga Co RACES Hamfest at Saratoga County Fairgrounds, follow orange and white signs; 7am-pm; adm $5 (incl. 1 tailgate spot), talk-in 146.40/147.00 and 147.84/147.24. VEC exams, prizes, fox hunt, radio test area, roaming auctioneer, food. Contact Darlene Lake N2XQG, 314 Louden Road #84, Saratoga Springs, NY 12866, (518) 587-2385, lake@capital.net

September 8: Virginia Beach, VA
Virginia Beach Hamfest, at Virginia Beach Pavilion, talk-in 146.970; 8a.m.-3p.m; admission $6. Major dealers, flea market, forums, free parking. For more info visit http://www.vahamfest.com, or write Lynn Lilla W9DJQ, 848 Stacey Place, Virginia Beach, VA 23464.

September 14: Grand Rapids, MI
Grand Rapids ARA hamfest at Forest Hills Northern High School (3801 Leonard NE Hwy I-96 exit #38/Hwy M-44, north 1 mile to Leonard St, turn right), 8a.m. to past noon; adm. $5, high school and under free. Talk-in 147.26+ (94.8 Hz) and 146.52 simplex. Exams 11 a.m. Contact Ed Novakowski N8UXN (616) 458-9029, hamfest@w8dc.org or visit http://www.w8dc.org/swap.htm

September 21: Seal Beach, CA
Southern California Area DXers (S.C.A.D.S.) meeting: The Utility World of Aircraft, Marine, Military, Volmet and Numbers stations; Gordon Levine speaker. For updates: http://www.ocnow.com/community/groups/radiocommunications.

September 21-22: Rolling Meadows, IL
W9DXCC Midwest DX Convention 50th anniversary and banquet at Holiday Inn near O'Hare Airport. Speakers, presentations by DXpeditions, DXCC QSL card checking, prizes, grand banquet. For information contact Bill Smith W9VA (847) 945-1564; w9va@aol.com or visit http://www.w9dxcc.com

September 22: Newtown, CT
Western CT Hamfest sponsored by Candlewood ARA, Edmond Town Hall (Rt 6, exit 10 off I-84, follow signs), 9a.m.-1p.m., admission $4. Talk-in 146.67/.17. New equipment dealers, tailgating, electronics, computers, refreshments. For information contact John M. Ahle W1JMA, 120 Fire Hill Ridgefield, CT 06877, (203) 438-6782; w1jma@aol.com.

September 28 Lawrenceville , NJ
Delaware Valley Radio Association, W2ZQ Hamfest, at NJ National Guard Armory, Eggerts Crossing Road, Talk In: 146.67 (-) 131.8; 0800-1400, adm $6 For More Information: Glenn Costello, N2RPM, abbott0903@aol.com, (609) 882-2240, www.w2zq.com

ers called it a cellphone. Applications could include such things as giving secret instructions to spies or play moves to athletes from coaches on the sidelines.

The Debate over Cell Phone Blocking

The development of cellular phone blocking technology continues, with Israel and Japan leading the way. Most devices have operated by "jamming" radio signals in a radius of up to 100 yards. However, in most countries only law enforcement and emergency services can legally interfere with radio signals, and many countries have not yet decided whether the blocking technology should be legal. Some are interested in the technology because cellphone signals interfere with other radio-related systems (such as medical equipment or wireless microphones), some because cellular phones are a nuisance (as in restaurants or concert halls), and others for security reasons (prisons, corporations, and military).

Worth Remembering:

"If commuters would set their radio dial before leaving the driveway, eat breakfast at home, turn off their cell phones while driving, and leave on time, some other family might be spared the grief the Morris family is feeling today." (From The Star, 9 July 2002, regarding death of tow-truck-driver Richard Morris hit by a motorist who was changing the radio station.)

As an alternative to emitting a jamming signal, Japanese scientists are developing wood paneling containing magnetic metal particles that absorb radio signals. Unlike the jamming devices, the FCC does not regulate this type of passive radio blocking device, and that has the Association of Public Safety Communications Officials (APCO) concerned. It is working to outlaw passive technology through U.S. building codes, since the paneling could also block radio communications that police, fire and other emergency services use.

When security is an issue, such as at the Pentagon, the simplest solution is simply to ban the use of wireless devices. John Stenbit, the Pentagon's CIO, is considering a ban on most if not all wireless devices within military installations.

Military facilities and offices that are used for highly classified meetings are already routinely scanned for listening devices. However, the new Pentagon policy extends the wireless ban to the majority of office spaces where sensitive but unclassified information may be discussed.

ARRL Receives Grant

The ARRL will receive a $181,900 homeland security grant from the US government to train Amateur Radio operators in emergency communication. The League was among several dozen nonprofit organizations designated to receive some $10.3 million in federal money to boost homeland defense volunteer programs. The grant, from the Corporation for National and Community Service special volunteer program, will provide free ARRL Amateur Radio Emergency Communications Course training to 5200 volunteers nationwide, starting in 2003.

The ARRL plans to revise and update the emergency communications curriculum to incorporate additional elements of emergency preparedness and homeland security.

National Guard Techies

Reminiscent of popular science fiction or adventure novels, the U.S. Senate passed legislation that would create a technology equivalent of the National Guard. The Science and Technology Emergency Mobilization Act, sponsored by Sen. Ron Wyden (D-OR) and Sen. George Allen (R-VA) calls for teams of volunteers with technology and science expertise, organized in advance and available to be mobilized on short notice; a "virtual technology reserve" that would consist of a database of private-sector equipment and expertise that emergency officials could call upon in an emergency; a Center for Civilian Homeland Security Technology Evaluation that would serve as a national clearinghouse and test bed for innovative technologies relating to emergency prevention and response, and a Web portal to provide individuals and companies with a single point to access the center and a single point of contact at each federal agency participating in the Center for Civilian Homeland Security; and a "communications interoperability" pilot program awarding seven grants of $5 million each. The grants would help fund pilot projects to enable communications systems used by fire, law enforcement, and emergency preparedness and response agencies to work together for cross-communication in disaster situations. The House Science Committee has passed a similar version of the Senate bill in the committee's portion of the Homeland Security package.

Source: Agence France-Presse / Washington Post

Steve Mansfield, N1MZA, SK

ARRL Legislative and Public Affairs Manager Steve Mansfield, N1MZA, of West Hartford, Connecticut, died July 29 following a spirited battle with brain cancer. He was 55. With the League for 11 years, Mansfield was the League's representative on Capitol Hill and managed the ARRL's public relations.

Among Mansfield's most notable accomplishments was his behind-the-scenes effort to facilitate introduction of the Amateur Radio Spectrum Protection Act, HR 817. The measure – still before Congress – would ensure that amateurs receive equivalent replacement spectrum for any frequencies lost to other services.

Mansfield also was deeply involved in the ARRL's efforts to initiate congressional legislation to aid Amateur Radio operators bound by restrictive private deed covenants, conditions and restrictions. Introduced earlier this year, HR 4720 – the Amateur Radio Emergency Communications Consistency Act – would make such private land-use regulations subject to the PRB-1 limited federal preemption. Mansfield also wrote and edited "DC Currents," which detailed the League's Washington efforts in *QST*.

"Communications" is compiled by MT editor Rachel Baughn (editor@monitoringtimes.com) from radio news sent in by our readers. Thanks to this month's reporters: Anonymous, Albany, NY; Gerald Brookman, Kenai, AK; Mark Burns, Terre Haute, IN; C.E. Doty, Bay City, MI; Linda Erdman, Perkiomenville, PA; Sterling Marcher, La Mirada, CA; Ira Paul, Royal Oak, MI; Doug Robertson, Oxnard, CA; Brian Rogers, Melvindale, MI; R.A. Sklar, Seattle, WA. News sent via email includes Michael Coppola, Peter Craig, Bob Felton, Alan Henney, Maryanne Kehoe, Henry LaViers, Ed Muro, Bill Pasternak, Laura Quarantiello, Michael R., Allan Stern, Larry Van Horn, Robert Weiss, Robert Wyman.

Tales from Bush House

by Chris Brand

Photos by Chris Brand

This year marks the 70th anniversary of the BBC World Service, which started in 1932 as the British Broadcasting Corporation Empire Service. Despite cutting the shortwave service to North America last year, the BBC remains a respected major international voice, both on radio and television, broadcasting in over 40 languages to over 150 million listeners a week. Since 1940, the BBC World Service has been located in Bush House, Aldwych, London, on the edge of The Royal Courts of Justice, just to the north of Waterloo Bridge and the river Thames.

You might be surprised to know the BBC has never owned Bush House. The current owner is a Japanese organization called Kato Kagaku. Previous owners have included the Church of Wales, and previous tenants have been on both sides of the political fence: The Soviet Steamship Company, news agency TASS, Intourist and a Russian bookshop, The British Air Ministry, The Parker Pen company, TNT, the Inland Revenue (British Taxation body) and the British Secret Service. There is some uncertainty to the BBC's future within Bush House when the lease runs out in 2008.

In 1982, as part of the celebration for 50 years of BBC international broadcasts, the *BBC World Information Centre and Shop* opened. It was originally intended to be open only for the 50th anniversary year. However, "BBC World," soon became a popular visitor center for World Service listeners, tourists, and Londoners alike, and remains so today. So read on as we look at some of the typical incidents and characters that passed through the Information Center, along with other tales from Bush House. The author speaks from his experience at BBC World during its early years.

❖ The building of Bush House

The Bush House building itself owes much to the U.S.A. It is named after Irving T Bush of the New York Bush Terminal Company, who originally planned for an international trade center to be built on the site, complete with luxury accommodation, a club, galleries and restaurants. Architect Harvey W. Corbett of Helmle and Corbett, New York, had to downsize when a 1921 slump caused financial problems, and only the main center block was built to the original specification, with the other wings of the building scaled down.

The building itself was opened on U.S. Independence Day 1925, and early tenants included the *Herald Tribune*, but it was to be another 15 years before the BBC moved in during World War II. It has been the home of the BBC's international radio services ever since, with BBC domestic radio located three miles away at Broadcasting House in Langham Place. Langham Place is an equally imposing building, built in art deco style, and resembling an ocean liner gliding down a narrow London street. It cost $1.25 million to build Broadcasting House in 1928, whereas Bush House was considered the most expensive building in the world in 1929, at a cost of $10 million.

A further early American connection was that of artist Malvina Hoffman, who made the statue which sits above the words carved over the front entrance: *To the friendship of English-speaking peoples.* The Indiana stone statue (the rest of the building is in British Portland stone) is of two men holding a torch and shields depicted with a British lion and an American eagle. One of the statues was damaged by a German bomb in World War II and remained without an arm until the Indiana Limestone Co. voluntarily repaired it in time for Queen Elizabeth II's Silver Jubilee in 1977.

During building renovations in the 1980s, a popular sales item in The Information Center were paperweights made of chunks of Portland stone from the building, encased in plastic, bearing the legend, *A piece of the BBC. Bush House is being rebuilt. This Portland stone came from its walls.*

❖ The world on eight floors

The construction of the 8 to 10 storey Bush House building is such that to get from one wing to another you usually have to go to the ground floor, cross a courtyard, and use an elevator. There are no connecting bridges, making for a lot of elevator travel, and henceforth a lot of impromptu language lessons should you eavesdrop in elevators crowded with different nationalities.

To reach the studios, offices, and departments in each of the four wings occupied by the BBC, (southeast, east, northeast, northwest) often requires you to go via the main center block where there sits a large marble bust of a elderly

Roman man, watching over the building. He was discovered in the excavations when Bush House was built. From there you can, if you feel energetic, walk up the elegant marble staircases and along corridors of Indian hardwood flooring to the office you are searching for. It is said that the building layout is so confusing that it takes two years of working there before you really know your way around.

There have been various alterations carried out for the BBC over the years. Studio 6 in the southeast wing basement was originally a swimming pool. Studio N42 in the northwest wing was a cinema, and there was once a badminton court in the northeast wing.

As you might expect, the building is a microcosm of the world containing all of the BBC language services: Albanian to Arabic, Bengali to Burmese, Hausa to Hindi, Kinyarwanda to Kyrgyz, Turkish to Thai, Ukrainian to Vietnamese. The canteen and BBC club bar in the basement is all the better for such multiculturalism, with a wide range of cuisine on offer and people wearing a range and variety of clothing that you don't often see on the comparatively drab London streets. Bush House is probably the most cosmopolitan office block in Britain.

As with many parts of Bush House the canteen is open 24 hours to sustain the workforce and to act as an impromptu meeting place. A studio production assistant from the Sinhalese service might be having her lunch while at the next table an engineer from the scheduling department is starting his breakfast.

The exotic smells emanating from the canteen could be recreated in your kitchen if you picked up a recipe book in the Information Center. The popular range of cookbooks which we shipped worldwide included *Vegetarian Kitchen*, Ken Hom's *Chinese Cookery*, Madhur Jaffrey's Indian cookery, and the ubiquitous, quintessential English cook, Delia Smith.

❖ Halcyon days at the Information Center

Working in the Information Center in its formative years rarely had a dull moment. With the BBC's global reputation, thousands of tourists would visit to pay homage, buy a souvenir, or just to tick it off on their holiday itinerary. A number of loyal listeners, having finally reached Bush House, wanted to go on guided tours of the studios or newsroom, or meet their favorite presenters and newsreaders.

Although some international broadcasters may have allowed tours or visitors prior to September 11, 2001, the BBC did not, for two reasons: an endless parade of visitors would soon interfere with the production of programs, and being on the air 24 hours a day there was never any downtime when people could be accommodated. Secondly, for security reasons. Then, as now, there were security risks with turbulent times in the Middle East, Northern Ireland and Eastern Europe. When the Information Center opened, it had only been a few short years since 1978, when Georgi Markov – Bulgarian dissident, Radio Free Europe and BBC broadcaster – was killed with a poison-tipped umbrella on Waterloo Bridge.

Many listeners would bring gifts for newsreaders and presenters, such as chocolates, paintings, and even Persian rugs, and would be delighted if the person in question was on duty and was able to receive the gift in person. This is the closest that visitors could get to the inside of the BBC.

Most visitors to the Information Center had straightforward requests. A copy of the program guide *London Calling* (later to become *BBC Worldwide* and now *BBC On Air*) or the Arabic version *Huna London*. Maybe a cassette or video from the BBC comedy archives such as *Fawlty Towers* ("Yes, sir, they really did only make the 12 episodes"), or a tie-in television book such as David Attenborough's *The Living Planet*.

Other visitors required a little more attention, such as a retired lady from Norway who had missed the end of *Play of the Week* and wondered if we had a copy of the script available. Thirty minutes and a few internal phone calls later, an assistant from the Drama department arrived with the script, the lady sat down and read the conclusion to the play. Unfortunately, she then declared that she didn't understand it.

Britons living overseas would stock up on recordings to take home with them, to remind them of life back in Britain, as they sat on verandas in Sierra Leone sipping gin and tonics. One lady purchased the entire BBC audio catalogue of drama and classical music, on audiocassette, to replace the vinyl versions she had in her Malaysian home – the tropical heat tended to warp the vulnerable vinyl records.

A BBC map of the world, complete with details of transmitter sites, was a best seller, but it had its downside. The maps were rolled up and sent to mail order purchasers in a 3-foot long cardboard tube, marked "fragile." However, dozens were returned damaged by careless postal staff or airways baggage handlers around the world. A battle commenced, with us sending them out in ever more durable containers, and the world's postal services seeing this as a challenge to bend or buckle them. I think the record was seven attempts to an address in Australia.

When the shop opened it stocked a conventional line of merchandise, which was supplemented over the years to an ever more esoteric range. Items such as BBC pens, postcards, diaries, airline bags, towels, bookmarks, baseball caps and sweaters were joined on the shelves by furry insects and golf balls bearing the BBC logo. An optimistic order for thousands of BBC cups created a six-foot-high pyramid in the stock room: 2,000 white china cups carried the BBC crest and motto *Nation shall speak peace unto Nation*, and 2,000 had the slogan *BBC World Service, a world of difference*. If you have one of these in the kitchen it is more of sentimental value rather than a valuable rarity.

We ran trailers on the air for various merchandise available by mail order. Products were also promoted periodically by continuity announcers looking for something to fill in gaps between programs. A promotional feature for the world map was accidentally left in a continuity studio for a whole month, which led to it being read out on air more frequently than planned. This in turn led to a new deluge of map orders and another battle with the postal service.

❖ Listeners and visitors

A large green world map on the wall had a dial underneath to tune into the live output of all 37 languages broadcast at the time. The studio feeds were piped into *The Information Center* and informed us of breaking news to the chimes of Big Ben. Some programs made a pleasant backdrop to work to, especially the classical music output such as *Baker's Half Dozen* (with Richard Baker), *The Pleasure's Yours* with Gordon Clyde, or Edward Greenfield's *Classical Record Review*. Other programs kept us up to date with developments in science and the arts, (*Science in Action, Meridian, Omnibus*), and others were just interesting in their own right, like *The Merchant Navy Programme, Sports International* and *The Farming World*.

The dial was usually set to the English Service, but at 1700 UTC each day an Eastern European gentleman would arrive, politely take a seat and listen to the Polish program. At the time, with no Internet and minimal satellite television, this feed (but more so the actual shortwave broadcasts), was a valuable source of news, especially for Eastern European residents or expatriates. This was later illustrated when it transpired that imprisoned Polish politicians and opponents to the regime were able to hear those very same Polish broadcasts in the Darlowek internment camp. Two important figures in Poland's modern history, Lech Walesa and Alexander Malachowki, were able to tune in, Malachowki by hiding a radio in his long bushy beard.

Another useful source of information was the daily bulletin from BBC Monitoring at Caversham, to the west of London. These 'Summary of World Broadcasts' arrived daily and we

had regular visitors who would come to read details of what All India Radio had to say on developments in Pakistan, or what the view was from the Soviet Defense Ministry on the arms race.

In addition to the day-to-day visitors, we received sacks full of mail from just about every country in the world. Most of the letters were requests for technical and frequency information or orders for merchandise, but there were more esoteric letters that asked for copies of the Bible, letters that begged for funding for children's education, or requests for free items of clothing.

Such letters were further proof of the BBC's reputation and impact on millions of listeners. Monitoring the letters over one sample four-week period illustrated the range of correspondents, as we received mail from continents and people as diverse as a Chinese farmer, the Tibetan embassy in Belgrade, a Church Minister in the Central African Republic, a Guatemalan student, a Japanese businessman, along with the usual letters from the western world.

Some of the most popular World Service programs have always been those that feature pop music. Although standard fare on UK radio stations, British pop was much in demand for a younger global audience. The Latin American service started *Ritmo* in 1965, a Saturday night request show, and other language services broadcast similar programs. Disc Jockey Dave Lee Travis (DLT) had a request show on the World Service, called *A Jolly Good Show*. Although the music may have been similar to that played on his domestic program on BBC Radio One, he commented that the main difference was in the type of requests he received. For his domestic show in Broadcasting House he might be playing a song "for Tracy in Scunthorpe, from Gary who says he's really got the hots for you," whereas his Bush House show might have him reading from a letter from Ángel who is writing to say that Zohra is akin to the delicate orange blossom in a spring time shower.

Broadcasting House, home of BBC's domestic service

A number of technical questions were raised and answered by the *Waveguide* program, and the program also produced a series of leaflets which were eagerly snapped up in the Information Center. Reviews of new receivers, such as the Sony ICF2002 with digital readout (one of the first of its kind in 1983), information on why frequencies are changed with the seasons, and overnight frequencies for nighttime listeners in Britain were useful handouts used to fend off repeated questions.

Literature available from the Information Center was of great interest to listeners and visitors: stacks of schedules in all languages, product reviews, photos of presenters, calendars and posters. The *English by Radio and Television* broadcasts spawned a lot of audio and video material. Best selling titles around the world included *Follow Me* with Francis Matthews and the children's series *Muzzy in Gondoland*. *Getting on in English, Choosing Your English, English for International Co-operation* and other output catered to all levels of English learners, from beginners to advanced, tourists to businesspeople. *English by Radio* output included programs such as *Can I Help You?* and *Paedagological Pop*. You could also learn other languages with the BBC, such as *Russian Language and People, Everyday Mandarin, Buongiorno Italia, Digame, Deutsche Direkt, A Vous La France* and the *'Get By'* series.

A secret weapon was used to deflect the barrage of questions from the public – a battered card file index behind the counter, which contained all sorts of pertinent information. There were answers to standard questions such as local bookshops that stocked Persian language learning materials, or simple tourist information on times of the changing of the guard at Buckingham Palace. Any questions which required a bit of research (and there were many), would be faithfully recorded and indexed, ready for the next time a visitor happened to ask what the theme tune is for *The Hitchhiker's Guide to the Galaxy?* ("Journey of the Sorcerer" by the Eagles) or the marching music for *Radio Newsreel* ("Imperial Echoes").

❖ Conclusion

At The Information Center no two days were the same. There might be a book signing by a media personality or politician. A famous actor on *Play of the Week* or a famous musician might pass through on their way to or from recording a program or interview. It might be a day for a surreal, Monty-Python-type experience in which we tried to sell an English teaching course to someone who didn't speak English at all, necessitating a phone call to the appropriate BBC language section for a translator. It might include playing music over the phone to someone who wanted to purchase a soundtrack but wasn't quite sure what it was called or what it sounded like.

There might be time for an interesting chat with a Swahili presenter or Romanian secretary, looking to purchase a BBC T-shirt or pen for a competition prize, or a Greek producer looking for inspiration for program themes amongst the books and merchandise.

The BBC's lease with Bush House runs out in 2008. The BBC wants to merge all its news services in one central location in a state of the art complex in Broadcasting House. Whether this will happen is as yet unknown, but there would be opposition amongst the employees at Bush House. Nonetheless, if you are visiting London, this would be a good time to make a trip to the BBC's Information Center. It could be your last opportunity to soak up the atmosphere of the marbled corridors and the distinguished voices that have floated across the airwaves these past 70 years.

Sources:

A World in Your Ear, Reflections on Change by John Tusa, Broadside Books, London 1992.
BBC World Service -
http://www.bbc.co.uk/worldservice
Vintage Broadcasting website -
http://www.vintagebroadcasting.org.uk/bbcws.htm

About the Author:

Chris Brand (*chris@sutton-brand.freeserve.co.uk*) has been a DXer since his teenage years in the 1970s. He worked for the BBC in the 1980s, first at the Equipment Department and then at the BBC Information Center and Shop in Bush House. He is currently a freelance writer on International Broadcasting, and also a Board member of the British DX Club. http://www.bdxc.org.uk
Chris's DX International website is -
http://members.tripod.co.uk/chrisbrand1977

Virginia's Statewide Agencies Radio System (STARS)

by Alan Henney

Virginia is in the process of selecting a systems integrator to build its first statewide high-capacity radio system. The project, dubbed the Statewide Agencies Radio System (STARS), is one of the most enormous and comprehensive of any radio system undertaken by a government in our region. Not only does the project include two-way radio communications, but also the addition of a new mobile data system, replacement or addition of dispatch consoles for several state agencies, upgrade of the state's existing microwave network, and incorporation of a statewide intranet utilizing the microwave network.

A board composed of the secretaries of Public Safety, Technology, Transportation, Natural Resources and Finance will provide policy direction and overall governance for the STARS network. This includes review and approval of all procurement solicitations and contracts.

The 19 state agencies participating in the STARS network are: Capitol Police, Marine Resources Commission, Virginia departments of Alcoholic Beverage Control, Aviation, Conservation & Recreation, Corrections, Emergency Management, Environmental Quality, Fire Programs, Forestry, Game & Inland Fisheries, Health, Information Technology, Juvenile Justice, Military Affairs, Mines, Minerals & Energy, Motor Vehicles, State Police, and Transportation. In addition, several federal and commonwealth municipalities will participate.

The state has a $20 million contract with Hayes, Seay, Mattern & Mattern, Inc. and its communications subsidiary, CTA Communications Inc. CTA is providing radio engineering consultant services and prepared the STARS request for proposals. CTA will oversee the installation and integration, and assure system performance and vendor compliance for the proposed STARS system.

In its 2,690-page solicitation, the state asks bidders to describe how they intend to mount VHF (high and low band), CB, cellular and UHF antennas next to each other and to explain how they would accommodate those vehicles equipped with LOJACK! Now for the specifics...

Existing VSP Radio System As Basis

The existing Virginia State Police (VSP) radio and microwave systems are the basis for the STARS project. VSP is divided into seven divisions. Each VSP division is responsible for dispatching and coordinating the radio communications within its area of responsibility. Each VSP division for this project, with the exception of Division 7, has been subdivided into two "communications zones." Each communications zone is allocated a set of channels, which may be reused elsewhere in the state. VSP's Division 7, which is Northern Virginia and is the smallest division geographically, will not be subdivided as are the other six divisions. All of Division 7 will lie in Communications Zone 13 with a single set of assigned channels.

VSP presently communicates on a statewide VHF high-band radio system interconnected by a 2 GHz and 6 GHz microwave network. The state describes them as "mature architectures that have been operationally and technically refined over the years." Together, this system provides approximately 90 percent of the state's troopers with mobile radio coverage using 47 VHF sites interconnected by 87 microwave sites Portable radios are used through the use of vehicular repeaters on 458.35 to extend coverage when officers are out of their cruisers.

The majority of the state police mobile radios are approximately 20 years old. The present conventional four-channel system, originally installed in 1977, supports approximately 3,235 users (2,375 VSP personnel and 860 other federal, state and local users).

Other state agencies in Virginia operate separate mobile radio networks to support their operations. Since VSP has chosen to replace its current system, the Commonwealth decided that a shared high-capacity network is the most efficient solution.

Radio System Specifications

The Commonwealth seeks a top-of-the-line public-safety-grade high-capacity digital radio system with the most advanced digital modulation commercially available. The documents only specify a "high-capacity" radio system, but it is unlikely that bidders will propose anything other than a trunked system.

The state specifically mentions Motorola's QPSK-C, four-level modulation, or Ericsson's GFSK modulation as candidates. Bidding vendors are required to offer their most advanced voice encoder, e.g. Improved Multiband Excitation (IMBE) vocoder. The system is required to have Advanced Encryption Standard (AES) capability with the ability to provide over-the-air rekeying of encryption keys.

The Commonwealth reserves the right to purchase any combination of analog and digital radios, including all analog or all digital. In any case, the system's infrastructure should be dual-mode so either analog or dual-mode non-fixed units may be accommodated on an ad-hoc basis. The state says the general framework for the communications system is expected to be compliant with those standards specified by the Association of Public-Safety Communications Officials-International's Project 16 committee in 1978.

The Commonwealth desires a 95 percent guaranteed area reliability for mobile radio coverage (geographically) and on the state's territorial waters. The area of the capital buildings in Richmond is the only region in the Commonwealth where the system is to be designed for in-building (portable radio) penetration. Reception in eight of the state's highway tunnels will also be included in this project.

The state desires that high-tier radios have the ability to be programmed for telephone interconnect.

The Commonwealth estimates an initial need for 12,034 mobile STARS radios, which includes 4036 for VSP and 5000 for VDOT. Fewer than 25 percent of these VSP mobile radios will be encrypted. Forestry and Game & Inland Fisheries have estimates of 610 and 720 mobile radios, respectively. Less than 40 percent of the GIF radios will have encryption. None of the Forestry or VDOT radios will include encryption. Overall, the state's projections show only 12 percent of the initial mobile radios having encryption.

State agencies will continue to retain, or install, new mobile repeater systems to allow per-

sonnel outside of their vehicles to communicate through the mobile radios. State estimates show an initial need for 2423 vehicular repeater systems for use with the STARS system. By comparison, the state estimates an initial need of 3249 STARS portable radios, of which 10 percent will feature encryption.

Towers

The state encourages the winning contractor to plan the system using the Commonwealth's existing 87 microwave sites, of which 47 are also VHF sites. If coverage is degraded, or nonexistent in some areas, however, it will be necessary to consider up to 14 additional sites. In addition, communications for the eight tunnels must be included in the project.

The contractor is requested to provide a mechanism for wireless service providers to supplement the STARS network by establishing a tower co-location lease/purchase plan. The program is desired so that the Commonwealth will have the ability to generate revenue and/or improve the STARS infrastructure by establishing partnerships with private and public wireless service providers.

Microwave Network

The VSP microwave system consists of 84 hops of 6 GHz digital, 2 GHz analog, and 900 MHz analog links. Some are leased. The hub of the microwave network is the state police headquarters in Richmond. Four main microwave circuits, known as the East, North, Northeast and West circuits, originate at this location.

The 6 GHz DS3 digital backbone network consists of 19 hops. Five of the seven division headquarters are served by the digital backbone. The remaining division headquarters are served by 2 GHz analog microwave networks. The channel capacity of these circuits is 36 or 48 channels. Fifteen of VSP's 47 VHF base station sites are fed with digital microwave, and the remaining are fed by analog microwave systems. The microwave system primarily supports the VSP VHF radio systems and the area office microwave telephone network. Additional analog 2 GHz, and 950 MHz systems interconnect VDOT low-band radio sites and district offices into the VSP network.

The radio system's prime control site will be constructed on the existing large dirt parking lot on the west side of VSP headquarters' radio tower. A backup control site will be in an existing warehouse behind the headquarters.

VSP expects the digital and analog microwave system to be upgraded to support mobile radio, intranet, telephone and mobile data systems for the STARS. The upgraded microwave network will replace all of the VSP data processing leased lines, including those used by the VSP area offices for the department's wide and local area networks.

Virginia's Integrated Flood Observation & Warning System (IFLOWS) monitors rainfall and stream level data which is used to help predict flash floods. Several VSP dedicated microwave channels carry this data to an emergency management computer at VSP headquarters. The state would like to incorporate these links within the STARS microwave network. The rain gauge-to-processor links would continue to use 169.5.

Mobile Data Network

Current VSP mobile data computers operate on the cellular digital packet data (CDPD) and CS-CDPD networks. But the STARS project promises to create a new mobile data network. The new mobile data system will support access to the STARS intranet through both the STARS network as well as one or more commercial data services.

The goal is to have the mobile computer system automatically switch between STARS and commercial data services depending on the size of the file to be transferred, the coverage area of each system, the system usage charges and the destination.

The new mobile data network may be implemented on the proposed high-capacity radio system channels or on a separate set of frequencies. The private data network will have the same 95 percent desired coverage requirement as the radio system. Data transmissions may be handled by the system using either trunking (circuit switched), packet switched or a combination of these modes.

Internet Protocol (IP) addressing will be used throughout the network. Voice over IP is an option as well. The computer-aided dispatch message-switch LAN connections will be Ethernet/IEEE 802.3 (10/100BaseT). The Commonwealth desires that the system be designed to be capable of meeting the National Crime Information Center's Service Level 4 with the understanding that current wireless technology and bandwidth may limit it to Service Level 2. Mobile data will be encrypted in accordance with Criminal Justice Information Services and NCIC security requirements (minimum of 128-bit encryption).

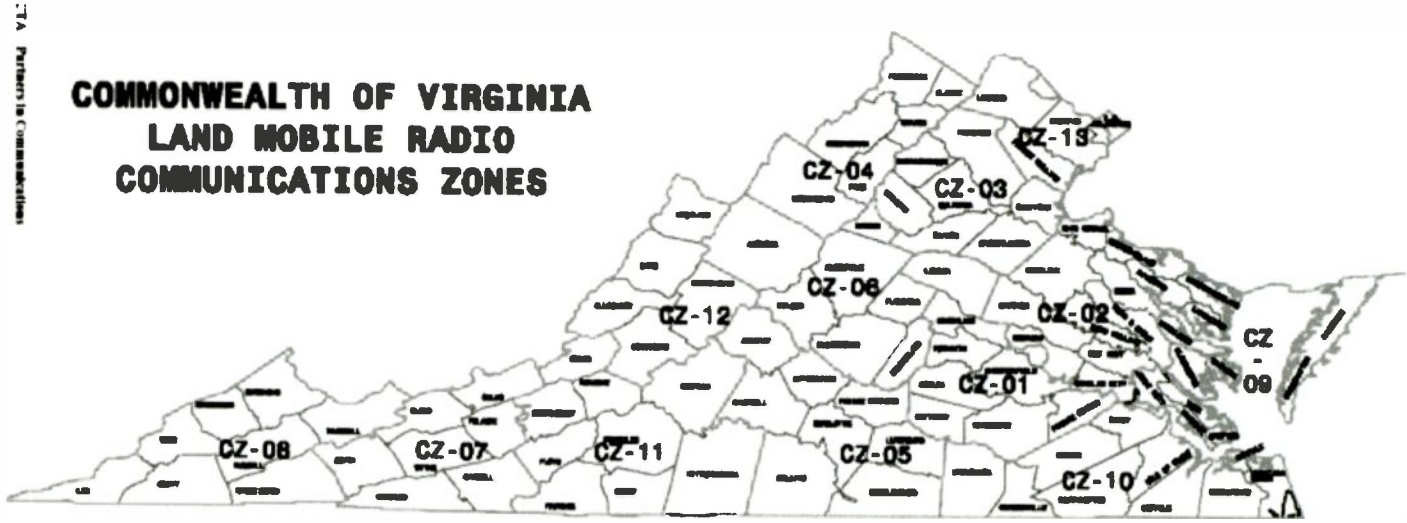
The Commonwealth estimates an initial need for 2306 mobile computer terminals, which includes 1503 for VSP and 260 for VDOT. Optional mobile accessories under consideration include bar-code readers, biometric devices such as fingerprint capture, automatic vehicle location (AVL) units and vehicle-mounted printers.

Existing mobile computers used by VSP, Department of Mines, Minerals & Energy, and the Department of Environmental Quality, will be retrofitted and incorporated into this new network. Additional agencies are expected to join at a later date.

The mobile data system is also expected to be integrated with the VSP local area network (VSP-LAN) as part of the intranet. This includes sending and receiving messages (with attachments) from the VSP-LAN user community.

The mobile data system will permit computer terminals to communicate with each other, access numerous databases and allow dispatchers to relay message traffic to an individual unit or groups of units. Mobile units will be able to access the computer-aided dispatch (CAD) system to check calls pending, calls in progress, calls completed, event files and nearby or proximate events.

A vast array of law enforcement, public safety and general databases will be available for query by authorized mobile units. A few of the key law enforcement databases will include the Virginia Criminal Information Network (VCIN), the National Crime Information Center (NCIC) and out-of-state agencies by way of the National Law Enforcement Telecommunications System (NLETS).



An interface with the Capitol Wireless Integrated Network (CAPWIN) is also planned. The Commonwealth desires to have this ability to query Maryland and D.C. police databases. Under consideration is a message switch that would tie the D.C. area mobile data users and databases together. Grant money has been received by the University of Maryland, which is proving CAPWIN project management.

The objective of CAPWIN is to give all participating agencies the ability to automatically query each other's databases and send text messages between users. This same system would allow Virginia highway crews to coordinate with their counterparts in Maryland and D.C., and also with law enforcement. Alexandria is currently using CDPD and is considering connecting it directly into the CAPWIN switch. The CAPWIN committee issued a request for proposals for the switch last summer (**http://www.capwinproject.com/**).

Statewide Intranet

A wide-area network (WAN), also known as the "intranet," is being planned as part of STARS. The STARS intranet will be capable of interconnecting the 19 participating state agencies, but configured initially for the agencies which will be operating in the mobile data environment. The state desires that the network technology used for the LAN conform to IEEE 802.3u 100 Mbps Fast Ethernet. The communication protocol will be TCP/IP.

This wide-area data network will: provide message and data switching to support the mobile data users; allow for state agency connectivity into the intranet through several technologies including microwave, fiber optic, frame relay, and others; provide a reliable and secure private data network for the upgraded VSP radio and microwave networks; provide a repository and distribution center for STARS project information, including radio personality profiles; provide wireless data access for mobile computers; provide access to the VSP-LAN; provide access to a software distribution server.

Future phases will: allow for interconnection of remote offices and support of the Digital Dominion and e-Government initiatives; provide limited mobile access to the Internet.

New Consoles and Expanded Comm Centers

The STARS project promises to renovate and expand all seven of the VSP communications centers at their present locations. At the moment, each of the seven VSP divisions have autonomous CAD systems that consist of dual DEC AlphaServers, a shared mass-storage array and at least five Windows NT Workstation dispatch terminals. VSP prefers that its current Orbacom consoles be upgraded and re-used if economically practical.

In addition to VSP, replacement or additional dispatch equipment will be provided for the following agencies: Capitol Police, Department of Emergency Management, Department of Forestry, Department of Game & Inland Fisheries, Marine Resources Commission, Department of Military Affairs, and Department of Transportation.

Transportable Sites

Probably one of the most fascinating aspects of this project is the creation of a transportable site as well as a separate disaster recovery trunked system site.

The transportable site (TS) could be mounted in a shelter that is part of a self-propelled vehicle or in a shelter that is mounted on a towable trailer. TS operators will have access to the STARS mobile data network. Base station radio gear installed in the unit will support two 150 MHz conventional channels and a complete five-channel 800 MHz trunked system using Commonwealth-licensed frequencies (the state has not yet specified the frequencies).

The TS is expected to be equipped with fifty 800 MHz portable radios and charging stations. It will have the ability to link its 800 MHz trunked radio network to the nearest VHF STARS radio site. This will hopefully allow for seamless operation between users of the 800 MHz trunked site and those on the STARS VHF radio network.

The TS unit will include interface capabilities for telephone, microwave and to its own self-contained antenna system with its own 100-foot portable tower.

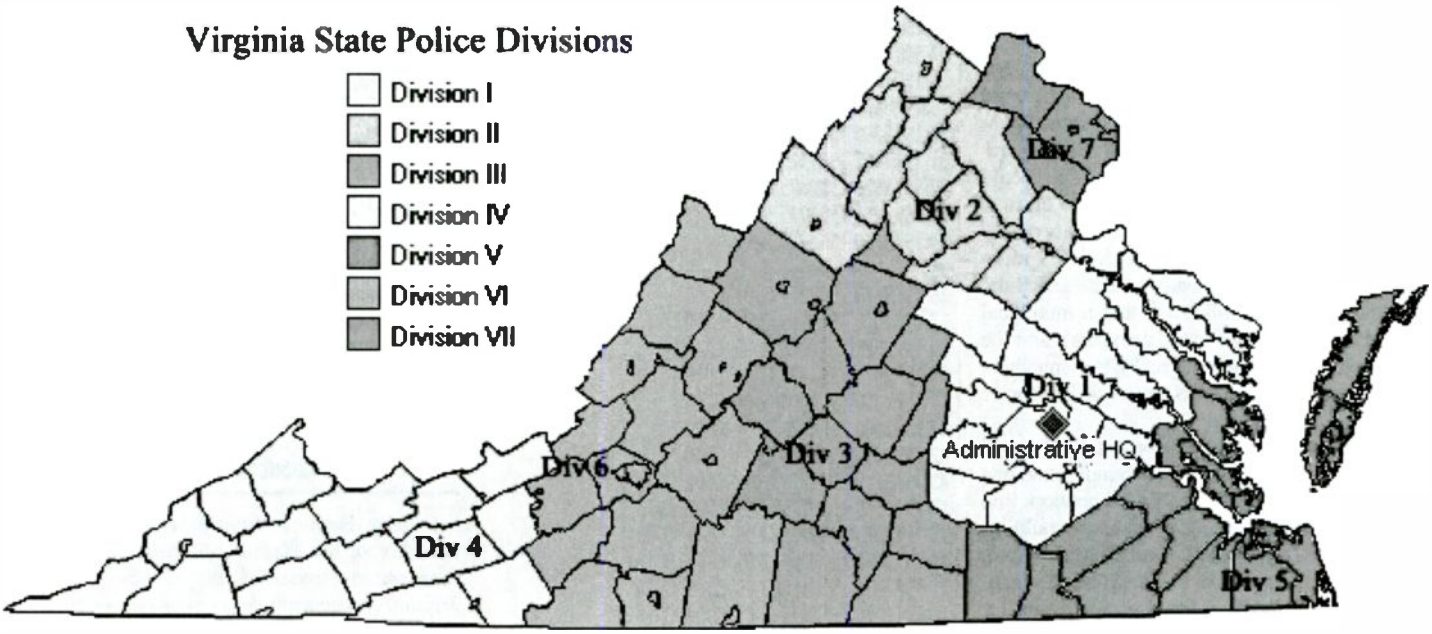
In addition to the TS, the offeror is to include a separate disaster recovery transportable site (DRTS) that can be used by VSP technicians in the event that a STARS radio site is lost.

DRTS will be at a minimum a five-channel 100 watt VHF repeater suite with an RF cabinet containing a hybrid multiplexer and combiners, site controller computer, a telephone interface panel and mobile data and radio interface equipment. The DRTS will include an AC generator and transfer switch and a generator fuel tank with a 36-hour capacity. The state desires a 100-foot crank-up tower.

Private/Public Partnership

The Commonwealth is considering a private/public partnership for the STARS system. Operating a system under a private/public partnership, the proposal states, will involve the private vendor providing the radio, mobile computer terminal, microwave infrastructure, towers, shelters/buildings, and land. The private partner may also provide any added equipment shelters as well as maintenance necessary to meet these specifications for all of this equipment that is not provided by the Commonwealth. The vendor is welcome to make suggestions.

The state says its intention is to capture as many opportunities as possible to generate revenue from the communications system. Such opportunities could include mobile computing customers who can share common resources on the state's wireless and hard-wired networks; tower tenants who could potentially rent antenna space on new and existing towers; or third-party users of the radio system.



Scanning the STARS!

The state says it desires the winning vendor to provide a scanner radio that: will be programmed under the control of the Commonwealth, will be available for purchase by authorized parties, and allows monitoring of specifically programmed talkgroups. Any transmitter circuitry must be removed or destroyed. The user of the programming equipment must "commit to never program any scanner radio onto the system without prior approval from the Commonwealth, and must proactively provide security for safeguarding the scanner radio." The offeror is expected to provide a detailed plan as to how the security of this device will be safeguarded. It is the Commonwealth's desire that the security include password-protected firmware.

Talkgroups and Interoperability

The state has tentatively identified 1256 talkgroups. The agencies with the most allocated talkgroups are VDOT with 541, VSP with 263, and 61 each for Forestry and Game & Inland fisheries. Few talkgroups are designated for statewide use. Thus, each communications zone will have its own set of talkgroups.

Each communications zone, for example, will have its own VSP emergency "9-1-1" talkgroup. All radios will be equipped with this talkgroup so users many summon assistance from the VSP division dispatch center which serves that communications zone.

All radios in each communications zone will also have three interagency working "interop" talkgroups. In addition, law enforcers will have access to a SIRS/interop talkgroup in each communications zone for communications among VSP and other federal, state and local law enforcement users.

The Commonwealth's goal is to connect Virginia's 95 county and 40 independent city dispatch centers and specialized/mutual aid networks such as COG-MARS (866 MHz), LOJACK (173.025), PMARS (866.3625), TCAP (453.8) and SIRS (39.54), directly or indirectly, into the STARS network. Some municipal and county agencies are expected to move to STARS for their primary communication.

But for agencies who decline to join STARS, the state suggests two methods for interoperability: Channels can be programmed directly into the STARS subscriber radios for agencies which continue to use conventional VHF frequencies, or a "locality network interface" could be employed. Such an interface would allow a VSP dispatcher to connect federal, county or city public safety providers into the STARS radio system. VSP would manually patch STARS users onto a common talkgroup that a municipal government dispatcher could then patch into the municipality's radio system. VSP dispatchers would control all STARS network interfaces within their division.

All dispatch consoles, not just VSP's, will have the ability to interconnect an individual or a talkgroup operating on the STARS network into another radio channel. Other channels could include conventional systems, retained agency channels, or various city and Commonwealth channels. An optional APCO Project 25 interface for Federal Law Enforcement Wireless Users Group (FLEWUG) users is also under consideration.

STARS Radio Frequencies

These are the tentative statewide frequency assignments for the STARS radio network. Mobile and portable radios will be programmed with at least one yet-to-be-determined simplex channel. Some frequencies have not been licensed in the communications zone for which they have been assigned, and frequencies for some channels have yet to be determined.

Most of the frequencies have been recently licensed for narrowband (15 kHz) operation. Several older frequencies, however, are used by various state agencies which currently use them for wideband (30 kHz) operation. The wideband channels will continue to be used by the contributing state agency during the transition period. These channels will eventually be included in the STARS pool as users migrate to the system.

#/ Base Tx/ Mob Tx/ Comm-Zone(s)
01 158.7225 154.6575 CZ-01, CZ-07
02 158.8575 154.8075 CZ-01, CZ-07
03 159.1875 154.9575 CZ-01, CZ-07
04 159.3375 155.1075 CZ-01, CZ-07
05 158.7975 154.7325 CZ-01, CZ-07
06 159.1125 154.8825 CZ-01, CZ-07
07 159.2625 155.0325 CZ-01, CZ-07
08 159.4125 155.2575 CZ-01, CZ-07
09 ——— CZ-01, CZ-07
10 159.2250 155.4975 CZ-01, CZ-08
11 159.3750 151.2050 CZ-01, CZ-08
12 159.4650 151.1900 CZ-01, CZ-08
13 159.1650 155.4450 CZ-01, CZ-08
14 159.0000 154.9350 CZ-01, CZ-08
15 158.7375 154.6725 CZ-02, CZ-08, CZ-12
16 158.9250 154.8225 CZ-02, CZ-08, CZ-12
17 159.2025 154.9725 CZ-02, CZ-08, CZ-12
18 159.3525 155.1225 CZ-02, CZ-08, CZ-12
19 159.2550 155.5050 CZ-02, CZ-08, CZ-12
20 159.4200 151.2800 CZ-02, CZ-12
21 158.8125 154.7425 CZ-02, CZ-11
22 159.1275 154.8975 CZ-02, CZ-11
23 159.2775 155.0475 CZ-02, CZ-11
24 159.4275 155.3175 CZ-02, CZ-11
25 158.4450 155.4525 CZ-02
26 158.7525 154.6875 CZ-03, CZ-11
27 158.9925 154.8375 CZ-03, CZ-11
28 159.2175 154.9875 CZ-03, CZ-11
29 159.3675 155.1375 CZ-03, CZ-11
30 158.8200 154.7625 CZ-03, CZ-11
31 159.1425 154.9125 CZ-03, CZ-11
32 159.2925 155.0625 CZ-03, CZ-11
33 159.4425 155.3775 CZ-03
34 159.3600 155.5725 CZ-03
35 ——— CZ-03
36 158.7675 154.7025 CZ-04, CZ-10
37 159.0075 154.8525 CZ-04, CZ-10
38 159.2325 155.0025 CZ-04, CZ-10
39 159.3825 155.1525 CZ-04, CZ-10
40 159.4350 151.4300 CZ-04, CZ-10
41 159.3000 155.5425 CZ-04, CZ-10
42 159.1350 155.4600 CZ-04, CZ-10
43 158.8275 154.7775 CZ-05, CZ-09, CZ-13
44 159.1575 154.9275 CZ-05, CZ-09, CZ-13
45 159.3075 155.0775 CZ-05, CZ-09, CZ-13
46 159.4575 155.4225 CZ-05, CZ-09, CZ-13
47 158.7825 154.7125 CZ-05, CZ-09, CZ-13
48 159.0975 154.8675 CZ-05, CZ-09, CZ-13
49 159.2475 155.0175 CZ-05, CZ-09, CZ-13
50 159.3975 155.1975 CZ-05, CZ-09, CZ-13
51 159.3300 155.5575 CZ-05, CZ-09, CZ-13
52 159.4500 155.6025 CZ-05, CZ-13
53 158.8425 154.7925 CZ-06
54 159.1725 154.9425 CZ-06
55 159.3225 155.0925 CZ-06
56 159.4725 155.4375 CZ-06
57 159.2850 155.5125 CZ-06
58 159.4050 155.5875 CZ-06
59 159.9925 156.0600 CZ-06
60 ——— CZ-06
61 ——— CZ-06
62 158.9850 154.9050 CZ-10, CZ-13
63 159.1750 155.4675 CZ-10
64 159.4800 156.2250 CZ-10
65 ——— CZ-10
66 ——— CZ-10

VSP Division / STARS Communications Zone		
D1 South	(Richmond)	CZ-01
D1 North	(Richmond)	CZ-02
D2 East	(Culpeper)	CZ-03
D2 West	(Culpeper)	CZ-04
D3 South	(Appomattox)	CZ-05
D3 North	(Appomattox)	CZ-06
D4 East	(Wytheville)	CZ-07
D4 West	(Wytheville)	CZ-08
D5 North	(Chesapeake)	CZ-09
D5 South	(Chesapeake)	CZ-10
D6 South	(Salem)	CZ-11
D6 North	(Salem)	CZ-12
D7 ———	(Fairfax)	CZ-13

Project Schedule

The deadline for proposal submissions was November 28, 2001. The Commonwealth is now evaluating the proposals. The name of the firms which submitted proposals have not been made public. Furthermore, Teresa M. Hudgins, the STARS procurement and contract officer, stated she does not have any idea when the state might award a contract for the STARS project.

The state will be conducting a pre-award evaluation of radio equipment. From the VSP headquarters tower in Richmond, propagation and functional testing will be conducted to help establish suitability of the equipment proposed for the Commonwealth's upgraded system.

The state says it anticipates the systems integrator to complete the network in accordance with the schedule below. The actual implementation schedule, however, will be determined upon further negotiations. This project will be completed in four phases, with the phases delineated by the VSP divisions.

Tentative STARS completion dates by VSP division:
07/01/03 Richmond (Phase 1)
10/01/03 Richmond Area Commonwealth System Review
10/01/04 Appomattox and Chesapeake (Phase 2)
10/01/05 Culpeper and Fairfax (Phase 3)
10/01/06 Salem and Wytheville (Phase 4)

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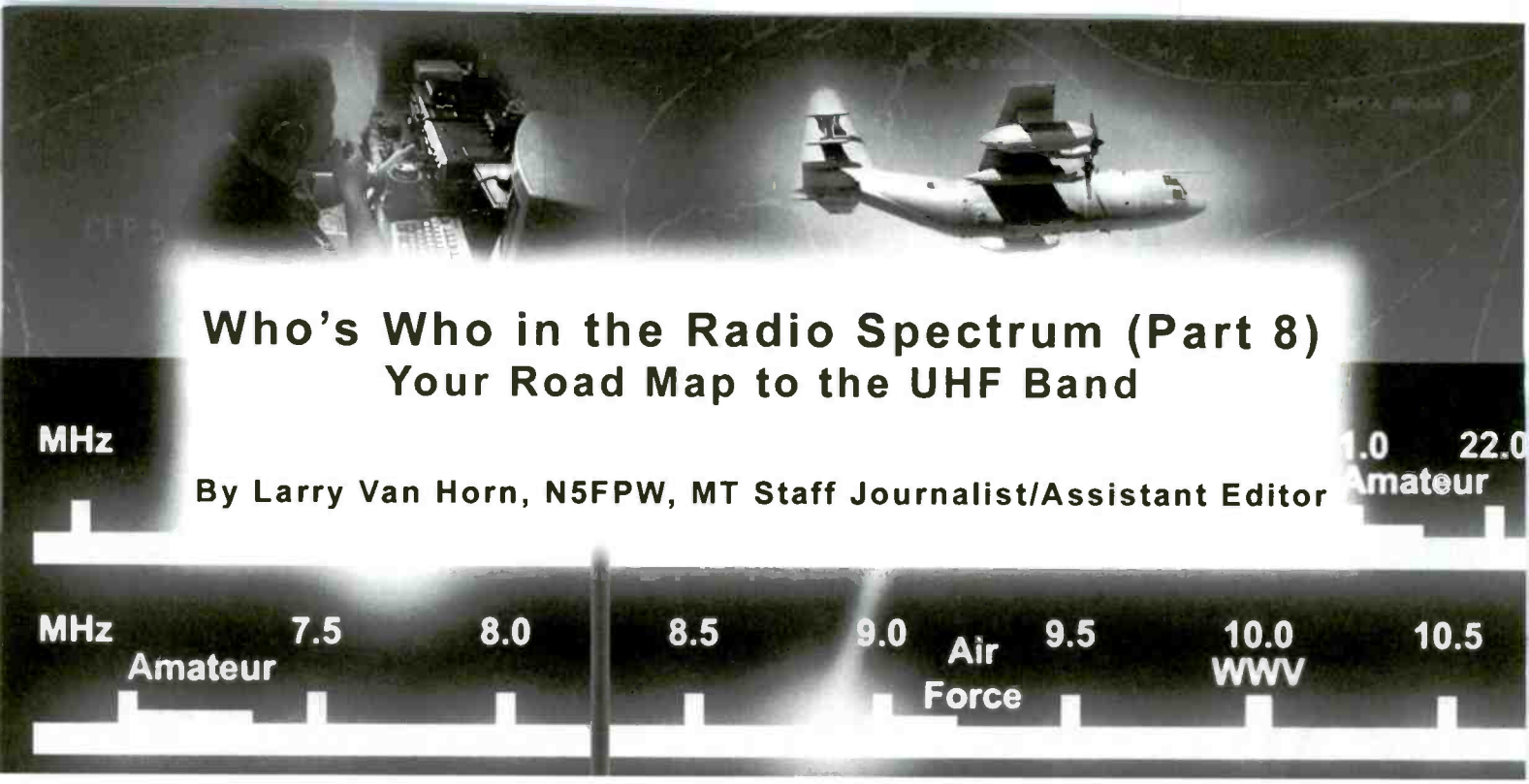


Who's Who in the Radio Spectrum (Part 8)

Your Road Map to the UHF Band

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

Things have really changed over the last few years when it comes to radio hobby monitoring. If we turn back the clock 20 years to the days when *Monitoring Times* first started publication, you would see a radical difference in frequencies pre-programmed into the scanners of those days versus today's wideband receivers.

Looking back at *MT* Volume 1 No. 1 printed in 1982, *MT* mentioned the two top Bearcat scanners of the day: BC-100 handheld and BC-350 desktop. Both had frequency coverage of 30-50, 138-174, and 406-512 MHz only.

Radio technology for users of the spectrum and hobby monitors alike has marched ahead, and today it would be unthinkable to stop a scanner's frequency coverage at 512 MHz.

UHF Propagation

As I have pointed out several times in this series, the radio spectrum changes dramatically as we move higher in frequency. Over those earlier installments we have seen a wide variety of propagation modes for receiving signals from distant points.

At 400 MHz and up, we are moving well into the UHF portion of the spectrum. Gone are such propagation effects as ionospheric skip (E and F-layer skip). Meteor scatter (MS) also becomes much more difficult than on the lower bands, because the signal bursts are significantly weaker and much shorter in duration. In fact, meteor scatter propagation generally is not an effective way to monitor distant public safety communications. The same also applies to aurora signal reception, As we move up in frequency, doppler shift and distortion off the auroral curtain will be considerable.

For the average radio hobbyist who might want to monitor some distant UHF communications, the best bet will be tropospheric ducting. Weather-induced enhancements can occasionally extend the range of reception well beyond what is normally heard at one's monitoring post. Tropo skip occurs more frequently at these higher frequencies than is experienced in the lower VHF frequency ranges.

There are also some other general rules of the road that the monitor needs to remember when prowling these frequencies. Ground wave reception ranges shorten as we move higher in frequency. One only has to look around at the number of 800 MHz cell phone towers required for coverage in their neighborhood, as opposed to 400 MHz public safety system repeaters, to understand this concept.

Our basic rule of VHF/UHF monitoring still applies: "The higher your antenna, the more distant the signals that can be monitored."

400 to 406 MHz

This is one of the more interesting subbands in this portion of the spectrum. While the monitor won't hear many (if any), analog voice communications, there are quite a few digital signals in this band.

399.90 - 400.05	Mobile Satellite – Little LEO (Low Earth Orbit) uplinks and Radio Navigation Satellites. Russian Navigation Satellites: 399.76, 399.84, 399.92, 400.00, 400.08
400.05 - 400.15	Standard Frequency and Time Signal Satellites (U.S. does not operate satellites in this band)
400.15 - 401.00	Radiosonde and Little LEO satellite downlinks.
400.15 - 406.00	Weather aids - There are a wide variety of animal tracking telemetry, weather and water data collections uplinks allocated on these frequencies. The U.S. military Defense Meteorological Satellite Program (DMSP) also uses this band.

406 to 420 MHz

At the bottom portion of this sub-band (406.0-406.1) you will find the new generation of emergency locating devices in operation. Known as EPIRBs (Emergency Position Indicating Radio Beacons) current models operate on 406.025. It has been reported that newer models will use 406.028 MHz.

The radio astronomy community shares the 406.1-410.0 MHz range with the government land mobile service below. The primary space target in this frequency range are pulsars and continuum observations.

The main general-purpose federal UHF land mobile band runs from 406.1 to 420.0 MHz. Spacing in this spectrum is 12.5-kHz and the predominant mode is narrowband FM. This frequency range also has the bulk of the U.S. Government multi-agency trunk systems. A detailed breakdown of this band and the agencies using it is on CD-ROM in the *Grove Federal Frequency Directory*.

420 to 450 MHz

Amateur Radio operators call this range of frequencies the 70 cm band, but there is much more here than ham radio. The band is used for telemetry and long range radar surveillance by the U.S. Government. The Air Force Ballistic Missile Early Warning System (BMEWS) uses this band. The U.S. Air Force PAVE PAWS radar is used to track satellites and submarine-launched ballistic missiles.

There are other governmental users of this spectrum also. The National Oceanic and Atmospheric Administration (NOAA) operates a network of 449 MHz wind profilers all across the United States.

The Arecibo Observatory in Puerto Rico, operated by Cornell University in cooperation with the National Science Foundation, uses these frequencies for radar and radio astronomy observations. NASA also has its primary balloon command frequency within this range.

PMRS or the Private Mobile Radio Service uses the 421-430 MHz band in Buffalo, Detroit, and Cleveland. Several years ago the Land Mobile Communications Council was attempting to wrestle the 420-430 and 440-450 MHz portion of the band away from the ham community. They have since apparently backed away from that position in their filings with the FCC.

Table One: U.S. Amateur Radio 70 cm Band Plan

420.00-426.00	Amateur TV repeater or simplex with 421.250 MHz video carrier control links and experimental
426.00-432.00	Amateur TV simplex with 427.250 MHz video carrier frequency
432.00-432.07	EME (Earth-Moon-Earth) operations
432.07-432.10	Weak-signal modes: Morse code
432.10	70-cm calling frequency
432.10-432.30	Mixed-mode and weak-signal work
432.30-432.40	Propagation beacons
432.40-433.00	Mixed-mode and weak-signal work
433.00-435.00	Auxiliary/repeater links
435.00-438.00	Amateur Radio Satellite operations only (International agreement)
438.00-444.00	ATV repeater input with 439.250 MHz video carrier frequency and repeater links
442.00-445.00	Repeater inputs and outputs (local option)
445.00-447.00	Shared by auxiliary and control links, repeaters and simplex (local option)
446.00	National FM simplex frequency
447.00-450.00	Repeater inputs and outputs (local option)

450 to 454 MHz

Frequencies from 450 to 451 MHz and 455 to 456 MHz are assigned to the Radio/Television Broadcast Auxiliary Service. Here you will find wireless mikes, transmitter telemetry signals and electronic newsgathering base/mobile communications. In one of the strangest pieces of legislation ever, the 1986 Electronic Communications Privacy Act passed by Congress made it a crime to monitor communications in this portion of the spectrum.

Starting at 451 to 454 MHz and then from 456 MHz up to 470 MHz we have another Private Mobile Radio Service band. You will find frequencies here assigned to public safety and industrial/business communications. Spacing is generally 6.25 MHz and the primary mode is narrowband FM. Repeater output frequencies will be split from its associated input by 5 MHz on these frequencies.

454 to 455/459 to 460 MHz

Hidden within this frequency range is a service that few scanner hobbyists tune through. I call it the hidden aviation band. This is the home of the General Aviation Air-Ground Radiotelephone Service. There are two frequency ranges divided into twelve 25-kHz channels. The uplinks are from 454.700-454.975 MHz with ground signaling channel at 454.675 MHz. You will find the other side of these duplex channels from 459.700-459.975 MHz.

The other primary user of this spectrum is the Public Mobile Rural Radiotelephone Service. You will find the repeater outputs from 454.025-454.650 and the mobiles from 459.025-459.650 MHz.

460 to 470 MHz

This spectrum is typical of the wide variety of public service and industrial/business communications to be found on UHF. Base/repeater outputs will utilize 460-465 and the mobiles will be 5 MHz higher (465-470 MHz). This is also the domain of the Family Radio Service and General Mobile Radio Services. Frequencies in the table below reflect those assignments. Spacing in these ranges are 6.25 MHz and the primary mode is narrowband FM.

Table Two: FRS/GMRS Frequencies

Family Radio Service frequencies

Channel	MHz
1	462.5625
2	462.5875
3	462.6125
4	462.6375
5	462.6625
6	462.6875
7	462.7125
8	467.5625
9	467.5875
10	467.6125
11	467.6375
12	467.6625
13	467.6875
14	467.7125

General Mobile Radio Service frequencies

May transmit 5 watts on the following 462 MHz channels, shared with Family Radio Service:

462.5625 462.5875 462.6125 462.6375 462.6625 462.6875 462.7125

Base station, mobile relay station, fixed station or mobile station

462.550 462.575 462.600 462.625 462.650 462.675 462.700 462.725

Mobile station, control station or fixed station in a duplex system:

467.550 467.575 467.600 467.625 467.650 467.675 467.700 467.725

470 to 512 MHz

This band contains UHF TV channels 14-20. In eleven major U.S. urban areas, the Private Mobile Radio Service shares these frequencies, and you will find a wide variety of public safety and industrial business channels in use.

These urbanized areas and the associated TV channels are as follows:

New York, New York-Northeastern New Jersey	Channels 14 and 15
Los Angeles, California	Channels 14, 16, and 20
Chicago, Illinois-Northwestern Indiana	Channels 14 and 15
Philadelphia, Pennsylvania-New Jersey	Channels 19 and 20
San Francisco-Oakland, California	Channels 16 and 17
Boston, Massachusetts	Channels 14 and 16
Washington, D.C.-Maryland-Virginia	Channels 17 and 18
Pittsburgh, Pennsylvania	Channels 14 and 18
Miami, Florida	Channel 14
Houston, Texas	Channel 17
Dallas, Texas	Channel 16

512 to 806 MHz

One of the more frequently asked questions I get on the Grove Tech Support line is, "What can I hear from 470 to 806 MHz?" Answer: Mostly television audio and video. There are exceptions.

In the frequency range from 608 to 614 MHz, we have TV channel 37 on which no TV transmissions are permitted. This channel is used for radio astronomy continuum observations and it has a very low background noise. Most of the activity in this band involves Very Long Baseline Interferometry (VLBI). That is where several radio astronomy receivers quite distant from each other are connected electronically and act as one giant receiver.

Over the next few years, as TV broadcasters make the move into high definition digital TV (HDTV), they will need less spectrum and that unused spectrum will be turned over to public safety, business and common carrier users. This has happened before when the 800 MHz band was carved out of old TV channels 70-83.

Soon, virtually all TV broadcasting here in the United States will shift to TV channels 2-51 and a new 700 MHz band will be carved out of UHF channels 52-69. The basic assignments are covered below.

Freq	TV Channels	Usage
698.0-746.0	52-59	Fixed, Mobile and new broadcasting services for commercial use.
746.0-764.0	60-62	Miscellaneous Wireless Communications Services
764.0-776.0	63-64	Private Land Mobile Service: State and local public safety services
776.0-794.0	65-67	Miscelloneous Wireless Communications Services
794.0-806.0	68-69	Private Land Mobile Service: State and local public safety services

The new 764-776/776-794 MHz authorization above is the largest allocation the FCC has ever made for public safety communications (24 MHz total bandwidth). More details on specific frequency assignments in the 698-806 MHz range will be forthcoming in *Monitoring Times*.

Table Three lists all the UHF TV channels with audio and video carrier frequencies.

806 to 896 MHz

As I mentioned earlier, the original TV spectrum reached to channels 7-83 (806-890 MHz). The FCC later reallocated this segment to mobile services and required the segment's TV stations to move to other channels. Older TV sets that tune channels 70-83 can receive mobile services in this spectrum including cellular telephone calls and 800-MHz mobile radio. The breakout for this spectrum is listed below.

806.0-821.0	Private Mobile Radio Service – General/SMR/ Public Safety, Industrial/Land Transportation and Business pool (mobile to base frequencies, paired with 851.0-866.0 MHz)
821.0-824.0	Private Mobile Radio Service – Nationwide Public Safety Use (mobile-to-base frequencies, paired with 866.0-869.0 MHz)
824.0-849.0	Cellular Radiotelephone Service (mobile-to-base frequencies, paired with 869.0-894.0 MHz)
849.0-851.0	Commercial Aviation Air-Ground Systems (uplink, paired with 894.0-896.0 MHz)
851.0-866.0	Private Mobile Radio Service – General/SMR/ Public Safety, Industrial/Land Transportation and Business pool (base to mobile frequencies, paired with 806.0-821.0 MHz). Conventional and trunk services.
866.0-869.0	Private Mobile Radio Service – Nationwide Public Safety Use (base-to-mobile frequencies, paired with 821.0-824.0 MHz)
869.0-894.0	Cellular Radiotelephone Service (base-to-mobile frequencies, paired with 824.0-849.0 MHz)
890.0-902.0	U.S. Navy ship-borne, long range search radars
894.0-896.0	Commercial Aviation Air-Ground Systems (downlink, paired with 849.0-851.0 MHz)

896 to 960 MHz

As we move higher in frequency into the microwave portion of the spectrum, the amount of analog voice communications in use starts to drop off dramatically. In fact, by the time we get to 1000 MHz and above, you won't hear much analog voice communications, if any, and there are no public safety bands allocated.

896.00-901.00	Specialized Mobile Radio (mobile-to-base, paired with 935.00-940.00 MHz)
901.00-902.00	Personal Communication Services (paired with 940.00-941.00, reserve 930.00-931.00 MHz)
902.00-928.00	"The Kitchen Sink Band." Analog/digital/spread spectrum cordless phones, listening devices, wireless local networks, military radars, Industrial, Medical, Science (ISM) equipment, Amateur Radio (see table four below for 33-cm sub-bands), video and voice eavesdropping, Location and Monitoring Services
928.00-929.00	Fixed Point-to-Point Service
928.00-928.85	Multiple Address System (paired with 952.00-952.85)
928.00-942.00	U.S. Navy ship-borne, long range search radars

929.00-930.00	Private Carrier Paging
930.00-931.00	Personal Communication Services reserve
931.00-932.00	Private Carrier Paging
932.00-932.50	Multiple Address System (paired with 941.00-941.50)
932.50-935.00	Common Carrier Fixed Point-to-Point Microwave Service/Private Operational Fixed Point-to-Point Service
935.00-940.00	Specialized Mobile Radio (base-to-mobile, paired with 896.00-901.00 MHz)
940.00-941.00	Personal Communication Services (paired with 901.00-902.00, reserve 930.00-931.00 MHz)
941.00-941.50	Multiple Address System (paired with 932.00-932.50)
941.50-944.00	Common Carrier Fixed Point-to-Point Microwave Service/Private Operational Fixed Point-to-Point Service
944.00-952.00	Broadcast Auxiliary Services (Studio-to-Transmitter Links)
952.00-952.85	Multiple Address System (paired with 928.00-928.85)
952.00-960.00	Fixed Microwave Services
956.25-956.45	Multiple Address System (unpaired frequencies)

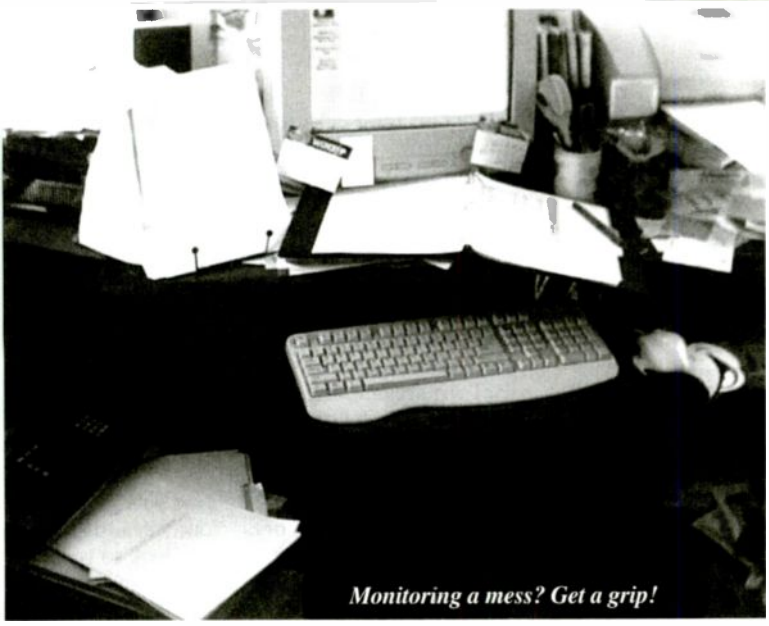
So we are now close to the top of the spectrum that can be monitored easily with a conventional scanner setup. In our next edition of *Who's Who in the Radio Spectrum*, we will explore the new frontier for radio hobbyists and amateur radio operators alike. A few have bravely gone where few others have, but the journey isn't easy, as you will see. Still, there can be some interesting and rewarding monitoring for those that venture up into the S-band (1000-2000 MHz) and beyond on the radio dial.

Table Three: UHF Television Channels

Channel	*Bandwidth*	*Video*	*Color*	*Audio*
14	470-476	471.250	474.830	475.750
15	476-482	477.250	480.830	481.750
16	482-488	483.250	486.830	487.750
17	488-494	489.250	492.830	493.750
18	494-500	495.250	498.830	499.750
19	500-506	501.250	504.830	505.750
20	506-512	507.250	510.830	511.750
21	512-518	513.250	516.830	517.750
22	518-524	519.250	522.830	523.750
23	524-530	525.250	528.830	529.750
24	530-536	531.250	534.830	535.750
25	536-542	537.250	540.830	541.750
26	542-548	543.250	546.830	547.750
27	548-554	549.250	552.830	553.750
28	554-560	555.250	558.830	559.750
29	560-566	561.250	564.830	565.750
30	566-572	567.250	570.830	571.750
31	572-578	573.250	576.830	577.750
32	578-584	579.250	582.830	583.750
33	584-590	585.250	588.830	589.750
34	590-596	591.250	594.830	595.750
35	596-602	597.250	600.830	601.750
36	602-608	603.250	606.830	607.750
37	608-614	609.250	612.830	613.750
38	614-620	615.250	618.830	619.750
39	620-626	621.250	624.830	625.750
40	626-632	627.250	630.830	631.750
41	632-638	633.250	636.830	637.750
42	638-644	639.250	642.830	643.750
43	644-650	645.250	648.830	649.750
44	650-656	651.250	654.830	655.750
45	656-662	657.250	660.830	661.750
46	662-668	663.250	666.830	667.750
47	668-674	669.250	672.830	673.750
48	674-680	675.250	678.830	679.750
49	680-686	681.250	684.830	685.750
50	686-692	687.250	690.830	691.750
51	692-698	693.250	696.830	697.750
52	698-704	699.250	702.830	703.750
53	704-710	705.250	708.830	709.750
54	710-716	711.250	714.830	715.750
55	716-722	717.250	720.830	721.750
56	722-728	723.250	726.830	727.750
57	728-734	729.250	732.830	733.750
58	734-740	735.250	738.830	739.750
59	740-746	741.250	744.830	745.750
60	746-752	747.250	750.830	751.750
61	752-758	753.250	756.830	757.750
62	758-764	759.250	762.830	763.750
63	764-770	765.250	768.830	769.750
64	770-776	771.250	774.830	775.750
65	776-782	777.250	780.830	781.750
66	782-788	783.250	786.830	787.750
67	788-794	789.250	792.830	793.750
68	794-800	795.250	798.830	799.750
69	800-806	801.250	804.830	805.750

Table Four: Amateur Radio 33 Centimeters (902-928 MHz)

902.0-903.0	Narrow-bandwidth, weak-signal communications
902.0-902.8	Slow Scan TV (SSTV), Facsimile (FAX), Amplitude Companded Sideband (ACSSB), Experimental
902.1	Weak-signal calling frequency
902.8-903.0	Reserved for Earth-Moon-Earth (EME) operations, Morse code/CW expansion
903.1	Alternate calling frequency
903.0-906.0	Digital communications
906.0-909.0	FM repeater outputs
909.0-915.0	Amateur Television (ATV)
915.0-918.0	Digital communications
918.0-921.0	FM repeater inputs
921.0-927.0	Amateur Television (ATV)
927.0-928.0	FM simplex and links



Monitoring a mess? Get a grip!

Managing Radio Data

By John Mayson

Information. Mankind has taken this simple concept and turned it into a multi-billion dollar industry. Some would say we're drowning in information. A generation ago we were content with three television networks with a total of five or six local stations. Today cable and satellite systems deliver hundreds of channels. We have non-stop financial information from around the globe, headlines every half-hour, weather on the 8's. Dial-up and broadband Internet provides another information pipeline into our homes and businesses. If a villager in Papua New Guinea so much as sneezes, there's probably a news organization or Internet site reporting it. A quake rattles Tokyo, we know all about it in Toledo while in our car.

We decide we need to relax and take up a hobby, and guess what? We pick radio: very information-intensive, and not just for program content. Few of us purchase a shortwave radio or scanner just to haphazardly tune around. Sooner or later we accumulate lists of times, frequencies, locations, etc. then have to store this information somewhere. That's where the trouble begins.

MT editor Larry Van Horn has always impressed me with his vast knowledge of everything radio-related seemingly right at his fingertips. He not only can tell you the output frequencies of repeaters but can also tell you the input frequency, call sign, tone, description, and which mountaintop hosts the transmitter. I had this image of Larry as being a wizened old gnome sitting on a stool poring over a jewel-encrusted tome containing his wealth of radio knowledge. However, a little checking has determined he doesn't have a dusty, magical tome, but rather relies on computer files for his information. I also suspect Larry is not a gnome. (*And not old, either, says Larry! - ed.*)

Getting a grip

Information management as a concept is quite simple: Store the information in a manner which makes for easy retrieval. In practice, this requires a fair amount of analysis and planning before you even start. Fortunately, radio information is not as complex as, for example, medical records, so maintaining the data is simpler.

In this article we will explore a variety of radio data storage methods and examine the strengths and weaknesses of each. But before we launch into this topic let me set an expectation. I will not reveal the "best" way to maintain your radio-related data, because it doesn't exist. First of all, I cannot know what works best for you. Only you can determine that. Second, when it comes to computerized solutions, I have learned that all applications stink, but some stink less than others.

Unless you're an experienced computer programmer or have ample amounts of time, you are limited to available programs. On the other hand, you shouldn't shy away from learning a new computer language or application. "The mind is a cistern, not a cesspool," fictional detective Nero Wolfe once said.

Some might wonder why they should learn computer packages like Perl, mySQL, Python, or XML. I have some personal experience in this regard. In an attempt to improve my radio hobby I took the time to learn new computer languages and applications. While learning the new languages, I began to see how these could be used to also automate and improve many tasks where I work. I implemented some of these ideas and received recognition for my initiative. Consequently, despite heavy cutbacks in my particular industry, I am still employed, doing what I enjoy doing. I can credit my radio hobby as the catalyst for improving my professional skills.

Never be afraid to learn something new: You don't know where it may lead.

Paper or plastic?

This is a favorite expression of mine when it comes to radio data. Which is the better method, a printed list or an electronic format such as CD-ROM? "Paper or silicon?" might be more accurate.

Not everybody has access to a computer. For these people, a purely paper method is the only answer, and there's nothing wrong with it. I've been in the radio hobby for twenty years now and for half of those I refused to use a computer as part of my radio hobby. Computers were nothing more than broadband signal generators that did not belong in a shack. Today I cannot imagine the hobby without computers, but not everyone agrees.

Index cards

It's hard to beat the cost and simplicity of index cards. Index cards work great for shortwave. A listener can write the frequency across the top and then list which stations can be heard on that frequency at a given time. Some might wish to use different colored index cards to indicate the type of transmission (broadcast, aeronautical, maritime, etc.). Since the cards are keyed by frequency, they of course should be sorted by frequency.

The disadvantages? It's very easy to sort the cards incorrectly. If you ever drop the cards, you're in for a long afternoon of sorting work. Cards can get lost. The worst is that your data cannot be cross-referenced. It's simple to look up by frequency, but nearly impossible to look up by station. You could create two stacks, one by frequency, the other by station, but you'd need to maintain two sets of identical data.

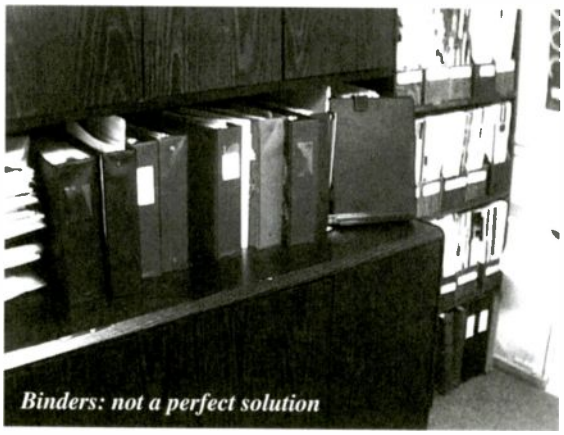
Conclusion: if you're new to the hobby or have little data to store, index cards may be right for you.

Three-ring binders

A good old-fashioned three-ring binder costs little and holds a lot. That's the problem. I finally decided computers could be used sparingly in the radio hobby. I used my 286 PC to download frequency lists off the old Scan Atlanta BBS, printed and hole-punched them, and stuck them in my binder. I tore out pages from *Monitoring Times* and stuck them in my binder. I stuffed handwritten notes into the binder. I ended up with a 500-page useless mess. I had a lot of great information stored, but could not retrieve it.

A storage system is only as good as the retrieval mechanism. It's pointless to store great information if you cannot find anything. I call this storage method WORN: Write Once, Read Never.

Tab dividers can help alleviate the problem of an unsorted mess. However, they are not the



Binders: not a perfect solution

perfect solution. Often data in a page format is not structured in a way that makes categorizing it behind one tab easy.

Conclusion: if you have little data or don't mind hunting for your information, a three-ring binder can be useful. (Also, read Gary Webbenhurst's *Bright Ideas* column: he has lots of uses for 3-ring binders.)

Other paper methods: Spiral notebooks, journals, even paper towels can, of course, be used, but should be reserved for quick note taking and not long term storage. Information cannot be sorted, moved, or easily inserted in a fixed-page format such as a spiral notebook.

The computer

Enter the computer. Once upon a time many hobbyists, including myself, would never have dreamed of combining computers and radio. My very first computer, a Tandy 1000, virtually wiped out reception on my shortwave radio. As computers advanced they didn't get any quieter in the RF spectrum, but they began to offer databases, reception report generators, WEFAX demodulators, etc. to the average hobbyist at a very reasonable price. Today, with instant frequency information available on the Internet it's hard to imagine our hobby without computers.

I created my first computerized radio database using a tilde-delimited file and a Unix Kornshell script to manipulate and view the data. It worked very well. The downside was that the Unix machine I used was the size of a household refrigerator. When I lost access to the Unix machine, I lost access to my database and had to search for a PC solution.

Before we launch too deeply into computers, I want to head off any holy wars. The Microsoft Windows operating system and Intel Pentium architecture are the dominant players in the home computer market. I will use the term "PC" or "personal computer," but I am by no means limiting anyone to a Microsoft Windows based computer. If you use MacOS, Linux, BeOS, or Amiga, the concepts are the same.

Another battle that I want to avoid is over software choices. Windows and MacOS are expensive. Linux is free. Microsoft Access and dBase are expensive. Mysql is free. Microsoft Office is expensive. Open Office is free. Should you use the free packages? Maybe. Maybe not. It just depends on your needs, your skill level, and the skill level of those around you. You may know nothing about databases. Your office mate or next-door neighbor is far more likely to know Access than mysql simply because it's more popular in the market place. Would you rather buy a commercial package with a lot of support or download a free package with minimal support? It's your decision.

Yes, I have my own thoughts on the operating system wars and the payware versus freeware issue, but they have absolutely nothing to do with this article. I'm keeping my opinions to myself for once.

Easy

The simplest computerized radio database you can have is using a word processor or text editor. You're free to place your data in any fashion you want. You can easily add and delete information. With a full-fledged word processor you can use different colors, create tables, and even include objects such as pictures.

If you're using this method, it's a good idea to print the pages and keep them in your shack in a (gasp!) three-ring binder. You can make changes on the paper using a red pen, then periodically update and reprint the file.

If your Internet service provides space for a website, you can save your documents as an HTML file and put it up on your website so others can benefit.

Without too much more effort you can also use a spreadsheet. Originally designed for accountants, spreadsheets have become powerful data collection and analysis tools. Everyone from engineers to librarians use spreadsheets. Spreadsheets offer the added advantage of sorting, and all have some sort of macro language that allows you to narrow down your search to specific criteria, such as city. You don't have the freedom to place your information anywhere in the document, since the spreadsheet expects information to be in cells. You can also export your spreadsheet to an HTML file.

Getting harder

I believe that maintaining data in a spreadsheet is the smartest, easiest method one can use. Each column of the spreadsheet holds a unique piece of data, such as frequency, agency, city, etc. If a piece of data is unknown or just not applicable, the cell is left blank. The downside to a spreadsheet is that even with just a couple of hundred of rows (records), the spreadsheet becomes unwieldy. For instance, what if you want just the police frequencies in your database? Or frequencies for a particular county?

Microsoft Excel includes a macro language. In short, a macro "memorizes" keystrokes and can prompt for human intervention. You could write a macro to prompt for a particular search key, and then have Excel display only the requested information.

Most people quickly outgrow simple macros and progress to writing Visual Basic (VB) or Perl programs to access and manipulate data inside a spreadsheet. A tutorial on these two languages is beyond my expertise and would require a couple hundred pages. I suggest checking the links listed at the end of the article if you would like to learn more about these languages. Perl requires modules available for free from CPAN (not to be confused with the cable TV channel featuring your Senators and Representatives).

Once you have access to your data in VB or Perl, the sky is the limit. Your spreadsheet software provides a great front-end tool, so you can focus on accessing and displaying your data any way you want.

The hardest

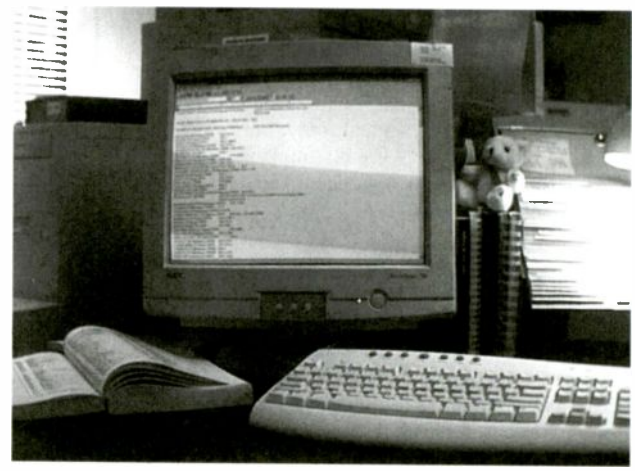
Two words: relational databases. You can invest several semesters at a local college learning about these. Governments, banks, and large corporations rely on relational databases. Do you need one to manage your radio data? Probably not. But a little knowledge never hurt anybody, right?

What makes a relational database powerful is also what makes it so difficult to design. Consider a simple non-relational database:

Freq	Agency	Chan	City	County	State
460.1	Whoville PD	1	Whoville	Interrogative	IL
460.2	Whoville PD	2	Whoville	Interrogative	IL
460.3	Whatville PD	1	Whatville	Interrogative	IL

It's simple and easy to read. But it's far from ideal. What if instead of entering the abbreviation for Illinois, you entered the actual name or if you spelled "Whoville" with only one "L"? Quickly your database becomes unreliable to someone searching it. With the above example a search on the word "Illinois" would turn up nothing, whereas the database contains three records for that state.

A relational database is a collection of tables, each with a unique key. One table would contain all agencies, another all cities, etc. The database administrator can set up the database to accept only postal abbreviations or full state names. These tables are linked together when a query is made. The above example might look like this:



Frequency Table

ID	Freq	Agency	Chan	City	County	State
1	460.1	1	1	1	1	1
2	460.2	1	2	1	1	1
3	460.3	2	1	2	1	1

Agency Table

ID	Agency
1	Whoville Police Department
2	Whatville Police Department

City Table

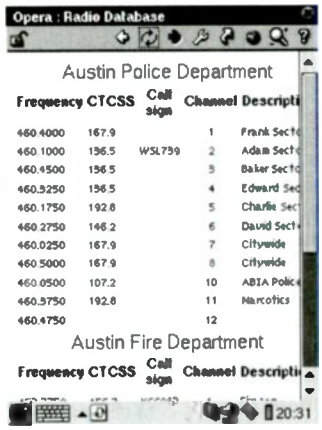
ID	City
1	Whoville
2	Whatville

County Table

ID	County
1	Interrogative
2	Accusative

State Table

ID	State
1	Illinois
2	Michigon
3	Kentucky



By setting up tables for fields such as state, county, and city, you can force the user (probably you) to select a predefined entry, thus eliminating typos and misspellings. At first glance it looks much harder to set up a database in this fashion. It really is not. Consider an agency such as the New York Police Department. It has over eighty frequencies in use. It's much easier to type "New York Police Department" once, and then reference its ID than to type those four words over eighty times. Additionally if you later entered data and typed "NYPD" or "New York PD" or "New York Police Dept." these will all appear to be unique agencies. Forcing the user to select "New York Police Department" from a pre-defined list eliminates the problem.

Microsoft Access is an example of a commercial relational database. As you might expect there is a freeware relational database called mySQL. Don't let the word freeware fool you: mySQL is used throughout government and industry. Visitors to http://www.trunkedradio.net/ will be interested to know that the site uses a mySQL database engine with a Perl front end to serve the pages.

If a Perl tutorial required a couple of hundred pages to describe, relational databases would require closer to a thousand. If you take the time to learn about them, it's definitely a skill to add to your resume. By the way, Larry Van Horn's trusty tome is contained in multiple MS Works database files.

Mobile Options

When considering computer options, do not forget personal data assistants, or PDAs. In a few short years these gadgets have gone from little more than computerized address books to full-fledged computers. I am quite embarrassed to admit that my PDA, a Sharp Zaurus, has a faster processor and more memory than my desktop PC at home.

Today the PDA market is dominated by two platforms with a third rising star:

Palm

Most people are familiar with Palm. They didn't invent the PDA, but rather made "Palm Pilot" a household name. Palm has licensed their operating system to other hardware vendors such as Handspring and Sony. The PalmOS is still the market leader in the PDA arena.

Three popular database packages for the Palm are ThinkDB, HanDBase, and Jfile. All have the ability to share data with desktop software, making it easy to take your data with you.

Microsoft

Quickly closing that gap is Microsoft's Pocket PC. Suppliers such as Hewlett-Packard and Casio produce PDAs running the Microsoft operating system. All have pocket versions of popular desktop software such as Word, Excel, and Access. While they have the look and feel of their desktop counterpart, some have been disappointed to learn that these "pocket PCs" will not run Microsoft Windows desktop applications. However Microsoft Office files can easily be read and modified on a Pocket PC device.

Linux

By now most everyone has heard of Linux, the free derivation of the Unix operating system that is popular with the server market and amongst geeks. Sharp introduced the Zaurus in early 2002. It features the Linux operating system along with a built-in keyboard. Unlike the Microsoft counterpart, the Zaurus runs true Linux. A lot of software has been ported from desktop versions of Linux to the Zaurus. The built-in keyboard is great. In fact I wrote most of this article on my Zaurus while traveling down I-75 from Atlanta to Tallahassee in April 2002. I will admit to editing and rewriting parts on my Windows PC, but most of this article was typed with my thumbs on a keyboard smaller than a business card.

Not only can the Zaurus read, create, and modify Excel, Word, and Power Point files, the fact it runs Linux means advanced packages such as mySQL and Perl can also be used. I no longer store any data whatsoever on any PC or laptop I have. Instead it's all stored on my Zaurus. I run a web server on the PDA and can easily access HTML files I create with my Perl scripts. I have mapped a Windows drive to the device so I can access files as if they were on network drive.

The Future?

Radio manufacturers have really come through for us over the past six years or so. We now have trunk following scanners, and soon will see scanners that demodulate APCO-25 digital signals. Shortwave radios have become more powerful, smaller, and cheaper. All but the least expensive radios have some sort of computer programming or control.

What else could they offer? Memory is cheap, cheap, cheap. Why are we still limited to a paltry 300 or 500 channels and forced into a fixed number of channels and banks? Radios in the future should list memory in megabytes, not channels.

Compact flash devices such as PDAs and digital cameras are all around us. Why can't we have a radio that accepts compact flash cards?

The cost of GPS receivers has fallen dramatically. Why not combine a radio with a GPS? A scanner could automatically program itself based on location.

It seems PDAs are becoming as common as a cell phone. Imagine a radio that plugs into the compact flash port of a PDA, making the radio and database a single unit. Business travelers would love to have the AM and FM broadcast bands along with the shortwave "worldband" built in to their PDAs. It wouldn't be that much more difficult to add a trunk following, digital capable scanner.

But, one step at a time: most of us are still getting accustomed to the amount of information already available to us via web browsers and CDs. Organizing it and getting it programmed into our radios is our next challenge. Once we've mastered that, perhaps we won't be overwhelmed by the next evolution in the ever-expanding world of radio communications.

Table 1: Definitions

Database: A collection of data stored in a fixed format that is indexed to allow easy retrieval.

Delimited file: A text file whose fields are separated by a common character, usually a comma or tab.

Field: A single piece of data from a record. Examples include: frequency, call sign, and city.

Record: A complete piece of information stored in a database.

Text editor: Software that allows the creation and editing of a plain text file. Special formatting such as bold, italics, underlining, colors, and tables are not allowed.

Work processor: Software that allows the creation and editing of a file. The file may contain text, graphics, and special formatting.

Table 2: Web sites

Access Tutorial:
http://www.fgcu.edu/support/office2000/access/

CPAN
http://www.cpan.org/

Excel tutorial
http://www.fgcu.edu/support/office2000/excel/

HanDBase for Palm
http://www.ddhsoftware.com/

Jfile for Palm
http://www.land-j.com/jfile.html

Mysql
http://www.mysql.com/

Perl
http://www.perl.com/

ThinkDB for Palm
http://www.thinkingbytes.com/

Visual BASIC Tutorial
http://www.vbtutor.net/vbtutor.html

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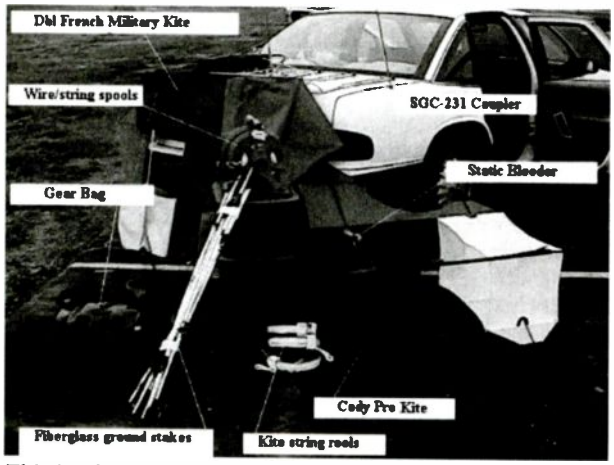
Kite Lift Antennas and More

Cast your memory back to the June issue of *MT* and you will recall that at the end of the column I wrote, "...I'll be trying out one of my operating goals: kite and balloon supported antennas." Confidently I added, "I'll tell you how it worked out." In brief, it didn't. I had no idea what I was getting into, but the effort has led me down a very narrow and fascinating avenue.

It all started back in March with a conversation I had on 17 meters with Dave Hatch, N9ZRT. He was mobile in his car in rural Wisconsin and the conversation eventually turned to his passion for flying kite-supported antennas. He described his set-up for operating all bands from 160 meters to 10 meters using a variety of kites, antennas and other devices used in the effort to launch and fly his kites. I made notes on what he said, including his web site, and filed it away for future reference.

❖ A Dose of Reality

In the weeks leading up to Field Day in June, I sauntered over to his web site to see just what was involved and quickly realized I needed months, if not years, to get up to speed on this amazing end of the hobby. Well, you can put away your dime store kites with their 10-pound cotton line. In fact, you can forget everything you've ever known about kites and what it takes to fly them. This is serious kite flying at its best. Who would have ever thought it would come to this?!



This is what it takes to launch an antenna with a kite: heavy duty kites, hundreds of feet of antenna wire and kite line. Don't forget the static bleeder! (Courtesy: Dave Hatch N9ZRT)

At Dave's *Kite Lifted Antenna Adventure Pages* (**http://www.wireservices.com/n9zrt/kite.html**) you'll get a great history lesson and find out that Marconi first used kite lifted antennas in his earliest radio experiments. You'll learn some interesting science tidbits, such as the fact that wind-generated static can build up on the line and knock you flat on your rear end and destroy your radio in the bargain if you don't bleed it off. You'll be introduced to special kites designed to do heavy lifting such as the Double French Military or the Cody Extreme, which at 7ft x 4ft may have you wondering if you don't have to pull this kite behind a NASCAR racer to launch it. In fact, it's just the opposite. Great kites like this need only an 8 mph breeze to launch and fly steadily in winds up to 25 mph. Oh yeah: don't forget the 150 pound test line!

Dave launches his kites in the wide-open spaces of Wisconsin no matter what the season, though he prefers to fly in the winter when winds tend to be steady with fewer thermals to cause erratic flight behavior by his hard working kites. There's no chance of thunderstorms in winter, either, which is the only thing that will keep him "grounded."

Dave keeps a running log of his activities at his web page as well as other links to others performing similar feats of radio wizardry. You'll also see some great pictures of his kites in action and read his tales of triumphs and near misses. Everything you need to know about this subject can be found on his FAQ page (http://www.wireservices.com/n9zrt/livewire/events/marconi/kitefaq.html). Dave also has excellent reviews of his two favorite kites at http://www.wireservices.com/n9zrt/livewire/events/marconi/2kitereview.html. Even if you never intended to launch an antenna these kites look like a lot of fun just to fly!

Keep in mind, though, that this type of serious kite flying requires extra planning and care. Running out hundreds of feet of line could cause you to come into contact with power lines, trees or other hazards. Visit his links to kite flying safety to insure your outing isn't your last. At these lengths and heights you must also be aware of aviation activity in your area. Be sure to check out his links to FAA rules regarding kite flying or tethered balloon launch to avoid interfering with nearby air traffic.

❖ Tractor Supply Antennas

The neatest thing I learned from Dave is that you can get all your home-brew antenna supplies at your nearest Tractor Supply or other farm supply store. Taking his advice, I bought a roll of 17 gauge electric fence wire 1/4 mile long ($10), a box of 25 ceramic fence post insulators (complete with double headed nails $5) and four large ceramic insulators with tree screws molded right into the insulator (50 cents each). For $20 I now have the makings of a 160 meter, full wave loop antenna!

A friend of mine also took advantage of the tip and found a 250ft roll of the wire at his local Southern States Co-op for $3. You can't beat those prices anywhere! You can find rolls up to thousands of feet in 17 or 14 gauge for a fraction of the cost you'd pay for copper stranded wire. The amazing selection of ceramic insulators aren't even found at radio supply houses. It's a large-scale antenna builder's dream. Imagine the Beverage antennas you can put up for DXing the low bands in the coming season!

❖ Lofty Heights and Crazy Ideas

Dave is a Lutheran minister near Green Bay, Wisconsin, and came to ham radio fairly late in life. He's making up for lost time by working his passion for hamming and kite flying into his daily work. In addition to his rig in the car he also has several in his church office. Here he can introduce church youngsters to the hobby and I'll bet he has no difficulty getting their attention with his kite activities.

He's also eager to experiment with other strange antennas such as what he calls the Ionic Fluid Antenna (IAF). It's a column of salt water in a plastic tube which is used as an antenna. It turns out that he's not the only one to do this and has actually had what he believes is the first IAF to IAF antenna contact on 17 meters. You can read more about this and many other antenna adventures on his web site. All of Dave's activities should teach us that once we break out of the radio routine there's a whole new world to be enjoyed.

I contacted Dave via e-mail just prior to filing this column and he wrote, "...Yesterday I had a 300 foot (total length) delta loop up100 feet

altitude. Preparing for a 160 meter full wave loop launch in the coming days. If you are on the Live-Wire list, you will be able to monitor the event (**http://www.wireservices.com/livewire.html**)." Check into his web site and see how he made out. With this kind of enthusiasm Dave Hatch has guaranteed himself a rewarding and interesting amateur radio career.

Have you tried kite or balloon supported antennas for listening or transmitting? Let me know what your results were and I'll share them with the rest.

❖ Readers Write

• As usual there were more inquiries regarding the Grove Tunerless All-Band antenna (see July 2002 MT). Briggs Longbothum, AB2NJ, had trouble locating the center connector and wanted to know what the part number was. He writes, "...I am writing up 'projects' for my radio club's education committee for our next ham radio class for grade school kids (10-12 yrs.). This antenna design would seem to be simple enough for them to build for the class's shortwave radio activities."

After some digging around in stacks of manuals and info I located the Instruction Manual for the Center Insulator which had the Telex/Hy-gain logo on it. In bold letters on the top was written Order No. 155S and underneath it says "Center Insulator CI". So, it goes by both. The product can be ordered directly from Hy-gain at 800-973-6572, cost is $15 plus shipping the web site is **http://www.hy-gain.com**. Have you built the GTAB? If so, what were your results?

Kevin Inscoe KE3VIN from Florida also had trouble locating the center insulator as well as the 4:1 balun to connect the TVM wire to the 50 ohm coax. I found the balun, made by Van Gorden Engineering, available from Amateur Electronic Supply (800-558-0411) for $15 plus shipping. You may be able to find other 4:1 baluns from other sources which should work as well.

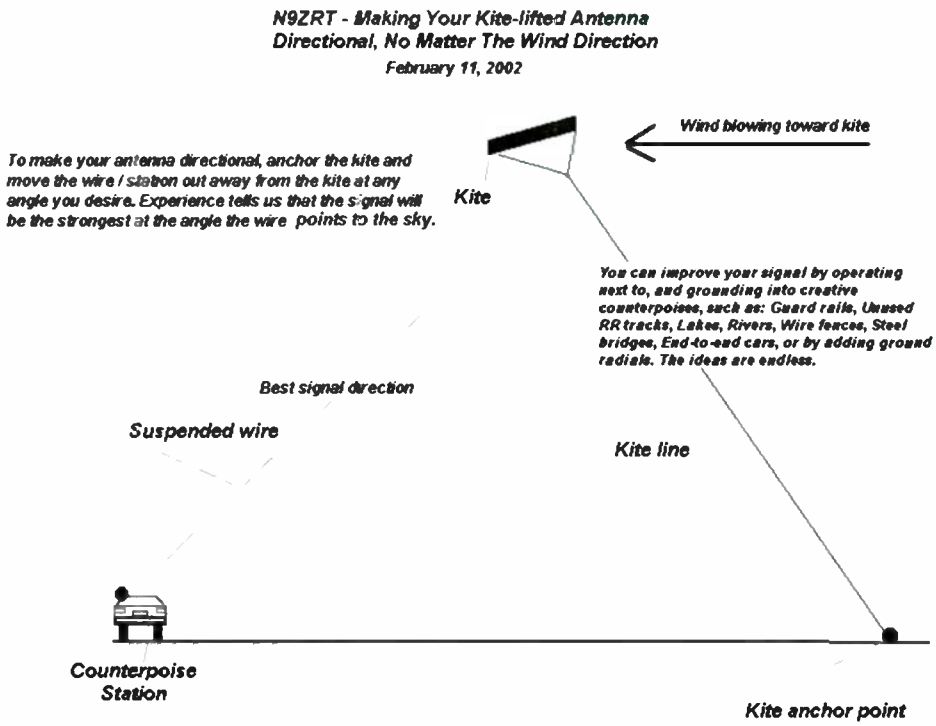
• And, finally, John Foley, Jr., from Central Massachusetts wrote concerning a *Beginner's Corner* piece from March, '01 about a small FM transmitter for whole house audio. The idea of the piece was to take a music source, say from your satellite receiver or an audio web site, and plug the audio from that into a small FM transmitter such as those used to transmit a small CD player into your car radio. The article details how to use these cheap transmitters (typically $20 from retail electronics stores) in conjunction with a power supply (such as Radio Shack's 273-1662 $13) for running off wall current. Range is typically 30-50 feet which, if set up in the center of your house, can reach most rooms.

Foley bought the Ramsey Electronics Model FM25B already built from Hobbytron (**http://www.hobbytron.com**) for $169 plus shipping. He says the same product is available in kit form directly from Ramsey for $40 less and requires 4-8 hours of soldering. I might add that this is not a good kit for beginners. You'll need a fair amount of experience wielding a soldering iron to make this an enjoyable project. If you do get in over your head you should know that Ramsey will correct your mistakes for a bench fee and return shipping. Check their web site for details.

John says, "...I am now able to receive high quality radio stations via the Internet and retransmit them to the FM radios within my house and yard. The quality is similar to FM stations in my hometown." He also says that the range is significantly greater than the small transmitters; that the frequency, set by dip switch, is drift-free; that the unit has no audible hum and excellent stereo separation.

For more information on the Ramsey FM25B check out the aforementioned site or go directly to Ramsey: **http://www.ramseyelectronics.com**.

Have you had an experience putting together a kit? E-mail your experiences to me and I'll share them with the rest of us beginners.



Flight logistics to launch a kite lifted antenna for a particular direction. (Courtesy: Dave Hatch N9ZRT)

Ready for flight! One of N9ZRT's heavy lift kites hovers over a winter Wisconsin corn field waiting to pull hundreds of feet of antenna line up. (Courtesy: Dave Hatch N9ZRT)

Ask Bob

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

Q. What kind of equipment, and what kind of methods do utilities DXers use for catching seemingly-obscure short wave communicators? (Bill Seamans, Pineville, LA)

A. Believe it or not, Steve, while images of NSA monitoring posts first come to mind, the fact is that knowledge, not equipment, is power. While there are dedicated ute DXers who do have sophisticated monitoring equipment and specialized antennas, a sizeable percentage of those who send us loggings have modest equipment.

First, a good receiver – used or new – with decent selectivity and dynamic range is of paramount importance. Secondly, one or two outdoor antennas, preferably one dipole in a north/south direction, the other in an east/west direction, with a switch to choose between them, is easy, inexpensive, and effective.

But most important is information. Successful ute DXers keep their knowledge honed via up-to-date loggings as seen in *MT*, and as posted on ute web sites like **http://www.wunclub.com.** CDROM databases like the forthcoming all-new edition of the *Grove Shortwave Frequency Directory* are excellent references as well.

And finally, successful DXers are familiar with how propagation affects signals on various bands throughout the 24 hour period, as well as seasonally, allowing them to search at the most effective times, rather than wasting their efforts and time when signal paths are unproductive.

Q. Do those radar jammers actually work? (Numerous inquiries)

A. According to speed radar expert Don Sawicki, author of the *Traffic Radar Handbook* (on his web site: **http://www.CopRadar.com**):

"The ad you included is very similar to an ad placed in a *St. Louis Post Dispatch* magazine insert February 1999. Rocky Mountain Radar had a Web site as early as 1997, to the best of my knowledge. The company has been around since 1990. In 1993 the organization R.A.D.A.R published a very critical article on Rocky Mountain Radar (and several other jammer manufacturers), and referenced several credible magazine articles and tests.

"To the best of my knowledge all currently available microwave jammers, including Rocky Mountain Radar jammers, are a total waste of money (they do not work), and are illegal. Companies like Rocky Mountain that claim their jammers are passive (not transmitters), and thus are legal, are incorrect based on FCC rulings.

"On 4 December 1997 the FCC ruled passive jammers violate federal regulations because the jammers radiate RF energy that (or is intended to) adversely affect the ability of law enforcement officials to protect public safety on the highways. The ruling was based on a passive jammer (Sprint II) made by Rocky Mountain Radar. Before this ruling, passive jammers were not considered transmitters and thus not covered by FCC regulations.

"To date only one known microwave (X/K band) jammer actually works: the Stealth/VRCD made by Stealth Technologies in Naperville, IL – reported (June 1998) to be out of business due to an FCC crackdown on radar jammer manufacturers. There is some evidence that some laser jammers may work on occasion if the laser radar beam and the jammer beam align properly."

Q. I've often seen the reference "DC to daylight" applied to certain pieces of radio equipment; what does this mean? (Jim Martin, Anchorage, Alaska)

A. The reference "DC to daylight" is a hyperbole applied to wide frequency coverage. A direct current (DC) exhibits no alternating current (reversal in direction of the current) at all; if electrons do start to alternate back and forth in a conductor like a wire, they produce an electromagnetic field. The faster they alternate, the higher the frequency: 60 Hz AC power line, then audio frequencies, then radio, then finally visible light.

Thus, a "DC to daylight" receiver, or spectrum analyzer, or wideband antenna, is simply an exaggerated reference to a piece of equipment with extra-wide frequency coverage.

Q. A recent newsgroup visitor made the statement that only products carried by Grove Enterprises, the owner and publisher of Monitoring Times, *are reviewed there; is this true?*

A. There are folks who abuse newsgroups by making irresponsible statements, some out of ignorance. Let's take a look at the issue that I'm currently reading (May).

Unless I've overlooked something, of nearly two dozen products reviewed or announced in that issue, not a single one is carried by Grove Enterprises. Of course there are some Grove ads, but they are a tiny minority compared to the number of non-Grove ads.

The policy is quite simple: If *MT* is made aware of a product that is of interest to our readers, we announce it in *MT* (space permitting), and if it's directly related to radio reception, we may do a thorough review of it. If it's a lousy product, or its application is not likely to be of interest to our readers, we don't bother to review it.

If Grove Enterprises decides to carry a product, an attempt is made to contact the manufacturer to arrange a dealership. Since reviews have a lead time, it's quite possible that a new product is available from Grove by the time the review is in print, in which case a Grove ad for that product may be in the same issue.

Q. What are the "swooshing" sounds I occasionally hear pass through my dial when I'm listening to shortwave?

A. Some are ionosondes, radio devices that regularly check frequencies for best propagation throughout the day. Others are scientific experiments checking propagation characteristics. But you could also be hearing CODAR, a coastal radar system operating in New Jersey and New England. *MT* contributor Jacques D'Avignon suggests this excellent web page as a start: **http://www.sover.net/~hackmohr/swiper.htm**.

Q. I read that a new mercury-ion clock is accurate to one femtosecond. How much improvement and impact will that have on shortwave listeners? (Donald Michael Choleva, Euclid, OH)

A. About one millionth of a billionth of a second.

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

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83 There is a new acronym out there since one year ago on 9/11. The letters WMD (Weapons of Mass Destruction) are often heard. As radio monitors, we often hear three letter acronyms: These sites contain several others that you might want to brush up on:
http://www.fema.gov/regions/ix/env/acronym.shtm
http://www.fema.gov/hazards/hurricanes/huracrnm.shtm

Want still more info on the current status of Homeland Defense? Try:
http://www.homeland-directory.com/gg.html
http://www.whitehouse.gov/deptofhomeland/
http://www.eham.net/forums/EmergencyCommunications
http://www.wmdfirstresponders.com/

84 In response to the new threats, many cities, large, and small, are organizing neighborhood response teams. They use many different names, but Community Emergency Response Teams (CERT) is common. Naturally, the common piece of equipment is radios. Their frequencies? If you're intrigued, get involved. Call your county Emergency Management Office. They are in the Government section in the front of your phone book. Here are the internet sources:
http://training.fema.gov/EMIWeb/cert/
http://www.citizencorps.gov/cert.html
http://www.lafd.org/cert.htm

85 OK, so perhaps you are ahead me and have already joined a community response group. No matter what the group's name, you need to look and act professional. Here is a new source for tactical radio vests: http://cops911.com/amoteurRadiovest.asp (See photo)

86 Of course we still face all the usual potential disasters from Mother Nature. You can stay informed with technology. Check out the NOAA weather radios by Oregon Scientific: http://osi.weathertools.com/noaa/thumbnails.html. I have the WRS 101 from Lee Electronics **http://www.leeselect.com/**. This rocks! I love it! Here are some terrific web pages for real time monitoring and alerts from earthquakes, volcanoes, tsunamis, etc.
http://neic.usgs.gov/neis/bulletin/bulletin.html
http://volcanoes.usgs.gov/main.html
http://www.hpc.ncep.noaa.gov/nationalfloodoutlook/
http://wcatwc.arh.noaa.gov
http://wwwneic.cr.usgs.gov/
http://www.geophys.washington.edu/tsunami/general/warning/warning.html#overview

Sorry about the long URLs. If you are lucky enough to get *MT* in the electronic format, you can just click on it for instant gratification.

87 There is a new Wal-Mart in my town. As I perused the store, I noticed some FRS carrying cases that would fit some of my smaller radios. The camera shop also sports a variety of bags easily adapted for scanner carrying. Don't forget the fisherman vests! They have pockets for extra batteries and all our radio needs. The big winner? Metal sixteen inch Pizza Pans for $3.28. Makes a perfect base/ground for portable or indoor magmount antennas. I bought three at that price!

88 Do you own one of the newer, sophisticated scanner/receivers with an operating manual over 40 pages? You can make yourself a "cheat sheet." I made my own for the Yaesu VX-7R, VX-120 and VR-500. Get the manual, and write down the obvious steps like writing to a memory channel. How do you scan in VFO, or memory mode? Simplify the main procedures into a sentence or two. Perhaps just a phrase. Never overlook the obvious abbreviations on the keypad. I reduced the information to two pages. I then placed these two pages back to back and mounted them into one of the plastic sheet protectors available at any office supply store. I actually have three sets for each radio, one for the car, one for the radio room, and one in my "Go Bag."

89 I recently had a phone call from a reader who uses a motorized wheelchair. He uses the onboard 12-volt battery for powering his (on board) radios. I suspect that radio monitors in similar circumstances have already used this idea. But what about those in wheelchairs that are not members of the monitoring hobby? If you know someone that is wheelchair bound, why not suggest scanning/monitoring as a new hobby?

90 I decided I needed a little more punch from my two meter VHF radio. So I bought a new 7/8's wave spike. I needed a new magmount for it and found the Diamond K702M magnetic base plate. Wow! This is the new standard for magnet mounts. It is nearly seven inches across at the base, with a dimple for the coax, and a special rubber base to protect your car finish. It even has a special lip you grab for easy removal. Most ham radio dealers should stock it. Finally a mag mount base that should stay put under anything short of hurricane strength winds. However, it is not cheap: around $60.

91 September and October are usually the busiest wildland fire periods because the vegetation is really dry. Here is a new site for you west coast monitors.
http://www.norcalscan.org/fire/index.html
Some more "must see daily specials":
http://www.qsl.net/n6uru/firescopefreqs.htm
http://www.nifc.gov/fireinfo/nfn.html
http://www.scancal.org/index.html
http://www.or.blm.gov/nwcc/

92 The latest mini ham radio transceiver has hit the marketplace. Yaesu VX-7R is truly a wonder. It transmits on six meters, two meters, 222, and 440 MHz bands. It also receives from 500 kilohertz to 998.9875 MHz. A good internet resource can be found at:
http://www.icongrp.com/~sllewd/VX7Rmods.html.

With 89 preprogrammed frequencies for HF stations, SWLers should consider the new wide coverage receivers. Naturally a better antenna is advisable, although the VX-7R does come with two different antennas, one for just HF. This is a great radio.

Reflections:

As always, I sit back to review my monthly column. I could not help but notice all the references to the internet and specific websites. The internet has changed everything. Whether you are looking for a replacement battery (overcharged to death), new antenna (dog ate mine), or just information, the world wide web is amazing. These days people exchange email addresses just as they do phone numbers.

My point? Get on the internet. If you do not have a computer, you can use one at your local public library. There are still many resources for free email programs and addresses. Whether you are eight or eighty, you need to get on the net. On the flip side, I promise to get back to bright ideas you cannot find on the internet yourself. Back to the basics of just plain bright ideas.

Your ideas, and comments are always welcome. Keep listening.

Robert Wyman
robertwyman@monitoringtimes.com

Gramma in Florida

Who's Listening? Dr. Mark Levine has a long history with amateur and public safety radios, scanners, antenna systems and communication protocols...and you'll be reading about him in an upcoming issue. For this month, though, we're featuring his mother, Mrs. Eileen Levine, affectionately known to her grandkids as "Gramma-in-Florida."

"I became interested in radios when Mark received a CB for his Bar Mitzvah," Eileen Levine recalled of life in the late 1960s. "He later became an amateur radio operator, an EMT, a paramedic and a doctor. He always had radios and scanners."

For Mrs. Levine, the constant radio chatter was not a bother: "He had one in the car, one in the house and one on his hip. I got very used to it! When he would be out on a call (as an EMT and later as a Paramedic in New York City), I would listen to where the calls were happening."

The family eventually relocated to Florida and Mark continued in the paramedic field, eventually becoming an instructor for the Associate Degree paramedic program at Broward Community College in Fort Lauderdale. He later went back to school, married and opened a chiropractic office in Connecticut.

After all those years listening to Mark's exploits in New York and Florida, Mrs. Levine more recently started missing the scanner and the excitement of hearing local events. True to form, "Dr. Mark" presented her with a Radio Shack Pro-92 for her 70th birthday! With frequencies programmed for the Broward County Sheriff's Office and nearby cities of Coral Springs, Tamarac, Sunrise and Plantation, Mrs. Levine is once again "in the know" and knowledgeable of happenings in her community.

Interestingly, Mrs. Levine embraces the scanner's programmability and automation. Before her retirement, she worked for the Florida Department of Highway Safety and Motor Vehicles where she often participated in law enforcement activities and investigations. License fraud and passport violations were usually the subject of her extensive database searches for state and federal investigators.

Prior to that job, Eileen was one of the pioneer users in the computer world. Few of us remember the huge, room-sized NCR computers of old. But, Mrs. Levine remembers: she was a keypunch operator and later a programmer for the big counting machines, working at the time for the U.S. General Services Administration.

"I liked computers. My supervisors and coworkers saw that. They said, 'If she can work these machines, there's nothing she can't work,'" Eileen remembered.

Today, Mrs. Eileen Levine remains active in her community, enjoys her trunk-tracking scanner, and is regularly found at the computer of her home-office sending e-mail to her children and grandchildren. To keep the family tree straight in their minds, the grandkids declared Mark's wife's mother to be "Grandma Pond" (the name of that side of the family), and Mark's mom to be "Gramma-in-Florida." We're glad she's here, and happy she's still listening in.

❖ On-Scene Commander: Kansas

Bill Brown of Rosehill, Kansas, sends in his recent frequency loggings:

Butler County, Kansas
155.820 EMS-Fire pagers
453.225 Augusta Fire & Police
453.250 Andover Fire
453.325 Augusta Fire & Police
453.375 Burns Fire
453.650 Andover Fire
453.800 Rosehill Fire
453.950 El Dorado Fire
453.975 El Dorado Police
460.075 Butler County Sheriff
460.150 Andover Police
460.175 Butler County Command for Sheriff, Fire, and EMS
460.350 Andover Police
460.400 El Dorado Police
460.475 Rosehill Police
460.525 Butler County EMS
460.550 Leon Fire
460.575 Towanda Fire
460.600 Rosalia Fire
460.625 Benton Fire
462.950 Butler County Lifewatch

❖ Bank Number One: hands-free

While searching the web for cellphone data cables and accessories, I came across some products that rebroadcast your cellular conversations through your car's stereo speakers for hands-free use. A muting system prevents microphone feedback.

The only frequency identified was 88.3 MHz, although some products can apparently tune to any vacant channel on the FM broadcast band.

I'll let the legal minds in our readership send in their opinions regarding the legality of monitoring cellular communications (restricted under U.S. law) broadcast on the FM broadcast band (not restricted)!

❖ 900 MHz Questions

Kenneth N. Pearson of Freehold, New Jersey, asks about the value of monitoring the 900 MHz band. He wants to know if anything can be monitored as in the other bands, or is everything up there digital and trunked?

Kenneth, the 900 MHz band (U.S.) is allocated to a variety of services, just as other segments of the radio spectrum. Similarly, a variety of radio transmission modes are utilized.

The 900 MHz range includes everything from analog, digital, and spread-spectrum cordless telephones (illegal to monitor); "normal" land mobile industrial and business uses, studio-to-transmitter links used by AM and FM

broadcast radio stations, low power industrial, and scientific and medical uses. The top end of the band is reserved for aeronautical navigation uses.

To look for new loggings on this band, a complete band sweep or search is recommended. In your location of Freehold, NJ, between New York City and Philadelphia, you should have no trouble hearing a wide variety of channels. The telephones and pagers are off limits, but the land-mobile communications are easy targets.

My quick web search found some pages on the CityFreq directory, at:
http://www.cityfreq.com:81/nj/freehold/

Many of the land-mobile frequencies are part of a radio service called Specialized Mobile Radio (SMR). A great definition of the service is located on the FCC website as reproduced below:

Specialized Mobile Radio Service

The Specialized Mobile Radio (SMR) service was first established by the Commission in 1979 to provide land mobile communications on a commercial (i.e., for profit) basis. A traditional SMR system consists of one or more base station transmitters, one or more antennas, and end user radio equipment that usually consists of a mobile radio unit either provided by the end user or obtained from the SMR operator for a fee.

SMR end users may operate in either an "interconnected" mode or a "dispatch" mode. Interconnected mode interconnects mobile radio units with the public switched telephone network (PSTN). An end user may thus transmit a message with its mobile radio unit to the SMR base station. The call will then be routed to the local PSTN. This allows the mobile radio unit to function as a mobile telephone.

Dispatch mode allows two-way, over the air, voice communications between two or more mobile units (e.g., between a car and a truck) or between mobile units and fixed units (e.g., between the end user's office and a truck). Typical SMR customers using dispatch communications include construction companies with several trucks at different jobs or on the road, with a dispatch operation in a central office.

SMR systems consist of two distinct types: conventional and trunked systems. A conventional system allows an end user the use of only one channel. If someone else is already using that end user's assigned channel, the end user must wait until the channel is available. In contrast, a trunked system combines channels and contains microprocessing capabilities that automatically search for an open channel. This search capability allows more users to be served at any one time. A majority of the current SMR systems are trunked systems.

Although SMRs are primarily used for voice communications, systems are also being developed for data and facsimile services. Additionally, the development of a digital, rather than analog, SMR marketplace is allowing new features and services, such as two-way acknowledgment paging and inventory tracking, credit card authorization, automatic vehicle location, fleet management, inventory tracking, remote database access, and voicemail.

900 MHz SMR

Two distinct sets of frequencies are available for SMR operation: 800 MHz and 900 MHz. A total of approximately nineteen MHz of spectrum is available for use by SMRs, fourteen MHz in the 800 MHz band and five MHz in the 900 MHz band. The 800 MHz SMR systems operate on two 25 kHz channels paired, while the 900 MHz systems operate on two 12.5 kHz channels paired. Due to the different sizes of the channel bandwidths allocated for 800 MHz and 900 MHz systems, the radio equipment used for 800 MHz SMRs is not compatible with the equipment used for 900 MHz SMRs.

The 200 channel pairs in the 900 MHz service have been allocated in the 896-901 MHz and 935-940 MHz bands.

– Source for above text: FCC

More information about the 900 MHz band may be found on the FCC's bandplan webpage and the National Telecommunications and Information Administration radio spectrum webpage:
http://wireless.fcc.gov/auctions/data/bandplans.html
http://www.ntia.doc.gov/osmhome/nebbia.html

◆ Atlantic City, New Jersey...

Eddie Muro forwarded a Motorola Press Release that is typical of the almost-daily marketing and engineering reports being released by radio manufacturers:

"Atlantic City, N.J., went online this spring with a new Motorola, Inc. voice communications system that provides interoperability among the area's 13 casinos and city public safety agencies. More than 700 users in the city's police, fire, emergency management and beach patrol are on the new system, which also is interoperable with neighboring towns and the New Jersey State Police. It replaced the city's aging VHF/UHF system, which did not enable public safety personnel to talk directly to workers outside their agencies."

– Source for above text: Motorola, Inc.

You will see the word "interoperability" more and more over the next few years. While the word may be new to those outside of the professional communications industry, the concept is as old as radio itself: having the ability to talk to other people, on other systems, in other locations...or even the same location. We'll have more on interoperability in a future column.

❖ More from Detroit

In the June issue, George M. Kupraszewicz provided a list of Detroit's police, fire and EMS channels. This month, he follows up with transit and recreational loggings:

Detroit Department of Transportation
44.540 Maintenance
452.375 Supervisors
452.425 Dispatch
452.475 Telemetry
452.625 Dispatch
452.775 Dispatch
453.475 Transit Police
453.725 Operations
860.8625 Telemetry
860.8875 Telemetry

Suburban Mobility Authority for Regional Transportation (SMART)
43.760 Dispatch
43.780 Dispatch
860.7625 Telemetry

Additional SMART channels:
44.480
44.500
44.520
44.560
44.600
452.625
860.7875
860.8125
860.8375

Greektown Casino
462.225 Security
462.250 Valet
462.300 Misc.
462.350 Operations
462.425 Technicians

MGM Grand Detroit Casino
422.6375 Security
422.6500 Misc.
422.6875 Security
424.5250 Main Operations
424.5375 Food Service
424.6500 Misc.
424.6875 Slot Technicians
424.7625 Slot Operations
424.8250 Misc.
424.9750 Misc.

Motor City Casino
451.900 Management
452.025 Misc.
452.200 Maintenance
452.625 Security
452.675 Security
452.800 Misc.
461.325 Slots
461.875 Surveillance
462.000 Misc.
462.075 Misc.
462.200 Misc.
462.825 Misc.
463.700 Misc.
464.225 Misc.
464.575 Misc.

Possible additional channels associated with Motor City Casino:
462.325 Housekeeping
464.075 Valet

That's it for this month. In October, we'll talk about the weather, talk to Eileen's son (Dr. Mark), and talk again about your frequency lists and questions.

Scanning Canada

John David Corby, VA3KOT
johncorby@monitoringtimes.com

Flying North to the Arctic

Just three short years ago, the Canadian government consummated an agreement with the Inuit people of Canada's Arctic, to create a homeland carved out of the North West Territories. The new territory was called "Nunavut" and extended from Hudson's Bay all the way north to Canada's coast on the Arctic Ocean.

The capital of Nunavut was established on Baffin Island at a place formerly known as Frobisher Bay, but now renamed "Iqaluit." Iqaluit is located just south of the Arctic Circle (the imaginary line above which the sun never rises or sets at some point during the year). Iqaluit airport is an important hub for air travel in the entire Arctic region and a gateway to Ottawa and the rest of Canada to the south. It was three years ago, while Nunavut was still celebrating its birth, that I flew into Iqaluit myself – a truly exciting journey that I will never forget. This month *Scanning Canada* looks at the air traffic control and beacon frequencies that can be monitored at Iqaluit's airport.

◆ Monitoring Iqaluit Airport

Table 1: Air Traffic Control:

Radio – 122.2 126.7 296.2
VDF (VHF Direction Finder) – 122.2 126.7
Peripheral Station (Montreal Centre) – 134.55

Table 2: Navigation Beacons:

VOT (VHF Omnidirectional range Test facility) – 114.8
VOR (VHF Omnidirectional Range) – "YFB" – 117.4 (located at 63 44 30N; 68 28 24W)
DME (Distance Measuring Equipment) – "IFB" – 109.9 (located at 63 45 00N; 68 32 39W)
ILS (Instrument Landing System) – "ILB" - 109.9

◆ Introducing Jack Little

ScanCan receives a lot of mail from readers so I was not surprised to receive an offer of a contribution to the column from reader Jack Little. Jack told me of his interest in the City of Hamilton, Ontario, and, more particularly, of the Canadian Football League's Hamilton Tiger Cats. What floored me, when the package arrived in the mail, was that Jack is an American citizen and a resident of Toledo, Ohio. Now, some Canadians claim sovereignty over large tracts of the state of Florida and regard Interstate 75 from Detroit to the sunshine state as an international right-of-way. Hundreds of Canadian "snowbirds" travel south every winter to evade the cold weather in the Great White North.

Scanning Canada Reader Jack Little

In return, many thousands of US visitors cross the border every year from Washington, Oregon, and California to enjoy the ski resorts near Vancouver. Further east, vacationers from New York, Ohio, Michigan,and even further away come to enjoy the theatres and shopping in Toronto. Many more cross from the New England states to capture the unique French-style hospitality of Montreal and Quebec City. But Jack comes to the humble steel town of Hamilton to watch Canadian Football! Jack, you are very welcome, and *Scanning Canada* thanks you for reading the column and contributing the frequency list in the table below. Jack uses a Radio Shack Pro-2035 scanner and makes a log of all the frequencies he receives on his trips.

The City of Hamilton lies at the western end of Lake Ontario and is well known locally as a steel-making town (see Jack's logs for frequencies confirmed by *ScanCan*). Hamilton is also home to the John C. Munro International Airport and the Canadian Warplane Heritage Museum already mentioned in previous *Scanning Canada* columns. Watch out for low flying, privately owned and restored fighter jets and World War II heavy bomber aircraft. Hamilton Air Traffic Control is on 125.000 MHz.

Along the shore of Lake Ontario between the Niagara frontier and Hamilton can be found many AM broadcast transmitter sites. The lake water makes a good reflection plane for signals into the City of Toronto on the north shore of the lake. *Scanning Canada* readers can check the station identities by monitoring the harmonics of the transmitter frequencies within a kilometer or two of the towers. Wideband scanners like the versatile Icom R10 are ideal for this. Alternatively check the VHF/UHF STLs (Studio/Transmitter Links) – *Scanning Canada* will provide a frequency list in a future column.

On Jack's drive between the US border and Hamilton he would pass close by Niagara Falls. We will devote a column to Niagara Falls in the near future, but Jack has already snagged the local Niagara Parks police frequency on his journey. The Falls area is an ideal location for scooping frequencies from both sides of the international border. (There is a waterfall there as well, apparently).

A little further along the highway called the Queen Elizabeth Way (QEW) lies the Welland Canal. The Welland Canal permits huge "Great Laker" ships to bypass Niagara Falls on their journey from inland lake ports to the Atlantic. Check the VHF marine band for activity on the canal.

The following table is a sample of Jack's logs for Hamilton and surrounding areas. Keep in mind that these are actual logs, not comprehensive frequency tables. Also, some frequencies (particularly police frequencies) are subject to change or encryption.

Jack Little's Frequency Logs

Hamilton area:
OPP (Ontario Provincial Police): 141.405, 141.435, 141.495, 141.630, 142.170, 142.245, 142.365, 142.410, 142.575, 142.605, 142.665
Waterford Police: 142.740
Niagara Falls Parks Police: 142.860
Niagara Region Police: 142.545
Port Dover Police: 142.740
RCMP (Royal Canadian Mounted Police – Toronto airport): 412.0625
Taronto Police (51 division): 857.1625

Miscellaneous:
Paging – 148.270, 150.215; Taxi – 150.280, 155.925, 462.4625; Ambulance – 152.000, 155.130; Port Dover lift bridge – 156.300; Welland Canal Locks – 156.700; Marine Weather – 157.100; Dofasco Steel Works – 469.6375; Stelco Steel Works – 851.100, 851.600, 852.450; Grimsby Fire Dept. - 155.910

Trunked systems:
Hamilton Municipal: 857.0625, 857.3125, 859.6125, 860.3125, 862.0625, 862.0125,866.2875, 866.5625, 867.2875, 867.0375, 867.5375, 867.787, 868.0375
Toronto Police: 860.9825, 860.9875, 861.2125, 861.6825, 861.7125, 861.7625, 861.9625, 862.2125, 862.9625

Thanks again, Jack. Reader contributions are always welcome – send me a picture and your frequency logs; let's keep Canada in focus at *MT*! Next month *Scanning Canada* reaches its northernmost destination – Resolute in the High Arctic. Dress warmly and come back in a month. 73 de John.

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GRUNDIG		
Satellit 800	RCV 33	$499.95
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DRAKE		
R8-B	RCV 3	$1349.00
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Select-A-Tenna	ANT 21	$59.95
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Portable power supply	PWR 5	$189.95
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Audio Cable	CBL 3	$10.00
DRAKE RECEIVERS		
VHF converter + $65 installation	ACC 43	$249.00
External Speaker	SPK 2	$48.95
JRC RECEIVERS		
Wide-band converter (less cellular)	ACC 11	$349.95
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NVA-319 External Speaker	SPK 6	$210.00
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DSP1 Digital Signal Processor	ACC 1	$119.00
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Maritime Radio Turns Topsy-Turvy Down Under

On July first, the Australian phone company Telstra went out of the coastal radio business, and the Navy closed several of its transmitters used for weather and standard time broadcasts. This affected a total of nine stations, all of which had been widely-monitored utilities for many years.

The Navy stations are weather transmitters AXI and AXM in Canberra, along with the site formerly used by VNG, the time station. Closed commercial maritime stations are VIB, Brisbane; VID, Darwin; VIM, Melbourne; VIP, Perth; VIS, Sydney; and VIT, Townsville.

On June 30, VIM dropped its 24-hour distress channel radio guard with a goodbye message in upper-sideband voice (USB), at two minutes before midnight Coordinated Universal Time (UTC). As they noted, this was the end of a service dating to Marconi. In fact, the February 8, 1912, opening was actually two months before the *Titanic* sank.

All this left Australian high frequency (HF) maritime communication and weather services scrambling for new stations. Last month, we detailed USB voice and facsimile (FAX) weather schedules from new stations VMC and VMW. Those with World Wide Web access can also get these at:

http://www.bom.gov.au/marine/marine_weather_radio.shtml.

The only change from last month is that Weather West (VMW, Wiluna, West Australia) will not be using 12356 kilohertz (kHz). This is due to interference with a New Zealand station already on this channel, as shown during the testing period. The weather bureau has gone back to the Australian Communication Authority for a new 12-megahertz frequency.

◆ Australian Distress Comms

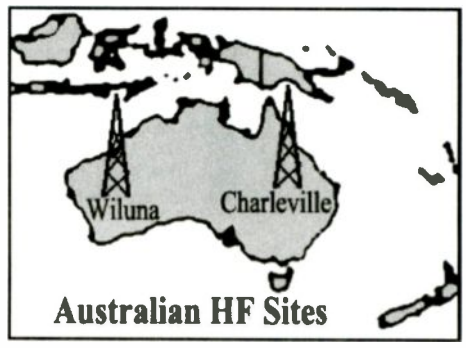
Since this is maritime radio, there's the usual alphabet soup of catchy acronyms to remember. The government-funded Australian Maritime Safety Authority (AMSA) has put into place an entirely new network for HF radio services required by the Global Maritime Distress and Safety System (GMDSS). While Telstra originally bid on the new system, the 5-year contract was ultimately won by the Australian division of TVNZ, a New Zealand company. They built new stations co-sited with the weather transmitters at Charleville and Wiluna. These use similar callsigns, VIC and VIW respectively, and the receiving sites are said to be very quiet locations.

Network control is co-located with other functions at the Australian Rescue Coordination Center (RCC Australia). This particular RCC controls the Australian SRR (Search and Rescue Region), a very large one covering at least ten per cent of the Earth's surface. It's also the headquarters for AusSAR, Australian Search And Rescue, a division of AMSA charged with providing internationally mandated Safety Of Life At Sea (SOLAS) services. International treaties require that the Commonwealth government fund SOLAS services to the large "compulsory" ships, but non-SOLAS communications with small vessels are now funded by individual states and territories.

The new network now provides Digital Selective Calling (DSC) services on the international channels of 4125, 6215, and 8291 kHz. Initial contact uses the maritime mobile service identifier (MMSI) of "005030001." The widely separated HF receiving stations "vote" on the best incoming signal and reply from the appropriate transmit site. If further communication is needed, stations will move to a working frequency and use the more familiar modes of USB voice or narrowband direct printing, probably Simplex Telex over Radio (SITOR), mode B.

Maritime Safety Information (MSI) broadcasts have gone to satellite, or to yet another new network, this one operated by the government's inter-agency Australian Maritime Group and funded by a patchwork of national and state sources depending on band and type of service. All HF broadcasts are on 8176 kHz USB, per the following schedule, all UTC:

Adelaide, 0357 / 0757; Cairns, 2357 / 1257; Darwin, 1157 / 0957; Gladstone 0857 / 1157; Hobart 0557 only; Melbourne, 0257 / 2157; Perth 0657 / 1057; Port Hedland 0457 / 0857; and Sydney 0057 / 1457.



Adelaide's broadcasts are on VNZ, a station licensed to the Royal Flying Doctor Service, and often monitored in the western United States. Perth and Port Hedland use state police transmitters. Melbourne uses VKI, at Point Lonsdale Lighthouse.

◆ ARINC Increases Arctic Coverage

Aeronautical Radio, Incorporated (ARINC) is a Maryland company providing global radio services to airlines. While aircraft on polar routes can use its digital High-Frequency Data Link (HFDL) system, they have never had reliable HF or satellite voice radio.

It's a tough path for radio waves. Few stations have the brute strength to punch through the polar and auroral absorption zones, where the ionosphere is often weak, disturbed, or nonexistent. Satellites are even worse, because at this latitude they are very low on the horizon, causing spotty coverage. The military has tried various exotic modes ranging all the way to meteor-trail burst reflection, but commercial users have been pretty much out of luck.

This should have changed in June, when a new voice station was slated to open at the same Barrow, Alaska, site used by HFDL station number 12. Barrow is near the northernmost point in the United States, well above the Arctic Circle. The sun does not rise for weeks in the winter, nor does it set for a similar period in summer. This high-powered station will allow contact up to 3000 nautical miles away, or clear across the pole into Russia.

The voice transmitter, like the HFDL, is remotely controlled from the network operating center in San Francisco, California. Actually, ARINC San Francisco is at a massive HF installation at the shared "supersite" with Globe Wireless near Dixon, CA. Dixon's an isolated little town off Interstate 80, about 65 miles northwest of San Francisco, and 17 miles past Travis Air Force Base. It has a lot of radio history, being a prime transmitting location used by several other giant HF stations in years past.

ARINC notes that HFDL's digital mode still "gets out" better than USB at these latitudes, but there are plenty of cases when the user might want to change to voice mode. In fact, such customers as United and Continental Airlines have desired such capability for company traffic or emergencies. Now they have it.

Utility World

Utility Logs

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

ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARINC	Aeronautical Radio, Inc.
ARQ	Automatic Repeat Request teleprinting system
BOM	Bureau Of Meteorology (Australia)
CAMSLANT	Communication Area Master Station, Atlantic
CW	Morse code telegraphy ("Continuous Wave")
DEA	Drug Enforcement Administration
DX	Distant Transmitter
E10	Israeli phonetic English female "numbers"
EAM	Emergency Action Message
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
FGS	Federal German Ship
HFDL	High-Frequency Data Link (air digital system)
JSTARS	Joint Surveillance Target Attack Rador System
LDOC	Long-Distance Operational Control
LSB	Lower Sideband
M22	Israeli Morse code "numbers," callsign 4XZ
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
MFSK	Multitone Frequency-Shift Keying
PR	Puerto Rico
PACTOR	Packet Teleprinting Over Radio
RSA	Republic of South Africa
RTTY	Radio Teletype
SITOR-A	Simplex Teleprinting Over Radio
UK	United Kingdom
Unid	Unidentified
US	United States
V2	Cuban Spanish female "numbers"
VOLMET	Aviation Weather broadcast

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.

2588.0 New York-New York VOLMET, flight weather in LSB at 0235. (Ron Perron-MD)

2618.5 GYA-UK Royal Navy, Northwood, with weather FAX, also on 4610 and 8040, at 2132. (Ary Boender-Netherlands)

2680.0 4XZ-Israeli Navy, Haifa, with coded CW "numbers" (M22), parallel on 2800, 4241, 4331, 5159, 8103, 10046, 12984, 14495 and 18329 (yes, all of those!) at 2023. (Boender-Netherlands)

2749.0 Stephenville-Canadian Coast Guard, with information broadcast at 0235. (Perron-MD)

3292.0 Unknown, 5-figure Spanish "numbers" in AM, probably Cuban, at 0420. (Barry Williams-AL)

3855.0 DDH3-Hamburg Meteo, Germany, weather FAX, simulcast on 7880 DDK3, at 2137. (Boender-Netherlands)

4032.0 ZSD/ZSJ-South African Navy, in MFSK, at 1745. (Bob Hall-RSA)

4244.0 DAO 4-Kiel Mail, with PACTOR markers and CW identifier, at 2250 (Day Watson-UK)

4515.0 Unknown US military with EAM at 0647. (Jeff Haverlch-TX)

5649.0 Speedbird 176-British Airways, giving position to Shanwick oceanic control, Ireland, at 0445. (Patrice Privat-France)

5696.0 Coast Guard Rescue 2114-US Coast Guard Falcon Jet, working CAMSLANT in a search at 0108. US Coast Guard Cutter *Eagle* (the sailing ship!) working CAMSLANT at 0210. (Allan Stern-FL) USCGC *Eagle*, setting up an 8-megahertz channel with CAMSLANT at 0214. Coast Guard San Juan-Greater Antilles Section, PR, working o rescue aircraft at 0540. (Rick Baker-MI)

5841.0 Panther (US DEA, Nassau, Bahamas), working Coast Guard 32C, at 0115. (Perron-MD)

6210.0 FDUK-Abnormal Israeli "numbers" callup (E10), at 1750. (Boender-Netherlands)

6697.0 Iron Man-US military, with EAM and occasional audio keying, at 0507. Electric, possible command post aircraft, with EAM simulcast on 8992, at 0554. (Haverlah-TX)

6778.5 B01-Norwegian military, with ALE soundings and command strings every 5 minutes after 1545. (Watson-UK)

6833.0 "5-X-Q"-US military, with EAM at 0633. (Jeff Haverlah-TX). Unknown station in chitchat about needing rain, at 2320. (Williams-AL)

6855.0 Cuban AM "Atencion" station (V2), two simultaneous broadcasts of different short (6-group) messages, one slightly off-frequency, at 0300. (Williams-AL)

6903.0 Unknown "numbers" station, long transmissions using live, American English, male and female voices to read multiple messages and group counts in a format a bit like the old "Non-NATO Phonetic Station," but not this station, also on 6988, lasted for hours after 0200. (Roger Huff-VA)

6905.0 Unid-CW station with fast coded messages, all beginning with "00500," at 0315. (Williams-AL)

6912.0 CIO2-Israeli intelligence (E10), long carrier before starting callup in AM at 0245. (Williams-AL)

6930.0 VLB2-Israeli intelligence (E10), long carrier and AM callup at same time as 6912 station, at 0245. (Williams-AL)

6940.5 Shadow Warrior-US military exercise, working various stations at 1626. (Haverlah-TX)

7810.0 Monteca-Venezuelan Navy, calling CDDA (Ciudad Guyana) in ALE, at 0056. Maracay, ALE call to CDDA at 0045 and 0143. MQQ, ALE call to CDDA at 2215. (Watson-UK)

7831.0 Flatware-US military, with a 22-character EAM, also 8992 and 11244, at 1815. (Haverlah-TX)

7857.0 RFVITT-French Navy, Mayotte, ARQ at 1556. (Hall-RSA)

7945.7 RFVI-French Navy, Le Port, Reunion Island, ARQ at 1530. (Hall-RSA)

8122.0 Darwin Control-Unknown Australian station working unid vessel at 0839. (Perron-MD)

8191.7 9MR-Malaysian Navy, Johor Baharu, testing in RTTY at 1553. (Hall-RSA)

8335.5 DRHM-German Navy tender FGS Werra, working DHJ 59 (Wilhelmshaven), in RTTY at 0213. (Perron-MD)

8500.0 VTH-Indian Navy, Mumbai, with encrypted RTTY traffic in 4-letter groups, at 1540. (Hall-RSA)

8503.9 NMG8-US Coast Guard, New Orleans, nice clear FAX weather chart at 0730. (Hall-RSA)

8804.0 Unid-European-accented English language female, with 5-figure phonetic groups in AM, at 0447. (Williams-AL) *[Israel? - Hugh]*

8902.0 Wingnut 58-Unknown military, at 2320. (Williams-AL)

8971.0 Blue Star-US Navy, Roosevelt Roads, PR, working aircraft "603" at 0142. (Perron-MD)

8983.0 Coast Guard Rescue 2113-US Coast Guard Falcon Jet, reporting visual contact with persons on a wooden raft to CAMSLANT Chesapeake, VA, at 2017. (Stern-FL) Search 2624 working CAMSLANT at 2110. (Williams-AL)

8992.0 Renegade Ops-Possibly US Army, radio check with Andrews AFB, at 0137. (Perron-MD) Mud Duck-US military, with a 28-character EAM, simulcast on 11244, at 1855z and 1925. (Haverlah-TX)

9013.0 Argentina 136-Aerolineas flight working an unknown ground station in Spanish, probably a LDOC, at 0008. (Perron-MD)

9016.0 Ring Bowl-US military, with EAM simulcast on 6697, 8992, and 11244, at 0404. (Haverlah-TX)

9057.0 Mail Bag-US military, with EAM, also 6697, 8992, and 11244, at 0315. (Haverlah-TX)

9110.0 NMF-US Coast Guard, Boston, MA, with Atlantic weather FAX (remote from CAMSLANT), also on 12750, at 2123. (Boender-Netherlands)

9259.0 AL11J-Algerian Ministry of Information, calling FK11J in ALE, at 1526. (Watson-UK) PCBOOU-Gabon Railway, Port Bouet, ALE sounding at 1730. (Hall-RSA)

9360.0 OXT-Copenhagen Meteo, Denmark, with a FAX ice chart at 1249. (Watson-UK)

10100.8 DDH-Hamburg Meteo, Germany, with RTTY ship weather observations, at 0600. (Privat-France) DDK2-Hamburg Meteo, RTTY markers at 1725 (Hall-RSA)

10192.6 DRHK-German Navy tender FGS *Mosel*, working DHJ 59 in English, at 0113. DRAQ-Frigate FGS *Bremen*, English with DHJ 59 at 0110. (Perron-MD)

10204.0 DRAF-German Navy destroyer FGS *Molders*, working DHJ 58 (Glucksburg), in German and English, at 0147. (Perron-MD)

10536.0 CFH-Canadian Forces, Halifax, NS, weather in RTTY at 0730. (Hall-RSA)

10555.0 VMW-Australian BOM, Wiluna, testing at 1556, then the first FAX chart from the new station at 0750. VMC-BOM, Charleville, with FAX test charts every 15 minutes from 1800. (Watson-UK)

11090.0 KVM70-Honolulu Meteo, with nice clear FAX chart at 1600. (Hall-RSA)

11168.6 KMN-Unknown US government, sounding in ALE at 0012 and 0340. KMN94, possibly same agency, sounding approximately every half hour from 0042. (Watson-UK)

11175.0 Soda 91-US military, ops-normal traffic for Offutt AFB, NE, at 0045. (Haverlah-TX) Unid-loud, dead carrier on-channel, reported to the Andrews Global operator by an aircraft, at 1346 until 1418. (Ken Maltz-NY)

11181.0 Iron Man-US military, with a 28-character EAM, simulcast on 6697, 8992, and 11244. (Haverlah-TX)

11184.0 LH872-Lufthansa Airlines, working ARINC HFDL ground station 03 (Reykjavik, Iceland), at 2316. SV7595-Aeroflot, HFDL position for 03 at 2317. (Watson-UK)

11186.0 Dragon Claw 804-US aircraft, also identifying as MN 804, calling Keep Track (unknown surveillance center), then working aircraft MN 806, at 0238. (Perron-MD)

11220.0 Yelnij 83-Unknown Russian-speaking male, calling Popka-59, went to 10370 at 0144. (Perron-MD)

11226.0 JDG-US Air Force, Diego Garcia, and MCC, McClellan/West Coast, sounding in ALE at the same time, at 1347. GUA, Guam, and HAW, Ascension, also sounding at the same time, at 1456. (Hall-RSA)

11235.0 443-Probable Spanish Air Force aircraft, working a ground station in Spanish, at 2307. (Perron-MD)

11244.0 Reaffirm-US military, Skymaster exercise traffic with Como 10, also using 8992, at 0335. (Haverlah-TX)

11396.0 New York Radio-Oceanic air route control, handing off an aircraft to approach on 132.15 megahertz, at 1950. (Harold Frodge-MI)

11425.0 ZUP-Unknown Romanian embassy, calling CENTR6, Bucharest, in ALE at 1439. (Watson-UK)

11642.0 HSP-UK military or diplomatic, Hanslope Park, sounding in ALE, at 0935. (Watson-UK)

12178.0 DREU-German Navy mine hunter FGS *Sulzbach-Rosenberg*, working DHJ 59 (Wilhelmshaven), in English at 0050. (Perron-MD)

12212.3 PWX33-Brazilian Navy, Brasilia, sending grid squares, then "Touros for Windows 2.0," then 6-letter groups, all in FEC at 1345. (Hall-RSA) *["Bulls for Windows?" Now, that's weird. -Hugh]*

12789.9 NMG-US Coast Guard, New Orleans, with tropical weather FAX at 0620. (Watson-UK)

12856.7 6WW-French Navy, Dakar, Senegal, testing in RTTY at 1629. (Hall-RSA)

12983.0 4XZ-Israeli Navy, Haifa, with CW markers and then 5-figure code groups (M22), at 1632. (Hall-RSA)

13116.0 DRAK-German Navy frigate FGS *Mecklenburg*, working Australian Navy Canberra Control, at 1039. (Perron-MD)

13155.0 Skate Key-US military, with a 28-character EAM, also on 8992, 9016, and 11244, at 0405. (Haverlah-TX)

13357.0 Dakar-Oceanic air route control, Senegal, working aircraft Springbok 201, KLM 6840, and Orange 594, at 2238. (Perron-MD)

13886.3 "Moscow-13" Unknown Russian Meteo, with very clear FAX weather charts at 1623. (Hall-RSA)

13900.0 BMF-Taipei Meteo, Taiwan, with a Chinese FAX fishing chart at 2059. (Boender-Netherlands)

13927.0 Razor 26-US Air Force E-8 JSTARS, scheduling tanker Topcat 02 in a patch to MacGuire AFB, at 1508. (Stern-FL)

14360.0 BGD-Slovakian embassy, Baghdad, Iraq, sounding in ALE at 0810. (Watson-UK)

14550.0 PAR-Rockwell Collins network, Paris, France, sounding in ALE at 1339. (Watson-UK)

14556.0 RIW-Russian Navy, Moscow, with CW message in 5-figure groups, at 0831. (Hall-RSA)

14575.0 RFGW-French MFA, Paris, with encrypted FEC traffic for Bucharest, Romania, at 1423. (Hall-RSA)

14689.0 CENTR6-Romanian MFA, Bucharest, working ZOW in ALE and data bursts, at 1518. (Watson-UK)

14848.0 BASE4-Probably Turkish military, calling BASE9 in ALE, at 0102. (Privat-France)

14867.7 Kdakrfr-Egyptian MFA, Cairo, working KKXU, Harare, in Arabic ARQ at 1600. (Hall-RSA)

15600.0 CDDA-Venezuelan Navy, calling Guasdualito in ALE at 1951. (Watson-UK)

15867.0 43-Probable US military or government, working Ping Pong (US Customs Surveillance Center, TX), clear and secure voice at 2155. (Perron-MD)

16256.7 Kdlisf- Egyptian MFA, Cairo, long ARQ message in Arabic to unknown station at 1544. Kdzywr, Cairo, long Arabic ARQ message to 16 embassies, at 1623. (Hall-RSA)

16260.0 P6Z-French MFA, Paris, calling H6L, Algiers, in FEC at 1633. (Hall-RSA)

16621.5 Unid-Possible Bulgarian oil rig, CW personal messages in Russian, at 1732. (Hall-RSA)

16710.5 UAUA-Russian vessel *Valery Dzhaparidze*, with ARQ traffic for UIW, Kaliningrad, at 1315. (Privat-France)

16716.0 UBLA-Russian vessel *Mekhanik Slauta*, working UFN, Novorossiysk, in ARQ at 1700. (Privat-France)

17148.5 URL-Sevastopol Radio, Russia, CW traffic list at 1704. (Hall-RSA)

17314.0 SPO-Szczecin Radio, Poland, news in Polish voice at 2034. (Privat-France)

17415.0 S94-Swedish embassy, Guatemala City, sounding in ALE at 1327. S31, Algiers, sounding at 1504. S84, Washington, DC, sounding at 1605. (Watson-UK)

17430.0 9VF-Kyodo News Agency, Singapore, Japanese newspaper FAX at 2010. (Privat-France)

17967.0 AY2017-Finnair aircraft OHLBU, logging on in HFDL and giving position, at 1523. (Watson-UK)

18003.0 JNR-US Air Force, PR, sending "ouryr msg we like beer thanx," in ALE at 1445. (Watson-UK)

18060.0 VMW-Australian BOM, Wiluna, testing in FAX, faded at 0732. VMC-BOM, Charleville, FAX test and weather charts, weak at 2309. (Watson-UK)

18220.0 JMH5-Tokyo Meteo. Japan, with weather FAX at 2103. (Boender-Netherlands)

18594.0 CS5-US Customs Service, NC, ALE sounding at 1521. CS1-Atlanta, GA, sounding at 1526. PR1-Puerto Rico, sounding at 1923. CS6-Kansas City, MO, sounding at 2152. (Watson-UK)

18945.0 S84-Swedish embassy, Washington, DC, calling S94, Guatemala, in ALE at 1718. (Watson-UK)

19762.4 CPK-Globe Wireless Digital Node, Santa Cruz, Bolivia, with Morse identifiers then Globedata/dataplex with a ship on 18787.4, at 1444. (Watson-UK)

19862.0 MGJ-UK Royal Navy, Faslane, Scotland, with RTTY channel status at 1305. (Privat-France) MGJ, RTTY channel status at 1610. (Hall-RSA)

19977.0 ASI-UK military, Ascension, ALE sounding at 0809 and 0949. (Hall-RSA)

20890.0 PR1-US Customs Service, sounding in ALE at 1540. (Watson-UK)

21949.0 08-ARINC ground station, Johannesburg, RSA, relaying an HFDL message from Air India 11 to AI 10, at 1515. (Watson-UK)

21982.0 CO0921-Continental Airlines, working ARINC station 15, Bahrain, in HFDL at 1233. (Hall-RSA)

22311.0 ELQZ5-Vessel *Frost-1*, working UIW, Kaliningrad, in ARQ at 0714. (Watson-UK)

22387.0 Unknown CW station sending "DESUO," at 1815. (Williams-AL) *[Strange, and right on an Olympia Radio maritime SITOR frequency. -Hugh]*

22887.0 V5G-Romanian MFA, Bucharest, with encrypted FEC traffic at 0840. (Hall-RSA)

23214.0 CS9-US Customs Service, SC, sounding in ALE at 1417. D49, sounding at 1422. PR1, Puerto Rico, sounding at 1447. (Watson-UK)

23523.0 JMH6-Tokyo Meteo, Japan, clear FAX satellite picture at 0723. (Hall-RSA)

Utility World

Digital Digest

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Colombian Phone Patches

This month we cover a mixed bag of interesting ALE-related things around the shortwave utility bands.

❖ Colombian Phone Patches

Many of you are familiar with the ongoing situation in and around the southern areas of Colombia. In short, an ever-confusing mix of left-wing and right-wing paramilitaries and government forces and their supporters have been clashing in and around the "safe haven" that was granted to the FARC rebels in 1998. Perhaps what is not so well known is that you can sometimes hear communications from the respective "sides" in the conflict on HF.

About a year ago, alerted by the ALE that triggered the conversations, we caught what was clearly Colombian phone patch traffic on a number of frequencies. It wasn't until recently that we were able to confirm this, because of the usual problems of tracking down the pair of frequencies that make up both sides of a full duplex link that is required to make telephone-style conversations possible over radio.

Here's what happens with the Colombian system, which is probably composed of Motorola equipment which typically makes use of four-digit ALE identifiers:

- Person making the outbound call picks up the handset on their radio
- The radio uses ALE to establish a connection to the remote end
- The radio at the remote end acknowledges the call with ALE
- The person dials the telephone number
- The radio sends "DIAL" followed by the telephone number as AMD data to the remote end
- The remote radio dials the number and makes the phone connection
- The people converse normally until they finish
- The remote end sends ALE to close the link down

Here are the (USB) frequencies heard so far.

Frequencies:
10142.0 paired with ?
10706.0 paired with ?
11426.7 paired with ?
16037.5 paired with 16278.0 kHz
ALE Identifiers:
1900, 1901, 1500, 1505, 1601, 1700, 1705, 1706, 1709, 1906

Most of this traffic has been heard at the weekend and usually consists of calls to family back home in the north of the country. We've also heard calls to headquarters in Barranquilla which probably indicates that this network is operated by the Colombian Army. Let us know if you manage to find any of the missing frequency pairs – they are usually not too far away (perhaps 500 kHz to 1 MHz) from each other.

❖ The Mysterious "055" Network

Once in a while there is a network that simply won't yield any secrets. The "055" network – named after the network control identifier that appears on every frequency – is one such network. All anyone has ever recorded are regular exchanges of ALE without any triggering of modems, voice or any other traffic. Maybe not so unusual, one might think, but then this network is *big* by all present ALE network standards, as one look at the frequency list shows:

Frequencies:
5395, 8592, 8972, 9070, 10238, 10618, 10619, 10627, 10821, 11466 11475, 13442, 14422, 14731, 14913, 15687, 17198, 18336, 19043, 19309 19554, 20107, 20438, 22016, 22131, 22571, 22769, 22771, 23428, 25571 kHz (USB)
Identifiers:
055, 172, 445, 586

Take a listen. Perhaps you will hear the telltale traffic that reveals the origins of this network. Our best guess so far is that it comes from the Far East or South East Asia.

❖ New US Coast Guard ALE Network

A number of monitors reported the arrival of a new USCG network with its origins at the agency's Cleveland, OH, district HQ. A number of cutters have been heard on the network and encrypted data is often sent using the MIL-STD-188-110A PSK modems. The data speed is fixed at 1200bd. Here are the frequencies and identifiers to watch out for:

Frequencies:
5423.9, 7629.1, 8126.4, 9278.5, 11199, 13432.6kHz (USB)
Identifiers:
CGD9 Cleveland, OH (CG District 9)
NRUU Cutter "Neah Bay"
NRLX Cutter "Katmai Bay"
NRLY Cutter "Bristol Bay"

❖ New Clothes for CIA/State Dept Network?

Another new ALE network heard recently for the first time has been reported by some monitors as a possible replacement for the (in)famous network of CW stations operated by the US CIA.

Up until the early- to mid-1990s the stations KKN50 (Warrenton Training Center, VA, USA), KWH50 (RAF Croughton, England) and others (allegedly) in Liberia, Greece, and the Philippines could be heard on a number of frequencies with either beacon transmissions or occasional five figure group messages.

Now a new ALE network has been linked with this old network, including:

KMN93 Springfield, VA
KMN94 Fort Lauderdale, FL
KMN95 Warrenton, VA
KRC81 Unidentified
KWG41 Washington, DC
KWL90 Unidentified
KWL93 Unidentified

Frequencies:
4553.6, 6902.6, 11168.6, 11217, 13503.6, 18944.6, 20810.6 kHz (USB)

Time may tell, but we believe it more likely that this network is an offshoot of the National Telecommunications Alliance or perhaps connected to the Bush government's new Department of Homeland Security.

❖ German Police/MOI ALE Network

Audible at considerable strengths here in the US on some nighttime frequencies is a new network operated by the German Ministry of the Interior (MOI). At least one station has been confirmed as transmitting from atop the buildings of the Bavarian Federal Police HQ in Munich and uses Rohde & Schwarz equipment. The traffic is mostly ALE link checks and very occasional modem bursts.

Frequencies:
3850, 4537.5, 4879.5, 5022.5, 5258, 6890, 7597, 8132, 10217.5, 10272.5 kHz (USB)
Identifiers:
Berlin, Muenchen

❖ Another New OTHR

Regular readers will be familiar with recent developments in Over The Horizon Radar (OTHR) systems covered this column – the French Nostradamus system, SUPERDARN and others. Over the period of a week in June this year we heard yet another OTHR. Extending over a 30 kHz wide swathe of spectrum centered on approximately 14500 kHz this OTHR shows a distinctive pulse repetition frequency of 31.25 Hz.

That's it for this month. See you next month.

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Coconut-Powered Bougainville Heard in North America

Rebel leader Francis Ona's clandestine station, R. Free Bougainville had been off the air for four years, but came back in June during the Papua New Guinea elections amid renewed tensions. His supporters control what they call their Me'ekamui nation area, reports the PNG *Post-Courier* via E. Baxendale, UK, in *DX Listening Digest.*

Johno Wright, Australian Radio DX Club, recommended listening to 3850 at 1030 and recalls they ran the station on coconut oil. Anker Petersen, DSWCI *DX Window* adds that RFB was last heard by DXers in 1998 around 3850 on LSB at *1000-1030*. It verified by QSL.

Sam Voron of NSW, who set up the original station, filled in details to Hans Johnson of *Cumbre DX*: now the name is Radio Independent Makumui (RIM) [and the spelling varies], using Radio Free Bougainville's equipment, reactivated on June 12th. RIM operates from the self-declared Republic of Mekamui, where Francis Ona is the President of the Mekamui National Congress (MNC). The MNC fears that the PNG elections are a way for the PNG government to reëstablish control over central Bougainville. Hence the reactivation of the radio station and the declaration of the "No Go Zone" by the Mekamui Defense Force. Mekamui means "holy land" in the local language. RIM is using 3850 kHz AM mode with about 80 watts, on the air at 0845-1100: 0845-0900 music, then programs in English, pidgin, and vernaculars 0900-1100. RIM operates from the Panguna copper mine site in Bougainville. There had been no PNG government reaction via radio so far, such as jamming or the setting up of a radio service to operate around RIM's frequency.

Then DXers all over went looking for it: in Australia, Craig Seager reported to ARDXC: 3850, R. Independent Makumui, good at 1020 with PNG pops, ID. In full AM, several IDs 1105, off abruptly 1112. Much stronger than when previously heard a couple of years back and now armchair level from home most evenings, noise notwithstanding. (So that raises the question whether it is really much more than 80 watts now.) In Victoria, BC, Walt Salmaniw found 3850 from 1028, peaking about 1045.

AFGHANISTAN [non] R. Afghanistan's expanded schedule was only temporary for the Loya Jerga conclave; then reverted to 0130-0327 on 15240 via UAE, clashing with Australia; and 1330-1627 on 18940 via [via Kvitsøy, Norway] (Ivo and Angel!, Observer, Bulgaria) 0130 moved to 15485

ALASKA KNLS puts in a surprisingly good signal during 1300 English hour to EAs on 11565, completely clear of QRM. **http://www.knls.org** has a nice virtual tour. This is due west, 270 degrees, mostly over ocean, somewhat east of Tokyo and Manila; so directly off the back would be 90 degrees, along this great circle: Bismarck – Des Moines – St. Louis – not far from Nashville, HQ of KNLS, not a coincidence? – Ft. Pierce. KNLS' tactic is to make evangelism as brief and palatable as possible, in a magazine format mixing short secular features, great music from the big band era (public domain?), with pro-Christian entreaties. At 1347:30 came what we were waiting for, *DX Tips for Beginners* with Carl Mann, lasting about 2:30. This was something technical; the 'tips' never deal with DX or station news, I think. This segment doesn't make it to DX program listings, since time is unpredictable within the hour, altho it may appear almost every day. Earlier, a feature on English usage dealt with "The Good, the Bad, and the Ugly" (Glenn Hauser, OK)

ARGENTINA On 10015-LSB, LR9 R. América, B.A. at 1830, with *Entretiempo* interview show; not there at 1900 (Horacio Nigro, Uruguay, *radioescutas*)

Received a beautiful, and huge certificate from R. Baluarte, 6215 in less than 30 days. Also sent small QSL card with full data. Signed by Hugo Eidinger, Director. Slogan is "La Voz de las Tres Fronteras de América". Certificate bears station seal with verification date. Address used: Casilla de Correos 45, 3370 Puerto Iguazú, Provincia de Misiones, Argentina (Arnaldo Slaen, Argentina, *Conexión Digital*)

BHUTAN BBS, 6035, full data QSL card via P-mail with personal letter for the delay in reply. V/S: Dorji Wangchuk, station engineer. "This card is printed on traditional Bhutanese handmade paper, made from daphne plant which is widely found in Bhutan". Card, cover letter and envelope all made from it (Swopan Chakroborty, India, *Cumbre DX*)

BOLIVIA Website in Spanish about the Aymara language spoken here and on broadcasts: **http://www.aymara.org/** (Arnaldo Slaen, Argentina, *Conexión Digital*)

BRAZIL Rádio Cacique from Sorocaba, SP, heard on 2470.9 at 2320 local sports, music, ID, jingle, much better at 0314 (Rik van Riel, Curitiba, Brazil)

Rádio Nacional, São Gabriel da Cachoeiro (AM), operotes on 3375 at 0900-0200. It's a Radiobrás station and relays its newscasts. Programming inclues lots of music, info, Indian-produced service shows aimed at Amazônia, in an area with one of the greatest concentrations of indigenous people (Pauto Roberto e Sauza, Tefé (AM), *@tividode DX*)

Sked of Rádio Educação Rural, Campo Grande (MS), on 4755 is 0700-0300.

R. Brasil, Campinas, SP, heard on 4785 after a long absence, at 1007 with ID as ZYG857 on 4785.

Per Luiz Octávio de Mella Pena, Rádio Inconfidência, Belo Horizonte (MG), is in a "growth phase." Has acquired new transmitter, heard with good signal on 6010 after 2330.

R. Gazeta, São Paulo, planned to replace religion with programming made by academics at Faculdade Casper Libero, sa it rescinded its contract with the Igreja Pentecostal Deus é Amor. The religionists did not like this and sued for breach of contract. They won the first round, so 5955, 9685 and 15325 have resumed religious programming (all: Célio Romais, *@tividade DX*)

CANADA CHNX, Halifax, which was reported last month to have quit SW, was offered a 500-watt transmitter by Larry Baysinger and the Cumbre DX radio project, but would not accept it: "no money in the budget for operating." A shame this couldn't work out. We certainly tried to show that the SWL/DXer community was very interested in paying to keep CHNX on the air (Hans Johnson, WY, *Cumbre DX*) See CUBA

CHILE Radio Parinacota, 6010 e-mail: rparinacota@latinmail.com (Gabriel Iván Barrera, *dxing.info*)

Voz Cristiana heard on 5674.7 at 0220, how come? (Tore B. Vik, Norway, *SW Bulletin*) Weak spur at night, also heard here, probably 0000-1100, the difference between 11745 and 6070 (Rik van Riel, Brazil, *hormonics yahoogroup*)

R. Esperanza, 6089.91, a regular 0956-1055 after Gene Scott signs Anguilla off at 0955 and until Japan signs on Korean at 1058. Nearly continuous music; good ID at 1039; another day, 6089.96 also exposed after R. Japan closed Korean at 1131, reading list of listeners abroad, frequent mentions of Temuco, 1144 ID (Don Nelson, OR, *DXLD*)

COLOMBIA La Voz de tu Conciencia says: Our SW will be shifting from 6065 to 6060 to avoid WYFR. The 5 kW transmitter (which used to belong to Colmundo) is now at Lomalinda. We are also planning English broadcasts. A year ago Radia Nuevo Continente in Bogotá gave us a 30 year old AM transmitter which we set up on 1530. Later we traded this for the SW transmitter from Colmundo and have been testing (Russ Stendal, La Voz de tu Conciencia, via Henrik Klemetz, *dxing.info*) It's in a rebel area. To the FARC guerrillas, Christianity is a dangerous enemy. Many churches have been closed and many more people forced to leave their homes (Klemetz, *ibid.*) Stendal soys his personal address is fine for DX reports: rms05001@neutel.com.co and p-mail is Calle 44, No. 13-69, Barrio Palermo, Bogotá, D.C. Also, website where one can contact the station is **http://www.fuerzadepaz.com/webcristo/emisora/contactenos/contactenos.htm** (Henrik Klemetz, *DX Listening Digest*) La Voz de su Conciencia comes in well on 6064.54 at 0800. Russ Stendel E-mails they would be off the air to adjust to 6060, asked for recommendotions when to run English. I suggested they wait till Argentina closes at 0300 (Brandon Jordan, TN, *hard-core-dx*) New canned ID: *"Lo Voz de tu Conciencio, 6060 kHz en onda corta. Transmitimos nuestra señol desde Lomolinda, Colombia, para el mundo. Una emisoro del Sistemo Alcarován Radio."* Programming is octually not religious, but "philosophical," not aimed ot any particular combotant factions, but to all of them (Henrik Klemetz, *DXLD*) Instead of 6060, after o couple

*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; A-02=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

weeks they came back, still on 6064.5, IDs at 0756 and 0801, but much stronger (Paul Ormandy, New Zealand, *DXLD*) Also 1000 past 1100 on 6064.57, religious format (Chuck Bolland, FL) And 1130 on 6064.5, better modulation (Rafael Rodríguez, Bogotá)

CONGO DR Radio Okapi, the radio network operated by UN Mission in the Democratic Republic of the Congo, is adding more and more cities with FM relays. In addition, a SW transmitter site is under construction in Kinshasa, with three 10 kW Marconi transmitters, due to go on air in early September. In the meantime, Radio Okapi is already operating on SW using three 100 watt transmitters, on 6020, 9550, 11690 (© Radio Netherlands *Media Network*) Those who heard 9550 overriding Habana would dispute the 100-watt rating! (gh)

[non] RTVC via Moyabi, Gabon, 9770 at 1735-1832, in French, African light songs, timesignal, news 1800, weather 1825, more music (Carlos Gonçalves, Portugal, *BC-DX*) 1600-1900 on 9770 is definitely RTNC Kinshasa relay, presumably via Gabon, always in French (Vashek Korinek, RSA, *BC-DX*) 9770, R-TV Congolaise, Kinshasa via Moyabi, Gabon heard at *1600-1900*, French/Vernacular announcements, African light songs, timesignal, news 1800, weather 1825 (Carlos Gonçalves, Portugal and Noel Green, England, DSWCI *DX Window*)

COSTA RICA RFPI planned to move the antenna for 7445 from the 100 foot tower over to the 200 foot tower and switch from USB to AM; 21815-USB had a tube failure so is off the air; needs new tube costing about $500, and not available in CR, to revive transmitter at 3 kW, SSB, and in next year or two, probably move to a lower frequency, such as 17 MHz range. Both 15039 and 7445 are 'twins' now operating at same hours, 2200-0800 (RFPI *Mailbag*)

You may never have heard it on the air or seen it in lists, but we finally found out that the registered callsign of Dr. Gene Scott's Cahuita facility is TIRWR. We hate to stop calling it 'TIDGS' (gh)

CUBA Arnie Coro of RHC's *DXers Unlimited* was invited to speak at the annual convention of the Radio Amateurs of Canada, in Vernon, BC, during Cuba's national holiday July 26 – and to meet Toronto-area DXers a few days before and after during stopovers. All the paperwork was supposedly taken care of, including a visa to be issued by the Canadian Embassy in Habana shortly before his heavily-booked flight. But when the time came, the visa was denied, much to the embarrassment of the organizers and Coro, who suspected a deliberate diplomatic snub. The embassy blamed it on a backlog due to World Youth Day at the same time in Toronto, but few Cubans were going to that. Coro had previously visited the US for academic and ham events without such problems (gh)

unID LA on 5064.77 at 2345-2415* mentioning Santa Clara; Cuba? (Björn Malm, Quito, Ecuador, *SW Bulletin*) Must surely be a new pirate out of mainland Cuba, Radio Cienfuegos. A friend here in Puerto Rico has been lucky enough to catch it on both 5400 and 11300. We all presume that trying to avoid Cuban Security Monitors, they change frequently from side to side (Hector (Luigi) Pérez, PR, NP4FW, via Thomas Nilsson, *DXLD*)

[non] Ten months after discontinuing its broadcasts to Cuba, the Cuban American National Foundation resumed July 24 La Voz de la Fundación via WRMI, M/W/F 1030-1130 on 9955 (Jeff White, WRMI)

ESTONIA [and non] About radio jamming by the USSR: **http://www.okupatsioon.ee/english/mailbox/radio/radio.html** (James Welsh, BDXC-UK) Long text, plus antenna diagrams, forbidden photos of transmitters (gh)

GREECE [and non] VOG's *Learn Greek*, with English responses, heard one Friday at 1207-1222, another until 1215, on 12105, 15650, 17900 and via Delano 11730 (John Babbis, MD, *DX Listening Digest*)

GUATEMALA R. Verdad, 4052.5, QSL from Edgar Amilcar Madrid, Director and Manager says they have received reports from 213 towns in 34 countries and 16 provinces of Guatemala. 1 kW transmitter has been reduced to 300 to 700 watts due to governmental limitations. Still no callsign more than two years after starting (Takeshi Sejimo, Japan, *Radio Nuevo Mundo*)

INDIA AIR Bangalore, new HS relay in Hindi and English on 9425, 500 kW: 0128-0530, 0930-1235, 1320-0042. Includes news in English at 0300 (Jose Jacob, VU2JOS, Hyderabad, India, *DX Listening Digest*) 1820 western pop music and requests, 1830 English news. Announces as The National Channel of All India Radio. 1835 Hindi? 1840 return to English, program highlights. A good S9 but side-splash (Noel Green, UK, DSWCI *DX Window*)

INDONESIA Reactivated on 4606.4, RRI Serui, at 1306, weak with Jakarta news // 4753.3 and 4925 (Don Nelson, OR, *DX Listening Digest*) 3231.89, RRI Bukittinggi reactivated in late June after 15 months, 1140-1335, fine modulation, Jakarta news on hour (Roland Schulze, Philippines, *BC-DX*)

IRAN Another edition of VIRI's traditional contest is being promoted, *Fadjir VII*. This year the theme is the Palestinian Intifada. Just send an essay on the subject, deadline December 31. Valuable prizes are promised (Paulo Roberto e Souza, Tefé, Amazonas, *@tividade DX*)

IRAQ [non] Clandestine V. of Iraqi People, supposedly via Sa'udi Arabia, for years varied around 9568, but came back in July on 9570.0; its other frequency remained off, 9563.0 at 2000-2100 (Vlad Titarev, Ukraine, *BC-DX*) 9570.0 via Jeddah at 1715-1725, ex-9568.5 (Anker Petersen, Denmark, *Clandestine Radio Watch*)

ISRAEL Received personally written letter from Kol Israel, saying there would be no cuts, transmissions will continue "indefinitely." (Jon Kempster, BBC, UK, *DX Listening Digest*) Changes July 21 included English at 1600-1630 retimed to 1630-1645 on 15615, 17545; one hour later from about October 10 (Moshe Oren, Frequency manager, BEZEQ) Actual date to quit DST is again subject of debate around Yom Kippur (gh)

ITALY We had to reduce schedule as fees for broadcasting from Italy have gotten out of hand. These high fees also force out the AWR operation in Forlì (Alfredo Controneo, IRRS to Hans Johnson, *Cumbre DX*) Sked is now: M-F 0530-0630 13840; Sat-Sun 0800-1200 13840 (Ron Norton, IRRS via *Cumbre DX*) When I looked at their website, no morning broadcast (gh)

KASHMIR [non] All India Radio and Azad Kashmir Radio had long been clashing on 4790, Azad being slightly offset causing a nasty het, but no longer, noted June 25 at 0015 and until 1710, now they are absolutely on same frequency; tech at Rawat finally fixed long standing frequency offset with a crystal drive. But it's still the old buzzy transmitter, noted at *2340 (Olle Alm, Sweden, *BC-DX*)

KOREA NORTH On 2624, Frontline Soldiers R, Channel 1, reactivated June 1, 1940-2000*, Korean, revolutionary songs, very seldom on the air; not // 3025.6, Frontline R, Channel 2, Jun 1, 1940-1956*, Korean. QSA 4 (Roland Schulze, Philippines, DSWCI *DX Window*)

KYRGYZSTAN Ibrahim Rustamov in Tajikistan rediscovered English program of Kyrgyz State Radio: 0200-0220 on 4010, part of the home service program 1 (Bernd Trutenau, Lithuania, *BC-DX*)

LAOS RNL strong at 1325 in French on 7145, 1331 into English but then little heard (Walt Salmaniw, Grayland WA DXpedition, *WORLD OF RADIO*)

LATVIA see UK [non]

LIBERIA WJIE Shortwave in Kentucky has been granted a license for FM, TV and SW stations here to counteract the onslaught of Islam. I am going there July 21 to establish V. of Liberty FM first (Doc Burkhart, WJIE newsletter) see also USA

LUXEMBOURG Broadcasting Center Europe reactivated the 500 kW Jünglinster transmitter on 6090 July 10 only for a reception test at 0600-2100 (*Observer*, Bulgaria) One-time event, for remote monitoring to evaluate coverage areas in view of Digital Radio Mondiale (Eugene Muller, Broadcasting Center Europe **http://www.bce.lu** via Jorge M. Valdés, *Conexión Digital*) Widely heard in Europe and elsewhere, but timing and interference made it difficult in the Americas (gh) 6090 was shut down at the end of 1994 (Kai Ludwig, Germany) Future will be the evaluation DRM, **http://www.drm.org** on SW. Further tests planned (Eugène Muller, Broadcasting Center Europe via Mike Terry)

MEXICO XERTA, Radio Transcontinental de América has a new website with programming in realaudio, same as on SW: **http://www.misionradio.com** (Héctor García Bojorge, DF, *Conexión Digital*) As name implies, it's now insipid gospel rock in Spanish (gh) Nominal 4810 varies widely. Maybe the strong, distorted FM on 4670 at 1029 was this (David Hodgson, TN, *Cumbre DX*)

MONGOLIA VOM moved from 12015 to 12085, heard at 1000 IS and presumed English, barely detectable (John Cobb, GA, *DX Listening Digest*) Received a letter from VOM Japanese section confirming my reception; enclosed a text in Japanese with photos of antelope and other animals – but I was surprised to find a bone enclosed with the papers, perhaps of the antelope? Wonder what this signifies (Marco Antonio Archanjo, Brasil, *radioescutas*)

NETHERLANDS On the night of the 5/6 July, a fire broke out in the high tension section of transmitter number 4 at Radio Netherlands' Flevo transmitting station. It was off the air for a couple of weeks while repairs were made, the reserve 100 kW transmitter used instead. (Andy Sennitt, Radio Netherlands *Media Network*)

NEW ZEALAND For its 1106-1305 broadcast to W Pac, Bougainville, E Timor, Asia, RNZI was on 9515 briefly, clashing with Sackville, then moved to 9850 (Wolfgang Büschel and John Figliozzi)

NIGERIA [non] Salama Radio, 1900-2000, 15250 kHz, 500 kW, studio and transmitter in UK, beamed to Nigeria. Main language is Hausa, but also broadcasts in Fulfulde and others, even more exotic. You may hear many pieces of African music. Sometimes, at 1930, Brian Edwards, of a Calvinist Church, reads his sermons. Reception very good (Vasily Gulyaev, Astrakhan, Russia, *Signal*)

PAPUA NEW GUINEA 3290, R Central, at 0943 in Pidgin English; irregular (Paul Ormandy, Oamaru, New Zealand)

R. Bougainville [3325] fell silent yet again July 17 after the provincial government's power station pulled the plug because of unpaid bills. Bougainvilleans in remote areas who rely on radio news will be missing out on new developments without their *"Maus B'long Sankamap"* (Voice of the Sunrise), which is the ID (*Post-Courier*, via E. Baxendale, UK, Don Nelson) See also lead story on opposition outlet

PARAGUAY We are Radiodifusión América (Radio América), ZP20, in Asunción. Our station ZP20 operates on 1480 with 1 kW, 24 hours. We have been constructing a new transmitter plant, near Villeta: testing 24 hours on 15185, initially only 5 watts, to a 5/8 wavelength, omni antenna, theoretical gain 8.84 dBi, vertical take-off angles 3 to 27 degrees, with regular programming of Radio América, and classical music. Tests also underway on 7300, directional 184 degrees, theoretical gain of 25 dBi, a horizontal beamwidth of 22.5 degrees, vertical take-off angles 3 to 27 degrees. Power varies from 100 watts to much more. Reception reports are most welcome, and will be verified, promptly. With best regards from Paraguay! Maiteipa! (Adán Mur, Technical Advisor, Radiodifusión América, Asunción, Paraguay, ramerica@rieder.net.py, *World Of Radio*)

PERÚ On 2413.39v, Radio Paraíso, unknown QTH. Clear IDs and lovely Peruvian folk music with super audio quality in *"Amanecer campesino"*. *"Comunicados"* can be a good way to find out the departamento of the station. One to a person living in "Santa Rosa, Cajamarca" was mentioned. Varies some kHz up/down.

5879.19, harmonic, Radio Imperio, Chiclayo, provincia de Chiclayo, departamento de Lambayeque. Had been a big mystery but now I find it is the sum of their SW and MW frequencies: 4388.96 plus 1490.23 = 5879.19 kHz! (Björn Malm, Ecuador, *SW Bulletin*)

R. San Antonio de Padua, Callalli-Caylloma-Arequipa, notified DXers by E-mail July 23 that it had been off the air for a week, following a winter storm, heavy snows, high winds, low temperatures, which were life-threatening to people in the higher elevations around Arequipa, and to the livestock they depend on who had nothing to eat. A transformer was out, leaving many people and the station without power. It was trying to get fuel from the authorities for a generator to return to the air, 3375 (via Chuck Bolland, FL)

R. Bethel, Arequipa, 5940, at 0020 broadcast an announcement in English inviting reports to Union Avenue 225, Miraflores, Arequipa, Perú, or call 051 054 220450 (Rafael O. Rodríguez R., Santa Fé de Bogotá, Colombia, *Conexión Digital*)

POLAND [and non] Radio Polonia official heard indicating that "shortwave is far from dead"; would be closing down obsolete transmitters in Poland and had reached agreement to broadcast via Julich in Germany and via Slovakia. So if you want to log them via Poland, time is running out. If you want to hear them with a clearer signal, those days are coming (Fred Waterer, ODXA) Radio Polonia is going to stop renting the SW transmitters in Leszcynka from 1 October 2002 and will instead lease airtime abroad. Transmitters in Germany and Slovakia have been taken into consideration as possible options, but no final decision has been taken (Bernd Trutenau, Lithuania, *DX Listening Digest*)

SEYCHELLES On HCJB *DXPL*, Allen Graham interviewed two representatives of FEBA, Mike Proctor from Cyprus, and Theodora Hanidis from their U.K. HQ. Most transmissions are from Seychelles with three 100-kW. Antennas: 6 curtains and 7 masts, arranged in an arc. They cover Sri Lanka, the Indian subcontinent, the Middle East and southern Africa on SW. May hove to move transmitter site due to a government land reclamation project; tests are being done to determine if FEBA can still use SW without horm to the people who will live on the reclaimed land. Updates available at **http://www.feba.org.uk** (via Marie Lamb, W9WZE site)

SLOVAKIA On 5670 at 0200, RSI in French, mix of 6190 and 5930 (Groham Powell, Wales, *Online Logbook*, via Tim Bucknall, *harmonics* yahoogroup) Terse look at upcoming week: **http://www.slovakradio.sk/rsi/ang/program.html** (Richard Cuff, *swprograms*)

SOMALILAND R. Hargeisa, 7530 USB, news in English 1920-1930 UT. Blocked before 1900 by Chinese music jammer; off at 2000 (Erich Bergmann, Germany, *BC-DX*)

TAIWAN Name of numbers station is not New Star Broadcasting Stotion but Star Star radio station, per E-mail from them (Tooru Yamashita, Japan, *Clandestine Radio Watch*) Is the confusion a translotion problem? What is the actual name in Chinese? (gh) StarStar operates at 0800-0900 on channels number 1 thru 5 in this order: 11430, 15388, 9725, 8300, 13750 (Wolfgang Büschel, *BC-DX*)

[and non] RTI map of transmitter links: **http://www.cbs.org.tw/english/images/2002_espflow.gif** (Daniel Say, BC, *DX Listening Digest*) By microwave to sites in Taiwan. Elsewhere, the first step is by undersea cable to Family Radio in Oakland; then by one satellite link to Okeechobee; by another, also including an internet link, eventually to a Merlin transmitter at Gerrards Cross, England on 3955. (Glenn Hauser, *DXLD*) It's a small town in a now rather built-up orea about 20 miles west of London. There are no masts of any significance, close to a papular private airfield. I expect it's the last "stop" before the link to the transmitting site (Paul Kennett, Chorleywood, Herts., *DXLD*)

TIBET Tibet PBS can be heard in English Mon-Sat at 1100 UT, besides 1630. The 1100 repeots at 1630. ID as China Tibet Broodcast Company and the program is "Holy Tibet." Frequencies audible are: 5240 6130 7385 and best on 9490 (Harjot Singh Brar, Punjab, *GRDXC*) 9490 at 1102-1112, fair to good signal in difficult to follow English, sounds like tourist program (Walt Salmaniw, Victoria BC, *DX Listening Digest*)

QSL from Xizang PBS, Lhasa, 6130 had 3 page handwritten letter in English from v/s: Tse Ring Deky, who soys: "Your letter brightened my day"! (Björn Fransson, Gotland, *DXLD*)

[non] Voice of Tibet in Tibetan/Chinese via Dushanbe, Almoty, Tashkent, at 1213-1300 on new 15170, 15225, 15330, ex 15655, 15660, 15670 \\ 15645, 21585 (Ivo and Angel! Observer, Bulgaria) But frequencies change from day to day, even minute to minute (gh)

U K BBC hos welcomed o £48m boost for the World Service – even though it is only two-thirds of the funding hike requested. The increose, to be spread over the next three years, will coincide with a "rigorous programme of efficiency". The extra cash – equivalent to an annual funding increase in real terms of 3.4% – will be ploughed into recently extended BBC services in the wake of September 11 and the war on terror, in Afghanistan, south Asia and the Arab world (John Plunkett, *Guardian* via Mike Terry) However, listenership has declined.

[non] The Laser Radio group is experimenting with 100 kW SW beamed into the UK and Europe, Sundays in July 1400-2200 on 5935 via Ulroka, Latvia, with actual programming storting in August (via Mike Terry, BDXC-UK) see also TAIWAN

UNITED NATIONS [non] Updated July 1 UN Radio via Merlin includes English M-F 1730-1745 on new 7150 via South Africa, 100 kW, 005 degrees (but totally blocked by Ukraine in Bulgaria); new 17570 Ascension, 250 kW, 65 degrees; and 17710 UK, 300 kW, 125 degrees (Ivo and Angell Observer, Bulgaria)

U S A VOA news director Andre de Nesnera decided to broadcast a controversial interview with Taliban leader Mulloh Mohammad Omar, despite strong pressure from the White House not to air it. Now, de Nesnera receives a "constructive dissent" award from the Americon Foreign Service Association, the labor union representing US diplomats (© Radio Netherlands *Media Network*)

FCC has approved tests of WWRB's newest antenna, 340° azimuth dual feed rhombic on: 5070, 5085, 7315, 9495, 12160, 12172, 15825, 17495, and 26800, on no defined schedule. Coverage maps at **http://www.wwrb.org** (Dave Frantz, *DX Listening Digest*) 26800?! Means 25800? Which is inside the 11m SWBC band. All the other frequencies already pioneered by other US stations, but WWRB must avoid using them when they are on: WWCR, WHRI, WINB, WBCQ. Reaching SE Asia over the pole from Tennessee will hardly be reliable (gh) Heard testing 5070 at 2245 (George S. Thurman, IL, *DXLD*)

WBCQ has a Harris MW-50 converted to SW. WWRB is authorized two MW-50C transmitters "modified for shortwave same as WBCQ." According to FCC International Bureau data file transmitter.dat (Donald Wilson, *DXLD*)

Rumor had it that WJIE approached KVOH about the possibility of using their SW transmitter, either in California, or to replace the one in Kentucky (Glenn Hauser, *DX Listening Digest*) Starting in September, we will be called 'World Prayer Broadcasting Network' (WPBN). Under this umbrella: WJIE Shortwave #1 & #2, WJIE-FM Louisville, WVHI-AM Evansville, KVOH Shortwave #1 & #2 [Los Angeles], KHBN Shortwave [Palau], Voice of Liberty FM/Shortwave, and Liberty Television [Liberia]. We are also in the process of purchasing four more AM stations that will be added to the family. See **http://www.wjiesw.com** (Doc Burkhart, WJIE Shortwave) see also LIBERIA! Not heard on 7490 for several weeks, WJIE was back in late July, again with a very weak signal, audible in the daytime at 1500 in Chicago (George Thurman, IL) And after 0500 in OK, English preaching, no ID heard (gh)

From the Colleton County Detention Center, SC, Brother Stair moved to maximum security "through no fault of the inmate" said the Colleton County Jail. The judge said he'd hold another hearing on or after July 29 on the question of release on bond. B.S. seemed to think there's a good chance those charges also will be dropped. While he was in jail, Brother Stair's radio programs appeared to be unaffected. I'm convinced that 99% of his listening audience has no idea Brother Stair is gone. As much as I dislike Stair, I have believed from the start he shouldn't have been put in jail (and certainly not max. security) on charges from disgruntled former members, which by their very nature require skepticism. As of July 9, reply from Sister Stair said he was not yet released, but the two breach of trust (financial) charges were dropped. The other two (sexuol misconduct) charges remained, altho the judge found them laughable (Robert Arthur, *DX Listening Digest*) (gh) Check out **http://rickross.com/groups/rgstair.html** Has links to several articles, plus some lovely pics. ;-) 73/ (Liz Cameron)

White supremacist leader William Pierce, whose book *The Turner Diaries* is believed to have inspired Oklahoma City bomber Timothy McVeigh, died July 23 of cancer in West Virginia. He was 68. Mark Potok, editor of the Southern Poverty Law Center's intelligence report on hate groups, said Pierce's death is a significant development because the group has no clear heir. (*Miami Herald* via John Norfolk) What about Kevin Alfred Strom? Both were involved in the SW program *American Dissident Voices* once carried on WRNO and other stations (gh) A transcript of his final *ADV* show July 20 shows the usual virulent anti-Semitism (via Joel Rubin)

[non] Family Radio started expanded relays via Merlin sites:

1400-1700 Abu Dhabi (UAE)	17800 India, English, Hindi
1900-2000 Woofferton (UK)	9590 ME, Arabic
1700-1900 Woofferton (UK)	15290 W Russia, Russian
1700-1800 Ascension	21680 CAf, English
2000-2100 Ascension	15195 C/WAf, English
1900-2100 Meyerton (RSA)	3230 SAf, English

(Merlin via WWDXC via *BC-DX*) Replacing all the relays via DTK Germany

VIETNAM 5925, Xuan Mai outlet of VOV heard 2206-2226 at fair level, news and songs (Carlos Gonçalves, Portugal, *BC-DX*)

Tran Mai Hanh, Director General of Radio Voice of Vietnam, has been fired in a purge of senior porty officials linked to a corruption scandal. Hanh is accused of having sought an early release from custody for gang leader Truong Van Cam, who was charged with murder, gambling ond fraud. VOV web site lists new Director General as Vu Van Hien (© Radio Netherlands *Media Network*)

[non] Que Huong QSL says it moinly serves the Vietnamese American in Northern California on MW 1120. SW to Vietnam tries to promote freedom and human rights. Reports welcome in English and Vietnamese. Signed Nguyen Khoi, Manager of Que Huong Radio, 2670 S. White Rd, Suite 165, Son José, CA 95148. **http://www.quehuongmedia.com/** E-mail: quehuong@quehuongmedia.com Sked via KWHR: 1300-1330 on 9930 (via John Durham, *NZ DX Times*)

R. Free Vietnom, in Vietnamese 1400-1430 M-F on 15235 changed site from Tashkent to Dushanbe, 200 kW, 125 degrees (Ivo and Angel! Observer, Bulgaria)

ZIMBABWE In early July, police raided the offices of Voice of The People, a private radio station in Harare, confiscated 133 tapes and files, after failing to find a transmitter or any other broadcasting equipment (*The Daily News*, Harore, via allofrica.com via Dave White) ? Doesn't everybody know they broadcast via Madogascar 7310 at 0330-0430? (gh) The Broadcasting Services Act 2001 bars anyone from broadcasting without a valid license. However, in legal terms, VOP is not a radio station, but a production company which hires airtime on the RN Madagascar Relay, and beams programs back into Zimbabwe on SW. A spokesperson for VOP told RN that the raid had not affected its ability to produce material, ond normal broadcasts are continuing (© Radio Netherlands *Media Network*)

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

Global Forum

Broadcast Logs

Gayle Van Horn
gaylevanhorn@monitoringtimes.com

0000 UTC on 6155
BOLIVIA: Radio Fides. Spanish. Audible // 760 AM. Ads for Joyeria El Centro, Calzados America Embotelladora Tejada to Latin ballads, & 0305-0320. Bolivians audible on subsequent checks: **Radio Juan XXII** 1039-1055, 6054.4; **Radio San Gabriel** 6085.4, 0831-0840; **Radio Santa Cruz** 0900, 6135. (Fernando Garcia, Baltimore, MD; Nicholas Eramo, Buenas Aires, ARG/*HCDX*) **Radio La Cruz del Sur** 4876.6, 1040+; **Radiodifusora Mineria** 5927, 1032-1039; **Radio Panamericana** 6105, 1052-1100. (Arnaldo L. Slaen, Buenos Aires, ARG)

0104 UTC on 6950.2 LSB
PIRATE. WANP. Old Uncle Schleckstein comments to many IDs. SIO=3=54. Subsequent pirates logged: **United Patriot Militia Radio** 6925.45 AM, 0138-0153+; **WHYP** 6925 AM, 0159-0222+. *James Brown Special* segment. Email quoted: **WHYP@partlycloudy.com**. SIO=444. Euro-**Radio Alfa Lima** 15069.65 AM, 2308-2321+. Pop tunes to ID "Alfa-Lima from the Netherlands." Best heard in quite a while. (Harold Frodge, Midland, MI)

0136 UTC on 11787
IRAQ: Radio Int'l. English service with fair copy for talk and news. (William McGuire, Cheveryl, MD) Audible 1910-1923+ with IDs at 1911 and 1921 interspersed with newscast. SIO=222, best in USB. (Frodge, MI)

0200 UTC on 3250
COSTA RICA: Radio Exterior España relay. Sign-on with news and segment Latin Jazz Great Stars from Cuba. (Garcia, MD) **University Network** 0300-0430, 6150. (Frank Hillton, Charleston, SC) **Radio Casino** 1030 on 5954. (Garcia, MD)

0230 UTC on 6175
CANADA: Voice of Vietnam relay. National and world news, followed by current affairs discussion. SIO=544. (John Vercellino, Downers Grove, IL) Audible 6175 at 0330, with report on national aid. (McGuire, MD)

0241 UTC on 11924.95
BRAZIL: Radio Bandeirantes. Nice variety show in Portuguese, with many local ads and mentions of São Paulo. Good reception, slightly better than // 9645.15. **Radio Brasil Central** 11815, 0245+. Local IDs and Braz pops. Full ID at 0258 into jingles and 0259 newscast. (Salminw, CAN/CDX)

0255 UTC on 9720
TUNISIA: RTV Tunisienne. Arabic music and talk, covered at 0330 by China. (McGuire, MD) Audible 17735, 1553 in Arabic. News. (Salmaniw, CAN/CDX)

0600 UTC on 4783
MALI: RTV Malienna. French news into Arabic music. Best on // 5995. (Garcia, MD)

0820 UTC on 4985
BRAZIL: Radio Brazil Central. Portuguese. Sports roundup report to station ID. Brazilian's audible on subsequent checks: **Radio Educadora Rural** 4755.22, 0905; **Radio Itatiaia** 5970, 0924; **Radio Rio Mar** 9695, 2207-2215; **Radiodifusora do Amazonas** 0935-0948, 4805; **Radiodifusora Acreana** 0950-1000, 4885; **Radio Cultura** 0925-0940, 3365; **Radiodifusora da Aquidauana** 0955+, 4795; **Radio Clube** 1000-1004, 3375. (Slaen, ARG) **Radio Aparecida** 9630, 2125-2145. (Frank Hillton, Charleston, SC)

0830 UTC on 6160
CANADA: CKZN-Newfoundland. *Music Almanac* segment, relayed from CFGB 89.5 FM. Morning Dr. Goose Bay promo to relay/anthem at 0858. IDed as "CBC Radio One" with world service news. (Garcia, MD) Audible 2244-2305+ with CBC Radio segment *Dispatches*, on violence in Jamaica. SIO=343, fair. (Frodge, MI) Canada's **CFVP** Calgary audible 6030, 0031+. Financial planning news and IDs. (Salmaniw, CAN/CDX)

0830 UTC on 9735
PARAGUAY: Radio Nacional. Spanish to folk music by Los Galanes. Station ID at 0846 including mention of La Hora Cooperativa at 6:30 local on 9735 and 920 AM. (Garcia, MD)

0900 UTC on 6010
MEXICO: Radio Mil. Spanish. IDs to Latin pops, PSAs to 0910. Mexico's **Radio Educacion** 6185, with Jarabe music from Zacatecas. ID to local time check and AM/SW freq quotes. (Garcia, MD)

0900 UTC on 6110
ECUADOR: HCJB. Quecha text read by Hmno Francisco. Time check at 0920 into local huaynos music. (Garcia, MD)

1015 UTC on 3905
INDONESIA: RRI-Merauke. Local languages to Indo musical program and mentians of "Merauke." (Erama, ARG/*HCDX*) **RRI_Padang** 4003, 1120-1234*. Station back after long absence. Bahasa Indo language for IDs. Relayed **RRI-Jakarta** 1200-1224 with IDs and popular music. (Ranald Schultz, Philippines/Jembatan DX)

1038 UTC on 4389.2
PERU: Radio Imperio. Spanish service for Catholic Santo Rosario. SINPO 23432. Peruvians audible on subsequent checks: **Radio La Voz del Campesino** 2350-2354, & 0200 on 6956.5; **Radio La Hora** 0212+, 4855; **Radio Cusco** 1053-1058, 6193.4 (Slaen, ARG; Garcia, MD) **Radio Santa Rosa** 6045.4, 1012-1025. (Slaen, ARG)

1549 UTC on 9490
TIBET: Tibet Peoples BS. Hoping to hear their English segment at 1630, but reception has gone from fair to good, to just a carrier when rechecking at 1623. (Salmaniw, CAN/CDX)

1850 UTC on 17755
SPAIN: Radio Exterior España. Pop music to interval signal/ID segment. News in Spanish to 1858*. Audible 2339-2356+ on 9620. (Frodge, MI)

1858 UTC on 7200
SUDAN: SNBC Omdurman. Arabic news to English news with mention of, "idhaa tul gumhuriya Sudan" and mentions of Omdurman. Sudanese music to 1902*. (Savolainen, FNL/*HCDX*)

1919 UTC on 15435
LIBYA: Radio Jamahiriya. World headlines to 1921, followed by French service. SIO=3+53. (Frodge, MI)

1949 UTC on 15160
NEW ZEALAND: Radio NZ Int'l. South Pacific news with remotes and commentary. Station ID 1959. SIO=2+53, better after 2000. (Frodge, MI) *Pacific Focus* audible 9885, 1040. (Frazer, MA)

2024 UTC on 9745
SOUTH AFRICA: AWR/Voice of Hope. Religious instrumental music to multiple local language IDs and text at 2059, 2100*. (Frodge, MI) S.A.'s **Channel Africa** 17870, 1820. (Frazer, MA) **Radio Veritas** via Meyerton 3280, 1600-1900 in English with IDs. (Savolainen, FNL/*HCDX*)

2030 UTC on 17680
CHILE: La Voz Christiana. Spanish religious segment to religious rock music. SIO=4+54+. [Frodge, MI]; audible 2030 on 21550. (Garcia, MD) Chile's **Radio Cooperativa** 0732 on 6010. (Slaen, ARG)

2152 UTC on 15345
ARGENTINA: Radio Nacional. Commentary and promos to 2200. "Radio Nacional" ID to newscast. SIO=3+53. (Frodge, MI)

2206 UTC on 13610
SYRIA: Radio Damascus. Poetry reading to 2208 ID. News to 2209 close and anthem. Station returned at 2212 with Arabic music. National anthem at 2215 to Arabic text. (Frodge, MI)

2210 UTC on 6137.8
SIERRA LEONE: Radio Unamsil. Decent carrier but very low audio. English phone-ins and music bridges. Station mentioned while taking new calls. (Savolainen, FNL/*HCDX*)

2230 UTC on 9550
CUBA: *News Making News in Cuba* segment to *Radio Habana Viewpoint*. English for SIO=543 with interferences observed. (Frodge, MI)

2325 UTC on 9875
LITHUANIA: Radio Vilnius. Presumed Russian service to English ID and programming at 2329. Commentary on Lithuania-Latvia economics. (Frodge, MI)

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*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) **Please note**: paper strips and cassette recordings will no longer be accepted. English broadcast unless otherwise noted.*

Global Forum

The QSL Report

Gayle Van Horn
gaylevanhorn@monitoringtimes.com

DX Season...are you ready?

Have you noticed radio signal conditions improving? Static levels don't appear as elevated as last July, and that could only mean one thing: DX season is here and will improve as winter approaches in the northern hemisphere.

Africa, Europe and South America are beginning to fade in earlier just prior to 0000 UTC. Asia and Indonesia are heard, too, in the tropical bands (4750-4995 and 05005-5060 kHz), beginning at twilight in the evenings, as well as anytime from 1000-1500 UTC, depending on your location. By mid November or earlier, India's subcontinent will fade in by early afternoon and the regionals of Papua New Guinea provide an early morning hour taste of regional programming.

Medium wave DXing improves for cross country signals and utility hobbyists will observe improved signals above 15 MHz.

With all this great DX, if you're a QSL collector don't forget to stock up on envelopes, souvenir postcards and preprinted address labels. Return postage usually is a must, and *MT* recommends the excellent service of Bill Plum's *DX Supplies*. Send Bill a self-addressed envelope for his worldwide postage price list and DX supplies to: 12 Glenn Road, Flemington, NJ 08822-3322.

Don't forget to contribute when your cards and letters begin to pour in. Good luck!

AMATEUR RADIO

Bora Bora, French Polynesia-FO8DX. (IOTA OC-067), 10 meters SSB. Full data color QSL card via JF1SQC. Received in 16 days for two US dollars and a nested Euro self-addressed envelope (used for reply). QSL address: Seiichiro Morikawa, 24-8-506, Tatsuno-Cho, Hiratsuka, Kanagawa, 254-0046 Japan. (Larry Van Horn, Brasstown NC)

San Felix Island-XROX (IOTA SA-13), 12 meters. Full data color folder card via N7CQQ. Received in 10 days for a self-addressed envelope. QSL address: John P. Kennon-N7CQQ, P.O. Box 31553, Laughlin, NV 89029. (DXCC # 146). (Van Horn, NC)

ARGENTINA

Radio Baluarte, 6215 kHz. Full data station card plus large color certificate and city map of Iguazu, Argentina. Station slogan noted as, *La Voz de las Tres Fronteras de America*. Station address: P.O. Box 45, 3370 Puerto Iguazu, Missiones, Argentina. (Arnaldo Slaen, Buenos Aires, Argentina)

BHUTAN

Bhutan Broadcasting Service Corp., 6035 kHz. Full data QSL card signed by Dorji Wangchuk-Chief Engineer, plus personal letter for delay in response. The QSL notes, "This card is printed on a traditional Bhutanese handmade paper from a daphne plant widely found in Burma." The letter and envelope are also of the same paper. Station address: Department of Information & Broadcasting, Ministry of Communications, P.O. Box 101, Thimphu, Kingdom of Bhutan. (Swopan Chakroborty, India/Cumbre DX via DXLD)

BONAIRE

Radio Netherlands relay, 9845 kHz. Full data QSL card, with note that listeners submitting reports should not send currency to cover return postage. Received in 25 days for an English report. Station address: P.O. Box 222, 1200 JG Hilversum, Holland. (Joe Squashic, Wake Forest, NC)

GUAM

Adventist World Radio, 11960 kHz. 30th Anniversary QSL card, signed by Niki de Vera-Manager of Listener Services, plus personal letter of thanks, station souvenirs and program guide. Received in 111 days for an English report, two US airmail stamps enclosed with printed reception report from station website. **http://www.awr.org**. QSL address: 39 Brendon St., London W1H 4HD England. (Glenn Bowman, Saline, MI)

ISRAEL

Kol Israel, 9435 kHz. Full data station logo card unsigned, plus program schedule. Received for an English report in 30 days. Station address: Israel Broadcasting Authority, P.O. Box 1082, Jerusalem 91010 Israel. Website: **http://www.israelradio.org**. (Hodhis, VA)

MEDIUM WAVE

KFSB, 1220 kHz AM. Information letter signed by *Bridge Staff*, plus party cards. Received in 96 days for an AM report. Station address: 39138 Fremont, 3rd Floor, Fremont, CA 94538. (Patrick Martin, Seaside, OR)

KNRS, 570 kHz AM. QSL verification letter signed by Patrick Gleason-Engineer, plus QSL card, key chain and program guide. Received in 356 days for an AM report. Station address: 2801 S. Decker Lake Dr., Salt Lake City, UT 84119. (Martin, OR)

KALT, Atlanta, Texas, 1610 kHz AM. Verification letter on Dominion Media Corp. letterhead, signed by S. Tyler Swain-Attorney. Confirmation was from attorney who previously represented KALT. Received in ten days for an AM follow up report. Thanks to Greg Myers (NRC) and Michael Procop (DX-midAMerica) for address tip. Station address: 12200 NW Freeway, Ste 675, Houston, TX 77092. (Patrick Griffith, Westminster, CO)

KTSM, El Paso, Texas, 690 kHz AM. Verification letter on *Clear Channel* letterhead signed by Carol Perez. Enclosures included station history sheet, stickers, program schedule, coverage map and *Talk Guide* brochure. Received in 15 days for an AM report and one US dollar. Station address: 4045 N. Mesa St., El Paso, TX 79902. (Griffith, CO).

WSJZ, Des Moines, IA, 1700 kHz AM. Full data hand written verification on station letterhead, signed by Jack O-Brian-Operations Manager. Mentioned they had call letters only a few weeks, before reverting back to KBGG. Received in 11 days for a taped report. Station address: 4143 109th Street, Urbandale, IA 50322. (Martin, OR; Griffith, CO)

PIRATE

Happy Hanukkah Radio, 6925 kHz. Full data *Hanukkan Highlights* sheet and personal note signed by P. Judah, plus the front of a Manischewitz grape matzo box. Received in 155 days for a pirate report and one US dollar. Station address: Box 293, Merlin, ON Canada N0P 1W0. This ranks as my most unusual item received from a pirate station. (Bill Wilkins, Springfield, MO)

Voice of the New World Order, 6950 kHz. Full data color computer-generated *Know Your Black Helicopters* sheet signed by Bill D. Berger, plus a *Fun Activity* sheet of games. Received in eight days for an email report to; **vonwoun@yahoo.com.** (Wilkins, MO)

POLAND

Radio Polonia, 9525 kHz. Full data QSL card signed by station Freq. Manager, plus program schedule. Received in 45 days for an English report. Station address: External Service, P.O. Box 46, PL -00-977 Warsaw, Poland. (Jeffrey Hodgis, Virginia Beach, VA)

SPAIN

Radio Exterior de Espana, 6055 kHz. Full data signed QSL card plus station stickers and pennants. Received in 117 days for an English report. Station address: c/o English Service, Apartado 156.202, E-28080 Madrid, Spain. (Squashic, NC)

John Figliozzi
johnfigliozzi@monitoringtimes.com

Yankee Doodle Shortwave II: AFRTS

The *American Forces Radio and Television Service* **http://www.afrts.osd.mil** is part of the Department of Defense (DoD), and is headquartered in Alexandria, Virginia. According to the service's web site, "The AFRTS mission is to communicate Department of Defense policies, priorities, programs, goals and initiatives. AFRTS provides stateside radio and television programming, "a touch of home," to U.S. service men and women, DoD civilians, and their families serving outside the continental United States."

❖ A Distinguished History

AFRTS has undergone a number of changes over the years. Founded during World War II, by the cold war years of the '60s, '70s and '80s, the radio service was a unitary global network fed by landline and eventually satellite to local MW and FM stations established on or near U.S. military installations, and by shortwave primarily for ships at sea and more remote land-based locations unserved by local facilities. These affiliates added their own programming to that provided by the centralized global service to create a unique local sound for each station. Over time, the global service took on the cast of a "feed" service for the local stations, complete with "3-2-1" countdowns for those taping various segments. These segments, in turn, represented the best in news, commentary, entertainment and sports play-by-play broadcasts available from the U.S. commercial radio networks of the day. They still provide this material today to AFRTS, free of charge.

Avid shortwave listeners stateside could "eavesdrop" and hear – all in one place – a cornucopia of domestic radio programming. But, it was sports broadcasts that made AFRTS a mainstay for these "civilian" listeners. One or more baseball broadcasts could be heard nightly during the spring and summer months, all called by the legendary "home team" announcers of the time. Many college and pro football matches were heard as well. It was truly an audio precursor to today's ESPN. Furthermore, reception stateside was outstanding since the shortwave broadcasts originated from transmitters in Greenville (NC), Bethany (OH), Delano and Dixon (CA).

So, it's easy to understand the disappointment felt by these listeners when AFRTS left shortwave completely in 1988. Of course, the AFRTS's decision is equally understandable given improvements in delivery technologies, and especially in light of the fact that non-military listeners stateside and overseas were, in no way, the service's target audience!

❖ Today

More recently, as U.S. domestic radio has become more complex and increasingly formatted, the AFRTS has changed with it. What is now called the *American Forces Network* (AFN) radio service has split into several targeted feeds and now includes both a primary service and 10 different, targeted, full-time radio services.

The primary service is an information news/talk/sports channel that consists of international, national and military news, commentary, talk radio, and live sports including broadcasts of over 500 live professional and collegiate sports events each year.

AFN also distributes seven music services, 24-hours per day, in these formats: Pure Gold (Oldies), Hot AC (Adult Contemporary), Z Rock (Alternative Rock), Bright AC (Adult Contemporary), Country (Today's hits plus '60s, '70s & '80s), The Touch (Urban Adult Contemporary) and Adult Rock (Classic Rock of '60s, '70s & '80s).

There are also two sports talk channels: Fox Sports Plus, which includes sports talk from Ron Barr's *Sports Byline Network* and ESPN Sports Plus including sports talk from *Sporting News Radio*.

Finally, there's a **National Public Radio** (NPR) service featuring jazz, classical music and NPR news, commentary and information.

Radio programming originates at the AFRTS Broadcast Center in California and is distributed by satellite to an overseas affiliate network of military broadcast stations, base cable TV systems, and AFN Direct-to-Home (DTH) satellite dish users.

❖ A Return to Shortwave

Within the last couple of years, shortwave radio transmissions have returned to allow AFN to reach U.S. Navy ships in areas not served by satellite. While the AFRTS internet site says that these shortwave transmitters carry only the primary information news/talk/sports channel, I have heard one or more of the other services from time to time. Refer to the web site for program schedule information, which is usually accurate, and to the accompanying box on this page for instructions on how to tune in these broadcasts yourself.

In October, we'll give a brief overview of this country's private international shortwave broadcasting activities. Until then, good listening!

Tuning In AFN...

...on shortwave, requires the use of a receiver that can receive in single sideband (SSB) mode. Normally, stations transmit in higher fidelity AM mode (meaning a signal that utilizes a carrier and two sidebands, one on the upper side of the carrier and one on the lower side). However, since AFN broadcasts on shortwave are meant to serve as feeders to ships and other remote locations not reachable via satellite or other conventional means, they are transmitted utilizing only the upper sideband, which has the advantage of requiring much less power.

Once received by their intended users, the audio signal is remixed and retransmitted locally using carrier current transmitters aboard ship and low power MW or FM transmitters on land covering very small geographical areas.

Relatively inexpensive (about US$150 or less) radios are available that can resolve ssb signals. These include the Sangean ATS-505P, the Grundig YB-400PE and the Sony ICF-7600GR. Most receivers above this price range can also resolve SSB signals. Once you've familiarized yourself with how the SSB feature works on your particular radio, you can attempt to tune in one or more of the following frequencies.

Location	Day* Freq.	Night* Freq.
Diego Garcia	12579 kHz	4319 kHz
Guam	13362 kHz	5765 kHz
Key West, FL	——12689.5 kHz**——	
Pearl Harbor, Hawaii	10320 kHz	6350 kHz
Puerto Rico	——6458.5 kHz**——	
Keflavik, Iceland	10320 kHz	6350 kHz

*at transmitting location
**These frequencies rounded down in SWG frequency listings, as we cannot show decimal points
Source: AFRTS web site, Glenn Hauser

The Key West and Puerto Rico frequencies are regularly received at my location in New York, with reception possible occasionally from Iceland. The rest, for me, serve as interesting potential DX catches. There have been occasional changes to these frequencies and the locations originating these broadcasts; you can keep up by setting your internet browser to:
http://www.myafn.net/radio/shortwave/

How to Use the Shortwave Guide

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Savings Time) 4, 5, 6, or 7 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, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

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

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

Day Codes

s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly

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

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Program Highlights

John Figliozzi

Attention Sports Fans!

Your shortwave radio is your ticket to a wide range of international sporting events. The major European soccer leagues have just started their league seasons, while the regular seasons of the rugby and Australia rules football leagues "down under" are building to climaxes leading to playoff round games and, ultimately, championship matches later in this month and early next.

European Football

Their seasons are in early stages and there are opportunities to hear the major matches of each week, more so if you have working knowledge of other languages in addition to English.

The **BBC World Service** offers live commentary of second half action of at least one key match each weekend from the English premier league and, on occasion, from the Scottish premier league. These descriptions are broadcast as part of *Sportsworld*, a three hour veritable orgy of sport that airs from 1400-1700 UT on Saturdays and 1600-1700 on Sundays.

Check in on **RTE Ireland's** half hour relays of domestic radio on weekends at 0130 UT, which are dominated by sports reports and commentary.

REE Spain, **RAI** Italy, **RDP** Portugal and **DW** Germany all carry live sport on weekends in their respective native language services and these broadcasts are dominated by coverage of their national football leagues. Try these frequencies on weekends during the afternoon hours of each respective country: **REE** - 15170, 17850, 21700; **RAI** - 17780, 21520; **RDP** - 17575, 17615, 21655, 21800; **DW** - 15515, 17730, 17875. Of course, it helps immensely if you understand Spanish, Italian, Portuguese and/or German, as these broadcasts are not in English.

Down Under

Important late season Australian Rules football and Rugby League matches are carried in their entirety on **Radio Australia's** Grandstand airing Saturdays and Sundays 0200-0700. 17580 kHz appears to propagate best to North America; 9660, 12080 and 21725 are also used.

Radio New Zealand International also offers complete coverage of important rugby matches. The schedule is changeable and posted at *http://www.rnzi.com*. Click on "Sport".

0000 UTC - 8PM E / 7PM C / 5PM P

0000	0015		Cambodia, National Radio Of	11940as				
0000	0015		Japan, Radio	6145na	13650as	17810as		
0000	0030		Egypt, Radio Cairo	9900na				
0000	0030		Mexico, Radio Mexico Intl	9705am	11770am			
0000	0030	mtwhf/vl	Solomon Islands, SIBC	5020do				
0000	0030		Sri Lanka, SLBC	4940do				
0000	0030		Thailand, Radio	9690va				
0000	0030	vl	Vanuatu, Radio	4960do	7260do			
0000	0045		India, All India Radio	9705as	9950as	11620as	13605as	
0000	0055		Spain, R Exterior Espana	15385na				
0000	0100		Anguilla, Caribbean Beacon	6090am				
0000	0100		Australia, ABC NT Alice Springs	4835do				
0000	0100		Australia, ABC NT Katherine	5025do				
0000	0100		Australia, ABC NT Tennant Crk	4910do				
0000	0100		Australia, Radio	9660pa	12080pa	15240pa	15415as	
			17580pa 17750as	17775pa	17795pa	21725as		
0000	0100	irrg/vl	Cameroon, RTV	4850do				
0000	0100		Canada, CBC Northern Service	9625do				
0000	0100		Canada, CFRX Toronto ON	6070do				
0000	0100		Canada, CFVP Calgary AB	6030do				
0000	0100		Canada, CKZN St John's NF	6160do				
0000	0100		Canada, CKZU Vancouver BC	6160do				
0000	0100		Canada, Radio Canada Intl	9640as	11895as			
0000	0100		Costa Rica, R for Peace Intl	7445va	15039va			
0000	0100		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na					
0000	0100	a/monthly	Finland, Scandv Weekend Radio	5980va	11720va			
0000	0100	m	Finland, YLE/Radio Finland	11990na	13730na			
0000	0100	m/vl	Guatemala, Radio Cultural	3300do	5955do			
0000	0100		Guyana, Voice of	3290do	5950do			
0000	0100		Malaysia, Radio	7295do				
0000	0100		Namibia, NBC	3270af	3290af			
0000	0100		Netherlands, Radio	6165na	9845na			
0000	0100		New Zealand, Radio NZ Intl	17675pa				
0000	0100		Russia, University Network	9940as				
0000	0100		Singapore, SBC Radio One	6150do				
0000	0100		UK, BBC World Service	3915as	5875as	5970as	5975am	6195va
			9410as 9825sa	11835ca	11765me	11945as	11955as	12095sa
			15280as 15310as	15360as	17615as			
0000	0100		Ukraine, R Ukraine Intl	5905as	7320as	12040as		
0000	0100		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb	
0000	0100		USA, KAIJ Dallas TX	13815va				
0000	0100		USA, KTBN Salt Lk City UT	15590na				
0000	0100		USA, KWHR Naalehu HI	17510as				
0000	0100	twhfa	USA, Voice of America	5995am	6130am	7405am	9455am	9775am
			11695am 13790am					
0000	0100		USA, WBCQ Kennebunk, ME	7415na	9335na			
0000	0100		USA, WEWN Birmingham AL	5825na	9355na	15745na		
0000	0100		USA, WHRA Greenbush ME	7580va				
0000	0100		USA, WHRI Noblesville IN	5745va	7315am			
0000	0100		USA, WINB Red Lion PA	12160am				
0000	0100		USA, WJIE Louisville KY	7490am	13595am			
0000	0100	mtwhf	USA, WRMI Miami FL	7385am				
0000	0100		USA, WRMI Miami FL	9955am				
0000	0100		USA, WRNO New Orleans LA	7355am				
0000	0100		USA, WSHB Cypress Creek SC	7535am	9430sa	15285sa		
0000	0100		USA, WTJC Newport NC	9370na				
0000	0100	sm	USA, WWBS Macon GA	11900na				
0000	0100		USA, WWCR Nashville TN	3210na	5070na	7435na		
			13845na 15685na					
0000	0100		USA, WWRB Manchester TN	3270va	5085va	6890va	9320va	
0000	0100		USA, WYFR Okeechobee FL	6085na	9505na			
0000	0100		Zambia, Christian Voice	4965af				
0000	0115	vl	Pakistan, Radio	11580as	15455as			
0003	0010		Croatia, Croatian Radio	9925sa				
0015	0100		Japan, Radio	6145na				
0030	0100		Iran, VOIRI	9610am	11970na			
0030	0100		Lithuania, R Vilnius	9855na				
0030	0100	as/vl	Solomon Islands, SIBC	5020oo				
0030	0100		Sri Lanka, SLBC	6005as	6075as	6130do	9770as	15425as
0030	0100		Thailand, Radio	15395na				
0030	0100		UAE, AWR	6035as	6055as			
0030	0100		USA, Voice of America	7215va	9770va	11760va	15185va	15290va
			17740va 17820va					
0055	0100		Italy, RAI Intl	9675na	11800na			

0100 UTC - 9PM E / 8PM C / 6PM P

0100	0115		Italy, RAI Intl	9675na	11800na			
0100	0125		Netherlands, Radio	6165na	9845na			
0100	0127		Czech Rep, Radio Prague Intl	7345na	11615na			
0100	0127		Vietnam, Voice of	6175na				
0100	0130	s	Germany, Universal Life/Santec	9435as				
0100	0130		Hungary, Radio Budapest	9560na				
0100	0130		Iran, VOIRI	9610am	11970na			
0100	0130		Slovakia, R Slovakia Intl	5930na	6190ca	9440sa		
0100	0130	twhfa	USA, Voice of America	5995am	6130am	7405am	9455am	
			13790am					
0100	0130		Uzbekistan, Radio Tashkent	5025as	7190as	9375as	9530as	
0100	0145		Germany, Deutsche Welle	6040na	9640am	11810na		
			13720am					
0100	0156		North Korea, Voice of	6195as	7140as	9345as	11735ca	
			13760ca 15180ca					
0100	0159		Canada, Radio Canada Intl	5960am	13670am	15170am		
			15305am					
0100	0200		Anguilla, Caribbean Beacon	6090am				
0100	0200		Australia, ABC NT Katherine	5025do				
0100	0200		Australia, ABC NT Tennant Crk	4910do				
0100	0200		Australia, Radio	9660pa	12080pa	15240pa	15415as	
			17580pa 17750as	17775pa	17795pa	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, 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	7445va	15039va			
0100	0200		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na					
0100	0200		Cuba, Radio Havana	6000na	9820na	11705usb		
0100	0200		Ecuador, HCJB	9745na	11960na	21455usb		
0100	0200	a/monthly	Finland, Scandv Weekend Radio	5980va	11720va			
0100	0200	m/vl	Guatemala, Radio Cultural	3300do	5955do			
0100	0200		Guyana, Voice of	3290do	5950do			
0100	0200		Indonesia, Voice of	9525pa	11785al	15150as		
0100	0200		Japan, Radio	11860as	11870me	11880me	15325as	
			17685pa 17810as	17835sa	17845as			
0100	0200		Malaysia, Radio	7295do				
0100	0200		Namibia, NBC	3270af	3290af			
0100	0200		New Zealand, Radio NZ Intl	17675pa				
0100	0200		Russia, University Network	9940as				
0100	0200		Russia, Voice of Russia	7180na	9725na	11825na	12000na	
			17595na					
0100	0200		Singapore, SBC Radio One	6150do				
0100	0200	vl	Solomon Islands, SIBC	5020do				
0100	0200		Sri Lanka, SLBC	6005as	6075as	6130do	9770as	
			15425as					
0100	0200		UK, BBC World Service	5975am	6195as	9410as	9825as	
			11955sa 15280as	15310as	15360eu	17615as	17790af	
0100	0200		USA, Armed Forces Network	4319usb	4993usb	5765usb		
			6350usb 6458usb	10320usb	10940usb	12579usb	12689usb	
			13362usb					
0100	0200		USA, KAIJ Dallas TX	5755va				
0100	0200		USA, KTBN Salt Lk City UT	7505na				
0100	0200		USA, KWHR Naalehu HI	17510as				
0100	0200		USA, Voice of America	7115me	9635va	11705va	11725va	
			11820va 13650va	17740va	17820va			
0100	0200		USA, WBCQ Kennebunk, ME	7415na	9335na			
0100	0200		USA, WEWN Birmingham AL	5825na	9355na	15745na		
0100	0200		USA, WHRA Greenbush ME	7580va				
0100	0200		USA, WHRI Noblesville IN	5745va	7315am			
0100	0200		USA, WINB Red Lion PA	9320am				
0100	0200		USA, WJIE Louisville KY	7490am	13595am			
0100	0200		USA, WRMI Miami FL	9955am				
0100	0200		USA, WRNO New Orleans LA	7355am				
0100	0200		USA, WSHB Cypress Creek SC	7535am	9430sa	15285sa		
0100	0200		USA, WTJC Newport NC	9370na				
0100	0200		USA, WWCR Nashville TN	3210na	5070na	5935na	7435na	
			15685na					
0100	0200		USA, WWRB Manchester TN	5085va	6890va			
0100	0200		USA, WYFR Okeechobee FL	6065na	9505na	15060as		
0100	0200		Zambia, Christian Voice	4965af				
0103	0110		Croatia, Croatian Radio	9925sa				
0130	0145	vl	Libya, Voice of Africa	15435irr	17750irr			
0130	0200		Austria, Radio Austria Intl	9870na				
0130	0200		Sweden, Radio	13625va				
0130	0200		UK, RTE Radio	6155na				
0130	0200	twhfa	USA, Voice of America	5995am	6130am	7405va	9455am	9775va

SELECTED PROGRAMMING BEGINS ON PAGE 55

			13740va				
0140	0200		Vatican City, Vatican Radio	9650au	12055au		
0145	0200	twhfa	Albania, Radio Tirana Intl	6115na	7160na		

0200 UTC - 10PM E / 9PM C / 7PM P

0200	0227		Czech Rep, Radio Prague Intl	6200na	7345na		
0200	0230		Austria, AWR 9820as				
0200	0230	sm w fa	Belarus, Radio Belarus Intl	6070eu	7210eu		
0200	0230		Myanmar, Radio 7185do				
0200	0230	as/vl	Solomon Islands, SIBC 5020do				
0200	0245		Germany, Deutsche Welle	11965as	13720as	15370as	
0200	0256		North Korea, Voice of 11845as	15230as			
0200	0257		Canada, Radio Canada Intl	15260as	17860as		
0200	0300		Anguilla, Caribbean Beacon	6090am			
0200	0300	twhfa	Argentina, RAE 11710am				
0200	0300		Australia, ABC NT Alice Springs	4835do			
0200	0300		Australia, ABC NT Katherine	5025do			
0200	0300		Australia, ABC NT Tennant Crk	4910do			
0200	0300		Australia, Radio 9660pa	12080pa	15240pa	15415as	
			15515pa 17580pa	17750as	21725as		
0200	0300		Bulgaria, Radio 9400na	11700na			
0200	0300		Canada, CBC Northern Service	9625do			
0200	0300		Canada, CFRX Toronto ON	6070do			
0200	0300		Canada, CFVP Calgary AB	6030do			
0200	0300		Canada, CKZN St John's NF	6160do			
0200	0300		Canada, CKZU Vancouver BC	6160do			
0200	0300		Costa Rica, R for Peace Intl	7445va	15039va		
0200	0300		Costa Rica, University Network	5030am	6150am	7375am	9725sa
			11870am 13750na				
0200	0300		Cuba, Radio Havana 6000na	9820na	11705usb		
0200	0300		Ecuador, HCJB 9745na	11960na	21455usb	21470as	
0200	0300		Egypt, Radio Cairo 9475na				
0200	0300	a/monthly	Finland, Scandv Weekend Radio	5980va	11720va		
0200	0300	m/vl	Guatemala, Radio Cultural	3300do	5955do		
0200	0300		Guyana, Voice of 3290do	5950do			
0200	0300		Kenya, Kenya BC Corp 4885do	4935do			
0200	0300		Malaysia, Radio 7295do				
0200	0300		Namibia, NBC 3270af	3290af			
0200	0300		New Zealand, Radio NZ Intl	17675pa			
0200	0300		Philippines, Radio Pilipinas	12015as	15120as	15270as	
0200	0300		Romania, R Romania Intl	9510na	11940na	15105as	15180as
			17815pa				
0200	0300		Russia, University Network	9940as			
0200	0300		Russia, Voice of Russia 7180na	9725na	12000na	17595na	
0200	0300		Singapore, SBC Radio One	6150do			
0200	0300	mtwhf/vl	Solomon Islands, SIBC 5020do				
0200	0300		South Korea, R Korea Intl	7275as	9560na	11725sa	11810sa
			15575na				
0200	0300		Sri Lanka, SLBC 6005as	6075as	6130do	9770as	15475as
0200	0300		Taiwan, R Taipei Intl 5950na	9680na	11740na	15320as	15345as
0200	0300		UK, BBC World Service 5975am	6195as	9410as	9510eu	9770af
			9825sa 11835ca	12095sa	15280as	15310as	15360eu 15470af
			17790af				
0200	0300		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb
0200	0300		USA, KAIJ Dallas TX 5755va				
0200	0300		USA, KJES Vado NM 7555na				
0200	0300		USA, KTBN Salt Lk City UT	7505na			
0200	0300		USA, KWHR Naalehu HI 17510as				
0200	0300		USA, Voice of America 7115va	9635va	11705va	11725va	11820va
			13650va 17740va	17820va			
0200	0300		USA, WBCQ Kennebunk, ME	7415na	9335na		
0200	0300		USA, WEWN Birmingham AL	5825na	9355na	15745na	
0200	0300		USA, WHRA Greenbush ME	7580va			
0200	0300		USA, WHRI Noblesville IN	5745va	7315am		
0200	0300		USA, WINB Red Lion PA 9320am				
0200	0300		USA, WJIE Louisville KY 7490am	13595am			
0200	0300		USA, WRMI Miami FL 7385am				
0200	0300		USA, WRNO New Orleans LA	7355am			
0200	0300		USA, WSHB Cypress Creek SC	5850am	7535eu	9430af	
0200	0300		USA, WTJC Newport NC 9370na				
0200	0300		USA, WWCR Nashville TN	3210na	5070na	5935na	7435na
			15685na				
0200	0300		USA, WWRB Manchester TN	5085va	6890va		
0200	0300		USA, WYFR Okeechobee FL	6065na	9505na		
0200	0300		Zambia, Christian Voice 4965af				
0200	1215		Cambodia, National Radio Of	11940as			
0203	0210		Croatia, Croatian Radio 9925na				
0215	0220		Nepal, Radio 3230as	5005as			
0230	0257		Vietnam, Voice of 6175na				
0230	0300		Albania, Radio Tirana Intl	6115eu	7160eu		
0230	0300		Hungary, Radio Budapest	9570na			
0230	0300		Slovakia, AWR 7235as				
0230	0300		Sweden, Radio 9490na				
0230	0300	a	UK, Wales Radio Intl 9795na				
0230	0300	vl	Zambia, Radio ZNBC 4910do	6265al			
0250	0300		Vatican City, Vatican Radio	7305am	9605am		

0300 UTC - 11PM E / 10PM C / 8PM P

0300	0310		Vatican City, Vatican Radio	7305am	9605am		
0300	0327		Czech Rep, Radio Prague Intl	7345na	7385na	9870na	
0300	0330		Ecuador, HCJB 11960na	21470as			
0300	0330		Egypt, Radio Cairo 9475na				
0300	0330		Philippines, Radio Pilipinas	12015as	15120as	15270as	
0300	0330		S Africa, Channel Africa 6035af				
0300	0330		Thailand, Radio 15395na				
0300	0330		USA, KJES Vado NM 7555na				
0300	0330		USA, KVOH Los Angeles CA	9975na			
0300	0345		Germany, Deutsche Welle	9535na	9640na	11935am	
			15105na				
0300	0356		China, China Radio Intl 9560na	9690na			
0300	0356		North Korea, Voice of 6195as	7140as	9345as		
0300	0400		Anguilla, Caribbean Beacon	6090am			
0300	0400		Australia, ABC NT Alice Springs	4835do			
0300	0400		Australia, ABC NT Katherine	5025do			
0300	0400		Australia, ABC NT Tennant Crk	4910do			
0300	0400		Australia, Radio 9660pa	12080pa	15240as	15415as	
			15515pa 17580pa	17750as	21725as		
0300	0400	vl	Botswana, Radio 3356do	4820do	7255do		
0300	0400		Canada, CBC Northern Service	9625do			
0300	0400		Canada, CFRX Toronto ON	6070do			
0300	0400		Canada, CFVP Calgary AB	6030do			
0300	0400		Canada, CKZN St John's NF	6160do			
0300	0400		Canada, CKZU Vancouver BC	6160do			
0300	0400		Costa Rica, R for Peace Intl	7455va	15039va		
0300	0400		Costa Rica, University Network	5030am	6150am	7375am	9725sa
			11870am 13750na	17645as			
0300	0400		Cuba, Radio Havana 6000na	9820na	11705usb		
0300	0400		Ecuador, HCJB 9745na	21455usb			
0300	0400	a/monthly	Finland, Scandv Weekend Radio	5980va	11720va		
0300	0400	vl	Guatemala, Radio Cultural	3300do	5955do		
0300	0400		Guyana, Voice of 3290do	5950do			
0300	0400		Japan, Radio 17825ca	21610pa			
0300	0400		Kenya, Kenya BC Corp 4885do	4935do			
0300	0400		Malaysia, Radio 7295do				
0300	0400		Namibia, NBC 3270af	3290af			
0300	0400		New Zealand, Radio NZ Intl	17675pa			
0300	0400		Oman, Radio 15355va				
0300	0400		Russia, University Network	17765as			
0300	0400		Russia, Voice of Russia 11750na	12000na	15455na	17650na	
			17660na 17690na				
0300	0400		Singapore, SBC Radio One	6150do			
0300	0400	mtwhf/vl	Solomon Islands, SIBC 5020do				
0300	0400		Sri Lanka, SLBC 6005as	6075as	6130do	9770as	15475as
0300	0400		Taiwan, R Taipei Intl 5950na	9680na	11875as	15320as	
0300	0400		Turkey, Voice of 7270va	9690va			
0300	0400		Uganda, Radio 4976do	5026al	7195al		
0300	0400		UK, BBC World Service 3255af	6005af	6190af	6195eu	7120af
			7160af 9410eu	11730as	11835am	12095sa	15280as 15310as
			15360as 15420af	15575me	17790as		
0300	0400		Ukraine, R Ukraine Intl 7150as	12040as			
0300	0400		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb
0300	0400		USA, KAIJ Dallas TX 5755va				
0300	0400		USA, KTBN Salt Lk City UT	7505na			
0300	0400		USA, KWHR Naalehu HI 17510as				
0300	0400		USA, Voice of America 5855af	6080af	7105af	7290af	7340af
			9575af 9885af	17895af			
0300	0400		USA, WBCQ Kennebunk, ME	7415na	9335na		
0300	0400		USA, WEWN Birmingham AL	5825na	7425na	15745na	
0300	0400		USA, WHRA Greenbush ME	7580va			
0300	0400		USA, WHRI Noblesville IN	5745va	7315am		
0300	0400		USA, WINB Red Lion PA 9320am				
0300	0400		USA, WJIE Louisville KY 7490am	13595am			
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 Cypress Creek SC	5850am	7535eu	9455eu	11550va
0300	0400		USA, WTJC Newport NC 9370na				
0300	0400		USA, WWCR Nashville TN	3210na	5070na	5935na	7435na
			15685na				
0300	0400		USA, WWRB Manchester TN	5085va	6890va		
0300	0400		USA, WYFR Okeechobee FL	6065na	9505na		
0300	0400		Zambia, Christian Voice 6065af				
0300	0400	vl	Zambia, Radio ZNBC 4910do	6265al			
0310	0315		Vatican City, Vatican Radio	7305am	9605am	9660af	
0315	0340		Vatican City, Vatican Radio	9660af			

0330	0345	vl	Libya, Voice of Africa	15435irr	17750irr		
0330	0350		UAE, Emirates Radio	12005na	13675na	15395na	15435na
0330	0357		Czech Rep, Radio Prague Intl		11600va	15260va	
0330	0357		Vietnam, Voice of	6175na			
0330	0400		Ecuador, HCJB	11960na			
0330	0400		Malaysia, RTM Kota Kinabalu		5979do		
0330	0400		Nigeria, Radio/Kaduna	4770do			
0330	0400		Nigeria, Radio/Lagos	3326do	4990al		
0330	0400		Sweden, Radio	9490na			
0330	0400		UAE, AWR 17780as				
0345	0400	f	Seychelles, FEBA Radio	11880af			
0345	0400		Tajikistan, Radio	7245as			

0400 UTC - 12AM E / 11PM C / 9PM P

0400	0415		Israel, Kol Israel	9435na	15640va	17600va	
0400	0425		Belgium, RVI Flanders R Intl		15565na		
0400	0430	mtwhf	France Radio France Intl	9550af	15155af		
0400	0430	vl	Guatemala, Radio Cultural		3300do	5955do	
0400	0430	twhfas	Mexico, Radio Mexico Intl		9705am	11770am	
0400	0430		S Africa, AWR	7235af			
0400	0430		S Africa, Channel Africa	5955af			
0400	0430		Sri Lanka, SLBC	6005as	6075as	6130do	9770as 15475as
0400	0445		Germany, Deutsche Welle		6180af	7225af	12045af 13690af
0400	0458		New Zealand, Radio NZ Intl		17675pa		
0400	0500		Anguilla, Caribbean Beacon		6090am		
0400	0500		Australia, ABC NT Alice Springs		4835do		
0400	0500		Australia, ABC NT Katherine		5025do		
0400	0500		Australia, ABC NT Tennant Crk		4910do		
0400	0500		Australia, Radio	9660pa	12080pa	15240pa	15415as
			15515pa 17580pa	17750as	21725as		
0400	0500	vl	Botswana, Radio	3356do	4820do	7255do	
0400	0500	irrg/vl	Cameroon, RTV	4850do			
0400	0500		Canada, CBC Northern Service		9625do		
0400	0500		Canada, CFRX Toronto ON		6070do		
0400	0500		Canada, CKZN St John's NF		6160do		
0400	0500		Canada, CKZU Vancouver BC		6160do		
0400	0500		China, China Radio Intl	9730na			
0400	0500		Costa Rica, R for Peace Intl		7455va	15039va	
0400	0500		Costa Rica, University Network		5030am	6150am	7375am 9725sa
			11870am 13750na	17645as			
0400	0500		Cuba, Radio Havana	6000na	9820na	11705usb	
0400	0500		Ecuador, HCJB	9745na	11960na	21455usb	
0400	0500	a/monthly	Finland, Scandv Weekend Radio		5980va	11720va	
0400	0500		Germany, Voice of Hope	15715me			
0400	0500		Guyana, Voice of	3290do	5950do		
0400	0500		Kenya, Kenya BC Corp	4885do	4935do		
0400	0500		Malaysia, Radio	7295do			
0400	0500		Malaysia, RTM Kota Kinabalu		5979do		
0400	0500		Malaysia, Voice of	6175as			
0400	0500		Namibia, NBC	3270af	3290af		
0400	0500		Nigeria, Radio/Kaduna	4770do	6090do		
0400	0500		Nigeria, Radio/Lagos	3326do	4990al		
0400	0500		Nigeria, Voice of	7255af			
0400	0500		Romania, R Romania Intl		9510na	11940na	17735as 21480as
0400	0500		Russia, University Network		17765as		
0400	0500		Russia, Voice of Russia	11750na	12000na	15455na	17650na
			17660na 17690na				
0400	0500		Singapore, SBC Radio One		6150do		
0400	0500	mtwhf/vl	Solomon Islands, SIBC	5020do			
0400	0500		Uganda, Radio	4976do	5026al	7195al	
0400	0500		UK, BBC World Service	3255af	6005af	6190af	6195af 7120af
			7160af 9410eu	11835am	12095va	15280as	15310as 15420af
			15575va 21660as	21830as			
0400	0500		USA, Armed Forces Network		4319usb	4993usb	5765usb 6350usb
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb
0400	0500		USA, KAIJ Dallas TX	5755va			
0400	0500		USA, KTBN Salt Lk City UT		7505na		
0400	0500		USA, KWHR Naalehu HI	17780as			
0400	0500		USA, Voice of America	4960af	5855af	6080af	9530va 7275af
			7290af 9575af	11965va	15205va	17895af	
0400	0500		USA, WBCQ Kennebunk, ME		7415na		
0400	0500		USA, WEWN Birmingham AL		5825na	7425na	15745na
0400	0500		USA, WHRA Greenbush ME		7580va		
0400	0500		USA, WHRI Noblesville IN		5745va	7315am	
0400	0500		USA, WINB Red Lion PA	9320am			
0400	0500		USA, WJIE Louisville KY	7490am	13595am		
0400	0500		USA, WMLK Bethel PA	9465eu			
0400	0500		USA, WRMI Miami FL	7385am			
0400	0500		USA, WSHB Cypress Creek SC		5850am	7535eu	9455eu
			11550am 15195am				
0400	0500		USA, WTJC Newport NC	9370na			
0400	0500		USA, WWCR Nashville TN		3210na	5070na	5935na 7560na
			15685na				
0400	0500		USA, WWRB Manchester TN		5085va	6890va	
0400	0500		USA, WYFR Okeechobee FL		6065na	9355eu	9505na 11580eu
0400	0500		Zambia, Christian Voice	6065af			
0400	0500	vl	Zambia, Radio ZNBC	4910do	6265al		
0403	0410		Croatia, Croatian Radio	9925na			
0427	0500	a	Madagascar, Radio VO Hope		12060af	15320af	
0430	0500		Netherlands, Radio	6165na	9590na		
0430	0500		Nigeria, Radio/Enugu	6025do			
0430	0500		Nigeria, Radio/Ibacan	6050do			
0430	0500		S Africa, AWR	11975af			
0430	0500		Sri Lanka, SLBC	6130do			
0430	0500		Swaziland, TWR	4775af			
0430	0500	mtwhfa	Swaziland, TWR	3200af			
0430	0500		UK, BBC World Service	6010eu	9815eu	13645me	21735me
0445	0500		Italy, RAI Intl	7235af	9875af		
0459	0500		New Zealand, Radio NZ Intl		15340pa		

0500 UTC - 1AM E / 12AM C / 10PM P

0500	0520		Vatican City, Vatican Radio	4005eu	5890eu	7250eu	9660af
			11625af 15570af				
0500	0525	a	Madagascar, Radio VO Hope	12060af	15320af		
0500	0530	mtwhf	France Radio France Intl	11685af	17800af		
0500	0530	twhfa	Mexico, Radio Mexico Intl		9705am	11770am	
0500	0530		Netherlands, Radio	6165na	9590na		
0500	0530		S Africa, AWR	5960af	6015af		
0500	0530		S Africa, Channel Africa	11710af			
0500	0530		Uganda, Radio	4976do	5026al	7195al	
0500	0545		Germany, Deutsche Welle		9670na	9785na	11985na
0500	0600		Anguilla, Caribbean Beacon		6090am		
0500	0600		Australia, ABC NT Alice Springs		4835do		
0500	0600		Australia, ABC NT Katherine		5025do		
0500	0600		Australia, ABC NT Tennant Crk		4910do		
0500	0600		Australia, Radio	9660pa	12080pa	15240pa	15415as
			15515pa 17580pa	17750as	21725as		
0500	0600	mtwhf	Bhutan, Bhutan BC Service		5030al	6035do	
0500	0600	vl	Botswana, Radio	3356do	4820do	7255do	
0500	0600	irrg/vl	Cameroon, RTV	4850do			
0500	0600		Canada, CBC Northern Service		9625do		
0500	0600		Canada, CFRX Toronto ON		6070do		
0500	0600		Canada, CKZN St John's NF		6160do		
0500	0600		Canada, CKZU Vancouver BC		6160do		
0500	0600		China, China Radio Intl	9560na			
0500	0600		Costa Rica, R for Peace Intl		7455va	15039va	
0500	0600		Costa Rica, University Network		5030am	6150am	7375am 9725sa
			11870am 13750na	17645as			
0500	0600		Cuba, Radio Havana	9550am	9665usb	9820na	
0500	0600		Ecuador, HCJB	9745na	11960na	21455usb	
0500	0600	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va	
0500	0600		Germany, Voice of Hope	15715me			
0500	0600		Guyana, Voice of	3290do	5950do		
0500	0600		Japan, Radio	5975eu	6110na	7230eu	11715as 11760as
			13630na 15195as	17810as	21755pa		
0500	0600		Kenya, Kenya BC Corp	4885do	4935do		
0500	0600		Liberia, R Liberia Intl	6100do			
0500	0600		Malaysia, Radio	7295do			
0500	0600		Malaysia, RTM Kota Kinabalu		5979do		
0500	0600		Malaysia, Voice of	6175as	9750as	15295as	
0500	0600		Namibia, NBC	3270af	3290af		
0500	0600		New Zealand, Radio NZ Intl		15340pa		
0500	0600		Nigeria, Radio/Enugu	6025do			
0500	0600		Nigeria, Radio/Ibadan	6050do			
0500	0600		Nigeria, Radio/Kaduna	4770do	6090do	9570do	
0500	0600		Nigeria, Radio/Lagos	3326do	4990al		
0500	0600		Nigeria, Voice of	7255af			
0500	0600		Russia, University Network		17765as		
0500	0600		Russia, Voice of Russia	17635au	17685au	17795as	21790au
0500	0600		Singapore, SBC Radio One		6150do		
0500	0600	vl	Solomon Islands, SIBC	5020do			
0500	0600		Sri Lanka, SLBC	6130do			
0500	0600		Swaziland, TWR	4775af	6035af	9500af	
0500	0600		UK, BBC World Service	6005af	6190af	6195eu	7160af 9410eu
			9875eu 11675eu	11760me	11765af	11940af	11955as 12095eu
			13645as 15280as	15310as	15360as	15420af	17640as 17790as
			17885af 17790as	21735me			
0500	0600		USA, Armed Forces Network		4319usb	4993usb	5765usb 6350usb
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb
0500	0600		USA, KAIJ Dallas TX	5755va			
0500	0600		USA, KTBN Salt Lk City UT		7505na		
0500	0600		USA, KWHR Naalehu HI	11565as	17780as		
0500	0600		USA, Voice of America	5970af	6035af	6080af	7195af 9530va
			11965va 12080af	13670af	15205va		
0500	0600		USA, WBCQ Kennebunk, ME		7415na		
0500	0600		USA, WEWN Birmingham AL		5825na	7425na	15745na
0500	0600		USA, WHRA Greenbush ME		11730va		
0500	0600		USA, WHRI Noblesville IN		5745va	7315am	

0500	0600		USA, WJIE Louisville KY 7490am	13595am			
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 Cypress Creek SC 11550va	5850am	7535eu	9455eu	9840eu
0500	0600		USA, WTJC Newport NC 9370na				
0500	0600		USA, WWCR Nashville TN 15685na	3210na	5070na	5935na	7560na
0500	0600		USA, WWRB Manchester TN	6890va			
0500	0600		USA, WYFR Okeechobee FL	9355eu			
0500	0600		Zambia, Christian Voice 6065af				
0503	0610		Croatia, Croatian Radio 9925na				
0520	0530		Vatican City, Vatican Radio	9660af	11625af	15570af	
0525	0600	vl	Ghana, Ghana BC Corp 3366do	4915do			
0530	0550		UAE, Emirates Radio 15435au	17830au	21695au		
0530	0600	mtwhf/vl	Italy, IRRS 13840va				
0530	0600		S Africa, AWR 15105af				
0530	0600		Thailand, Radio 21795eu				
0532	0600		Austria, Radio Austria Intl	6155eu	13730eu	17870me	

0600 UTC - 2AM E / 1AM C / 11PM P

0600	0615		S Africa TWR 11640af				
0600	0630	mtwhf	France Radio France Intl 11710af	17800af	21620af		
0600	0630	mtwhf/vl	Italy, IRRS 13840va				
0600	0630		S Africa, AWR 15105af				
0600	0630		S Africa, Channel Africa 15215af				
0600	0630	vl	Zimbabwe, ZBC Corp 5975do				
0600	0645		Germany, Deutsche Welle	6140eu	11925af	13790af	17860af
0600	0658		New Zealand, Radio NZ Intl	15340pa			
0600	0700		Anguilla, Caribbean Beacon	6090am			
0600	0700		Australia, ABC NT Alice Springs	4835do			
0600	0700		Australia, ABC NT Katherine	5025do			
0600	0700		Australia, ABC NT Tennant Crk	4910do			
0600	0700		Australia, Radio 9660pa 15515pa 17580pa 17750as	12080pa	15240pa	15415as	21725as
0600	0700	vl	Botswana, Radio 4820do	7255do			
0600	0700	irrg/vl	Cameroon, RTV 4850do				
0600	0700		Canada, CFRX Toronto ON	6070do			
0600	0700		Canada, CFVP Calgary AB	6030do			
0600	0700		Canada, CKZN St John's NF	6160do			
0600	0700		Canada, CKZU Vancouver BC	6160do			
0600	0700		Costa Rica, R for Peace Intl	7455va	15039va		
0600	0700		Costa Rica, University Network 11870am 13750na 17645as	5030am	6150am	7375am	9725sa
0600	0700		Cuba, Radio Havana 9550am	9665usb	9820no		
0600	0700		Ecuador, HCJB 11680eu				
0600	0700	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va		
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do		
0600	0700		Guyana, Voice of 3290do	5950do			
0600	0700		Japan, Radio 7230eu 17870pa 21755pa	11740as	13630na	15195as	
0600	0700		Kenya, Kenya BC Corp 4885do	4935do			
0600	0700	irreg	Liberia, ELWA 4760do				
0600	0700		Liberia, R Liberia Intl 6100do				
0600	0700		Malaysia, Radio 7295do				
0600	0700		Malaysia, Voice of 6175as	9750as	15295as		
0600	0700		Namibia, NBC 3270af	3290af			
0600	0700		Nigena, Radio/Enugu 6025do				
0600	0700		Nigeria, Radio/Ibadan 6050do				
0600	0700		Nigeria, Radio/Kaduna 4770do	6090do	9570do		
0600	0700		Nigeria, Radio/Lagos 3326do	4990al			
0600	0700		Nigena, Voice of 7255af				
0600	0700		Romania, R Romania Intl	9635na	11940na		
0600	0700		Russia, University Network	17765as			
0600	0700		Russia, Voice of Russia 15490au 21790au	17635au	17685au	17795as	
0600	0700		Sierra Leone, SLBS 3316do				
0600	0700		Singapore, SBC Radio One	6150do			
0600	0700	vl	Solomon Islands, SIBC 5020do				
0600	0700		Swaziland, TWR 4775af	6035af	9500af		
0600	0700		UK, BBC World Service 6055af 11955as 12095eu 13645as 17640as 17790as	6190af 17885af	9410eu 17790as	11765af 21735me	11940af 15420af
0600	0700	mtwhf	UK, BBC World Service 15400af	15575me			
0600	0700		USA, Armed Forces Network 6458usb 10320usb	10940usb	4319usb 12579usb	4993usb 12689usb	5765usb 13362usb 6350usb
0600	0700		USA, KAIJ Dallas TX 5755va				
0600	0700		USA, KTBN Salt Lk City UT	7505na			
0600	0700		USA, KWHR Naalehu HI 11565as	17780as			
0600	0700		USA, Voice of America 5970af 9760va 11965va	11995af	6035af 12080af	6080af 13670af	7195af 15205va 9530va
0600	0700		USA, WEWN Birmingham AL	5825na	7425na	15745na	
0600	0700		USA, WHRA Greenbush ME	11730va			
0600	0700		USA, WHRI Noblesville IN	5745va	7315am		
0600	0700		USA, WJIE Louisville KY 7490am	13595am			
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 Cypress Creek SC	9455sa	11550am		
0600	0700		USA, WTJC Newport NC 9370na				
0600	0700		USA, WWCR Nashville TN 15685na	3210na	5070na	5935na	7560na
0600	0700		USA, WWRB Manchester TN	6890va			
0600	0700		USA, WYFR Okeechobee FL	7355eu	11580eu		
0600	0700	vl	Vanuatu, Radio 4960do	7260do			
0600	0700		Yemen, Rep of Yemen Radio	9780me			
0600	0700		Zambia, Christian Voice 9865af				
0600	0700	vl	Zambia, Radio ZNBC 4910do	6265al			
0630	0700		Ecuador, HCJB 21455usb				
0630	0700		Georgia, Georgian Radio	11805eu			
0630	0700		Vatican City, Vatican Radio	11625af	13765af	15570af	
0637	0656		Romania, R Romania Intl	7105eu	9625eu	9550eu	11775eu
0645	0655	as	Monaco, TWR 9870eu				
0645	0700		Germany, Deutsche Welle	6140eu			
0645	0700	as	Germany, TWR 6045eu				
0655	0700		Germany, TWR 6045eu				
0655	0700		Monaco, TWR 9870eu				
0659	0700		New Zealand, Radio NZ Intl	9885pa			

0700 UTC - 3AM E / 2AM C / 12AM P

0700	0704	vl	Pakistan, Radio 17520as	21465as			
0700	0725		Belgium, RVI Flanders R Intl	5985eu			
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu		
0700	0730		Austria, AWR 7230va				
0700	0730		Slovakia, R Slovakia Intl 9440va	15460va	17550va		
0700	0750		Germany, TWR 6045eu				
0700	0750		Monaco, TWR 9870eu				
0700	0750		Swaziland, TWR 4775af	6035af	9500af		
0700	0800		Anguilla, Caribbean Beacon	6090am			
0700	0800		Australia, ABC NT Alice Springs	4835do			
0700	0800		Australia, ABC NT Katherine	5025do			
0700	0800		Australia, ABC NT Tennant Crk	4910do			
0700	0800		Australia, Radio 9660pa 17580pa 17750as	12080pa	15240pa	15415as	21725as
0700	0800	vl	Botswana, Radio 4820do	7255do			
0700	0800	irrg/vl	Cameroon, RTV 4850do				
0700	0800		Canada, CFRX Toronto ON	6070do			
0700	0800		Canada, CFVP Calgary AB	6030do			
0700	0800		Canada, CKZN St John's NF	6160do			
0700	0800		Canada, CKZU Vancouver BC	6160do			
0700	0800		Costa Rica, R for Peace Intl	7455va	15039va		
0700	0800		Costa Rica, University Network 11870am 13750na 17645as	5030am	6150am	7375am	9725sa
0700	0800		Ecuador, HCJB 11680eu	11755pa	21455usb		
0700	0800	mtwhf	Eqt Guinea, Radio Africa	15185af			
0700	0800	as/vl	Eqt. Guinea, Radio East Africa	15185af			
0700	0800	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va		
0700	0800	mtwhf	France Radio France Intl 15605af				
0700	0800		Germany, Deutsche Welle	6140eu			
0700	0800		Germany, Voice of Hope 5975eu				
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do		
0700	0800		Guyana, Voice of 3290do	5950do			
0700	0800		Kenya, Kenya BC Corp 4885do	4935do			
0700	0800	irreg	Liberia, ELWA 4760do				
0700	0800		Liberia, R Liberia Intl 6100do				
0700	0800		Malaysia, Radio 7295do				
0700	0800		Malaysia, RTM Kota Kinabalu 5979do				
0700	0800		Malaysia, Voice of 6175as	9750as	15295as		
0700	0800		Myanmar, Radio 9730do				
0700	0800		New Zealand, Radio NZ Intl	9885pa			
0700	0800		Nigeria, Radio/Enugu 6025do				
0700	0800		Nigeria, Radio/Ibadan 6050do				
0700	0800		Nigeria, Radio/Kaduna 4770do	6090do	9570do		
0700	0800		Nigeria, Radio/Lagos 3326do	4990al			
0700	0800		Palau, KHBN/VO Hope 9965as	9985as	15725as		
0700	0800		Papua New Guinea, NBC	4890do	9675al		
0700	0800		Romania, R Romania Intl	21530af			
0700	0800		Russia, University Network	17765as			
0700	0800		Russia, Voice of Russia 15490au 17685au 17795as	17495au	17525au	17635au	17675as
0700	0800		Sierra Leone, SLBS 3316do				
0700	0800		Singapore, SBC Radio One	6150do			
0700	0800	vl	Solomon Islands, SIBC 5020do				
0700	0800		Sri Lanka, SLBC 6130do				
0700	0800		Taiwan, R Taipei Intl 5950na				
0700	0800		UK, BBC World Service 6190af 12095eu 15310as	11760me 15360as	11765af 15400af	11940af 15565eu	11955as 17640af 17760as

			17790as 17885af 21660as	21735me				
0700	0800		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb		
0700	0800		USA, KAIJ Dallas TX 5755va					
0700	0800		USA, KTBN Salt Lk City UT	7505na				
0700	0800		USA, KWHR Naalehu HI 11565as	17780as				
0700	0800		USA, WEWN Birmingham AL	5825na	7425na	15745na		
0700	0800		USA, WHRA Greenbush ME	11730va				
0700	0800		USA, WHRI Noblesville IN	5745va	7315am			
0700	0800		USA, WJIE Louisville KY 7490am	13595am				
0700	0800		USA, WMLK Bethel PA 9465eu					
0700	0800		USA, WRNO New Orleans LA	7395am				
0700	0800		USA, WSHB Cypress Creek SC	9455sa	11550am			
0700	0800		USA, WTJC Newport NC 9370na					
0700	0800		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na	
			15685na					
0700	0800		USA, WWRB Manchester TN	6890va				
0700	0800		USA, WYFR Okeechobee FL	7355eu	13695af	15170af		
0700	0800	vl	Vanuatu, Radio 4960do	7260do				
0700	0800		Zambia, Christian Voice 9865af					
0700	0800	vl	Zambia, Radio ZNBC 4910do	6265al				
0715	0800		Guam, TWR 11850as	11980as				
0730	0800	t h	Georgia, Georgian Radio	6080me				
0730	0800		Switzerland, Swiss R Intl 15445af	17685af	21750af			
0730	0800	as	UK, BBC World Service 15575as					
0750	0800	smtwhf	Germany, TWR 6045eu					
0750	0800	smtwhf	Monaco, TWR 9870eu					

0800 UTC - 4AM E / 3AM C / 1AM P

0800	0815		Guam, TWR 15215as					
0800	0820	smtwhf	Germany, TWR 6045eu					
0800	0820	smtwhf	Monaco, TWR 9870eu					
0800	0830	s	Armenia, Voice of 15270eu					
0800	0830		Australia, ABC NT Alice Springs	4835do				
0800	0830		Australia, ABC NT Katherine	5025do				
0800	0830		Australia, ABC NT Tennant Crk	4910do				
0800	0830		Malaysia, RTM Kota Kinabalu	5979do				
0800	0830		Malaysia, Voice of 6175as	9750as	15295as			
0800	0830		Myanmar, Radio 9730do					
0800	0900		Anguilla, Caribbean Beacon	6090am				
0800	0900		Australia, Radio 5995pa	9580pa	9710pa	12080pa	15240as	
			15415as 21725as					
0800	0900	mtwhf	Bhutan, Bhutan BC Service	5030al	6035do			
0800	0900	vl	Botswana, Radio 4820do	7255do				
0800	0900	irrg/vl	Cameroon, RTV 4850do					
0800	0900		Canada, CFRX Toronto ON	6070do				
0800	0900		Canada, CFVP Calgary AB	6030do				
0800	0900		Canada, CKZN St John's NF	6160do				
0800	0900		Canada, CKZU Vancouver BC	6160do				
0800	0900		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na 17645as					
0800	0900		Ecuador, HCJB 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	11690va			
0800	0900		Germany, Deutsche Welle	6140eu				
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do			
0800	0900		Guyana, Voice of 3290do	5950do				
0800	0900		Indonesia, Voice of 9525pa	11785al	15150as			
0800	0900	as/vl	Italy, IRRS 13840va					
0800	0900		Kenya, Kenya BC Corp 4885do	4935do				
0800	0900	irreg	Liberia, ELWA 4760do					
0800	0900		Liberia, R Liberia Intl 6100do					
0800	0900		Malaysia, Radio 7295do					
0800	0900	vl/s	Malta, VO Mediterranean	9605eu				
0800	0900		New Zealand, Radio NZ Intl	9885pa				
0800	0900		Nigeria, Radio/Enugu 6025do					
0800	0900		Nigena, Radio/Ibadan 6050do					
0800	0900		Nigeria, Radio/Kaduna 4770do	6090do	9570do			
0800	0900		Nigeria, Radio/Lagos 3326do	4990al				
0800	0900		Nigeria, Voice of 7255af					
0800	0900		Palau, KHBN/VO Hope 9965as	9985as	15725as			
0800	0900		Papua New Guinea, NBC	4890do	9675al			
0800	0900		Russia, University Network	17765as				
0800	0900		Russia, Voice of Russia 15490au	17495au	17525au	17635au	17675as	
			17685au 17795as					
0800	0900		Singapore, SBC Radio One	6150do				
0800	0900		South Korea, R Korea Intl	9570am	13670eu			
0800	0900		Sri Lanka, SLBC 6130do					
0800	0900		UK, BBC World Service 6190af	9410eu	11940af	11955as	12095eu	
			15310as 15360eu 15485eu	15565eu	17640af	17760as	17885af	
			21470af 21660as 21735me					
0800	0900	mtwhf	UK, BBC World Service 15400af	17830af				
0800	0900		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb		
0800	0900		USA, KAIJ Dallas TX 5755va					
0800	0900		USA, KNLS Anchar Point AK	11765as				
0800	0900		USA, KTBN Salt Lk City UT	7505na				
0800	0900		USA, KWHR Naalehu HI 11565as	17780as				
0800	0900		USA, Voice of America 11930va	13610va	15190va			
0800	0900		USA, WEWN Birmingham AL	5825na	7425na	15745na		
0800	0900		USA, WHRI Noblesville IN	5745va	7315am			
0800	0900		USA, WJIE Louisville KY 7490am	13595am				
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 Cypress Creek SC	9845au	9860eu	11550am		
0800	0900		USA, WTJC Newport NC 9370na					
0800	0900		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na	
			15685na					
0800	0900		USA, WYFR Okeechobee FL	13570af				
0800	0900	vl	Vanuatu, Radio 4960do	7260do				
0800	0900		Zambia, Christian Voice 9865af					
0815	0900		Guam, TWR 15215as	15330as				
0830	0900		Australia, ABC NT Katherine	2485do				
0830	0900		Australia, ABC NT Tennant Crk	2325do				
0830	0900		Austria, AWR 17780af					
0830	0900		Georgia, Georgian Radio	11910eu				
0830	0900		Greece, Voice of 15630eu	17905eu				
0830	0900	vl	Solomon Islands, SIBC 5020do					
0830	0900		Switzerland, Swiss R Intl 21770af					
0840	0850		Turkmenistan, Turkmen Radio	5015as				

0900 UTC - 5AM E / 4AM C / 2AM P

0900	0915	mtwhf/vl	Solomon Islands, SIBC 5020do					
0900	0929		Czech Rep, Radio Prague Intl	21745va				
0900	0930		Austria, AWR 17780af					
0900	0930		Guam, TWR 15330as					
0900	0930	irreg	Liberia, ELWA 4760do					
0900	0945		Germany, Deutsche Welle	6140eu	6160va	9510am	12035af	
			15410af 15470as 17715as	17770pa	17800af	17820as	21560af	
			21780af 21790pa					
0900	1000		Anguilla, Caribbean Beacon	6090am				
0900	1000		Australia, ABC NT Katherine	2485do				
0900	1000		Australia, ABC NT Tennant Crk	2325do				
0900	1000		Australia, Radio 9580va	11880as	15240as	17750as	21820as	
0900	1000		Australia, Voice International	13685as	17645as			
0900	1000	vl	Botswana, Radio 4820do	7255do				
0900	1000	irrg/vl	Cameroon, RTV 4850do					
0900	1000		Canada, CFRX Toronto ON	6070do				
0900	1000		Canada, CFVP Calgary AB	6030do				
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, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750nc 17645as					
0900	1000		Ecuador, HCJB 11755pa	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	11690va			
0900	1000		Germany, Voice of Hope 21590me					
0900	1000	vl	Ghana, Ghana BC Corp	4915do				
0900	1000		Guyana, Voice of 3290do	5950do				
0900	1000	as/vl	Italy, IRRS 13840va					
0900	1000		Kenya, Kenya BC Corp 4885do	4935do				
0900	1000		Liberia, R Liberia Intl 6100do					
0900	1000		Malaysia, Radio 7295do					
0900	1000		New Zealand, Radio NZ Intl	9885pa				
0900	1000		Nigeria, Radio/Enugu 6025do					
0900	1000		Nigeria, Radio/Ibadan 6050do					
0900	1000		Nigeria, Radio/Kaduna 4770do	6090do	9570do			
0900	1000		Nigeria, Radio/Lagos 3326do	4990al				
0900	1000		Palau, KHBN/VO Hope 9965as	9985as	15725as			
0900	1000		Papua New Guinea, NBC	4890do	9675al			
0900	1000		Russia, University Network	17765as				
0900	1000		Sierra Leone, SLBS 3316do					
0900	1000		Singapore, SBC Radio One	6150do				
0900	1000	as/vl	Solomon Islands, SIBC 5020do					
0900	1000		Sri Lanka, SLBC 6130do					
0900	1000		UK, BBC World Service 6190af	6195eu	9605as	9740as		
			11760me 11940af 11945as	12095eu	15310as	15360as	15485eu	
			15565eu 17640af 17760as	17790as	21470af	21735me		
0900	1000	mtwhf	UK, BBC World Service 15190sa	17830af				
0900	1000		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb		
0900	1000		USA, KAIJ Dallas TX 5755va					
0900	1000		USA, KTBN Salt Lk City UT	7505na				
0900	1000		USA, KWHR Naalehu HI 11565as	17780as				

0900	1000		USA, Voice of America	11930va	13610va	15190va		
0900	1000		USA, WEWN Birmingham AL	5825na	7425na	15745na		
0900	1000		USA, WHRA Greenbush ME	11730va				
0900	1000		USA, WHRI Noblesville IN	5745va	7315am			
0900	1000		USA, WJIE Louisville KY	7490am	13595am			
0900	1000		USA, WRMI Miami FL	9955am				
0900	1000		USA, WSHB Cypress Creek SC	9455sa	9860eu	11550am		
0900	1000		USA, WTJC Newport NC	9370na				
0900	1000		USA, WWCR Nashville TN 15685na	9475na	5070na	5935na	7560na	
0900	1000	vl	Vanuatu, Radio	4960do	7260do			
0900	1000	mtwhf	Vatican City, Vatican Radio	5890eu				
0900	1000		Zambia, Christian Voice	9865af				
0930	0950		Greece, Voice of	15630eu	17900eu			
0930	1000		Georgia, Georgian Radio	11910me				
0930	1000	mtwhf	Guam, TWR	15330as				
0930	1000		Lithuania, R Vilnius	9710eu				
0930	1000		Netherlands, Radio	9790pa	12065as	13710as		
0945	1000		Germany, Deutsche Welle	6140eu				
0945	1000	mtwhf/vl	Salomon Islands, SIBC	5020do				

1000 UTC - 6AM E / 5AM C / 3AM P

1000	1005	vl	Pakistan, Radio	17520as	21465as			
1000	1027		Vietnam, Voice of	9840au	12020au			
1000	1030		Guam, AWR	11560as	11930as			
1000	1030		Mongolia, Voice of	12085as				
1000	1030		Netherlands, Radio	9790pa	12065as	13710as		
1000	1030		Sri Lanka, SLBC	4940do				
1000	1030		UK, RTE Radio	15280au				
1000	1056		North Korea, Voice of	9335ca	11710ca	11735as	13650as	
1000	1100		Anguilla, Caribbean Beacon	6090am				
1000	1100		Australia, ABC NT Katherine	2485do				
1000	1100		Australia, ABC NT Tennant Crk	2325do				
1000	1100		Australia, Radio	9580va	11880as	15240as	17750as	21820as
1000	1100		Australia, Voice International	13685as				
1000	1100	as	Bhutan, Bhutan BC Service	5030al	6035do			
1000	1100	vl	Botswana, Radio	4820do	7255do			
1000	1100	irrg/vl	Cameroon, RTV	4850do				
1000	1100		Canada, CFRX Toronto ON	6070do				
1000	1100		Canada, CFVP Calgary AB	6030do				
1000	1100		Canada, CKZN St John's NF	6160do				
1000	1100		Canada, CKZU Vancouver BC	6160do				
1000	1100		China, China Radio Intl	11730pa	15210pa			
1000	1100		Costa Rica, University Network 11870am	5030am	6150am	7375am	9725sa	
			13750na 17645as					
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	11690va			
1000	1100		Germany, Deutsche Welle	6140eu				
1000	1100	vl	Ghana, Ghana BC Corp	4915do				
1000	1100		Guyana, Voice of	3290do	5950do			
1000	1100		India, All India Radio	11585as	13695au	15020as	15260as	
			17510au 17800au 17895au					
1000	1100	as/vl	Italy, IRRS	13840va				
1000	1100		Japan, Radio	9695as	15590as	21755pa		
1000	1100		Liberia, R Liberia Intl	6100do				
1000	1100		Malaysia, Radio	7295do				
1000	1100		New Zealand, Radio NZ Intl	9885pa				
1000	1100		Nigeria, Radio/Enugu	6025do				
1000	1100		Nigeria, Radio/Ibadan	6050do				
1000	1100		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
1000	1100		Nigeria, Radio/Lagos	3326do	4990al			
1000	1100		Nigeria, Voice of	7255af				
1000	1100		Palau, KHBN/VO Hope	9965as	9985as	12160as	15725as	
1000	1100		Papua New Guinea, NBC	4890do	9675al			
1000	1100		Russia, University Network	17765as				
1000	1100		Singapore, SBC Radio One	6150do				
1000	1100	vl	Salomon Islands, SIBC	5020do				
1000	1100		UK, BBC World Service	6190af	6195va	9605as	9740as	
			11760me 11945af 12095eu	15280as	15310as	15335as	15360as	
			15485eu 15565eu 15575as	17640af	17790as	17885af	21730af	
			21470as 21660as					
1000	1100		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb		
1000	1100		USA, KAIJ Dallas TX	5755va				
1000	1100		USA, KTBN Salt Lk City UT	7505na				
1000	1100		USA, KWHR Naalehu HI	9930as	11565pa			
1000	1100		USA, Voice of America 15425va	5745am	7370am	9590am	9770va	15240va
1000	1100		USA, WEWN Birmingham AL 15745eu	7425na	7520na	9465na	15405eu	
1000	1100		USA, WHRI Noblesville IN	6040na	9495am			
1000	1100		USA, WINB Red Lion PA	13570am				
1000	1100		USA, WJIE Louisville KY	7490am	13595am			
1000	1100		USA, WRMI Miami FL	9955am				
1000	1100		USA, WRNO New Orleans LA	7395am				
1000	1100		USA, WSHB Cypress Creek SC	6095am	9455am			
1000	1100		USA, WTJC Newport NC	9370na				
1000	1100		USA, WWCR Nashville TN 15685na	5070na	5935na	7560na		
1000	1100		USA, WYFR Okeechobee FL	5950na				
1030	1035		Israel, Kol Israel	15640va	17545va			
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9704do		
1030	1057		Czech Rep, Radio Prague Intl	9880eu	11615eu			
1030	1100		Guam, AWR	11560as				
1030	1100		Netherlands, Radio 13710as	5965na	6045eu	9790pa	9860eu	12065as
1030	1100		Sri Lanka, SLBC	4940do	11835as	15120as	17850as	
1030	1100		UAE, Emirates Radio	13675eu	15370eu	15400eu	21597eu	

1100 UTC - 7AM E / 6AM C / 4AM P

1100	1105		New Zealand, Radio NZ Intl	9885pa				
1100	1120	fa	Kazakhstan, R Almaty	9620eu	11840eu			
1100	1127		Vietnam, Voice of	7285as				
1100	1130	as	Bhutan, Bhutan BC Service	5030al	6035do			
1100	1130		Netherlands, Radio 13710as	5965na	6045eu	9790pa	9860eu	12065as
1100	1130		Sri Lanka, SLBC	4940do	11835as	15120as	17850as	
1100	1130	mtwhf	UK, BBC World Service	15220am				
1100	1130		UK, BBC World Service	15400af	17790as			
1100	1145		Germany, Deutsche Welle 21525af 21665af	6140eu	11785af	15410af	17860af	
1100	1200		Anguilla, Caribbean Beacon	11775am				
1100	1200		Australia, ABC NT Katherine	2485do				
1100	1200		Australia, ABC NT Tennant Crk	2325do				
1100	1200		Australia, Radio	5995pa	6020pa	9475as	9580pa	
			11650pa 11880as	12080pa	15240as	21820as		
1100	1200		Australia, Voice International	13685as				
1100	1200	vl	Austria, Radio Africa Intl	17815eu				
1100	1200		Bulgaria, Radio	15700eu	17500eu			
1100	1200		Canada, CFRX Toronto ON	6070do				
1100	1200		Canada, CFVP Calgary AB	6030do				
1100	1200		Canada, CKZN St John's NF	6160do				
1100	1200		Canada, CKZU Vancouver BC	6160do				
1100	1200		Costa Rica, University Network 11870am 13750na 17645as	5030am	6150am	7375am	9725sa	
1100	1200		Ecuador, HCJB	12005am	15115na	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	5990va	11720va			
1100	1200	vl	Ghana, Ghana BC Corp	4915do				
1100	1200		Guyana, Voice of	3290do	5950do			
1100	1200		Iran, VOIRI	15215as	15585as	15600as	21470as	21730au
1100	1200	as/vl	Italy, IRRS	13840va				
1100	1200		Japan, Radio	6120na	9695as	15590as		
1100	1200		Jordan, Radio	11690eu				
1100	1200		Malaysia, Radio	7295do				
1100	1200		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as	
1100	1200		Papua New Guinea, NBC	4890do	9675al			
1100	1200		Russia, University Network	17765as				
1100	1200		Singapore, R Singapore Intl	6150as	9600as			
1100	1200		Taiwan, R Taipei Intl	7445as	11985as			
1100	1200		UK, BBC World Service	6190af	6195va	9605as	9740as	
			11760me 11945as 12095eu	12105sa	15190va	15220am	15280as	
			15310as 15400af 15485eu	15565eu	15575as	17640af	17700eu	
			17760as 17830af 17885af	21470af	21660as			
1100	1200		Ukraine, R Ukraine Intl	11840na	15520na			
1100	1200		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb		
1100	1200		USA, KAIJ Dallas TX	5755va				
1100	1200		USA, KTBN Salt Lk City UT	7505na				
1100	1200		USA, KWHR Naalehu HI	9930as	11565pa			
1100	1200		USA, Voice of America 15240va 15425va	6160va	9645va	9760va	9770va	15190va
1100	1200		USA, WEWN Birmingham AL 15745eu	7425na	7520na	9465na	15405eu	
1100	1200		USA, WHRI Noblesville IN	6040na	9495am			
1100	1200		USA, WINB Red Lion PA	13570am				
1100	1200		USA, WJIE Louisville KY	7490am	13595am			
1100	1200		USA, WRMI Miami FL	9955am				
1100	1200		USA, WRNO New Orleans LA	7395am				
1100	1200		USA, WSHB Cypress Creek SC	6095am	9455am	11660am		
1100	1200		USA, WTJC Newport NC	9370na				
1100	1200		USA, WWCR Nashville TN 15685na	5070na	5935na	7560na		
1100	1200		USA, WYFR Okeechobee FL	5850na	5950na	11725sa		
1106	1200		New Zealand, Radio NZ Intl	15175pa				

1115	1145		Nepal, Radio	3230as	5005as			
1120	1140	w	Kazakhstan, R Almaty	9620eu	11840eu			
1130	1145	vl	Libya, Voice of Africa	15435irr	17750irr			
1130	1155		Belgium, RVI Flanders R Intl	9865as				
1130	1200		Austria, Radio Austria Intl	6155eu	13730eu	21780as		
1130	1200		Netherlands, Radio	5965na	6045eu	9860eu		
1130	1200		South Korea, R Korea Intl		9650na			
1130	1200		Sri Lanka, SLBC	4940do				
1130	1200		Sweden, Radio	17505va	18960na			
1130	1200	mtwhf	UK, BBC World Service	11835am	15190sa			
1130	1200	f	Vatican City, Vatican Radio		15595va	17515va		
1140	1200	t	Kazakhstan, R Almaty	9620eu	11840eu			
1145	1200		Germany, Deutsche Welle		6140eu			
1155	1200	vl	Zimbabwe, ZBC Corp	5975do				

1200 UTC - 8AM E / 7AM C / 5AM P

1200	1215		UK, BBC World Service	7135af				
1200	1225		Netherlands, Radio	5965na	6045eu	9860eu		
1200	1230		France Radio France Intl	15540af	25820af			
1200	1230		Iran, VOIRI	15215as	15585as	15600as	21470as	21730au
1200	1230		Mongolia, Voice of	12015eu				
1200	1230		South Korea, R Korea Intl		9650na			
1200	1230		Uzbekistan, Radio Tashkent		5975as	7285as	9715as	15295as
				17775as				
1200	1230	vl	Zimbabwe, ZBC Corp	5975do				
1200	1259		Poland, Radio Polonia	6095eu	9525eu	11820eu		
1200	1300		Anguilla, Caribbean Beacon		11775am			
1200	1300		Australia, ABC NT Katherine		2485do			
1200	1300		Australia, ABC NT Tennant Crk		2325do			
1200	1300		Australia, Radio	5995pa	6020pa	9475as	9580pa	
				11650pa	11880as	21820as		
1200	1300		Australia, Voice International		13685as			
1200	1300		Bangladesh, Bangla Betar		7185as	9550as		
1200	1300		Canada, CBC Northern Service		9625do			
1200	1300		Canada, CFRX Toronto ON		6070do			
1200	1300		Canada, CFVP Calgary AB		6030do			
1200	1300		Canada, CKZN St John's NF		6160do			
1200	1300		Canada, CKZU Vancouver BC		6160do			
1200	1300		Canada, Radio Canada Intl		9660as	15190as		
1200	1300	mtwhf	Canada, Radio Canada Intl		9515na	13655na	17820na	
1200	1300		China, China Radio Intl	9730as	9760as	11760pa	11855pa	11980as
				15415pa				
1200	1300		China, Voice of Hope	7485as				
1200	1300		Costa Rica, University Network		5030am	6150am	7375am	9725sa
				11870am	13750na	17645as		
1200	1300		Ecuador, HCJB	12005am	15115na	21455usb		
1200	1300	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
1200	1300		Germany, Deutsche Welle		6140eu			
1200	1300		Germany, Overcomer Ministries		5975eu			
1200	1300		Guyana, Voice of	3290do	5950do			
1200	1300		Jordan, Radio	11690eu				
1200	1300		Malaysia, Radio	7295do				
1200	1300		New Zealand, Radio NZ Intl		15175pa			
1200	1300		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as	
1200	1300	mtwhfa	Papua New Guinea, NBC		4890do	9675al		
1200	1300		Russia, University Network		17765as			
1200	1300		Russia, Voice of Hope	13590as				
1200	1300		Singapore, R Singapore Intl		6150as	9600as		
1200	1300		Taiwan, R Taipei Intl	7130as	9610au			
1200	1300		UK, BBC World Service	6190af	6195va	9605as	9740as	
				11760me	11945as	12095eu	12105sa	15190va	15310as	15280as
				15565eu	15575as	17640af	17700eu	17760as	17830af	17885af
				21660as						
1200	1300		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb
				6458usb	10320usb	10940usb	12579usb	12689usb	13362usb	
1200	1300		USA, KALJ Dallas TX	13815va				
1200	1300		USA, KTBN Salt Lk City UT		7505na			
1200	1300		USA, KWHR Naalehu HI	9930as	11565pa			
1200	1300		USA, Voice of America	6160va	9645va	9760va	15160va	15240va
				15425va				
1200	1300		USA, WEWN Birmingham AL		9465na	11550na	11875na	15405eu
				15745eu				
1200	1300		USA, WHRI Noblesville IN		6040na	9495am		
1200	1300		USA, WINB Red Lion PA	13570am				
1200	1300		USA, WJIE Louisville KY	7490am	13595am			
1200	1300		USA, WRMI Miami FL	15725am				
1200	1300		USA, WRNO New Orleans LA		7395am			
1200	1300		USA, WSHB Cypress Creek SC		6095am	9455am	11660am	
1200	1300		USA, WTJC Newport NC	9370na				
1200	1300		USA, WWCR Nashville TN		5935na	7560na	12160na	
				13845na	15685na			
1200	1300		USA, WYFR Okeechobee FL		5850na	5950na	13695na	
				17750na				
1230	1257		Vietnam, Voice of	9840as	12020as			
1230	1300	mtwhfa	Finland, YLE/Radio Finland		15400na	17670na		
1230	1300		Sri Lanka, SLBC	4940do	6005as	6075as	9770as	15425as
1230	1300		Sweden, Radio	17505va	18960na	21530as		
1230	1300		Thailand, Radio	9885va				
1230	1300		Turkey, Voice of	17615as	17830eu			
1230	1300	a	UK, Wales Radio Intl	17845au				
1245	1300	tfa	Seychelles, FEBA Radio	15535me				

1300 UTC - 9AM E / 8AM C / 6AM P

1300	1305		New Zealand, Radio NZ Intl		15175pa			
1300	1310	mtwhfa	Turkmenistan, Turkmen Radio		5015as			
1300	1330		Guam, AWR	15385as				
1300	1330		Turkey, Voice of	17615as	17830eu			
1300	1330		UAE, AWR	17740as				
1300	1356		North Korea, Voice of	9335eu	11710na	13760eu	15244eu	
1300	1357		Czech Rep, Radio Prague Intl		13580eu	21735as		
1300	1400		Anguilla, Caribbean Beacon		11775am			
1300	1400		Australia, ABC NT Katherine		2485do			
1300	1400		Australia, ABC NT Tennant Crk		2325do			
1300	1400		Australia, Radio	5995pa	6020pa	9475as	9580pa	
				11650pa	11880as	21820as		
1300	1400		Australia, Voice International		13685as			
1300	1400		Canada, CBC Northern Service		9625do			
1300	1400		Canada, CFRX Toronto ON		6070do			
1300	1400		Canada, CFVP Calgary AB		6030do			
1300	1400		Canada, CKZN St John's NF		6160do			
1300	1400		Canada, CKZU Vancouver BC		6160do			
1300	1400		Canada, Radio Canada Intl		9515na	13655na		
1300	1400	as	Canada, Radio Canada Intl		17820na			
1300	1400		China, China Radio Intl	7405na	9570pa	11760pa	11980as	15180as
1300	1400		China, Voice of Hope	7485as				
1300	1400		Costa Rica, University Network		5030am	6150am	7375am	9725sa
				11870am	13750na	17645as		
1300	1400		Ecuador, HCJB	12005am	15115na	21455usb		
1300	1400	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
1300	1400		Germany, Deutsche Welle		6140eu			
1300	1400		Germany, Overcomer Ministries		13810me			
1300	1400		Jordan, Radio	11690eu				
1300	1400		Malaysia, Radio	7295do				
1300	1400		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as	
1300	1400	mtwhfa	Papua New Guinea, NBC		4890do	9675al		
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		South Korea, R Korea Intl		9570as	13670am		
1300	1400		Sri Lanka, SLBC	4940do	6005as	6075as	9770as	15425as
1300	1400		UK, BBC World Service	6190af	6195va	9605as	9740as	
				11760me	11940af	12095eu	12105sa	15190va	15285as	15310as
				15565eu	15420af	15485eu	15575eu	17640af	17720eu	17760as
				17795af	17830af	17885af	21470af	21640af		
1300	1400		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb
				6458usb	10320usb	10940usb	12579usb	12689usb	13362usb	
1300	1400		USA, KALJ Dallas TX	13815va				
1300	1400		USA, KNLS Anchor Point AK		11565as			
1300	1400		USA, KTBN Salt Lk City UT		7505na			
1300	1400		USA, KWHR Naalehu HI	9930as	11565pa			
1300	1400		USA, Voice of America	6160va	9645va	9760va	15160va	15425va
1300	1400		USA, WBCQ Kennebunk, ME		17495na			
1300	1400		USA, WBCQ Kennebunk, ME		7415na			
1300	1400		USA, WEWN Birmingham AL		11550na	11875na	15405eu	15745eu
1300	1400		USA, WHRI Noblesville IN		6040na	15105am		
1300	1400		USA, WINB Red Lion PA	13570am				
1300	1400		USA, WJIE Louisville KY	7490am	13595am			
1300	1400		USA, WRMI Miami FL	15725am				
1300	1400		USA, WRNO New Orleans LA		7395am			
1300	1400		USA, WSHB Cypress Creek SC		9430na	9455am		
1300	1400		USA, WTJC Newport NC	9370na				
1300	1400		USA, WWCR Nashville TN		9475na	12160na	13845na	
				15685na				
1300	1400		USA, WWRB Manchester TN		9320va	9400va	9495va	12172va
1300	1400		USA, WYFR Okeechobee FL		11550as	11830na	11865sa	
				11970na	17510sa	17750na		
1310	1400	occasional	New Zealand, Radio NZ Intl		6095pa			
1330	1350		UAE, Emirates Radio	13630eu	13675eu	15400eu	21597eu	
1330	1357		Vietnam, Voice of	7145eu	9730eu			
1330	1400		Austria, Radio Austria Intl		6155eu	13730eu		
1330	1400		Germany, Voice of Hope	17550as				
1330	1400		Guam, AWR	11705as	11980as			
1330	1400		India, All India Radio	9690as	11620as	13710as		
1330	1400		Laos, Lao National Radio		7145as			
1330	1400		Sweden, Radio	17505va	18960na			
1330	1400		UAE, AWR	15320as				
1330	1400		Uzbekistan, Radio Tashkent		5975as	7285as	9715as	15295as
				17775as				

Shortwave Guide

1400 UTC - 10AM E / 9AM C / 7AM P

1400	1415	mtwhf	UK, BBC World Service	11860af	21490af			
1400	1430		Ecuador, HCJB	12005am	15115na	21455usb		
1400	1430		Germany, Voice of Hope	17550as				
1400	1430		Thailand, Radio	9830va				
1400	1500		Anguilla, Canbbean Beacon		11775am			
1400	1500		Australia, ABC NT Katherine		2485do			
1400	1500		Australia, ABC NT Tennant Crk		2325do			
1400	1500		Australia, Radio	5995pa	9580pa	11650pa	11660as	
1400	1500		Australia, Voice International		13685as			
1400	1500		Canada, CBC Northern Service		9625do			
1400	1500		Canada, CFRX Toronto ON		6070do			
1400	1500		Canada, CFVP Calgary AB		6030do			
1400	1500		Canada, CKZN St John's NF		6160do			
1400	1500		Canada, CKZU Vancouver BC		6160do			
1400	1500		Canada, Radio Canada Intl 17820na		9515na	13655na	15305na	
1400	1500		China, China Radio Intl 17720na	7405na	9700as	11675pa	13685va	15125as
1400	1500		China, Voice of Hope	7485as				
1400	1500		Costa Rica, University Network 11870am 13750na 17645as		5030am	6150am	7375am	9725sa
1400	1500	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
1400	1500		France Radio France Intl	11610af	17620af			
1400	1500		Germany, Deutsche Welle		6140eu			
1400	1500		India, All India Radio	9690as	11620as	13710as		
1400	1500		Japan, Radio	7200as	9505na	11730as	17755me	
1400	1500		Jordan, Radio	11690eu				
1400	1500	occasional	New Zealand, Radio NZ Intl		6095pa			
1400	1500		Oman, Radio	13725va				
1400	1500		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as	
1400	1500	mtwhfa	Papua New Guinea, NBC		4890do	9675al		
1400	1500		Romania, R Romania Intl		15250eu	17735eu		
1400	1500		Russia, University Network		17765as			
1400	1500		Russia, Voice of Russia	7390as	9745as	12055as	15560as	17645as
1400	1500	as	S Africa, Channel Africa	11720af	17780af	21725af		
1400	1500		Singapore, SBC Radio One		6150do			
1400	1500		Sn Lanka, SLBC	4940do	6005as	6075as	9770as	15425as
1400	1500		Taiwan, R Taipei Intl	15265as				
1400	1500		UK, BBC World Service 12105sa 15105af 15575eu	6190af	6195va 15595eu	9605as 17640af	9740as 17810sa	12095eu 15420af 17830af 21470af
1400	1500		USA, Armed Forces Network 6458usb 10320usb		4319usb 10940usb	4993usb 12579usb	5765usb 12689usb	6350usb 13362usb
1400	1500		USA, KAIJ Dallas TX		13815va			
1400	1500		USA, KJES Vado NM		11715na			
1400	1500		USA, KTBN Salt Lk City UT		7505na			
1400	1500		USA, KWHR Naalehu HI	9930as	11565pa			
1400	1500		USA, Voice of America 15425va	6160va	7125va	9760va	15160va	15255va
1400	1500	s	USA, WBCQ Kennebunk, ME		7415na			
1400	1500		USA, WEWN Birmingham AL		11550na	11875na	15375na	15745eu
1400	1500		USA, WHRI Noblesville IN		6040na	15105am		
1400	1500		USA, WINB Red Lion PA	13570am				
1400	1500		USA, WJIE Louisville KY	7490am	13595am			
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 15685na		9475na	12160na	13845na	
1400	1500		USA, WWRB Manchester TN		9320va	9400va	12172va	
1400	1500		USA, WYFR Okeechobee FL 11970na 17510sa		11550as 17750na	11830na	11865sa	
1415	1420		Nepal, Radio	3230as	5005as			
1430	1500		Guam, TWR	15330as				
1430	1500		Myanmar, Radio	4725do	5985do			
1430	1500		Netherlands, Radio	9890as	11835as	12075as	15220na	
1445	1500	f	Seychelles, FEBA Radio	11600as				

1500 UTC - 11AM E / 10AM C / 8AM P

1500	1515		Pakistan, Radio	11570me	15100me	15725af	17750af	
1500	1530		Mexico, Radio Mexico Intl		9705am	11770am		
1500	1530		Mongolia, Voice of	12015eu				
1500	1530		S Afnca, Channel Africa	17770af				
1500	1556		North Korea, Voice of	9335na	11710na	13760eu	15245eu	
1500	1559		Canada, Radio Canada Intl		15455as	17720as		
1500	1559	as	Canada, Radio Canada Intl		9515na	13655na	17800na	
1500	1600		Anguilla, Caribbean Beacon		11775am			
1500	1600		Australia, Radio 11650pa 11660as	5995pa	9580pa	11650pa	11650pa	
1500	1600		Australia, Voice International		11930as			
1500	1600	vl	Austria, Radio Africa Intl	17895eu				
1500	1600		Canada, CBC Northern Service		9625do			
1500	1600		Canada, CFRX Toronto ON		6070do			
1500	1600		Canada, CFVP Calgary AB		6030do			
1500	1600		Canada, CKZN St John's NF		6160do			
1500	1600		Canada, CKZU Vancouver BC		6160do			
1500	1600		China, China Radio Intl	7160as	9785as	17720as		
1500	1600		China, Voice of Hope	7485as				
1500	1600		Costa Rica, University Network 11870am 13750na 17645as		5030am	6150am	7375am	9725sa
1500	1600	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va		
1500	1600		Germany, Deutsche Welle		6140eu			
1500	1600	a	Germany, Overcomer Ministries		6015eu			
1500	1600		Germany, Voice of Hope	15715me				
1500	1600		Guam, TWR	15330as				
1500	1600		Japan, Radio	7200as	9750as	11730as		
1500	1600		Jordan, Radio	11690na				
1500	1600		Myanmar, Radio	4725do	5985do			
1500	1600		Netherlands, Radio	9890as	11835as	12075as	15220na	
1500	1600	occasional	New Zealand, Radio NZ Intl		6095pa			
1500	1600		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as	
1500	1600	mtwhfa	Papua New Guinea, NBC		4890do	9675al		
1500	1600		Russia, Voice of Russia 11500as 11985me	4940me	4965me	4975me	7325me	7390as
1500	1600		Singapore, SBC Radio One		6150do			
1500	1600		Sri Lanka, SLBC	4940do	6005as	6075as	9770as	15425as
1500	1600		UK, BBC World Service 11860af 17700as	5975am	6190af 17830af	6195va 17860af	9740as 21470af	11685as 15565eu 21490af
1500	1600		USA, Armed Forces Network 6458usb 10320usb		4319usb 10940usb	4993usb 12579usb	5765usb 12689usb	6350usb 13362usb
1500	1600		USA, KAIJ Dallas TX		13815va			
1500	1600		USA, KJES Vado NM		11715na			
1500	1600		USA, KTBN Salt Lk City UT		15590na			
1500	1600		USA, KWHR Naalehu HI	9930as	11565pa			
1500	1600		USA, Voice of America 9845va	6160va	7125va 12040va	9590va 15205va	9700va 15255va	9760va 15550va
1500	1600		USA, WBCQ Kennebunk, ME		17495na			
1500	1600	s	USA, WBCQ Kennebunk, ME		7415na			
1500	1600		USA, WEWN Birmingham AL		11550na	11875na	15375na	15745eu
1500	1600		USA, WHRA Greenbush ME		17650va			
1500	1600		USA, WHRI Noblesville IN		13760na	15105am		
1500	1600		USA, WINB Red Lion PA	13570am				
1500	1600		USA, WJIE Louisville KY	7490am	13595am			
1500	1600		USA, WRMI Miami FL	15725am				
1500	1600		USA, WRNO New Orleans LA		7395am	15420am		
1500	1600		USA, WTJC Newport NC	9370na				
1500	1600		USA, WWCR Nashville TN 15685na		9475na	12160na	13845na	
1500	1600		USA, WYFR Okeechobee FL 17750na 17800as		6280as	11830na	15520as	
1515	1545	tw	Seychelles, FEBA Radio	11600as				
1515	1600	mtf	Seychelles, FEBA Radio	11600as				
1530	1600		Austria, Radio Austria Intl		17860na			
1530	1600		Iran, VOIRI	7245as	9635eu	11775as		
1530	1600	as	Seychelles, FEBA Radio	11600as				
1540	1550		Turkmenistan, Turkmen Radio		4930as			
1550	1600		Vatican City, Vatican Radio		12065au	13765au	15235au	

1600 UTC - 12PM E / 11AM C / 9AM P

1600	1610		Vatican City, Vatican Radio		12065au	13765au	15235au	
1600	1625		Netherlands, Radio	9890as	11835as	12075as	15220na	
1600	1627		Czech Rep, Radio Prague Intl		5930eu	21745va		
1600	1627		Vietnam, Voice of	7145eu	9730eu			
1600	1630		Iran, VOIRI	7245as	9635eu	11775as		
1600	1630		Israel, Kol Israel	15615va	17545va			
1600	1630		Mexico, Radio Mexico Intl		9705am	11770am		
1600	1630		S Africa, Channel Africa	9525af				
1600	1630		USA, KWHR Naalehu HI	9930as				
1600	1635		Germany, Voice of Hope	13810af				
1600	1640		UAE, Emirates Radio	13630eu	13675eu	15400eu	21597al	
1600	1645		Germany, Deutsche Welle 11665af 17595as		6140eu 21840af	6170as	7225as	9735af
1600	1650	occasional	New Zealand, Radio NZ Intl		6095pa			
1600	1656		North Korea, Voice of	9975af	11735af			
1600	1700		Algeria, Radio Algiers Intl		11715eu	15160eu		
1600	1700		Anguilla, Caribbean Beacon		11775am			
1600	1700		Australia, Radio	5995pa	9475as	9580pa	11650pa	11660as
1600	1700		Australia, Voice International		11930as			
1600	1700		Canada, CBC Northern Service		9625do			
1600	1700		Canada, CFRX Toronto ON		6070do			
1600	1700		Canada, CFVP Calgary AB		6030do			
1600	1700		Canada, CKZN St John's NF		6160do			
1600	1700		Canada, CKZU Vancouver BC		6160do			
1600	1700		China, China Radio Intl	7190af	13650af			

1600	1700		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na					
1600	1700		Ethiopia, Radio	5990do	7110af	7165af	9560af	9704af
			11800af					
1600	1700	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
1600	1700		France Radio France Intl	11615af	11995af	12015af	15605af	17605af
			17850af					
1600	1700	a	Germany, Overcomer Ministries	6015eu				
1600	1700	a	Greece, Voice of	9420eu	15630eu	17705na		
1600	1700		Jordan, Radio	11690na				
1600	1700		Palau, KHBN/VO Hope	9965as				
1600	1700		Russia, Voice of Russia	7350as	11720as	11985me	12055as	
			15540me					
1600	1700		South Korea, R Korea Intl	5975am	9515af	9870af		
1600	1700		Taiwan, R Taipei Intl	11550as				
1600	1700	as	UK, BBC World Service	9635af	12095eu			
1600	1700		UK, BBC World Service	3915as	5975as	6190af	6195va	7160af
			9410eu 9510as	11860af	11940af	12095eu	15190va	15310as
			15400af 15485eu	15565eu	17700eu	17830af	17860af	21470af
			21490af 21660af					
1600	1700		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb	
1600	1700		USA, KAIJ Dallas TX	13815va				
1600	1700		USA, KJES Vado NM	11715na				
1600	1700		USA, KTBN Salt Lk City UT	7505na				
1600	1700		USA, Voice of America	6035af	6160va	7125va	9700va	9760va
			13600va 13710af	15205va	15225af	15255va	15410af	15445va
			17810af 17895va					
1600	1700		USA, WBCQ Kennebunk, ME	17495na				
1600	1700	s	USA, WBCQ Kennebunk, ME	7415na				
1600	1700		USA, WEWN Birmingham AL	11550na	13615na	15375na	15745eu	
1600	1700		USA, WHRA Greenbush ME	17650va				
1600	1700		USA, WHRI Noblesville IN	13760na	15105am			
1600	1700		USA, WINB Red Lion PA	13570am				
1600	1700		USA, WJIE Louisville KY	7490am	13595am			
1600	1700		USA, WMLK Bethel PA	9465eu				
1600	1700		USA, WRMI Miami FL	15725am				
1600	1700		USA, WRNO New Orleans LA	7395am	15420am			
1600	1700		USA, WSHB Cypress Creek SC	18910af				
1600	1700		USA, WTJC Newport NC	9370na				
1600	1700		USA, WWCR Nashville TN	9475na	12160na	13845na		
			15685na					
1600	1700		USA, WYFR Okeechobee FL	11830na	17750na	17800as	18980eu	
			21455eu 21525af					
1610	1625		Armenia, TWR	5855eu				
1615	1630		Vatican City, Vatican Radio	4005eu	5890eu	7250eu	9645eu	
			15595eu					
1630	1700		Georgia, Georgian Radio	6180me				
1630	1700		Guam, AWR	9385me	11850me	17630me		
1630	1700		Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu		
1630	1700		UAE, AWR	9600me				
1630	1700		UK, BBC World Service	11955as	15645eu			
1645	1700		Germany, Deutsche Welle	6140eu				
1645	1700		Tajikistan, Radio	7245as				
1650	1700	mtwhf	New Zealand, Radio NZ Intl	11725pa				

1700 UTC - 1PM E / 12PM C / 10AM P

1700	1727		Czech Rep, Radio Prague Intl	5930va	21745va			
1700	1730		Azerbaijan, Voice of	6110eu				
1700	1730		France Radio France Intl	15605af	17605af			
1700	1730		S Africa, Channel Africa	17860af				
1700	1750	mtwhf	New Zealand, Radio NZ Intl	11725pa				
1700	1759		Poland, Radio Polonia	5995eu				
1700	1800		Anguilla, Caribbean Beacon	11775am				
1700	1800		Australia, Radio	5995pa	9475as	9580pa	9815pa	
			11880pa					
1700	1800		Canada, CBC Northern Service	9625do				
1700	1800		Canada, CFRX Toronto ON	6070do				
1700	1800		Canada, CFVP Calgary AB	6030do				
1700	1800		Canada, CKZN St John's NF	6160do				
1700	1800		Canada, CKZU Vancouver BC	6160do				
1700	1800		China, China Radio Intl	7150af	9570af	9675as	11910af	15205af
1700	1800		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na	17645as				
1700	1800	mtwhf	Eqt Guinea, Radio Africa	15185af				
1700	1800	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
1700	1800	a	Germany, Overcomer Ministries	6015eu				
1700	1800		Germany, Unt. Methodist Church	11735af	13820af			
1700	1800		Germany, Voice of Hope	9495eu				
1700	1800		Japan, Radio	9505na	11970eu	15355af		
1700	1800		Romania, R Romania Intl	11740eu	15380eu	15365eu	17805eu	
1700	1800		Russia, Voice of Russia	7310eu	9745af	9775eu	11510af	11985af
1700	1800	as	Russia, Voice of Russia	7360eu	9480eu	9820eu	11675eu	
1700	1800		Taiwan, R Taipei Intl	11550as				
1700	1800		UK, BBC World Service	3255af	3915af	5975as	6190af	6195eu
			7160af 7230af	9410eu	9510as	9630af	11860af	12095eu
			15310as 15400af	15420af	17830af	17860af	21470af	
1700	1800		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb	
1700	1800		USA, KAIJ Dallas TX	13815va				
1700	1800		USA, KTBN Salt Lk City UT	7505na				
1700	1800		USA, Voice of America	6160va	7125va	7170va	9700va	9645va
			15205va 15255va	15410af	15445af	17895af		
1700	1800	mtwhf	USA, Voice of America	5990va	6045va	7215va	9770va	9785va
1700	1800		USA, WBCQ Kennebunk, ME	17495na				
1700	1800	s	USA, WBCQ Kennebunk, ME	7415na				
1700	1800		USA, WEWN Birmingham AL	11550na	13615na	15745eu	17595eu	
1700	1800		USA, WHRA Greenbush ME	17650va				
1700	1800		USA, WHRI Noblesville IN	9495am	13760va			
1700	1800		USA, WINB Red Lion PA	13570am				
1700	1800		USA, WJIE Louisville KY	7490am	13595am			
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 Cypress Creek SC	18910af				
1700	1800		USA, WTJC Newport NC	9370na				
1700	1800		USA, WWCR Nashville TN	9475na	12160na	13845na		
			15685na					
1700	1800		USA, WWRB Manchester TN	9495va	12172va			
1700	1800		USA, WYFR Okeechobee FL	18980eu	21455eu	21680eu		
1730	1745	vl	Libya, Voice of Africa	15435irr	17750irr			
1730	1745		UK, BBC World Service	9525af				
1730	1745	mtwhf/vl	UK, United Nations Radio	7150af	17570af	17710eu		
1730	1755		Belgium, RVI Flanders R Intl	9925eu	13690eu	13710eu		
1730	1800	irreg	Liberia, ELWA	4760do				
1730	1800	vl/mtwhfa	Malta, VO Mediterranean	9605eu				
1730	1800		Netherlands, Radio	6020af	7120af	11655af		
1730	1800		Swaziland, TWR	9500af				
1730	1800	mtwhfa	Sweden, Radio	6065va	13580va			
1730	1800		Switzerland, Swiss R Intl	15220va	17735va	21720va		
1730	1800		Vatican City, Vatican Radio	13765af	15570af	17515af		
1735	1745	vl/-h	Paraguay, Radio Nacional	9739sa				
1745	1800		Bangladesh, Bangla Betar	7185eu	9550eu	15520eu		
1745	1800		India, All India Radio	7410eu	11620eu	11935af	13605af	15075af
			15155af 17670af					
1751	1800	mtwhf	New Zealand, Radio NZ Intl	15160pa				

1800 UTC - 2PM E / 1PM C / 11AM P

1800	1827		Vietnam, Voice of	5970eu	7145eu	9725eu	9730eu	
1800	1830	s	Germany, Universal Life/Santec	15750af				
1800	1830	s	Greece, Voice of	9420eu	15630eu	17705na		
1800	1830		Netherlands, Radio	6020af	7120af	11655af		
1800	1830		S Africa, AWR	5970af	6095af	7170af		
1800	1830		S Africa, Channel Africa	17860af				
1800	1830		UK, RTE Radio	15315me				
1800	1830	vl	Zimbabwe, ZBC Corp	4828do				
1800	1900		Anguilla, Caribbean Beacon	11775am				
1800	1900		Australia, Radio	6080pa	7240pa	9475as	9580pa	9815pa
			11880pa					
1800	1900		Bangladesh, Bangla Betar	7185eu	9550eu	15520eu		
1800	1900		Canada, CBC Northern Service	9625do				
1800	1900		Canada, CFRX Toronto ON	6070do				
1800	1900		Canada, CFVP Calgary AB	6030do				
1800	1900		Canada, CKZN St John's NF	6160do				
1800	1900		Canada, CKZU Vancouver BC	6160do				
1800	1900		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am 13750na	17645as				
1800	1900	mtwhf	Eqt Guinea, Radio Africa	15185af				
1800	1900	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
1800	1900		Germany, Unt. Methodist Church	11735af	13820af			
1800	1900		Germany, Voice of Hope	15715me				
1800	1900		India, All India Radio	7410eu	11620eu	11935af	13605af	15075af
			15155af 17670af					
1800	1900		Kuwait, Radio	11990va				
1800	1900	irreg	Liberia, ELWA	4760do				
1800	1900		Liberia, R Liberia Intl	5100do				
1800	1900	mtwhf	New Zealand, Radio NZ Intl	15160pa				
1800	1900		Russia, Voice of Russia	5950eu	7300eu	7310eu	7360eu	9480eu
			9745af 9775eu	9820eu	11510af	11870af		
1800	1900		Swaziland, TWR	9500af				
1800	1900		Taiwan, R Taipei Intl	3955eu				
1800	1900		UK, BBC World Service	3255af	5975as	6050eu	6190af	6195eu
			9410eu 9510as	12095eu	15310me	15400af	15420af	17830af
			17885af 21470af					
1800	1900		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb	
1800	1900		USA, KAIJ Dallas TX	13815va				
1800	1900		USA, KTBN Salt Lk City UT	7505na				

1800	1900		USA, Voice of America	6035af	7415af	9760va	9770va	11975af
			15410af 15580af	17895af				
1800	1900		USA, WBCQ Kennebunk, ME		17495na			
1800	1900	s	USA, WBCQ Kennebunk, ME		7415na			
1800	1900		USA, WEWN Birmingham AL		11530na	13615na	15745eu	17595eu
1800	1900		USA, WHRA Greenbush ME		17650va			
1800	1900		USA, WHRI Noblesville IN		9495am	13760va		
1800	1900		USA, WINB Red Lion PA	13570am				
1800	1900		USA, WJIE Louisville KY	7490am	13595am			
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 Cypress Creek SC		15665eu	18910af		
1800	1900		USA, WTJC Newport NC	9370na				
1800	1900		USA, WWCR Nashville TN		9475na	12160na	13845na	
			15685na					
1800	1900		USA, WYFR Okeechobee FL		18980eu			
1800	1900		Yemen, Rep of Yemen Radio		9780me			
1830	1900		Austria, Radio Austria Intl		5945eu	6155eu		
1830	1900	mtwhf	Georgia, Georgian Radio		6230eu			
1830	1900	as	Georgia, Georgian Radio		11910as			
1830	1900		Greece, Voice of	11645eu				
1830	1900	s	Greece, Voice of	9420eu	15630eu	17705na		
1830	1900		Netherlands, Radio	6020af	7120af	9895af	11655af	13700af
			17605af 21590af					
1830	1900		S Africa, AWR	7170af				
1830	1900		Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu		
1830	1900		Turkey, Voice of	9785eu				
1830	1900		UK, RTE Radio	13640na	21630af			
1830	1900	as	USA, Voice of America	11690af	13835af	15525af		
1845	1900	mtwhfa	Albania, Radio Tirana Intl		7210na	9520na		

1900 UTC - 3PM E / 2PM C / 12PM P

1900	1925		Israel, Kol Israel	9435va	11605va	15615va	15640af	17545va
1900	1927		Vietnam, Voice of	7145eu	9730eu			
1900	1930		Hungary, Radio Budapest		6025eu	7130eu		
1900	1930		Turkey, Voice of	9785eu				
1900	1945		Germany, Deutsche Welle		11805af	11965af	13720af	15390af
			17810af					
1900	1945		India, All India Radio	7410eu	11620eu	11935af	13605af	15075af
			15155af 17670af					
1900	1945		Iraq, Radio Iraq Intl	7157irr	9887irr	11787irr		
1900	1945	vl	Zimbabwe, ZBC Corp	4828do	5012do			
1900	1956		North Korea, Voice of	13760eu	15245eu			
1900	2000		Anguilla, Caribbean Beacon		11775am			
1900	2000	mtwhf	Argentina, RAE	9690eu	15345eu			
1900	2000		Australia, Radio	6080pa	7240pa	9500as	9580pa	9815pa
			11880pa					
1900	2000	vl	Botswana, Radio	3356do	4820do	7255do		
1900	2000		Bulgaria, Radio	9400eu	11900eu			
1900	2000	irrg/vl	Cameroon, RTV	4850do				
1900	2000		Canada, CBC Northern Service		9625do			
1900	2000		Canada, CFRX Toronto ON		6070do			
1900	2000		Canada, CFVP Calgary AB		6030do			
1900	2000		Canada, CKZN St John's NF		6160do			
1900	2000		Canada, CKZU Vancouver BC		6160do			
1900	2000		China, China Radio Intl	9440af	9585af			
1900	2000		Costa Rica, University Network		5030am	6150am	7375am	9725sa
			11870am 13750na	17645as				
1900	2000	mtwhf	Eqt Guinea, Radio Africa		15185af			
1900	2000	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va		
1900	2000		Germany, Voice of Hope	15715me				
1900	2000	vl	Ghana, Ghana BC Corp		3366do	4915do		
1900	2000		Guyana, Voice of	3290do	5950do			
1900	2000		Kenya, Kenya BC Corp	4885do	4935do			
1900	2000		Kuwait, Radio	11990va				
1900	2000	irreg	Liberia, ELWA	4760do				
1900	2000		Liberia, R Liberia Intl	5100do				
1900	2000		Malaysia, Radio	7295do				
1900	2000	smtwha	Malta, VO Mediterranean		12060eu			
1900	2000		Namibia, NBC	3270af	3290af			
1900	2000		Netherlands, Radio	6020af	7120af	9895af	11655af	13700af
			17605af 21590af					
1900	2000		New Zealand, Radio NZ Intl		15160pa			
1900	2000		Nigeria, Radio/Enugu	6025do				
1900	2000		Nigeria, Radio/Ibadan	6050do				
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
1900	2000		Nigeria, Radio/Lagos	3326do	4990al			
1900	2000		Nigeria, Voice of	7255af				
1900	2000	mtwhfa	Papua New Guinea, NBC		4890do	9675al		
1900	2000		Russia, Voice of Russia	7330eu	7350eu	7360eu	7440eu	9775eu
			9820eu 15735am					
1900	2000		Sierra Leone, SLBS	3316do				
1900	2000		South Korea, R Korea Intl		5975am	7275eu		
1900	2000		Thailand, Radio	7155eu				
1900	2000		Uganda, Radio	4976do	5026al	7195al		
1900	2000		UK, BBC World Service	3255af	5975as	6005af	6190af	6195eu
			9410eu 9630af	11720as	12095eu	15105af	15310as	15400af
			17830af 17885af					
1900	2000		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb	
1900	2000		USA, KALU Dallas TX	13815va				
1900	2000		USA, KJES Vado NM	15385au				
1900	2000		USA, KTBN Salt Lk City UT		7505na			
1900	2000		USA, Voice of America	4950af	6035af	6095va	6160va	7260va
			7375af 7415af	9525va	9680va	9770va	11770va	11975af
			13635va 15180va	15410af	15445af	15580af		
1900	2000		USA, WBCQ Kennebunk, ME		17495na			
1900	2000	s	USA, WBCQ Kennebunk, ME		7415na			
1900	2000		USA, WEWN Birmingham AL		11550na	13615na	15745eu	17595eu
1900	2000		USA, WHRA Greenbush ME		17650va			
1900	2000		USA, WHRI Noblesville IN		9495am	13760va		
1900	2000		USA, WINB Red Lion PA	13570am				
1900	2000		USA, WJIE Louisville KY	7490am	13595am			
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 Cypress Creek SC		15665eu	18910af		
1900	2000		USA, WTJC Newport NC	9370na				
1900	2000		USA, WWCR Nashville TN		9475na	12160na	13845na	
			15685na					
1900	2000		USA, WYFR Okeechobee FL		3230eu	18930eu	18980eu	
1900	2000	vl	Vanuatu, Radio	4960do	7260do			
1900	2000		Zambia, Christian Voice	4965af				
1900	2000	vl	Zambia, Radio ZNBC	4910do	6265al			
1930	1955		Belgium, RVI Flanders R Intl		9925eu	13690eu		
1930	2000		Austria, AWR	7130eu				
1930	2000	t h	Belarus, Radio Belarus Intl		7105eu	7210eu		
1930	2000		Georgia, Georgian Radio		11760eu			
1930	2000		Iran, VOIRI	9800eu	11670eu	11750af	11855eu	
1930	2000		Poland, Radio Polonia	7165eu	7265eu			
1930	2000	mtwhf/vl	Solomon Islands, SIBC	5020do				
1930	2000		Sweden, Radio	6065va				
1930	2000		Switzerland, Swiss R Intl	13645af	15220af	17580af	17735af	
1930	2000	mtwhf	USA, Voice of America	9550va	9840va	11780va	11970va	12015va
			13715va 15235va					
1935	1955		Italy, RAI Intl	5970eu	9745eu			
1940	2000	mtwhfa	Armenia, Voice of	4810eu	9960eu			
1950	2000		Vatican City, Vatican Radio		4005eu	5885eu	7250eu	9645eu

2000 UTC - 4PM E / 3PM C / 1PM P

2000	2010		Vatican City, Vatican Radio		4005eu	5885eu	7250eu	9645af
			9660af 11625af	13765af				
2000	2015	s/vl	Solomon Islands, SIBC	5020do				
2000	2025		Netherlands, Radio	6020af	7120af	9895af	11655af	13700af
			17605af 21590af					
2000	2027		Czech Rep, Radio Prague Intl		5930va	11600va		
2000	2027		Iran, VOIRI	9800eu	11670eu	11750af	11855eu	
2000	2029		Poland, Radio Polonia	7165eu	7265eu			
2000	2030	mtwhf	Lithuania, Tomorrow's Nx Today		7590eu			
2000	2030		Mongolia, Voice of	12015eu				
2000	2030	mtwhf/vl	Solomon Islands, SIBC	5020do				
2000	2030		Switzerland, Swiss R Intl	13645af	15220af	17580af	17735af	
2000	2030		USA, Voice of America	4950af	6035af	7375af	7415af	11855af
			11975af 15410af	15445af	15580af	17745af	17895af	
2000	2045		Germany, Deutsche Welle		6140eu			
2000	2045		Iraq, Radio Iraq Intl	7157irr	9887irr	11787irr		
2000	2050		New Zealand, Radio NZ Intl		15160pa			
2000	2059		Canada, Radio Canada Intl		5850va	5995va	11690va	11965va
			12015va 15325va	15470va	17870va			
2000	2100		Algeria, Radio Algiers Intl		11715eu	15160eu		
2000	2100		Anguilla, Caribbean Beacon		11775am			
2000	2100		Australia, ABC NT Katherine		2485do			
2000	2100		Australia, ABC NT Tennant Crk		2325do			
2000	2100		Australia, Radio	9500as	9580pa	9815pa	11880pa	
			12080pa					
2000	2100	vl	Botswana, Radio	3356do	4820do	7255do		
2000	2100	irrg/vl	Cameroon, RTV	4850do				
2000	2100		Canada, CBC Northern Service		9625do			
2000	2100		Canada, CFRX Toronto ON		6070do			
2000	2100		Canada, CFVP Calgary AB		6030do			
2000	2100		Canada, CKZN St John's NF		6160do			
2000	2100		Canada, CKZU Vancouver BC		6160do			
2000	2100		China, China Radio Intl	5965eu	9840eu	11640eu	13640af	
2000	2100		Costa Rica, University Network		5030am	6150am	7375am	9725sa
			11870am 13750na	17645as				
2000	2100		Ecuador, HCJB	17660eu				
2000	2100	mtwhf	Eqt Guinea, Radio Africa		15185af			

2000	2100	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
2000	2100		Germany, Voice of Hope	6175eu	15715me			
2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do			
2000	2100		Indonesia, Voice of	9525pa	11785al	15150as		
2000	2100		Kenya, Kenya BC Corp	4885do	4935do			
2000	2100		Kuwait, Radio	11990va				
2000	2100	irreg	Liberia, ELWA	4760do				
2000	2100		Liberia, R Liberia Intl	5100do				
2000	2100		Malaysia, Radio	7295do				
2000	2100		Namibia, NBC	3270af	3290af			
2000	2100		Nigeria, Radio/Enugu	6025do				
2000	2100		Nigeria, Radio/Ibadan	6050do				
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
2000	2100		Nigeria, Radio/Lagos	3326do	4990al			
2000	2100		Nigeria, Voice of	7255af				
2000	2100		Russia, Voice of Russia 15735am	7330eu	7350eu	9775eu	9820eu	11980eu
2000	2100		S Africa, AWR	9745af				
2000	2100		Sierra Leone, SLBS	3316do				
2000	2100	mtwhf	Spain, R Exterior Espana	9570af	15290af			
2000	2100		Uganda, Radio	4976do	5026al	7195al		
2000	2100		UK, BBC World Service 9410eu 9630af	3255af	5975ca	6005af	6190af	6195eu
				11835af	11955eu	12095eu	15400af	17830af
2000	2100		USA, Armed Forces Network 6458usb 10320usb	4319usb	4993usb	5765usb	6350usb	
				10940usb	12579usb	12689usb	13362usb	
2000	2100		USA, KAIJ Dallas TX	13815va				
2000	2100		USA, KJES Vado NM	15385na				
2000	2100		USA, KTBN Salt Lk City UT	7505na				
2000	2100		USA, Voice of America	6095va	6160va	9770va		
2000	2100		USA, WBCQ Kennebunk, ME	7415na	9335na	17495na		
2000	2100		USA, WEWN Birmingham AL 17595eu	11530na	11550na	13615na	15745eu	
2000	2100		USA, WHRA Greenbush ME	17650va				
2000	2100		USA, WHRI Noblesville IN	5745va	9495am	13760va		
2000	2100		USA, WINB Red Lion PA	13570am				
2000	2100		USA, WJIE Louisville KY	7490am	13595am			
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 15685na	9475na	12160na	13845na		
2000	2100		USA, WWRB Manchester TN	9320va	9400va	12172va		
2000	2100		USA, WYFR Okeechobee FL 18980eu	3230eu	15195eu	17725sa	17845af	
2000	2100	vl	Vanuatu, Radio	4960do	7260do			
2000	2100		Zambia, Christian Voice	4965af				
2000	2100	vl	Zambia, Radio ZNBC	4910do	6265al			
2000	2100	vl	Zimbabwe, ZBC Corp	5975do	6045al			
2000	2100		USA, WSHB Cypress Creek SC	15665eu	18910af			
2005	2100	vl	Syria, Radio Damascus	12085eu	13610eu			
2010	2030		Vatican City, Vatican Radio	9660af	11625af	13765af		
2025	2045		Italy, RAI Intl	6185af	9760af	11880af		
2030	2045	vl	Libya, Voice of Africa	15435irr	17750irr			
2030	2045		Thailand, Radio	9680eu				
2030	2057		Vietnam, Voice of	7145eu	9730eu			
2030	2100	t	Belarus, Radio Belarus Intl	7105eu	7210eu			
2030	2100		Cuba, Radio Havana	13660usb	13750eu			
2030	2100		Ecuador, HCJB	21455usb				
2030	2100	vl	Solomon Islands, SIBC	5020do				
2030	2100		Turkey, Voice of	9525va				
2030	2100	f	UK, Wales Radio Intl	7325eu				
2030	2100		USA, Voice of America 15455af 15580af	6035af	7375af	7415af	11975af	15410af
				17745af	17895af			
2030	2100	as	USA, Voice of America	4950af				
2030	2100		Uzbekistan, Radio Tashkent	5025eu	9545eu	11905eu		
2045	2100		India, All India Radio	7150eu	9650eu	11620eu	11715au	
2051	2100		New Zealand, Radio NZ Intl	17675pa				

2100 UTC - 5PM E / 4PM C / 2PM P

2100	2130		Australia, ABC NT Katherine	2485do				
2100	2130		Australia, ABC NT Tennant Crk	2325do				
2100	2130		Australia, Radio 11880pa 12080pa	7240pa	9500as	9580pa	9660pa	
				17715pa	21740pa			
2100	2130		Canada, Radio Canada Intl 17870va	5850va	7235va	13690va	15325va	
2100	2130		Cuba, Radio Havana	13660usb	13750eu			
2100	2130		Hungary, Radio Budapest	3975eu	6025eu			
2100	2130		Kenya, Kenya BC Corp	4885do	4935do			
2100	2130		Nigeria, Radio/Ibadan	6050do				
2100	2130		South Korea, R Korea Intl	3955eu	15575eu			
2100	2130		Turkey, Voice of	9525va				
2100	2145		Germany, Deutsche Welle 11915as 15135af	9670as	9765as	9830af	11865af	
2100	2156		North Korea, Voice of	13760eu	15245eu			
2100	2200		Anguilla, Caribbean Beacon	11775am				
2100	2200		Austria, AWR	15355af				
2100	2200	vl	Botswana, Radio	3356do	4820do			
2100	2200		Bulgaria, Radio	9400eu	11900eu			
2100	2200	irrg/vl	Cameroon, RTV	4850do				
2100	2200		Canada, CBC Northern Service	9625do				
2100	2200		Canada, CFRX Toronto ON	6070do				
2100	2200		Canada, CFVP Calgary AB	6030do				
2100	2200		Canada, CKZN St John's NF	6160do				
2100	2200		Canada, CKZU Vancouver BC	6160do				
2100	2200		China, China Radio Intl	5965eu	9840eu	11735eu	13630af	
2100	2200		Costa Rica, University Network 11870am 13750na	5030am	6150am	7375am	9725sa	
				17645as				
2100	2200		Ecuador, HCJB	17660eu	21455usb			
2100	2200	mtwhf	Eqt Guinea, Radio Africa	15185af				
2100	2200	f/monthly	Finland, Scandv Weekend Radio	6170va	11690va			
2100	2200	vl	Ghana, Ghana BC Corp	3366do	4915do			
2100	2200		Guyana, Voice of	3290do	5950do			
2100	2200		India, All India Radio	7150eu	9650eu	11620au	11715au	
2100	2200		Japan, Radio 11855af 17825na	6035pa	6055eu	6180eu	11830eu	
				17860pa	21670pa			
2100	2200	irreg	Liberia, ELWA	4760do				
2100	2200		Liberia, R Liberia Intl	5100do				
2100	2200		Malaysia, Radio	7295do				
2100	2200		Namibia, NBC	3270af	3290af			
2100	2200		New Zealand, Radio NZ Intl	17675pa				
2100	2200		Nigeria, Radio/Enugu	6025do				
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
2100	2200		Nigeria, Radio/Lagos	3326do	4990al			
2100	2200		Palau, KHBN/VO Hope	9985as				
2100	2200	mtwhfa	Papua New Guinea, NBC	4890do	9675al			
2100	2200		Romania, R Romania Intl 11940eu	9510eu	9725eu	11740eu		
2100	2200		Sierra Leone, SLBS	3316do				
2100	2200	vl	Solomon Islands, SIBC	5020do				
2100	2200	as	Spain, R Exterior Espana	9570af	9840eu			
2100	2200	vl	Syria, Radio Damascus	12085eu	13610eu			
2100	2200		Taiwan, R Taipei Intl	15600eu				
2100	2200		UK, BBC World Service 9410eu 11675va	3255af	3915as	6005af	6190af	6195eu
				11835af	11945as	12095as	15400af	
2100	2200		Ukraine, R Ukraine Intl 11950eu	5905eu	6020eu	9950eu	11705eu	
2100	2200		USA, Armed Forces Network 6350usb 6458usb 13362usb	4319usb	4993usb	5765usb		
				10320usb	10940usb	12579usb	12689usb	
2100	2200		USA, KAIJ Dallas TX	13815va				
2100	2200		USA, KTBN Salt Lk City UT	7505na				
2100	2200		USA, Voice of America 9530va 9705va 15185va 15410af 17895af	6035af	6040va	6095va	7375af	7415af
				9760va	11870va	11975af	13765va	
				15455af	15580af	17740va	17820va	
2100	2200		USA, WBCQ Kennebunk, ME	7415na	9335na	17495na		
2100	2200		USA, WEWN Birmingham AL 17595eu	11530na	11550na	13615na		
2100	2200		USA, WHRA Greenbush ME	17650va				
2100	2200		USA, WHRI Noblesville IN	5745va	9495am	13760va		
2100	2200		USA, WINB Red Lion PA	13570am				
2100	2200		USA, WJIE Louisville KY	7490am	13595am			
2100	2200		USA, WMLK Bethel PA	15265eu				
2100	2200		USA, WRMI Miami FL	15725am				
2100	2200		USA, WRNO New Orleans LA	7395am	15420am			
2100	2200		USA, WSHB Cypress Creek SC	15665eu	18910af			
2100	2200		USA, WTJC Newport NC	9370na				
2100	2200		USA, WWCR Nashville TN 15685na	9475na	12160na	13845na		
2100	2200		USA, WWRB Manchester TN	9320va	9400va	12172va		
2100	2200		USA, WYFR Okeechobee FL 17845af 18980eu	15120af	15770eu	17725sa		
2100	2200	vl	Vanuatu, Radio	4960do	7260do			
2100	2200		Zambia, Christian Voice	4965af				
2100	2200	vl	Zambia, Radio ZNBC	4910do	6265al			
2100	2200	vl	Zimbabwe, ZBC Corp	5975do	6045al			
2130	2157		Czech Rep, Radio Prague Intl	11600va	15545va			
2130	2200	mtwhfa	Albania, Radio Tirana Intl	7130eu	9540eu			
2130	2200		Australia, ABC NT Alice Springs	4835do				
2130	2200		Australia, ABC NT Katherine	5025do				
2130	2200		Australia, ABC NT Tennant Crk	4910do				
2130	2200		Australia, Radio 17715pa 21740pa	7240pa	9660pa	11880pa	12080pa	
2130	2200	mtwhf	Austria, Radio Austria Intl	5945va	6155eu			
2130	2200		Guam, AWR	11850as	11980as			
2130	2200		Iran, VOIRI	9570as	13655au			
2130	2200		South Korea, R Korea Intl	15575eu				
2130	2200		Sweden, Radio	6065va	15255va			
2130	2200		Uzbekistan, Radio Tashkent	5025eu	9545eu	11905eu		

Shortwave Guide

2200 UTC - 6PM E / 5PM C / 3PM P

2200	2205	vl	Syria, Radio Damascus	12085eu	13610eu			
2200	2230		Azerbaijan, Voice of	6110as				
2200	2230		Canada, Radio Canada Intl 13670am 15170am	17695am	17880am	6175am	9590am	11920am
2200	2230		India, All India Radio	7150eu	9650eu	11620au	11715au	
2200	2230		Iran, VOIRI	9570au	13655au			
2200	2230	as	USA, Voice of America 11975af	5855af	6035af	7375af	7415af	
2200	2230	vl	Zambia, Radio ZNBC	4910do	6265al			
2200	2230	vl	Zimbabwe, ZBC Corp	5975do	6045al			
2200	2300		Anguilla, Caribbean Beacon		6090am			
2200	2300		Australia, ABC NT Alice Springs		4835do			
2200	2300		Australia, ABC NT Katherine		5025do			
2200	2300		Australia, ABC NT Tennant Crk		4910do			
2200	2300		Australia, Radio 21470pa	13620as	15240as	17715pa	17795va	
2200	2300	irrg/vl	Cameroon, RTV	4850do				
2200	2300		Canada, CBC Northern Service		9625do			
2200	2300		Canada, CFRX Toronto ON		6070do			
2200	2300		Canada, CFVP Calgary AB		6030do			
2200	2300		Canada, CKZN St John's NF		6160do			
2200	2300		Canada, CKZU Vancouver BC		6160do			
2200	2300		China, China Radio Intl	7170eu				
2200	2300		Costa Rica, R for Peace Intl		7445va	15039usb		
2200	2300		Costa Rica, University Network 11870am 13750na		5030am	6150am	7375am	9725sa
2200	2300	mtwhf	Eqt Guinea, Radio Africa		15185af			
2200	2300	f/monthly	Finland, Scandv Weekend Radio		6170va	11690va		
2200	2300	vl	Ghana, Ghana BC Corp		3366do	4915do		
2200	2300		Guyana, Voice of	3290do	5950do			
2200	2300		Liberia, R Liberia Intl	5100do				
2200	2300		Malaysia, Radio	7295do				
2200	2300		Namibia, NBC	3270af	3290af			
2200	2300		New Zealand, Radio NZ Intl		17675pa			
2200	2300		Nigeria, Radio/Enugu	6025do				
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
2200	2300		Nigeria, Radio/Lagos	3326do	4990al			
2200	2300		Palau, KHBN/VO Hope	9965as	9985as			
2200	2300		Sierra Leone, SLBS	3316do				
2200	2300	vl	Solomon Islands, SIBC	5020do				
2200	2300		Taiwan, R Taipei Intl	15600eu				
2200	2300		Turkey, Voice of	11960va	12000va			
2200	2300		UK, BBC World Service 9580eu 9740as 15390ca 15400af	3915as	5965as	5975am	6195as	7105as
					11685as	11945as	11955as	12095af
2200	2300		USA, Armed Forces Network 6350usb 6458usb 13362usb		4319usb	4993usb	5765usb	
					10320usb	10940usb	12579usb	12689usb
2200	2300		USA, KAIJ Dallas TX	13815va				
2200	2300		USA, KTBN Salt Lk City UT		7505na			
2200	2300		USA, KWHR Naalehu HI	17510as				
2200	2300		USA, Voice of America 13765va 15185va	7215va	9705va	9770va	11760va	
				15290va	15305va	17740va	17820va	
2200	2300		USA, WBCQ Kennebunk, ME		7415na	9335na		
2200	2300		USA, WEWN Birmingham AL 15745eu 17595eu		9975eu	11530na	11550na	
2200	2300		USA, WHRA Greenbush ME		7580eu	17650af		
2200	2300		USA, WHRI Noblesville IN		5745va	9495am	13760va	
2200	2300		USA, WINB Red Lion PA	13570am				
2200	2300		USA, WJIE Louisville KY	7490am	13595am			
2200	2300		USA, WRMI Miami FL	15725am				
2200	2300		USA, WRNO New Orleans LA		7395am	15420am		
2200	2300		USA, WSHB Cypress Creek SC		13770eu	15285sa		
2200	2300		USA, WTJC Newport NC	9370na				
2200	2300		USA, WWCR Nashville TN 13845na 15685na		7435na	9475na	12160na	
2200	2300		USA, WWRB Manchester TN 12172va		6890va	9320va	9400va	
2200	2300		USA, WYFR Okeechobee FL 17845af		11740na	15695af	15770eu	
2200	2300	vl	Vanuatu, Radio	4960do	7260do			
2200	2300		Zambia, Christian Voice	4965af				
2205	2230		Italy, RAI Intl	11900as	15625as			
2230	2255		Belgium, RVI Flanders R Intl		15565na			
2230	2257		Czech Rep, Radio Prague Intl		11600na	15545na		
2230	2300		Canada, Radio Canada Intl 17695na		6175na	9590na	13670na	
2230	2300		Cuba, Radio Havana	9550am				
2245	2300		India, All India Radio	9705as	9950as	11620as	13605as	

2300 UTC - 7PM E / 6PM C / 4PM P

2300	0000		Anguilla, Caribbean Beacon		6090am			
2300	0000		Australia, ABC NT Alice Springs		4835do			
2300	0000		Australia, ABC NT Katherine		5025do			
2300	0000		Australia, ABC NT Tennant Crk		4910do			
2300	0000		Australia, Radio 17715pa 17795pa	9660pa	12080pa	13620as	15240as	
				21740pa				
2300	0000		Bulgaria, Radio	9400na	11700na			
2300	0000	irrg/vl	Cameroon, RTV	4850do				
2300	0000		Canada, CBC Northern Service		9625do			
2300	0000		Canada, CFRX Toronto ON		6070do			
2300	0000		Canada, CFVP Calgary AB		6030do			
2300	0000		Canada, CKZN St John's NF		6160do			
2300	0000		Canada, CKZU Vancouver BC		6160do			
2300	0000		China, China Radio Intl	5990na	13680na			
2300	0000		Costa Rica, R for Peace Intl		7445va	15039usb		
2300	0000		Costa Rica, University Network 11870am 13750na 17645as		5030am	6150am	7375am	9725sa
2300	0000		Egypt, Radio Cairo	9900na				
2300	0000	f/monthly	Finland, Scandv Weekend Radio		5980va	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	11620as	13605as	
2300	0000		Liberia, R Liberia Intl	5100do				
2300	0000		Malaysia, Radio	7295do				
2300	0000		Namibia, NBC	3270af	3290af			
2300	0000		New Zealand, Radio NZ Intl		17675pa			
2300	0000		New Zealand, Radio NZ Intl		17675pa			
2300	0000		Palau, KHBN/VO Hope	9965as	9985as			
2300	0000		Romania, R Romania Intl 15105na		9570eu	11740na	11775na	
2300	0000		Sierra Leone, SLBS	3316do				
2300	0000		Singapore, SBC Radio One		6150do			
2300	0000		Sri Lanka, SLBC	4940do				
2300	0000		UK, BBC World Service 9580eu 9740as 15400af	3915as	5965as	5975am	6195as	7105as
				11685as	11945as	11955as	12095af	15390ca
2300	0000		USA, Armed Forces Network 6458usb 10320usb		4319usb	4993usb	5765usb	6350usb
				10940usb	12579usb	12689usb	13362usb	
2300	0000		USA, KAIJ Dallas TX	13815va				
2300	0000		USA, KTBN Salt Lk City UT		7505na			
2300	0000		USA, KWHR Naalehu HI	17510as				
2300	0000		USA, Voice of America 15185va 15290va	7215va	9705va	9770va	11760va	13765va
				15305va	17740va	17820va		
2300	0000		USA, WBCQ Kennebunk, ME		7415na	9335na		
2300	0000		USA, WEWN Birmingham AL		9355na	9975eu	15745na	17595eu
2300	0000		USA, WHRA Greenbush ME		7580eu			
2300	0000		USA, WHRI Noblesville IN		5745va	9495am	13760va	
2300	0000		USA, WINB Red Lion PA	12160am				
2300	0000		USA, WJIE Louisville KY	7490am	13595am			
2300	0000	smtwhf	USA, WRMI Miami FL	7385am				
2300	0000		USA, WRMI Miami FL	9955am				
2300	0000		USA, WRNO New Orleans LA		7355am			
2300	0000		USA, WSHB Cypress Creek SC		13770eu	15285sa		
2300	0000		USA, WTJC Newport NC	9370na				
2300	0000	as	USA, WWBS Macon GA	11900na				
2300	0000		USA, WWCR Nashville TN 13845na 15685na		5070na	7435na	9475na	
2300	0000		USA, WWRB Manchester TN		6890va	9320va	9400va	12172va
2300	0000		USA, WYFR Okeechobee FL 17750sa		5895sa	11740na	11855sa	15255sa
2300	0000	vl	Vanuatu, Radio	4960do	7260do			
2300	0000	vl	Vanuatu, Radio	4960do	7260do			
2300	0000		Zambia, Christian Voice	4965af				
2300	2230		Mexico, Radio Mexico Intl		9705am	11770am		
2300	2330		Cuba, Radio Havana	9550am				
2300	2330		Nigeria, Radio/Enugu	6025do				
2300	2330		Nigeria, Radio/Kaduna	4770do	6090do			
2300	2330		Nigeria, Radio/Lagos	3326do	4990al			
2300	2330	vl	Solomon Islands, SIBC	5020do				
2300	2330		USA, Voice of America	7190va	7200va	9545va	11925va	13755va
2300	2345		Germany, Deutsche Welle		9815as	12000as	17560as	21790as
2303	2310		Croatia, Croatian Radio	9925na				
2330	0000		Canada, Radio Canada Intl 17695na		6175na	9590na	13670na	
2330	0000		Lithuania, R Vilnius	9875eu				
2330	0000		Netherlands, Radio	6165na	9845na			
2330	0000	a	Russia, Radio Ezra	17665na				
2330	0000		Switzerland, Swiss R Intl	9885sa	11905sa			
2330	0000		USA, Voice of America 11805va 11925va	7190va	7200va	7225va	7260va	9545va
				13735va	13775va	15205va		
2330	2345	vl	Libya, Voice of Africa	15435irr	17750irr			
2330	2357		Vietnam, Voice of	9840as	12020as			
2345	0000	vl	Pakistan, Radio	11580as	15455as			

BBCWS Americas Stream

This month's BBC World Service program listings include only those for the Americas stream. For other streams, please refer to *SWG* in the July and August issues.

0000 UTC/ 8pm E/5pm P - Page 43 Freqs

SUNDAY

0000	R. Netherlands	Music 52/15 (Martha Hawley presents musical styles from around the globe)
	WBCQ(7415kHz)	A Different Kind of Oldies Show (a unique mix of oldies music with "Big Steve" Cole)
	WHRI(5745kHz)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
	YLE R. Finland	Capital Weekend (a full hour of people, events and ideas of current interest in Finland)
0005	R. Australia	The Europeans (historical and cultural perspectives on European societies)
	R. Prague	Readings from Czech Literature
0010	R. Japan	Hello from Tokyo (listener letters, music and short features)
	R. Prague	Saturday Music (Czech classical, folk, jazz or rock music)
	R. New Zealand Int.	The Week in Parliament (a weekly roundup of NZ political news)
0030	BBCWS(am)	Agenda (the ideas and trends shaping our world)
R. Netherlands		Roughly Speaking (European youth lifestyles magazine)
	R. New Zealand Int.	Spectrum (a weekly look at the people, places and events around NZ)
0035	R. Australia	Ockham's Razor (sharp commentaries on science issues)
0045	R. Exterior de Espana	Radio Waves (a weekly program for radio enthusiasts)

MONDAY-FRIDAY

0000	R. New Zealand Int.	Midday Report (news updates and in-depth reports)

MONDAY

0000	R. Netherlands	Dutch Horizons (Bertine Kral chronicles life in Holland)
	WBCQ(7415kHz)	Radio New York International (Johnny Lightning plays classic rock)
0010	R. Australia	Awaye! (Aboriginal arts and culture program)
	R. Japan	Weekend Square (interviews, music and discussions presenting various aspects of Japan)
0030	BBCWS(am)	The World Today (the BBC's agenda-setting flagship global news program)
	R. Netherlands	Aural Tapestry (David Swartling weaves threads from different cultures and periods of history to tell interesting stories)
0040	R. Exterior de Espana	Radio Club (rebroadcast of A 0035 program.)

TUESDAY-SATURDAY

0000	R. Exterior de Espana	REE's News Service (international, Ibero-American and national news, Spanish press review, commentaries, analyses)
	VOA	News Now (continuous news service)
0015	R. Japan	44 Minutes (daily current affairs magazine about Japan and Asia)
	VOA	Focus (top news in perspective)
0032	VOA	Coast to Coast (magazine about American life with Dave Arlington)

TUESDAY

0000	R. Netherlands	The Research File (a magazine emphasizing the relevance of science to all our lives)
0005	BBCWS(am)	Meridian-Masterpiece (critical examinations of creative endeavors)
0010	R. Australia	The Science Show (one of the longest running programs on ABC Radio)
0030	BBCWS(am)	Charlie Gillett (presents his selection of music from around the globe)
	R. Netherlands	EuroQuest (a magazine placing Europe in context)

WEDNESDAY

0000	R. Netherlands	Music 52/15 (refer to Sun. 0000)
	WBCQ(7415kHz)	Off the Hook (discussing computer and information technology issues)
0005	BBCWS(am)	Meridian-Screen (interviews, documentaries, features and discussions on the film arts)
0010	R. Australia	The National Interest (Terry Lane's round-up of the week's major issues)
0030	BBCWS(am)	UK Top Twenty (music from the British rock and pop charts)
	R. Netherlands	A Good Life (how development affects societies)

THURSDAY

0000	R. Netherlands	The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)
0005	BBCWS(am)	Meridian-Writing (exploring fiction and non-fiction, plays and poetry, lyrics and letters, writers and readers)
0010	R. Australia	Background Briefing (ABC Radio's award-winning agenda-setting, current affairs radio documentary program)
0030	BBCWS(am)	Revolver (popular musicians select and present their favorite new music)
	R. Canada Int.	Dispatches (in-depth reports offering a Canadian perspective on international news topics)
	R. Netherlands	Dutch Horizons (refer to Mon. 0000)

FRIDAY

0000	R. Netherlands	Aural Tapestry (refer to Mon. 0030)
0005	BBCWS(am)	The Music Biz (a weekly look at the global music industry)
0010	R. Australia	Hindsight (Australian social history woven from the memories of those who were there)
0030	BBCWS(am)	John Peel (with his own unique and eclectic mix of new music)
	R. Netherlands	The Research File (refer to Tue. 0000)

SATURDAY

0000	R. Netherlands.	A Good Life (refer to W 0030)
	R. New Zealand Int	RNZ News
	WBCQ(7415kHz)	Allan Weiner Worldwide (the station manager's show)
0005	BBCWS(am)	Arts in Action (architects, playwrights, musicians and poets explain the ideas which shape our aesthetic, musical and literary worlds)
	R. Australia	Feedback (Roger Broadbent answers listener questions and provides regular updates about RA)
0010	R. New Zealand Int.	Focus on Politics (a report on government and politics in NZ)
0030	BBCWS(am)	Jazzmatazz (the best new releases, interviews with modern artists and tributes to the jazz greats)
	R. Australia	Country Breakfast (Australian rural and regional issues magazine)
	R. New Zealand Int.	The Sampler (Nick Bollinger casts a critical ear over the latest CD offerings)
	R. Netherlands	The Weekly Documentary (refer to H 0000)
0035	R. Exterior de Espana	Radio Club (answering listeners' letters)

0100 UTC/ 9pm E/6pm P - Page 43 Freqs

DAILY

0130	R. Austria Int	Report from Austria (a daily magazine focusing on Austria and central and eastern Europe)

SUNDAY

0100	BBCWS(am)	The World Today (the BBC's agenda-setting flagship global news program)
	HCJB Ecuador	DX Partyline (Allen Graham hosts a weekly program for DXers and SWLs)
	WBCQ(7415kHz)	Marion's Attic (rare and vintage recordings presented by Marion Webster)
0105	Deutsche Welle	Talking Point (European journalists discuss the week's events)
	R. Australia	In Conversation (Robin Williams talks to scientists and those interested in the subject about what it's meant to their lives)
	R. Canada Int.	Business Sense (an in-depth look at Canadian companies in the global economy)
	R. Netherlands	Europe Unzipped (the events of the past week in Europe, some unusual)
	R. New Zealand Int.	At the Movies (a weekly report on cinema with Simon Morris)
	R. Prague	Readings from Czech Literature
	R. Slovakia Int.	Insight Central Europe (refer to S 0135 R. Austria Int.)
0110		
	R. Prague	Saturday Music (Czech classical, folk, jazz or rock music)
0111	Voice of Russia	News and Views (Russian views on news developments)
0115	Deutsche Welle	Inside Europe (a weekly magazine exploring the topical issues shaping the continent)
0120	China R. Int.	In the Spotlight (Chinese arts and cultural magazine)
0130	BBCWS(am)	Music Review (personalities, views and issues from the international world of music)
	HCJB Ecuador	Saludos Amigos (HCJB's program promoting international friendship)
	R. Australia	Oz Sounds (Australian new music releases)
	R. New Zealand Int.	Bookmarks (NZ books, literature and writers)
	RTE Ireland	Sportsnews (reports and accounts on the weekend's events)
0132	Voice of Russia	Moscow Yesterday and Today (recalling the most interesting events in the history of the city)
0135	R. Austria Int.	Insight Central Europe (a regional magazine jointly produced by the region's broadcasters)
	R. Canada Int.	Canada in the World (Wojtek Gwiazda hosts a weekly magazine examining Canadian policies, priorities and international relations)
0140	R. Habana Cuba	DXers Unlimited (Arnie Coro presents a program from radio enthusiasts)
0145	BBCWS(am)	Letter from America (Alistair Cooke's weekly commentary on life in the USA)
0150	R. Austria Int.	Listener Letters

MONDAY-FRIDAY

0105	R. New Zealand Int.	Cadenza (light classical music selections)
0110	R. Australia	Asia-Pacific (RA's flagship current events and business report for and about Asia and the Pacific region)

MONDAY

0100	R. Habana Cuba	Weekly Review (Cuba's perspective on current events)
	HCJB Ecuador	Musical Mailbag (listener letters, food and the question of the week)
	WBCQ(7415kHz)	Radio New York International (continues from 0000)
0105	BBCWS(am)	Wright Around the World (Steve Wright reads listener messages and plays music requests)
	Deutsche Welle	Religion and Society (an insight into religious events around the world)
	R. Budapest	Spotlight (a monthly magazine)
		Europe Unlimited (Hungary's relations with the rest of Europe)[monthly]
		Heading for Hungary (a monthly travelogue)[monthly]
		And the Gatepost (listener letters)[monthly]
	R. Canada Int.	The Maple Leaf Mailbag (Ian Jones answers listener mail and hosts the fortnightly CIDX Report for dxers)
	R. Netherlands	Wide Angle (a single issue examined in-depth)
0110	R. Slovakia Int.	Listeners' Tribune (magazine of letters, features and Slovak music)
	Voice of Vietnam	SUNDAY Show (variety magazine with local reports and music)
0115	Deutsche Welle	Arts on the Air (Breandain O'Shea covers the German cultural scene.)
0130	China R. Int.	People in the Know (interviews with prominent Chinese who are shaping the nation's future)
	R. Australia	The Health Report (Dr. Norman Swan's weekly report on health and medical issues)
	RTE Ireland	Sportsnews (reports and accounts on the weekend's events)
0132	Voice of Russia	Timelines (Estelle Winters' variety show giving insight into life in Moscow through foreign eyes)
0135	R. Austria Int.	Network Europe (a weekly magazine on Europe jointly produced by European broadcasters)
	R. Canada Int.	Spotlight (magazine of arts and culture in Canada)
0140	R. Habana Cuba	The Mailbag Show (listener letters)
0150	R. Habana Cuba	Breakthrough (Arnie Coro's weekly science report)

TUESDAY-SATURDAY

0100	R. Netherlands	Newsline (news, analysis and background reports)
	VOA	News Now (continuous rolling news service)
0105	Deutsche Welle	Newslink (daily current affairs magazine focused on Europe
0110	R. Budapest	Hungary Today (daily magazine covering current events in Hungary)
	R. Canada Int.	Canada Today (daily magazine of interviews, correspondents' reports and Canadian views on world and national events)
	Voice of Russia	Commonwealth Update (comments on domestic developments and major domestic issues)
0110	HCJB Ecuador	Studio 9 (daily magazine with focused reports on Latin America)
0130	RTE Ireland	The News at Six (RTE's flagship evening news program)

TUESDAY

0105	BBCWS(am)	Health Matters (reports on the latest research explaining where medicine is going)
0130	BBCWS(am)	Everywoman (weekly magazine providing an insight into women and their world)
	China R. Int.	Biz China (Chinese business and economic development magazine)
	Deutsche Welle	Insight (a look at major international trends and developments)
	R. Australia	The Law Report (Damien Carrick presents breaking legal stories in Australia and overseas)
0132	Voice of Russia	Folk Box (music drawn from the traditions of the hundreds of nationalities that make up Russia and the CIS)
0135	R. Canada Int.	Media Zone (Ian Jones hosts a weekly forum with Canadian journalists discussing topical issues facing Canadians)
0145	VOA News Now	Dateline (a daily brief documentary)

WEDNESDAY

0105	BBCWS(am)	Go Digital (technology journalist Tracey Logan explains the latest in IT)
0130	BBCWS(am)	Omnibus (a weekly documentary)
	China R. Int.	China Horizons (life in China outside Beijing)
	Deutsche Welle	Man and Environment (John Hay presents the human element in environmental issues.)

Shortwave Guide

	R. Australia	The Religion Report (Stephen Crittenden examines the way religion and societies interact)
0132	Voice of Russia	The Jazz Show (recordings from the Russian world of jazz)
0135	R. Canada Int.	Spotlight (refer to M 0135)
0140	R. Habana Cuba	DXers Unlimited (Arnie Coro presents a program from radio enthusiasts)
0145	VOA News Now	Dateline (a daily brief documentary)

THURSDAY

0105	BBCWS(am)	Discovery (in-depth exploration of ideas and discoveries in science and technology)
0120	HCJB Ecuador	Ham Radio Today (a program for radio amateurs)
0130	BBCWS(am)	Sports International (the issues and personalities behind the headlines)
	Deutsche Welle	Living in Germany (people, places and events in Germany)
R. Australia		The Media Report (Mick O'Regan takes a critical look at the latest developments in the communications industries)
0135	R. Canada Int.	The Maple Leaf Mailbag (refer to M 0105)
0145	VOA News Now	Dateline (a daily brief documentary)

FRIDAY

0105	BBCWS(am)	One Planet (stories about the environment, development, agriculture and human impact on the natural world)
0115	Deutsche Welle	Hard to Beat—The World of Sport (weekly report on German and European sport)
0130	BBCWS(am)	People and Places (a forum for the exchange of views and experiences on a global scale)
	R. Australia	The Sports Factor (Amanda Smith presents reports which debate and celebrate the cultural significance of sport)
0135	R. Canada Int.	Business Sense (refer to S 0105)
0145	VOA News Now	Dateline (a daily brief documentary)

SATURDAY

0100	WBCQ(7415kHz)	Tasha Takes Control (upbeat progressive music)
0105	BBCWS(am)	Science in Action (reports on current developments in science and technology)
	R. Australia	Asia-Pacific Weekend Edition (a weekly current events and business report for and about Asia and the Pacific region)
	R. New Zealand Int.	Your Money (Bruce Wallace and a panel of investment advisors on financial trends)
0115	HCJB Ecuador	Musica del Ecuador (Jorge Zambrano presents selections of Ecuadorian and Andean music)
0120	R. Budapest	DX Corner (a report for radio hobbyists)
	China R. Int.	Cutting Edge (science and technology in China)
0130	BBCWS(am)	Essential Guide (the biggest developments, issues and names in global affairs)
	China R. Int.	Listeners Garden (letters, language lesson and other features)
	Deutsche Welle	German by Radio (a language lesson)
	R. Australia	RA Arts with Julie Copeland (an arts-related interview and a film review)
	R. New Zealand Int.	The Lord of the Rings (concluding episodes of a 26 part dramatization of the Tolkien trilogy)
0133	VOA News Now	VOA News Review (report on the past week's news)
0135	R. Canada Int.	Canada in the World (refer to S 0135)
0145	VOA Special English	American Stories (short stories by American authors)

0200 UTC/ 10pm E/7pm P - Page 44 Freqs

DAILY

0200	BBCWS(am)	The World Today (the BBC's agenda-setting flagship global news program)

SUNDAY

0200	HCJB Ecuador	Rock Solid (Elaine Childs brings you thoughtful commentary along with some of the best in contemporary Christian music)
	WBCQ(7415kHz)	Pocket Calculator (a forum celebrating personal memories of all integrated circuit-based consumer products from the electronics revolution of the 1970s and 1980s)
0205	R. Australia	Margaret Throsby (a guest is interviewed and presents favorite musical pieces)
0211	Voice of Russia	Moscow Mailbag (Joe Adamov answers listener questions and talks about the latest rumors and jokes sweeping Moscow)
0215	R. Taipei Int.	Great Wall Forum (the China-Taiwan issue from Taipei's perspective)
0230	BBCWS(am)	World Business Review (analysis of global business developments)
	R. New Zealand Int.	Health Matters or Environment Matters
	R. Sweden	Network Europe (a magazine about Europe on the 1st week of the month) Sweden Today (George Wood presents the voices of Sweden, 2nd week) Spectrum (Bill Schiller covers the Swedish cultural scene, 3rd week) Studio 49 (conversations on ideas and long-term trends in Sweden and the Nordic region, the 4th week)
	WRMI(7385kHz)	Drive-In Double Feature (a celebration of "B" movies with science fiction-related and unusual music)
	WHRI(7315kHz)	DXing with Cumbre (Marie Lamb with the latest DX catches)
	WWCR(5070kHz)	World of Radio (Glenn Hauser's comprehensive review of the week in international broadcasting)
0232	Voice of Russia	Songs from Russia (melodies and musical novelties from Russia's past)
0235	R. Habana Cuba	The World of Stamps (perhaps the only program on philatelic matters)

MONDAY-FRIDAY

0205	R. New Zealand Int.	In Touch with NZ—Wayne's Music (a domestic afternoon variety program w/Wayne Mowat, this hour features popular music set to a theme)
0210	R. Australia	The World Today (a comprehensive current affairs program with Monica Attard and John Highfield)

MONDAY

0200	WBCQ(7415kHz)	Radio New York International (continues from 0000)
0205	WWCR(3210kHz)	Golden Age of Radio Theatre (classic American radio shows from the past)
0210	R. Habana Cuba	From Havana (a showcase of contemporary Cuban music and musicians)
0211	Voice of Russia	Moscow Mailbag (refer to S 0211)
0215	R. Taipei Int.	Jade Bells and Bamboo Pipes (Carson Wong introduces selections of traditional Chinese music)
0230	BBCWS(am)	Assignment (documentaries that delve behind the headlines)
	R. Habana Cuba	The Jazz Place (the very best of Cuban jazz) or Top Tens (contemporary Cuban hits)
	R. Sweden	In Touch with Stockholm (an interactive listener contact program w/Nidia Hagström, 1st week of each month) Sounds Nordic (R. Sweden's youth music and trends magazine w/Gaby Katz)[exc. 1st week]
	WRMI(7385kHz)	Wavescan (Adventist World Radio's program for DXers and shortwave radio enthusiasts)
0232	Voice of Russia	This is Russia (the cities and regions, culture and the arts, the countryside, religion and people)
0235	R. Budapest	(refer to M 0105)

TUESDAY-SATURDAY

0215	R. Korea Int.	Seoul Calling (daily magazine of Korean people, places and events)
0230	R. Sweden	Sixty Degrees North (reports, interviews and analysis on the Nordic region)
0230	BBCWS(am)	World Business Report (the main business issues of the day)
0235	R. Budapest	Hungary Today (a daily magazine covering current events in Hungary)

TUESDAY

0211	Voice of Russia	Science and Engineering (the latest developments in science and technology)
0232	Voice of Russia	Kaleidoscope (the latest economic, social and cultural events in Russia and the CIS)
0245	BBCWS(am)	Analysis (background to the stories in the news)

WEDNESDAY

0211	Voice of Russia	Newmarket (news about business in Russia and Russia's involvement in international business)
0245	BBCWS(am)	Analysis (refer to T 0245)
	R. Sweden	Close Up (profiles of people in Sweden from all walks of life)[1st/3rd wk.]

THURSDAY

0211	Voice of Russia	Moscow Mailbag (refer to S 0211)
0215	R. Taipei Int.	Journey into Chinese Culture
0232	Voice of Russia	Moscow Yesterday and Today (recalling the most interesting events in the history of the city)
0245	BBCWS(am)	From Our Own Correspondent (the background to international events from BBC correspondents around the world)
0245	R. Sweden	Money Matters (a weekly economic report on the Nordic region)

FRIDAY

0211	Voice of Russia	Science and Engineering (refer to T 0211)
0232	Voice of Russia	Russian by Radio (a language lesson)
0245	BBCWS(am)	Analysis (refer to T 0211)
0245	R. Sweden	Nordic Report (a monthly magazine on Scandinavia jointly produced by Nordic region broadcasters, first week of the month) Greenscan (Azariah Kiros highlights Swedish environmental awareness and challenges, second week) Heart Beat (Gaby Katz hosts a monthly health and medical magazine, third week) The S-Files (Kris Boswell takes you to the Sweden behind the headlines, fourth week)

SATURDAY

0205	R. Australia	Background Briefing (refer to H 0010)
	R. New Zealand Int.	Eureka! (reports on science in NZ)
0211	Voice of Russia	Newmarket (refer to W 0211)
0230	R. New Zealand Int.	Health Matters or Environment Matters
0232	Voice of Russia	Audio Book Club (readings from the best of Russian classic and contemporary literature)
0245	BBCWS(am)	Analysis (refer to T 0245)

0300 UTC/ 11pm E/8pm P - Page 44 Freqs

SUNDAY

0300	HCJB Ecuador	Inspirational Classics (a program of sacred classical music by Judy Gillen from New Zealand)
	WWCR(5070kHz)	Spectrum (communications magazine/phone-in)
0305	R. Australia	Feedback (Roger Broadbent answers listener questions and provides regular updates about RA)
	R. Prague	Readings from Czech Literature
0310	R. Prague	Saturday Music (Czech classical, folk, jazz or rock music)
0315	Deutsche Welle	Spectrum (a weekly program looking at developments in the fields of science and technology)
0320	China R. Int.	In the Spotlight (refer to S 0120)
0330	BBCWS(am)	Reporting Religion (Trevor Barnes reports on how religion shapes major news events and provides analysis of religious and ethical issues)
	R. Australia	All in the Mind (the mind, brain and behavior presented by Natasha Mitchell)
	R. Sweden	Weekend (refer to S 0230) Sweden Today (refer to S 0230) Spectrum (refer to S 0230) Studio 49 (refer to S 0230)
	WRMI(7385kHz)	Viva Miami (R. Miami International's listener magazine show)
0332	Voice of Russia	Kaleidoscope (refer to T 0232)
0340	R. Habana Cuba	DXers Unlimited (Arnie Coro presents a program from radio enthusiasts)

MONDAY-FRIDAY

0320	R. Australia	Pacific Focus (daily regional report concentrating each weekday on a different theme----business, health, environment, sport and culture)

MONDAY

0300	R. Habana Cuba	Weekly Review (Cuba's perspective on current events)
	WBCQ(7415kHz)	Radio New York International (continues from 0000)
0305	R. New Zealand Int.	Tagata o te Moana (Anita Purcell presents a weekly Pacific magazine with NZ and regional Pacific news, issues, information and music.)
0315	Deutsche Welle	Arts on the Air (Breandain O'Shea covers the German cultural scene)
0330	BBCWS(am)	Westway Omnibus (an opportunity to hear again both episodes of this radio drama serial broadcast last week)
	China R. Int.	People in the Know (refer to M 0130)
	R. Sweden	In Touch with Stockholm (refer to M 0230) Sounds Nordic (refer to M 0230)
	WHRI(7315kHz)	DXing with Cumbre (refer to S 0230)
0332	Voice of Russia	Audio Book Club (refer to A 0232)
0340	R. Australia	The Australian Music Show (the latest rock music from the Triple J youth network of the ABC)
	R. Habana Cuba	The Mailbag Show (listener letters)
0350	R. Habana Cuba	Breakthrough (Arnie Coro's weekly science report)

TUESDAY-SATURDAY

0305	Deutsche Welle	Newslink (refer to T-A 0105)
0311	Voice of Russia	News and Views (Russian views on news developments)
0330	R. Sweden	Sixty Degrees North (refer to T-A 0230)
0345	BBCWS(am)	Off the Shelf (abridged serialized readings of novels, stories and other literature)

TUESDAY

0305	BBCWS(am)	Jazzmatazz (Alyn Shipton with the best new releases, interviews with modern artists and tributes to the jazz greats)
	R. New Zealand Int.	Top Five and New Releases (the top five singles and new music releases in NZ with Greg Tatere)
0315	Radio Taipei Int.	Taiwan Economic Journal
0330	China R. Int.	Biz China (refer to T 0130)
	Deutsche Welle	Insight (refer to T 0130)
0340	R. Australia	Music Deli (Australian performances of folk, acoustic, traditional and world music)

WEDNESDAY

0305	BBCWS(am)	Charlie Gillett (presents his selection of music from around the globe)
	R. New Zealand Int.	Pacific Report (RNZI correspondent Don Wiseman interviews and reports on regional matters)

Shortwave Guide

0330	BBCWS(am)	Write On (Dilly Barlow and Penny Vine sift through the listener mail)
	Deutsche Welle	Man and Environment (refer to W 0330)
	R. New Zealand Intl	Tradewinds (Walter Zweifel with a weekly report on Pacific regional business and economic news and features)
0340	R. Australia	Blacktracker (Mal Honess presents contemporary Aboriginal music)
	R. Habana Cuba	DXers Unlimited (refer to S 0340)
0345	R. Sweden	Close Up (refer to W 0245)

THURSDAY

0305	BBCWS(am)	John Peel (with his own unique and eclectic mix of new music)
	R. New Zealand Int.	RNZI Talk (a fortnightly introduction to the RNZI and National Radio staff, along with RNZI developments, projects and programmes) [or] Mailbox (a fortnightly program aimed at the serious shortwave listener, with Myra Oh answering letters, Paul Ormandy reporting the latest DX news, and Frequency Manager Adrian Sainsbury answering technical questions)
0330	BBCWS(am)	Heart and Soul (global religious and spiritual experiences)
	Deutsche Welle	Living in Germany (refer to H 0130)
	R. New Zealand Int.	The World in Sport (Dmitri Edwards presents highlights of the world's sporting week with emphasis on NZ and the Pacific.)
0340	R. Australia	Oz Country Style (country music from Australia)
0345	R. Sweden	Money Matters (refer to H 0245)

FRIDAY

0305	BBCWS(am)	Composer of the Month (the life stories and music of major composers in the Western classical tradition)
	R. New Zealand Int.	Dateline Pacific (the major Pacific stories of the week, with background and reaction from the people making the news, presented by Don Wiseman)
0330	China R. Int.	Life in China (refer to F 0130)
	Deutsche Welle	Hard to Beat: The World of Sport (refer to F 0130)
	HCJB Ecuador	The Book and the Spade (archaeology and religion)
	R. New Zealand Int.	Pacific Correspondent (RNZI's regional correspondents talk to Don Wiseman about political and social issues in their respective Pacific countries)
0340	R. Australia	Jazz Notes (Australian jazz presented by Ivan Lloyd)
0345	R. Sweden	Nordic Report (refer to F 0245) Greenscan (refer to F 0245) Heart Beat(refer to F 0245) The S-Files (refer to F 0245)

SATURDAY

0305	BBCWS(am)	Counterpoint (Ned Sherrin chairs this musical quiz)
	R. Australia	Rural Reporter (ABC's rural reporters present news and stories from rural and regional Australia)
	R. New Zealand Int.	The Mix (interviews and live recordings from contemporary pop musicians)
0330	BBCWS(am)	Patterns of Faith (a global exploration of religious values and human wisdom)
	Deutsche Welle	German by Radio (refer to A 0130)
	HCJB Ecuador	Walkin' in the Sunshine (Ben Cummings with the roots in country music from all over the world)

0400 UTC/ 12am E/9pm P - Page 44 Freqs

DAILY

0400	BBCWS(am)	The World Today (the BBC's agenda-setting flagship global news program)

SUNDAY

0400	R. Vlaanderen Int.	Music from Flanders (a half-hour of Flemish music, musicians and musical performances)
	HCJB Ecuador	DX Partyline (refer to S 0100)
	WBCQ(7415kHz)	Tom and Darryl (discussing satellite TVRO, shortwave, low power FM and the Internet)
0405	R. Australia	Pacific Focus-Arts (reports on culture and the arts in the Pacific region)
	R. New Zealand Int.	Playhouse (classic and contemporary radio drama)
0420	China R. Int.	In the Spotlight (refer to S 0120)
0430	BBCWS(am)	Global Business (Peter Day charts the transformations sweeping through the world of work and commerce)
	HCJB Ecuador	Saludos Amigos (refer to S 0130)
	R. Australia	RA Arts with Julie Copeland (an arts-related interview and a film review)
0432	Voice of Russia	Moscow Yesterday and Today (refer to S 0132)
0435	R. Habana Cuba	The World of Stamps (refer to S 0235)
	R. Netherlands	Europe Unzipped (the events of the past week in Europe, some unusual)
0455	R. Netherlands	Insight (Rob Green casts a critical and humorous eye on the past week's headlines)

MONDAY-FRIDAY

0400	WBCQ(7415kHz)	Amos 'n Andy (the classic radio comedy from America's radio past)
0405	R. New Zealand Int.	In Touch with New Zealand (continues from 0205, this hour including a daily report from one of NZ's regions)
0410	R. Australia	Margaret Throsby (a guest is interviewed and presents favorite musical pieces)

MONDAY

0400	R. Vlaanderen Int.	Radio World (Frans Vossen presents a weekly report about international radio)
	WBCQ(7415kHz)	Tom and Darryl (discussions about satellite, shortwave, LPFM and Internet communications)
	HCJB Ecuador	Musical Mailbag (refer to M 0100)
0410	R. Habana Cuba	From Havana (refer to M 0210)
0415	WBCQ(7415kHz)	Radio Timtron Worldwide
0430	China R. Int.	People in the Know (refer to M 0130)
	R. Habana Cuba	The Jazz Place or Top Tens (refer to M 0230)
0432	Voice of Russia	The Jazz Show (refer to W 0132)
0435	R. Netherlands	Sincerely Yours (RN's listener response program)
0455	R. Netherlands	The Week Ahead (on RN the next seven days)

TUESDAY-SATURDAY

0410	HCJB Ecuador	Studio 9 (refer to T-A 0110)
0430	R. Netherlands	Newsline (refer to T-A 0100)

TUESDAY

0411	Voice of Russia	Moscow Mailbag (refer to S 0211)
0430	China R. Int.	Biz China (refer to T 0130)

WEDNESDAY

0411	Voice of Russia	Science and Engineering (refer to T 0211)

THURSDAY

0411	Voice of Russia	Newsmarket (refer to W 0211)
0420	HCJB Ecuador	Ham Radio Today (refer to H 0120)
0432	Voice of Russia	Folk Box (refer to T 0132)

FRIDAY

0411	Voice of Russia	Moscow Mailbag (refer to S 0211)
0430	China R. Int.	Life in China (refer to F 0130)
0432	Voice of Russia	Audio Book Club (refer to A 0232)

SATURDAY

0400	WBCQ(7415kHz)	Amos 'n Andy (refer to M-F 0400)
0405	R. Australia	Pacific Focus-Environment (the past week's environmental news as reported on the weekday magazine, Pacific Beat)
	R. New Zealand Int.	Home Grown (Liz Barry plays contemporary Kiwi music)
0411	Voice of Russia	Science and Engineering (refer to T 0211)
0415	HCJB Ecuador	Musica del Ecuador (refer to A 0115)
0430	BBCWS(am)	Assignment (refer to M 0230)
	R. Australia	The Buzz (the week's big technology news and issues presented by Richard Aedy)
	R. New Zealand Int.	Musical Chairs (the music and background of a featured NZ musician)
	WHRI(7580kHz)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
0432	Voice of Russia	Timelines (Estelle Winters' variety show giving insight into life in Moscow through foreign eyes)

0500 UTC/ 1am E/10pm P - Page 46 Freqs

SUNDAY

0500	HCJB Ecuador	Inspirational Classics (a program of sacred classical music by Judy Gillen from New Zealand)
	R. Netherlands	Roughly Speaking (European youth lifestyles magazine)
	WBCQ(7415kHz)	Tom and Darryl (continues from 0400 on 1st and 3rd Sun.)
	WWCR(5070kHz)	World Wide Country Radio
0505	Deutsche Welle	Talking Point (European journalists discuss the week's events.)
	R. Australia	Pacific Focus-Business (reports on business and commerce in the Pacific region)
0510	R. Japan	Pop! Goes Asia (a look at Asia as it is now, presenting the cultures and lifestyles of other Asian countries through their popular music)
	R. New Zealand	Feature on religion and spirituality in NZ
0515	Deutsche Welle	Money Talks (DW's weekly financial magazine highlighting business in Europe)
0520	China R. Int.	In the Spotlight (refer to S 0120)
0530	R. Australia	Fine Music Australia (Australian classical artists with Charles Southwood)
0540	R. Habana Cuba	DXers Unlimited (refer to S 0140)

MONDAY-FRIDAY

0505	R. New Zealand Int.	Checkpoint (RNZ National Radio's flagship evening news program)
0510	R. Australia	Pacific Beat (one of RA's primary programs, this daily current events and features magazine focuses in on the Pacific island nations)
0515	R. Japan	44 Minutes (current affairs magazine about Japan and Asia)

MONDAY

0500	R. Habana Cuba	Weekly Review (refer to S 0100)
	R. Netherlands	Dutch Horizons (Bertine Krol chronicles life in Holland)
	WWCR(3210kHz)	World of Radio (Glenn Hauser's comprehensive review of the week in shortwave and international broadcasting)
0505	Deutsche Welle	Religion and Society (an insight into religious events around the world)
0515	Deutsche Welle	Cool (Erica Gingerich and Anke Rasper present DW's youth magazine with reports on the attitudes, music and style of young Europe)
0530	China R. Int.	People in the Know (refer to M 0130)
0540	R. Habana Cuba	The Mailbag Show (listener letters)
0550	R. Habana Cuba	Breakthrough (Arnie Coro with a report on science)

TUESDAY-SATURDAY

0505	Deutsche Welle	Newslink (refer to T-A 0105)

TUESDAY

0500	R. Netherlands	The Research File (a magazine emphasizing the relevance of science to all our lives)
0530	China R. Int.	Biz China (refer to T 0130)
	Deutsche Welle	Insight (refer to T 0130)

WEDNESDAY

0500	R. Netherlands	Music 52/15 (Martha Hawley presents musical styles from around the globe)
0530	Deutsche Welle	Man and Environment (refer to W 0130)
0540	R. Habana Cuba	DXers Unlimited (refer to S 0140)

THURSDAY

0500	R. Netherlands	The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)
	WBCQ97415kHz)	World of Radio (Glenn Hauser's comprehensive review of the week in shortwave and international broadcasting)
0530	Deutsche Welle	Living in Germany (refer to H 0130)

FRIDAY

0500	R. Netherlands	Aural Tapestry (David Swatling weaves threads from different cultures and periods of history to tell interesting stories)
0530	China R. Int.	Life in China (a weekly magazine focusing on the lives of ordinary people in China)
	Deutsche Welle	Hard to Beat: The World of Sport (refer to F 0130)
	HCJB Ecuador	The Book and the Spade (archaeology and religion)
	R. New Zealand Int.	The Pacific Report (a report on trends and events in the Pacific region)

SATURDAY

0500	R. Netherlands	A Good Life (how development affects societies)
	WHRI Indiana	DXing with Cumbre (Marie Lamb with the hottest DX catches)
0505	R. Australia	Pacific Focus-Sport (the week's sports news as reported on the daily magazine 'Pacific Beat')
	R. New Zealand Int.	Home Grown (continues from 0405)
0510	R. Japan	Hello from Tokyo (listener letters, music and short features)
0530	Deutsche Welle	German by Radio (a language lesson)
	HCJB Ecuador	Walkin' in the Sunshine (Ben Cummings with roots in country music from all over the world)
	R. Australia	Lingua Franca (a program about language and its social, cultural and historical ramifications)

0600 UTC/ 2am E/11pm P - Page 46 Freqs

SUNDAY

0600	WWCR(5070kHz)	This Week in Americana (antiques and collecting)
0605	R. Australia	The Europeans (historical and cultural perspectives on European societies.)
	R. New Zealand Int.	Whenua! (people, issues and music in Aotearoa, with Hanare te Ua and Libby Hakaraia)
0610	R. Japan	Weekend Square (A program designed to present various aspects of Japan in a friendly and relaxed atmosphere with interviews, music and discussions.)
0630	WHRI(5745kHz)	DXing with Cumbre (Marie Lamb with the latest DX catches)
	WWCR(5070kHz)	World of Radio (Glenn Hauser's comprehensive review of the week in shortwave and international broadcasting)
0635	R. Australia	Ockham's Razor (sharp commentaries on science issues)
	R. Habana Cuba	The World of Stamps (refer to S 0135))

Shortwave Guide

MONDAY-FRIDAY

0605	R. New Zealand Int.	What's Going On? (daily NZ entertainment and arts calendar)
0615	R. Japan	Asian Top News (the day's major stories as reported by the region's radio stations)
0620	R. Australia	Pacific Focus (daily regional report concentrating each weekday on a different theme—business, health, environment, sport and culture)
0630	R. New Zealand Int.	Worldwatch (the stories behind international headlines)
0645	R. New Zealand Int.	Storytime (children's stories)

MONDAY

0600	WWCR(3210kHz)	Spectrum (communications magazine)
0610	R. Habana Cuba	From Havana (refer to M 0210)
0625	R. Japan	Japan Music Log
0630	R. Habana Cuba	The Jazz Place or Top Tens (refer to M 0230)
0640	R. Australia	The Australian Music Show (refer to M 0340)

TUESDAY

0625	R. Japan	Let's Learn Japanese (a Japanese language lesson for beginners)
0640	R. Australia	Music Deli (refer to T 0340)

WEDNESDAY

0625	R. Japan	Japan Music Treasure Box
0640	R. Australia	Blacktracker (refer to W 0340)

THURSDAY

0625	R. Japan	Brush Up Your Japanese (an intermediate course in Japanese)
0640	R. Australia	Oz Country Style (refer to H 0340)

FRIDAY

0625	R. Japan	Music Beat (contemporary Japanese popular music)
0640	R. Australia	Jazz Notes (refer to F 0340)

SATURDAY

0605	R. Australia	The Europeans (historical and cultural perspectives on European societies)
	R. New Zealand Int.	Tagata o te Moana (Anita Purcell presents a weekly Pacific magazine with NZ and regional Pacific news, issues, information and music)
0610	R. Japan	Pop! Goes Asia (a look at Asia as it is now, presenting the cultures and lifestyles of other Asian countries through their popular music)
0630	BBCWS(am)	People and Politics (the week in Parliament)
0635	R. Australia	Ockham's Razor (sharp commentaries on science issues)

1000 UTC/6am E/3am P - Page 48 Freqs

DAILY

1000	BBCWS(am)	World Briefing (a comprehensive report on the latest news)
	VOA	News Now (the VOA's continuous rolling news service with analysis, sports, business reports and topical features)

SUNDAY

1005	R. Australia	The Buzz (the week's big technology news and issues presented by Richard Aedy)
1010	R. New Zealand Int.	Mediawatch (analyses of recent media events and trends in NZ)
1030	BBCWS(am)	Agenda (ideas and trends shaping our world)
1033	VOA News Now	On the Line (US foreign policy discussed and debated)
1035	R. Netherlands	Wide Angle (a weekly in-depth look at a news topic)
1055	R. Netherlands	The Week Ahead (on RN the next seven days)

MONDAY-FRIDAY

1000	R. New Zealand Int.	Late Edition (major domestic evening news magazine)
	WWCR(15825kHz)	World Wide Country Radio
1010	R. Australia	Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
1030	BBCWS(am)	World Business Report (a guide through the day's business issues)
	R. Australia	The Health Report (Dr. Norman Swan's weekly report on health and medical issues)
	R. Netherlands	Newsline (news, analysis and background reports)
1033	VOA News Now	Press Conference USA (shortwave's "Meet the Press")

TUESDAY

1030	R. Australia	The Law Report (Damien Carrick presents breaking legal stories in Australia and overseas)
1033	VOA News Now	Encounter (foreign affairs debated)

WEDNESDAY

1030	R. Australia	The Religion Report (Stephen Crittenden examines the way religion and societies interact)
1033	VOA News Now	Our World (the VOA's weekly science and technology magazine)

THURSDAY

1030	R. Australia	The Media Report (Mick O'Regan takes a critical look at the latest developments in the communications industry)
1033	VOA News Now	On the Line (US foreign policy discussed and debated)

FRIDAY

1030	R. Australia	The Sports Factor (Amanda Smith presents reports which debate and celebrate the cultural significance of sport)
1033	VOA News Now	Best of 'Talk to America' (excerpts from previous editions of this VOA listener phone-in)

SATURDAY

1000	WWCR(5070kHz)	The Old Record Shop (vintage recordings)
1005	R. Australia	Pacific Review (top reports from the past week's Asia Pacific magazine)
1010	R. New Zealand Int.	Deep Purple (relaxing, thoughtful and nostalgic music)
1030	BBCWS(am)	Reporting Religion (Trevor Barnes reports on how religion shapes major news events and provides analysis of religious and ethical issues)
	R. Australia	In Conversation (Robin Williams talks not only to scientists, but also to those interested in the subject, about what it's meant to their lives)
1033	VOA News Now	Best of 'Talk to America' (excerpts from previous editions of this VOA listener phone-in)
1035	R. Netherlands	Europe Unzipped (the events of the past week in Europe, some unusual)
1055	R. Netherlands	Insight (Rob Green casts a critical and humorous eye on the past week's headlines)

1100 UTC/ 7am E/4am P - Page 48 Freqs

DAILY

1100	BBCWS(am)	World Briefing (a comprehensive report on the latest news)

SUNDAY

1100	R. Netherlands	Aural Tapestry (David Swatling weaves threads from different cultures and periods of history to tell interesting stories)
	WWCR(5070kHz)	Ken's Country Classics (classic country music)
1105	R. Australia	Correspondents Report (The ABC's overseas reporters give their interpretation and analysis of the week's major events)
	R. New Zealand Int.	New Zealand Forces Program (a two hour package of programs designed specifically for NZ military and civilian personnel stationed in East Timor and Papua-New Guinea)
1110	R. Japan	Hello from Tokyo (listener letters, music and short features)
1130	R. Australia	The Business Report (a weekly round-up of the latest business news and information from Australia and the world presented by Norelle Hooper)
	BBCWS(am)	Assignment (documentaries that delve behind the headlines to find out how news events affect people's everyday lives)
1130	R. Netherlands	Dutch Horizons (Bertine Krol chronicles life in Holland)
	R. Sweden	In Touch with Stockholm (an interactive listener contact program presented the first weekend of each month by Nidia Hagström)
		Sounds Nordic (R. Sweden's youth music and trends magazine, presented by Gaby Katz every weekend of the month but the first)

MONDAY-FRIDAY

1105	BBCWS(am)	Caribbean Report (the latest news in the Caribbean)
	R. Australia	Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
1110	BBCWS(am)	Caribbean Sport
1115	BBCWS(am)	Caribbean Magazine (a current affairs and feature program focusing on life in the region)
	R. Japan	Asian Top News (the day's major stories as reported by the region's radio stations)
1130	BBCWS(am)	World Business Report (a guide through the main business issues of the day)
	HCJB Ecuador	Morning in the Mountains (the longstanding breakfast program from The Voice of the Andes with news, sports, prayer, friendly conversation and inspirational music)
	R. Australia	Bush Telegraph (an entertaining look at rural and regional issues in Australia with Belinda Varischetti)
1130	R. Sweden	Sixty Degrees North (reports, interviews and analysis on the Nordic region)
1145	R. Korea Int.	Seoul Calling (daily magazine of Korean people, places and events)

MONDAY

1100	R. Netherlands	EuroQuest (a magazine placing Europe in context)
1105	R. New Zealand Int.	Nine to Noon (a late morning domestic program featuring news stories and topics of interest)
1125	R. Japan	Japan Music Log
1130	BBCWS(am)	Letter from America (commentary on America by Alistair Cooke)
	R. Netherlands	The Research File (a magazine emphasizing the relevance of science to all our lives)
1145	BBCWS(am)	Sports Round-up (all the daily sporting news worldwide)
	R. Sweden	Sports Scan (a weekly report on sports in the Nordic region)

TUESDAY

1100	R. Netherlands	A Good Life (how development affects societies)
1105	R. New Zealand Int.	Nine to Noon (a late morning domestic program featuring news stories and topics of interest)
1125	R. Japan	Let's Learn Japanese (a Japanese language lesson for beginners)
1130	BBCWS(am)	Analysis (background to stories in the news)
	R. Netherlands	Music 52-15 (Martha Hawley presents musical styles from around the globe)
1145	BBCWS(am)	Sports Round-up (all the daily sporting news worldwide)
	R. Sweden	Close Up (profiles of people in Sweden from all walks of life)

WEDNESDAY

1100	R. Netherlands	Dutch Horizons (Bertine Krol chronicles life in Holland)
	WWCR(15685kHz)	Communications World (Kim Elliott reviews the week in global communications.)
1105	R. New Zealand Int.	Nine to Noon (a late morning domestic program featuring news stories and topics of interest)
1125	R. Japan	Japan Music Treasure Box
1130	BBCWS(am)	Analysis (background to stories in the news)
	R. Netherlands	The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)
1145	BBCWS(am)	Sports Round-up (all the daily sporting news worldwide)
1145	R. Sweden	Money Matters (a weekly economic report on the Nordic region)

THURSDAY

1100	R. Netherlands	The Research File (a magazine emphasizing the relevance of science to all our lives)
1105	R. New Zealand Int.	Nine to Noon (repeat of portions of a late morning domestic program featuring news stories and topics of interest)
1125	R. Japan	Brush Up Your Japanese (an intermediate course in Japanese)
1130	BBCWS(am)	From Our Own Correspondent (background to the news from BBC correspondents around the world)
	R. Netherlands	Aural Tapestry (David Swatling weaves threads from different cultures and periods of history to tell interesting stories)
1145	BBCWS(am)	Sports Round-up (all the daily sporting news worldwide)
	R. Sweden	Nordic Report (a monthly magazine on Scandinavia produced by the broadcasters of the Nordic region and broadcast the first week of the month)
		Greenscan (Azariah Kiros highlights Swedish environmental awareness and challenges the second week of the month.)
		Heart Beat (Gaby Katz hosts a monthly health and medical magazine, the third week of the month.)
		The 5-Files (Kris Boswell takes you to the Sweden behind the headlines, the fourth week of the month.)

FRIDAY

1100	R. Netherlands	The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)
	WWCR(15685kHz)	The Big Backyard (Australian country music)
1105	R. New Zealand Int.	Sports Story (a sport profile or documentary)
1125	R. Japan	Music Beat (contemporary Japanese popular music)
1130	BBCWS(am)	Analysis (background to stories in the news)
	R Netherlands	A Good Life (how development affects societies)
	R. New Zealand Int.	RNZI Top Five (the best-selling music in NZ)
1145	BBCWS(am)	Football Extra (global soccer news, reviews and interviews)
	R. Sweden	A Report on the Nordic Newsweek (the week's main news stories)

SATURDAY

1100	R. Netherlands	Roughly Speaking (European youth lifestyles magazine)
	WWCR(5070kHz)	This Week in Americana (antiques and collecting)
1105	R. Australia	Asia Pacific Weekend Edition (weekly current events and business report for and about Asia and the Pacific region)
	R. New Zealand Int	New Zealand Forces Program (a two hour package of programs designed specifically for NZ military and civilian personnel stationed in East Timor and Papua-New Guinea)
	WWCR(5070kHz)	This Week in Americana (magazine about antique collecting)
1110	R. Japan	Pop! Goes Asia (a look at Asia as it is now, presenting the cultures and lifestyles of other Asian countries through

		their popular music)
1130	BBCWS(am)	Analysis (background to stories in the news)
	R. Australia	Fine Music Australia (Australian classical artists with Charles Southwood)
	R. Netherlands	Music 52-15 (Martha Hawley presents musical styles from around the globe)
	R. Sweden	Weekend (a magazine about Europe from the Radio E consortium, on the first week of the month) Sweden Today (George Wood presents the voices of Sweden, the second week of the month) Spectrum (Bill Schiller covers the Swedish cultural scene, the third week of the month) Studio 49 (conversations on ideas and long-term trends in Sweden and the Nordic region, the fourth week of the month)
	WHRI(9495 kHz.)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
1135	R. New Zealand Int.	Dateline Pacific (the major Pacific stories of the week, with background and reaction from the people making the news, presented by Don Wiseman)
1145	BBCWS(am)	Sports Round-up (all the daily sporting news worldwide)

1200 UTC/ 8am E/5am P - Page 49 Freqs

DAILY

1200	BBCWS(am)	Newshour (an hour of news and analysis from around the globe)

SUNDAY

1200	R. Korea Int.	Multiwave Feedback (RKI's interactive program for DXers and SWLs)
1205	R. Australia	Nocturne (a beautifully woven tapestry of sound presented by Mairi Nicolson)
	R. Netherlands	Sincerely Yours (RN's listener response program)
	R. New Zealand Int.	New Zealand Forces Program (continues from 1105)
1230	R. Sweden	In Touch with Stockholm (an interactive listener contact program presented the first weekend of each month by Nidia Hagstrom) Sounds Nordic (R. Sweden's youth music and trends magazine, presented by Gaby Katz every weekend of the month but the first.)

MONDAY-FRIDAY

1200	HCJB Ecuador	Latin American and International News
	R. Netherlands	Newsline (news, analysis and background reports)
1205	BBCWS(am)	Caribbean Business (a report on regional commerce and economics)
	HCJB Ecuador	Sports Report
	R. New Zealand Int.	Late Edition (repeat of 1005 program)
1210	BBCWS(am)	Caribbean Report (the latest news in the Caribbean)
	HCJB Ecuador	Morning in the Mountains (continues from 1130)
1210	R. Canada Int.	This Morning (Shelagh Rogers hosts a lively mix of interviews, documentaries, music, and personal essays debating and discussing issues important to Canadians and showcasing Canada's finest writers, musicians, and artists)
1230	HCJB Ecuador	Latin American and International News
	R. Sweden	Sixty Degrees North (reports, interviews and analysis on the Nordic region)
1235	HCJB Ecuador	Morning in the Mountains (continues from 1130)

MONDAY

1205	R. Australia	Late Night Live (Philip Adams interviews the major newsmakers, philosophers, artists and trendsetters in Australia and around the world)
1230	YLE R. Finland	Finland This Morning (a breakfast program with news, a business report, sports, weather and interviews focused on Finland and the Nordic region)
1245	R. Sweden	Sports Scan (a weekly report on sports in the Nordic region)

TUESDAY

1205	R. Australia	Late Night Live (Philip Adams interviews the major newsmakers, philosophers, artists and trendsetters in Australia and around the world)
1230	YLE R. Finland	Finland This Morning (a breakfast program with news, a business report, sports, weather and interviews focused on Finland and the Nordic region)
1245	R. Sweden	Close Up (profiles of people in Sweden from all walks of life)

WEDNESDAY

1205	R. Australia	Late Night Live (Philip Adams interviews the major newsmakers, philosophers, artists and trendsetters in Australia and around the world)
1230	YLE R. Finland	Finland This Morning (a breakfast program with news, a business report, sports, weather and interviews focused on Finland and the Nordic region)
1245	R. Sweden	Money Matters (a weekly economic report on the Nordic region)

THURSDAY

1205	R. Australia	Late Night Live (Philip Adams interviews the major newsmakers, philosophers, artists and trendsetters in Australia and around the world)
1230	YLE R. Finland	Finland This Morning (a breakfast program with news, a business report, sports, weather and interviews focused on Finland and the Nordic region)
1245	R. Sweden	Nordic Report (a monthly magazine on Scandinavia produced by the broadcasters of the Nordic region and broadcast the first week of the month) Greenscan (Azariah Kiros highlights Swedish environmental awareness and challenges the second week of the month) Heart Beat (Gaby Katz hosts a monthly health and medical magazine, the third week of the month) The S-Files (Kris Boswell takes you to the Sweden behind the headlines, the fourth week of the month)

FRIDAY

1205	R. Australia	Sound Quality (Tim Ritchie seeks out the interesting, the evolutionary, the inaccessible and the wonderful in music)
1230	YLE R. Finland	Capitol Cafe (conversations with Finns from all walks of life)
1245	R. Sweden	A Report on the Nordic Newsweek (the week's main news stories)

SATURDAY

1200	R. Korea Int.	From Us to You (RKI answers listener mail and rewards its contest winners)
	WHRI(6040kHz)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
1205	R. Australia	The Spirit of Things (Dr. Rachael Kohn explores contemporary values and beliefs as expressed through ritual, art, music, and sacred texts)
	R. Netherlands	Europe Unzipped (the events of the past week in Europe, some unusual)
	R. New Zealand Int.	New Zealand Forces Program (continues from 1105)
1230	R. Sweden	Weekend (a magazine about Europe from the Radio E consortium, on the first week of the month) Sweden Today (George Wood presents the voices of Sweden, the second week of the month) Spectrum (Bill Schiller covers the Swedish cultural scene, the third week of the month) Studio 49 (conversations on ideas and long-term trends in Sweden and the Nordic region, the fourth week of the month)
	WHRI(9495kHz)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
	YLE R. Finland	Finland This Week (the best reports and interviews from the weekday program, Finland This Morning)
1245	YLE R. Finland	Starting Finnish (a language lesson)

1300 UTC/ 9am E/6am P - Page 49 Freqs

SUNDAY

1300	Channel Africa	Channel Africa Extra (a weekend magazine and variety show with news, sports, music, regular reports and features)
1305	BBCWS(am)	Composer of the Month (the life stories and music of major composers in the Western classical tradition)
	R. Australia	Nocturne (continues from 1205)
1310	R. Canada Int.	The Sunday Edition (the more relaxed and reflective weekend edition of This Morning, hosted by Michael Enright)
1320	China R. Int.	In the Spotlight (Chinese arts and cultural magazine)
1330	BBCWS(am)	In Praise of God (diverse services of worship)
	R. Sweden	In Touch with Stockholm (an interactive listener contact program presented the first weekend of each month by Nidia Hagström) Sounds Nordic (R. Sweden's youth music and trends magazine, presented by Gaby Katz every weekend of the month but the first)
	WWCR(15825kHz)	The Old Record Shop (vintage recordings)

MONDAY-FRIDAY

1300	R. Australia	RA News (a fifteen minute report with emphasis on significant events in Asia and the Pacific region)
1305	BBCWS(am)	Outlook (topical magazine of people, places and events)
1305	R. Canada Int.	This Morning (continues from 1210)
1320	R. Australia	The Planet (Lucky Oceans, a/k/a Rowan Gosfield, presents good, heartfelt, inspiring music from around the world with a rich mix of jazz, blues, folk styles, art music and more in a show artfully arranged for radio.)
1330	R. Sweden	Sixty Degrees North (reports, interviews and analysis on the Nordic region)
1345	BBCWS(am)	Off the Shelf (abridged serialized readings of novels, stories and other literature)

MONDAY

1330	China R. Int.	People in the Know (interviews with prominent Chinese who are shaping the nation's future)
1345	R. Sweden	Sports Scan (a weekly report on sports in the Nordic region)

TUESDAY

1330	China R. Int.	Biz China (refer to T 0130)
1345	R. Sweden	Close Up (profiles of people in Sweden from all walks of life)

WEDNESDAY

1345	R. Sweden	Money Matters (a weekly economic report on the Nordic region)

THURSDAY

1345	R. Sweden	Nordic Report (a monthly magazine on Scandinavia produced by the broadcasters of the Nordic region and broadcast the first week of the month) Greenscan (Azariah Kiros highlights Swedish environmental awareness and challenges the second week of the month) Heart Beat (Gaby Katz hosts a monthly health and medical magazine, the third week of the month) The S-Files (Kris Boswell takes you to the Sweden behind the headlines, the fourth week of the month)

FRIDAY

1330	China R. Int.	Life in China (a weekly magazine focusing on the lives of ordinary people in China)
1345	R. Sweden	A Report on the Nordic Newsweek (the week's main news stories)

SATURDAY

1300	Channel Africa	Channel Africa Extra (a weekend magazine and variety show with news, sports, music, regular reports and features)
1305	BBCWS(am)	World Football (a lively and forthright look at the world's favorite sport)
	R. Australia	The Science Show (one of the longest running programs on ABC Radio)
1310	R. Canada Int.	The House (Jason Moscovitz presents a review of the week in Canadian national politics)
1330	BBCWS(am)	The Music Feature (features and documentaries providing insight into current popular music genres)
	R. Sweden	Weekend (a magazine about Europe from the Radio E consortium, on the first week of the month) Sweden Today (George Wood presents the voices of Sweden, the second week of the month) Spectrum (Bill Schiller covers the Swedish cultural scene, the third week of the month) Studio 49 (conversations on ideas and long-term trends in Sweden and the Nordic region, the fourth week of the month)

1400 UTC/ 10am E/7am P - Page 50 Freqs

SUNDAY

1400	Channel Africa	Channel Africa Extra (continued from 1300)
1405	BBCWS(am)	Talking Point (live, global phone-in where listeners and internet users can share their views on the issues of the day and put questions to expert guests)
	R. Australia	Books and Writing (Ramona Koval conducts in-depth discussions focusing on books, ideas and writing)
	R. Canada Int.	The Sunday Edition (continues from 1310, usually with a feature documentary)
1410	R. Japan	Pop Joins the World
1420	China R. Int.	In the Spotlight (Chinese arts and cultural magazine)
1435	R. Netherlands	Sincerely Yours (RN's listener response program)
1455	R. Netherlands	The Week Ahead (on RN the next seven days)

MONDAY-FRIDAY

1405	R. Australia	The Planet (continues from 1320)
1405	R. Canada Int.	This Morning (continues from 1210)
1415	R. Japan	44 Minutes (current affairs magazine about Japan and Asia)
1430	R. Netherlands	Newsline (news, analysis and background reports)

MONDAY

1405	BBCWS(am)	Meridian-Masterpiece (critical examinations of creative endeavors)
1430	BBCWS(am)	Charlie Gillett (presents his selection of music from around the globe)
	China R. Int.	People in the Know (interviews with prominent Chinese who are shaping the nation's future)

1445	R. Canada Int.	Out Front (a place for new ideas, new ways of making radio and new voices from across Canada)
TUESDAY		
1405	BBCWS(am)	Meridian-Screen (interviews, documentaries, features and discussions on the film arts)
1430	BBCWS(am)	UK Top Twenty (music from the British rock and pop charts)
	China R. Int.	Biz China (refer to T 0130)
1445	R. Canada Int.	Out Front (a place for new ideas, new ways of making radio and new voices from across Canada)
WEDNESDAY		
1405	BBCWS(am)	Meridian-Writing (Harriett Gilbert explores fiction and non-fiction. plays and poetry, lyrics and letters, and talks to a wide variety of writers and readers)
1430	BBCWS(am)	Revolver (popular musicians select and present five current musical releases)
1445	R. Canada Int.	Out Front (a place for new ideas, new ways of making radio and new voices from across Canada)
THURSDAY		
1405	BBCWS(am)	The Music Biz (Mark Coles with a weekly look at the global music imdustry)
1430	BBCWS(am)	John Peel (with his own unique and eclectic mix of new music)
1445	R. Canada Int.	Out Front (a place for new ideas, new ways of making radio and new voices from across Canada)
FRIDAY		
1405	BBCWS(am)	Arts in Action (architects, playwrights, musicians and poets explain the ideas which shape our aesthetic, musical and literary worlds)
1430	BBCWS(am)	Jazzmatazz (Alyn Shipton with the best new releases, interviews with modern artists and tributes to the jazz greats)
	China R. Int.	Life in China (a weekly magazine focusing on the lives of ordinary people in China)
1430	R. Canada Int.	C'est La Vie (Bernard St.-Laurent presents a program about life in Quebec and French-speaking Canada)
SATURDAY		
1400	Channel Africa	Channel Africa Extra (continued from 1300)
1405	BBCWS(am)	Sportsworld (live commentary on major sports events and fixtures, reports and results from around Britain and Europe, and news of all the day's sporting action from around the world)
	R. Australia	New Dimensions (intimate conversations with many of this century's leading thinkers and social innovators)
	R. Canada Int.	The Vinyl Cafe (Canadian humorist and storyteller Stuart McLean plays music he's found at a mythical record store and weaves tales centered around the store's neighborhood)
1410	R. Japan	Weekend Square (a program designed to present various aspects of Japan in a friendly and relaxed atmosphere with interviews, music and discussions)
1435	R. Netherlands	Europe Unzipped (the events of the past week in Europe, some unusual)
1455	R. Netherlands	Insight (Rob Green casts a critical and humorous eye on the past week's headlines)

1500 UTC/ 11am E/8am P - Page 50 Freqs

DAILY		
1530	R. Austria Int.	Report from Austria (a daily magazine focusing on Austria and central and eastern Europe)
SUNDAY		
1500	R. Netherlands	Dutch Horizons (Bertine Krol chronicles life in Holland)
1505	BBCWS(am)	Concert Hall (classical music recitals and performances; the last program of the month is reserved for listeners' requests)
	R. Australia	Encounter (a highly acclaimed series exploring the connections between religion and life while reflecting on the religious experience of multicultural Australia)
	R. Canada Int.	The SUNDAY Edition (continues from 1310)
1530	R. Netherlands	Aural Tapestry (David Swatling weaves threads from different cultures and periods of history to tell interesting stories)
1535	R. Austria Int.	Network Europe (weekly magazine on Europe jointly produced by European broadcasters.)
MONDAY-FRIDAY		
1505	R. Australia	Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
MONDAY		
1500	R. Netherlands	The Research File (a magazine emphasizing the relevance of science to all our lives)
1505	BBCWS(am)	One Planet (stories about the environment, development, agriculture and human impact on the natural world)
1530	BBCWS(am)	People and Places (a forum for the exchange of views and experiences on a global scale)
	R. Australia	The Health Report (Dr. Norman Swan's weekly report on health and medical issues)
	R. Netherlands	EuroQuest (a magazine placing Europe in context)
TUESDAY		
1500	R. Netherlands	Music 52-15 (Martha Hawley presents musical styles from around the globe)
1505	BBCWS(am)	Science in Action (Richard Black reports on thefascinating worlds of science and technology)
1530	BBCWS(am)	Essential Guide (the biggest developments, issues and names in global affairs)
	R. Australia	The Law Report (Damien Carrick presents breaking legal stories in Australia and overseas.)
	R. Netherlands	A Good Life (how development affects societies)
WEDNESDAY		
1500	R. Netherlands	The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)
1505	BBCWS(am)	Health Matters (reports on research explaining where medicine is going)
1530	BBCWS(am)	Everywoman (the BBC's international magazine for women)
	R. Australia	The Religion Report (Stephen Crittenden examines the way religion and societies interact)
	R. Netherlands	Dutch Horizons (Bertine Krol chronicles life in Holland)
THURSDAY		
1500	R. Netherlands	Aural Tapestry (David Swatling weaves threads from different cultures and periods of history to tell interesting stories)
1505	BBCWS(am)	Go Digital (technology journalist Tracey Logan explains the latest in IT)
1530	BBCWS(am)	Omnibus (a weekly documentary)
	R. Australia	The Media Report (Mick O'Regan takes a critical look at the latest developments in the communications industry)
	R. Netherlands	The Research File (a magazine emphasizing the relevance of science to all our lives)
FRIDAY		
1500	R. Netherlands	A Good Life (how development affects societies)
1505	BBCWS(am)	Discovery (in-depth exploration of ideas and discoveries in science and technology)
1530	BBCWS(am)	Sports International (the issues and personalities behind the headlines)
	R. Australia	The Sports Factor (Amanda Smith presents reports which debate and celebrate the cultural significance of sport.)
	R. Netherlands	The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)
SATURDAY		
1500	R. Netherlands	Music 52-15 (Martha Hawley presents musical styles from around the globe)
1505	BBCWS(am)	Sportsworld (continues from 1405)
	R. Australia	Nocturne (a beautifully woven tapestry of sound presented by Mairi Nicolson)
	R. Canada Int.	Quirks and Quarks (what's new and next in science)
1530	R. Netherlands	Roughly Speaking (European youth lifestyles magazine)

1600 UTC/ 12pm E/9am P - Page 50 Freqs

SUNDAY		
1605	BBCWS(am)	Sunday Sportsworld (live commentary on major sports events and fixtures, reports and results from around Britain and Europe, and news of all the day's sporting action from around the world)
	R. Australia	The National Interest (Terry Lane's round-up of the week's major issues)
	R. Netherlands	Wide Angle (a weekly in-depth look at a news topic)
MONDAY-FRIDAY		
1600	BBCWS(am)	Europe Today (news, analysis and comment on issues and events on the continent)
	R. Netherlands	Newsline (news, analysis and background reports)
1630	BBCWS(am)	World Business Report
1645	BBCWS(am)	Sports Roundup (all the daily sporting news worldwide)
TUESDAY		
1605	R. Australia	The Comfort Zone (Alan Saunders presents a unique program that debates and celebrates the cultural significance of architecture and design, landscape and gardens, and food)
WEDNESDAY		
1605	R. Australia	Verbatim (a program that charts the story of the 20th century through the voices of ordinary Australians)
1630	R. Australia	Street Stories (a half-hour feature from the footpaths, paddocks, lounge rooms and shopping malls of the diverse Australian continent)
THURSDAY		
1605	R. Australia	Hindsight (a documentary program that looks at Australian social history through the broad themes of institutions, popular culture, health and the environment)
FRIDAY		
1605	R. Australia	Awaye! (Produced and presented by Aboriginal broadcasters, this is Australia's only national indigenous arts and culture program)
SATURDAY		
1600	BBCWS(am)	News
1605	BBCWS(am)	Sportsworld (continues from 1405)
	R. Australia	Nocturne (continues from 1505)
	R. Netherlands	Europe Unzipped (the events of the past week in Europe, some unusual)

1700 UTC/ 1pm E/10am P - Page 51 Freqs

DAILY		
1700	R. Japan	News (a round-up of Asian and world news)
SUNDAY		
1700	Voice of Greece	All Greek to Me (Greek traditional and popular music)
1705	R. Australia	The Spirit of Things (Dr. Rachael Kohn explores contemporary values and beliefs as expressed through ritual, art, music, and sacred texts)
	VOA Africa	Reporters Roundtable (Ashenafi Abedje moderates this lively roundtable of VOA journalists, bringing you analysis of the major news developments in Africa)
1730	VOA Africa	Music Time in Africa (Rita Rochelle highlights the best of traditional and modern African music)[broadcast in two editions with part two airing at 1930]
MONDAY-FRIDAY		
1705	R. Australia	Bush Telegraph (Belinda Varischetti hosts an entertaining look at rural and regional issues around Australia)
	VOA News Now	Talk to America (Carol Pearson hosts a worldwide call-in show featuring American decisionmakers, personalities and experts)
TUESDAY-SATURDAY		
1715	R. Japan	44 Minutes (current affairs magazine about Japan and Asia)
SATURDAY		
1700	Voice of Greece	Hellenes Around the World (program about Greeks and Greek culture and influence in the world)
1705	R. Australia	New Dimensions (an internationally syndicated program featuring interviews with leading thinkers and social innovators)
	VOA Africa	Hip Hop Connections (Rod Murray with the latest US hip hop music, interviews with artists and information of interest to African youth)

2000 UTC/ 4pm E/1pm P - Page 52 Freqs

THURSDAY-SUNDAY		
2000	WBCQ(7415kHz)	Radio Caroline (music and more from the legendary British pirate radio station)
THURSDAY		
2030	WWCR(15825kHz)	World of Radio (Glenn Hauser's comprehensive review of the week in shortwave and international broadcasting)
FRIDAY		
2015	WWCR(15825kHz)	New Horizons (award-winning science and technology report from London Radio Service)
SATURDAY		
2030	WWCR(15825 kHz)	Presidential Radio Address/Democratic Response

Shortwave Guide

2100 UTC/ 5pm E/2pm P - Page 53 Freqs

SUNDAY

2100	WBCQ(7415kHz)	Radio Free Euphoria (Captain Gonja's unique form of "variety" show)
	WHRI(5745kHz)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
2105	BBCWS(am)	Global Business (Peter Day charts the transformations sweeping through the world of work and commerce)
2110	R. Australia	AM (ABC Radio's flagship morning news magazine)
2130	R. Australia	Corridors of Power (a series of documentary programs dealing with Asian or Pacific history and politics. Specific details were unavailable at deadline)
2145	BBCWS(am)	Write On (Dilly Barlow and Penny Vine sift through the listener mail)

MONDAY-FRIDAY

2105	BBCWS(am)	World Business Report

MONDAY

2100	WBCQ(7415kHz)	Jean Shepherd (the noted humorist's classic radio programs from the 60s and 70s)
2110	R. Australia	AM (ABC Radio's flagship morning news magazine)
2130	R. Australia	The Health Report (Dr. Norman Swan's weekly report on health and medical issues)
2145	BBCWS(am)	Analysis (background to the stories in the news)

TUESDAY

2110	R. Australia	AM (ABC Radio's flagship morning news magazine)
2130	R. Australia	Innovations (a program showcasing Australian invention, enterprise and ingenuity)
	WBCQ(7415kHz)	International World Beat Music with DX Merlin
2145	BBCWS(am)	Analysis (background to the stories in the news)

WEDNESDAY

2110	R. Australia	AM (ABC Radio's flagship morning news magazine)
2130	R Australia	The Religion Report (Stephen Crittenden examines the way religion and societies interact)
2145	BBCWS(am)	From Our Own Correspondent (the background to international events from BBC correspondents around the world)

THURSDAY

2110	R. Australia	AM (ABC Radio's flagship morning news magazine)
2130	R. Australia	Rural Reporter (ABC's rural reporters present news and stories from rural and regional Australia)
2145	BBCWS(am)	Analysis (background to the stories in the news)

FRIDAY

2100	WBCQ(7415kHz)	Juliet's Wild Kingdom
	WHRA(17650kHz)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
2105	R Australia	Feedback (Roger Broadbent answers listener questions and provides regular updates about RA)
2130	R. Australia	Oz Sounds (Australian new music releases)
2130	WBCQ(7415kHz)	Pab Sungenis Project (stand-up comedy and sketches)
2145	BBCWS(am)	Analysis (background to the stories in the news)

SATURDAY

2100	WBCQ(7415kHz)	HarvZower (a personal selection of contemporary music)
2105	R. Australia	Australia All Over (Ian McNamara—aka "Macca"—hosts this celebration of Australiana and Australian values)
2130	WHRA(17650khz)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
2145	BBCWS(am)	Patterns of Faith (a global exploration of religious values and human wisdom)

2200 UTC/ 6pm E/3pm P - Page 54 Freqs

DAILY

2200	BBCWS(am)	The World Today (the BBC's agenda-setting flagship global news program)

SUNDAY

2200	R. Canada Int.	The World This Weekend (CBC weekend news magazine)
	WRMI(15725kHz)	Wavescan
2210	R. Australia	AM (ABC Radio's flagship morning news magazine)
2230	BBCWS (am)	Agenda (ideas and trends shaping our world)
	R Canada Int	The Inside Track (anthologies and documentaries about sports and those who compete in them)
	R. Vlaanderen Int.	Radio World (Frans Vassen presents a weekly report about international radio)
2240	R. Australia	The Australian Music Show (the latest rock music from the Triple J youth network of the ABC)

MONDAY-FRIDAY

2200	R. Canada Int.	The World at Six (the CBC's flagship evening newscast)
2230	R. Canada Int	As It Happens (Barbara Budd and Mary Lou Finley interview newsmakers from the famous to ordinary people eyewitnessing news in the making)

MONDAY

2210	R. Australia	AM (ABC Radio's flagship morning news magazine)
2240	R. Australia	Music Deli (Australian performances of folk, acoustic, traditional and world music)

TUESDAY

2210	R. Australia	AM (ABC Radio's flagship morning news magazine)
2240	R. Australia	Blacktracker (Mal Holness presents contemporary Aboriginal music)

WEDNESDAY

2210	R. Australia	AM (ABC Radio's flagship morning news magazine)
2240	R. Australia	Oz Country Style (country music from Australia)

THURSDAY

2210	R. Australia	AM (ABC Radio's flagship morning news magazine)
2230	WBCQ(7415kHz)	Uncle Ed's Musical Memories
2240	R. Australia	Jazz Notes (Australian jazz presented by Ivan Lloyd)

FRIDAY

2205	R. Australia	Asia-Pacific Weekend Edition (regional news and business report)
2230	BBCWS(am)	People and Politics (insight and analysis on British politics)
	R. Australia	AM Saturday (ABC Radio's weekend morning news magazine)
	WBCQ(7415kHz)	Wanton Display of Control and Disruption

SATURDAY

2200	R. Canada Int.	The World This Weekend (CBC weekend news magazine)
	WBCQ(7415kHz)	Radio Timtron Worldwide
2205	R. Australia	Correspondents Report (The ABC's overseas reporters give their interpretation and analysis of the week's major events)
2230	BBCWS(am)	From Our Own Correspondent (background to the news from BBC correspondents around the world)
	R. Australia	The Business Report (a weekly round-up of the latest business news and information from Australia and the world presented by Narelle Hooper)
	R. Canada Int.	Madly Off in All Directions (satire and comedy)
	R. Vlaanderen Int.	Music from Flanders (a half-hour of Flemish music, musicians and musical performances)
	WHRI(9495kHz)	DXing with Cumbre (Marie Lamb with the hottest DX catches)

2300 UTC/ 7pm E/4pm P - Page 54 Freqs

SUNDAY

2300	BBCWS(am)	The World Today (the BBC's agenda-setting flagship global news program)
	WBCQ(7415kHz)	Le Show (Harry Shearer with a tour-de-force variety show)
2305	R Canada Int.	Global Village (Jowi Taylor fields reports and music from global venues)
2310	R. Australia	Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
2320	China R. Int.	In the Spotlight (Chinese arts and cultural magazine)
2330	BBCWS(am)	Pick of the World (Daire Brehan with highlights from the past week's WS programs)
	R. Australia	Earthbeat (Alexandra DeBlas presents a program on environmental science)
2330	WHRI(5745kHz.)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
2335	R. Netherlands	Sincerely Yours (RN's listener response program)
2355	R. Netherlands	The Week Ahead (on RN the next seven days)

MONDAY-FRIDAY

2305	BBCWS(am)	Outlook (topical magazine of people, places and events)
2305	R. Canada Int	As It Happens (continues from 2230)
2330	R. Netherlands	Newsline (news, analysis and background reports)

MONDAY

2310	R Australia	Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
2330	China R. Int.	People in the Know (interviews with prominent Chinese who are shaping the nation's future)
	R. Australia	The Buzz (the week's big technology news and issues presented by Richard Aedy)
2345	BBCWS(am)	Write On (Dilly Barlow and Penny Vine sift through the listener mail)

TUESDAY

2310	R. Australia	Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
2330	China R. Int.	Biz China (refer to T 0130)
	R. Australia	RA Arts with Julie Copeland (an arts-related interview and a film review)
2345	BBCWS(am)	Heart and Soul (global religious and spiritual experiences)

WEDNESDAY

2310	R. Australia	Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
2330	R Australia	Rural Reporter (ABC's rural reporters present news and stories from rural and regional Australia)
2330	WBCQ(7415kHz)	World of Radio (Glenn Hauser's comprehensive review of the week in shortwave and international broadcasting)
2345	BBCWS(am)	Westway (drama serial)

THURSDAY

2310	R. Australia	Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
2330	R. Australia	The Media Report (Mick O'Regan takes a critical look at the latest developments in the communications industry)
2345	BBCWS(am)	What's the Problem (a panel of experts offers advice to listeners who write in with their problems)

FRIDAY

2300	WBCQ(7415kHz)	The Lost Discs Radio Show (spinning obscure oldies and "B" sides from 1955-70)
2305	R. Australia	Lingua Franca (a program about language and its social, cultural and historical ramifications.)
2330	China R. Int.	Life in China (a weekly magazine focusing on the lives of ordinary people in China)
	R. Australia	The Sports Factor (Amanda Smith presents reports which debate and celebrate the cultural significance of sport.)
2345	BBCWS(am)	Westway (drama serial)

SATURDAY

2300	WBCQ(7415kHz)	The Real Amateur Radio Show
2301	BBCWS(am)	Play of the Week (classic and contemporary drama for radio)
2305	R. Australia	All in the Mind (the mind, brain and behavior—everything from addiction to artificial intelligence—presented by Natasha Mitchell)
2305	R. Canada Int.	Quirks and Quarks (what's new and next in science)
2330	R. Australia	Innovations (a program showcasing Australian invention, enterprise and ingenuity)
	WBCQ(7415kHz)	Fred Flintstone's Music Show
2335	R. Netherlands	Europe Unzipped (the events of the past week in Europe, some unusual)
2335	R. Netherlands	Insight (Rob Green casts a critical and humorous eye on the past week's headlines)

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

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First Images from NOAA-17

The launch of NOAA-17 was quite spectacular – not least for watching it via the Internet on a low-speed modem connection. In Britain, launch was mid-evening, and although I had planned to wait for the first UK pass – following activation of the HRPT (high resolution pictures) transmitter – this depended on the availability of Kepler elements that are essential for tracking the satellite's signal in the 1700 MHz band.

I could not locate any elements during the early hours after launch, but then realized that activation was not scheduled to occur until after the UK passes anyway, so I waited until the following morning. Keplers were then appearing everywhere, so I was able to receive the first pass over Britain in daylight – after many countries around the world had already gotten their first images. These APT images show channels 1 and 2 (visible-light) prior to infrared activation.

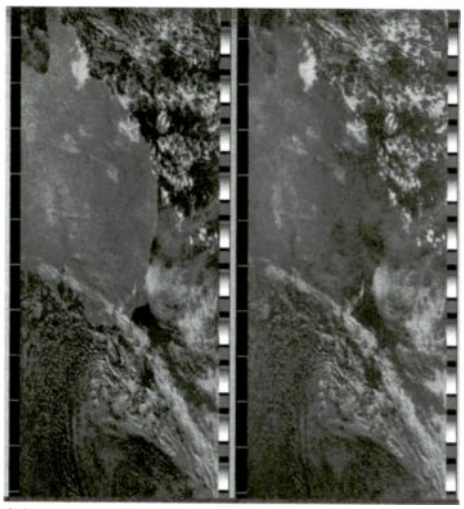

Fig 1: Early NOAA-17 image from Mike Kenny in Australia

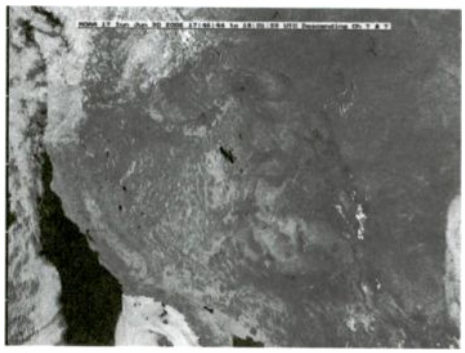

Fig 2: NOAA-17 1746UTC June 30, 2002 - APT image from John Hartsell

For those unable to watch the normal television channels, NASA Television coverage of launches are webcast on the NASA-KSC Home Page at: **http://www.ksc.nasa.gov**. Choose 'KSC Live Video Feeds' followed by 'NASA Television Coverage.'

Listeners and viewers were able to follow the sequence of operations involved in attaining orbit, followed by the deployment of the antenna and the solar array. Launch was at 1823 UTC, and the video feed showed the rocket disappear into low clouds and fog not long after. The video feed clearly showed separation of the two Titan 11 stages.

❖ Channel activation

The first HRPT transmission commenced on 1702.5 MHz, with a scheduled change to the "permanent" frequency of 1698.0 MHz a day or two later. The initial transmission was made using an omni-directional antenna, probably in case of satellite stabilization anomalies, so the switch to a directional antenna produced a welcome increase in signal strength.

NOAA-17 has six channels available, but only five can be transmitted continuously. Channels 1, 2, 4, and 5 are normally transmitted within the HRPT (high resolution picture transmission) data stream in the 1700 MHz band. The remaining channel (3) has two modes and is selectable depending on mission requirements. From the time of activation, channel 3A was included in the HRPT stream. The infrared sensors were activated around July 10, giving us normal five-channel content.

❖ NOAA operations

The National Oceanographic and Atmospheric Administration relies on a minimum of two polar orbiters, each covering the globe every 12 hours. In the past, one crossed the equator at 7:30 a.m. local time, and one at 2 p.m. NOAA-17 will replace NOAA-15 as the morning orbiter, but officials opted to place the craft in a 10 a.m. orbit to increase the amount of data it can obtain.

Mike Mignogno, NOAA's Polar Satellite program manager, explained: "This will be first satellite for NOAA that we have in this mid-morning orbit. Because of the better lighting at 10 o'clock versus the normal morning satellite time of 7:30a.m., we will be able to generate better imagery-based products than we have in the past. In addition, we will be able to operate an ozone instrument to monitor atmospheric ozone on this satellite, and again this is because of the higher sun angles that are associated with this particular orbit."

"The low-light conditions at 7:30a.m. prevent us from doing certain products that are based on our imager – the Advanced Very High Resolution Radiometer, the AVHRR. By moving to 10 o'clock, the sun angles are that much higher and the reflectivity off the surface gives us better input into the imager at that time and therefore the products are higher quality."

NASA is responsible for managing the construction of the NOAA weather satellites, getting them launched into space and performing the initial on-orbit checkout. Control of the craft is then handed to NOAA for operations. The remaining two NOAA polar orbiters in this series – NOAA-N and NOAA-N-Prime – will be launched by Boeing Delta 2 rockets in 2004 and 2008, respectively.

❖ WXSAT Frequencies

The activation of NOAA-17 and Fengyun-1D during recent weeks offers WXSAT monitors an unprecedented selection of transmission formats during the day:

APT

NOAA-12 and NOAA-15 transmit APT on 137.50 MHz (except during VHF conflict)
NOAA-14 and NOAA-17 transmit APT on 137.62 MHz
NOAAs transmit non-APT data on 137.77 or 136.77 MHz
Meteor 3-5 usually transmits on 137.30 MHz when in sunlight.
Meteor 2-21 may transmit on 137.40 MHz when Meteor 3-5 is switched off.

HRPT

NOAA-12 and NOAA-16 transmit on 1698.0 MHz
NOAA-14 transmits on 1707 MHz
NOAA-15 transmits on 1702.5 MHz
NOAA-17 transmits on 1707 MHz (from July 16)
Fengyun-1C and -1D transmit on 1700.5 MHz

WEFAX

GOES-8 and GOES-10 use 1691 MHz

Satellite Service Guide

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All Frequencies MHz

Panamsat Galaxy 11

Ku-Band - 91 degrees West longitude

1(H)	11720	Data Transmissions
2(V)	11740	Data Transmissions
3(H)	11760	Data Transmissions
4(V)	11780	Data Transmissions
5(H)	11800	Data Transmissions
6(V)	11820	Occasional video
7(H)	11840	Data Transmissions
8(V)	11860	Data Transmissions
9(H)	11880	Data Transmissions
10(V)	11900	Data Transmissions
11(H)	11920	Data Transmissions
12(V)	11940	Occasional video
13(H)	11960	Occasional video
14(V)	11980	Occasional video
15(H)	12000	Occasional video
16(V)	12020	Occasional video
17(H)	12040	Data Transmissions
18(V)	12060	Primedia (digital)
19(H)	12080	Data Transmissions
20(V)	12100	Data Transmissions
21(H)	12120	Data Transmissions
22(V)	12140	Data Transmissions
23(H)	12160	Data Transmissions
24(V)	12180	Data Transmissions
25(H)	10964	South-American beamed transponder
26(V)	10976	South-American beamed transponder
27(H)	10994	South-American beamed transponder
28(V)	11006	South-American beamed transponder
29(H)	11024	South-American beamed transponder
30(V)	11036	South-American beamed transponder
31(H)	11054	South-American beamed transponder
32(V)	11066	South-American beamed transponder
33(H)	11084	South-American beamed transponder
34(V)	11096	South-American beamed transponder
35(H)	11114	South-American beamed transponder
36(V)	11156	South-American beamed transponder
37(H)	11144	South-American beamed transponder
38(V)	11156	South-American beamed transponder
39(H)	11174	South-American beamed transponder
40(V)	11186	South-American beamed transponder

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	Occasional video
6(H)	3820	(none)
7(V)	3840	Occasional video
8(H)	3860	Occasional video
9(V)	3880	Occasional video
10(H)	3900	FOX Network feeds and FOX News Edge (digital)
11(V)	3920	Occasional video
12(H)	3940	Occasional video
13(V)	3960	FOX Network feeds (digital) / 20th Century Fox Syndication (analog)
14(H)	3980	Occasional video
15(V)	4000	Occasional video
16(H)	4020	Occasional video
17(V)	4040	Occasional video
18(H)	4060	Occasional video / CBS Network feeds (acc) (digital)
19(V)	4080	Occasional video / CBS Network feeds (acc) (digital)
20(H)	4100	CBS Network - East and CBS HDTV (digital)
21(V)	4120	Occasional video / CBS Network feeds (acc) (digital)
22(H)	4140	Occasional video / CBS Network feeds (acc) (digital)
23(V)	4160	CBS Network - West and CBS HDTV (digital)
24(H)	4180	Occasional video

Loral Skynet Telstar 6

Ku-Band - 93 degrees West longitude

1(V)	11728.5	CBS Newsnet (digital)
2(H)	11735.0	Reuters Newsfeeds (digital)
3(V)	11789.5	CBS Satellite Newsgathering (digital)
4(H)	11796.0	Occasional video
5(V)	11836.0	Data Transmissions
6(H)	11842.5	Data Transmissions
7(V)	11867.0	Data Transmissions
8(H)	11873.5	WSNet DBS (digital)
9(V)	11898.0	WSNet DBS (digital)
10(H)	11904.5	WSNet DBS (digital)
11(V)	11929.0	CBS Satellite Newsgathering (digital)
12(H)	11935.5	Occasional video
13(V)	11960.0	Occasional video
14(H)	11966.5	Occasional video
15(V)	11991.0	WSNet DBS (digital)
16(H)	11997.5	Occasional video
17(V)	12022.0	Occasional video
18(H)	12028.5	WSNet DBS (digital)
19(V)	12053.0	Occasional video
20(H)	12059.5	Occasional video
21(V)	12084.0	Data Transmissions
22(H)	12090.5	Occasional video
23(V)	12115.0	Data Transmissions
24(H)	12121.5	Occasional video
25(V)	12146.0	Occasional video
26(H)	12152.5	Data Transmissions
27(V)	12177.0	WSNet DBS (digital)
28(H)	12183.5	Occasional video

Panamsat Galaxy 3C

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	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 2 - East (VC2+)
17(H)	4040	MoreMax - East (VC2+)
18(V)	4060	Occasional video
19(H)	4080	HBO Signature - East (VC2+)
20(V)	4100	HBO 2 - West (VC2+)
21(H)	4120	Occasional video
22(V)	4140	Horse Racing (digital)
23(H)	4160	Occasional video
24(V)	4180	Horse Racing (digital)

Panamsat Galaxy 3C

Ku-Band - 95 degrees West longitude

T01(H)	1720	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, 3.69, 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, 4.08, 4.32, and 4.45 MHz

T04(H)	11780	CCTV-4 and CCTV-9 (digital)
T05(V)	11810	Data Transmissions
T06(H)	11810	Data Transmissions
T07(H)	11840	Data Transmissions
T08(V)	11870	Data Transmissions
T09(H)	11870	Data Transmissions
T10(H)	11900	Data Transmissions
T11(V)	11930	Data Transmissions
T12(H)	11930	Occasional video
T13(H)	11960	Data Transmissions
T14(V)	11990	Data Transmissions
T15(H)	11990	Occasional video
T16(H)	12020 FM2 services	

Data transmissions .06, .47, .53, .68, 1.95, 2.18, 2.45, 2.52, 2.82, 2.92, 3.20, 3.40, 3.97, 4.14, and 4.24 MHz

In-Store audio networks .15, .27, .39, .99, 1.11, 1.59, 1.71, and T17(V) 12050 Data Transmissions

T18(H)	12050	Occasional video
T19(H)	12080	Data Transmissions
T20(V)	12110	Data Transmissions
T21(H)	12110	Occasional video
T22(H)	12140	Data Transmissions
T23(V)	12170	Data Transmissions
T24(H) 1	2170	CCTV-4

Loral Skynet Telstar 5

C-Band - 97 degrees West longitude

1(V)	3720	Occasional video
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	Occasional video
9(V)	3880	Occasional video
10(H)	3900	FOX Network feeds (digital) / 20th Century Fox Syndication (analog)
11(V)	3920	Bonneville Satellite services (digital)
12(H)	3940	Occasional video
13(V)	3960	FOX Network feeds (digital) / 20th Century Fox Syndication (analog)
14(H)	3980	Occasional video
15(V)	4000	Globecast (digital)
16(H)	4020	Globecast (acc) / Paramount syndication (acc)
17(V)	4040	Bonneville Satellite services (digital)
18(H)	4060	Armed Forces Radio and Television Service (AFRTS) (digital)
19(V)	4080	Occasional video
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

THE FED FILES

A GUIDE TO GOVERNMENT COMMUNICATIONS

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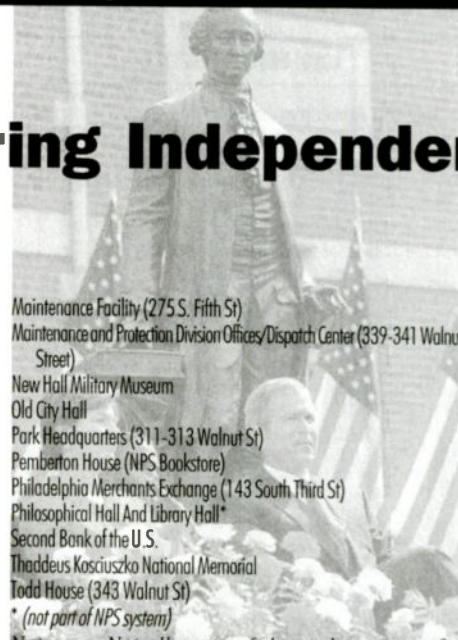
Monitoring Independence Hall



You would be surprised how many people travel in the fall after the long hot summer is over. And in the fall National Parks are a favorite destination spot. Recently Ben Russell shared two of the frequencies used in the Independence National Historic Park (INHP) in the Philadelphia area.

Independence National Historic Park encompasses a variety of historic structures in Philadelphia that played important roles in founding our nation. Staff here also administer and patrol a few other sites in and around the city.

Ben reports that ever since September 11, security has been tight around the Liberty Bell and Independence Hall. "If only I had been listening last year when the crazy guy whacked the Liberty Bell with a hammer," Ben said.

Here are the frequencies that Ben reported:

171.650 (R) INHP Channel 1 Law enforcement [*Repeater input 164.575-LVH*]

164.125 (R) INHP Channel 2 Maintenance and operations [*Repeater input 164.725-LVH*]

My notes indicate that the call sign used by the headquarters office is KGB 798 and a PL tone of 127.3 Hz is used on both frequencies. I also have indications that some communications associated with both repeaters could occur using the talk-around mode (using the repeater output frequency simplex).

Places in and around the Park and parts of the support organization that might be heard on this radio system include:

Benjamin Franklin National Memorial
Bishop White House (309 Walnut St)
Bond House (129 S. 2nd St—a Bed and Breakfast leased from NPS)
Bringhurst House (5448 Germantown Ave): Park residence
Carpenter's Hall *
City Tavern (138 S. Second St)
Christ Church *
Congress Hall
Declaration House
Deshler-Morris House (5442 Germantown Ave)
Edgar Allen Poe House National Historic Site
First Bank of the United States
Franklin Court:
- 314 Market Street (Book Store)
- 316 Market Street (Post Office and Postal Museum)
- 318 Market Street (Architectural-Archeological Exhibits)
- 320 Market Street (Print Shop)
- 322 Market Street (Book Bindery and Aurora Office)

Free Quaker Meeting House
Gloria Dei Church National Historic Site*
Independence Hall
Liberty Bell Pavilion
Leithgow Street Buildings (230 and 232 Leithgow St): Park residences
Locust Street Quarters (408, 410, 415, 421 & 423 Locust St): Park residences
Maintenance Facility (275 S. Fifth St)
Maintenance and Protection Division Offices/Dispatch Center (339-341 Walnut Street)
New Hall Military Museum
Old City Hall
Park Headquarters (311-313 Walnut St)
Pemberton House (NPS Bookstore)
Philadelphia Merchants Exchange (143 South Third St)
Philosophical Hall And Library Hall*
Second Bank of the U.S.
Thaddeus Kosciuszko National Memorial
Todd House (343 Walnut St)

* *(not part of NPS system)*

Note: Not all areas of the park are open for general access. All park residences are closed to the public. Check with the visitor center for current information.

Ben also wants to know if anyone knows of any other channels they use at INHP? Well, Ben, I have had one report of a UHF frequency pair 417.775/411.775 atop the Penn Mutual Building using a 127.3 PL tone. It is supposed to support security, fire and fire alarm units.

You can learn more about the park by visiting the website at:
http://www.nps.gov/inde/index.htm

❖ Federal Interagency Frequencies

I want to remind everyone to keep the following federal interagency frequencies in your scanner when you are in the vicinity of any government facilities. These paired frequencies are for use in wide-area (i.e. county-wide, statewide, continental U.S., and U.S. plus possessions) operations of a transient nature that require the use of a repeater station. According to the new government regulations, unpaired, single frequency operations will be authorized on the repeater transmit frequencies and on the repeater receive frequencies below *only* if all of the other wide-area, common-use frequencies are in use.

Wide-Area, Common-Use Paired Frequencies (MHz)

Repeater Transmit	*Repeater Receive*
163.1000	168.3500
409.0500	418.0500
409.3375	418.3375

The following frequencies are for use in wide-area operations of a transient nature that do not require the use of a repeater station, and will be used in the simplex mode (use of a base station is allowed).

Wide-Area, Common-Use Simplex Frequencies (MHz)
412.825 412.8375 412.850 412.8625

Government users of these frequencies do so on a shared, non-priority basis only; it is not authorized for, nor are these frequencies intended for, the exclusive use of any one agency.

A new category of government itinerants is now operational. The feds have set aside frequencies for local-area, common use. The following paired frequencies are being used only for local operations requiring the use of a repeater station at a fixed location. Like the wide-area frequencies mentioned above, these local frequencies can be used for unpaired operations.

Local-Area, Common-Use Paired Frequencies (MHz)

Repeater Transmit	*Repeater Receive*
173.6250	167.1375
407.5250	416.5250
409.0750	418.0750

The following frequencies are being used only for local area operations that do not require the use of a repeater station and can only be used in the simplex mode (use of base stations is allowed).

Local-Area, Common-Use Simplex Frequencies (MHz)
163.7125 168.6125 412.875 412.8875 412.900 412.9125

❖ New Interagency Law Enforcement Frequencies

The frequencies indicated below are now available for assignment to all U.S. Government agencies to satisfy intermittent law enforcement and public safety incident response requirements. Non-government agencies may use these frequencies only in cooperation with agencies of the Federal Government. These new frequencies are only available on a shared basis and they are not authorized for the exclusive use of any one agency.

Frequencies 167.0875 and 414.0375 MHz are designated as National Calling Channels and are being used for initial contact using the analog FM mode. The agency in control of the incident will assign specific operational channels as required for incident support operations.

The interoperability frequencies in mobile and portable radios will use a 167.9-Hz Continuous Tone-Controlled Squelch Systems (CTCSS) and/or a network access code (NAC) of $68F.

Interagency Law Enforcement VHF Interoperability Frequencies

Identifier	*Mobile Transmit*	*Mobile Receive*	
Natl Calling	167.0875	167.0875	Simplex
Inop 1	162.0875	167.0875	
Inop 2	162.2625	167.2500	
Inop 3	162.8375	167.7500	
Inop 4	163.2875	168.1125	

Inop 5	163.4250	168.4625	
Inop 6	167.2500	167.2500	Simplex
Inop 7	167.7500	167.7500	Simplex
Inop 8	168.1125	168.1125	Simplex
Inop 9	168.4625	168.4625	Simplex

Interagency Law Enforcement UHF Interoperability Frequencies

Identifier	*Mobile Transmit*	*Mobile Receive*	
Natl Calling	414.0375	414.0375	Simplex
Inop 1	418.9875	409.9875	
Inop 2	419.1875	410.1875	
Inop 3	419.6125	410.6125	
Inop 4	414.0625	414.0625	Simplex
Inop 5	414.3125	414.3125	Simplex
Inop 6	414.3375	414.3375	Simplex
Inop 7	409.9875	409.9875	Simplex
Inop 8	410.1875	410.1875	Simplex
Inop 9	410.6125	410.6125	Simplex

A new series of frequencies has also been set aside for interagency incident response. The frequencies 169.5375 paired with 164.7125, and 410.2375 paired with 419.2375 are designated as calling channels for initial contact using analog FM (no CTCSS tones).

Interagency VHF Incident Response Frequencies

Identifier	*Mobile Transmit*	*Mobile Receive*	*CTCSS*
VHF Calling	164.7125	169.5375	None
VHF-1	165.2500	170.0125	As Required
VHF-2	165.9625	170.4125	As Required
VHF-3	166.5750	170.6875	As Required
VHF-4	167.3250	173.0375	As Required
VHF-5	169.5375	169.5375	As Required/Simplex
VHF-6	170.0125	170.0125	As Required/Simplex
VHF-7	170.4125	170.4125	As Required/Simplex
VHF-8	170.6875	170.6875	As Required/Simplex
VHF-9	173.0375	173.0375	As Required/Simplex

Interagency UHF Incident Response Frequencies

Identifier	*Mobile Transmit*	*Mobile Receive*	*CTCSS*
UHF Calling	419.2375	410.2375	None
UHF-1	419.4375	410.4375	As Required
UHF-2	419.6375	410.6375	As Required
UHF-3	419.8375	410.8375	As Required
UHF-4	413.1875	413.1875	As Required/Simplex
UHF-5	413.2125	413.2125	As Required/Simplex
UHF-6	410.2375	410.2375	As Required/Simplex
UHF-7	410.4375	410.4375	As Required/Simplex
UHF-8	410.6375	410.6375	As Required/Simplex
UHF-9	410.8375	410.8375	As Required/Simplex

I am very interested in receiving reports from our readers on any activity you might be hearing on these frequencies. You can reach me at *larryvanhorn@monitoringtimes.com*.

❖ New USGS Frequency

Regular *Fed Files* reporter Chris Parris recently monitored some traffic regarding antennas and equipment on a frequency that had been on his scanner list for a long time, but had been inactive. He monitored the U.S. Geologic Survey (USGS) office in Vancouver, Washington, on 168.450 MHz.

Thanks for sharing that with *MT* readers, Chris. I believe that yours is the first USGS activity ever monitored on this frequency. Normally Department of Energy (DOE) communications dominate this channel. Hopefully our monitors nationwide will keep an eye on 168.450 MHz for additional U.S. Geologic Survey activity, especially if they are not near any DOE facilities.

❖ California Department of Forestry (CDF)

Now that we are in the peak fire season in the western states, those of you who live out there might be more than marginally interested in the following frequencies programmed into the CDF Technisonic Radios. The information in Table 1 was posted to one of the scanner lists by an anonymous source.

And that does it for the *MT Fed Files* this month. As always, I sincerely appreciate the contributions from this month's reporters. If you are monitoring some frequencies in the federal bands, we want to hear from you. Send your contributions to: The Fed Files, 7540 Highway 64 West, Brasstown, NC 28902 or email me at *larryvanhorn@monitoringtimes.com*. Until next month, 73 and good hunting.

Table 1: California Dept of Forestry Frequency Read-out

CH	Display	Receive	Transmit	Agency
1	Air Tac 1	166.675	166.675	Air Tac 1
2	Air Tac 2	169.150	169.150	Air Tac 2
3	Air Tac 3	169.200	169.200	Air Tac 3
4	Air Tac 4	151.280	151.280	Air Tac 4
5	Air Tac 5	151.295	151.295	Air Tac 5
6	Air Tac 6	151.310	151.310	Air Tac 6
7	Empty			
8	CDF A/G	151.220	151.220	CDF Air/Ground
9	CMD 1	151.355	159.300	CDF Net 1
10	CMD 2	151.265	159.330	CDF Net 2
11	MEU	151.385	159.270	CDF – Howard Forrest
12	HUU	151.250	159.405	CDF – Fortuna
13	LNU East	151.340	159.315	CDF – St. Helena
14	LNU West	151.460	159.390	CDF – St. Helena
15	MRN	151.040	151.040	Marin County Mutual Aid
16	SCU	151.445	159.345	CDF – Morgan Hill
17	CZU	151.170	159.285	CDF – Felton
18	USFS A/G	170.000	170.000	USFS Air/Ground
19	BUTT SUP	154.415	154.415	CDF Butte Support
20	BTU	151.400	159.375	CDF – Oroville
21	Empty			
22	LMU	151.250	159.405	CDF – Susanville
23	NEU	151.325	159.360	CDF – Grass Valley
24	SHU	151.160	159.270	CDF – Redding
25	TGU	151.370	159.285	CDF – Red Bluff
26	SKU	151.325	159.360	CDF – Yreka
27	NEU East	154.130	159.495	CDF – Grass Valley
28	Empty			
29	Empty			
30	RRU 1 E	151.385	159.360	Local 1 – East Perris
31	RRU 1 W	151.385	159.360	Local 1 – West Perris
32	RRU 2	151.175	159.285	Local 2 – Perris
33	MVU	151.190	159.225	CDF – Monte Vista
34	SLU	151.325	159.315	CDF – San Luis
35	BDU 1	151.445	159.390	CDF – San Bernadino
36	BDU 2	151.325	159.315	CDF – San Bernadino
37	BDU 3	151.250	159.405	CDF – San Bernadino
38	RRU 3	151.130	158.925	Local 3 – Perris
39	Empty			
40	Empty			
41	TUU	151.190	159.225	CDF – Tulare
42	MWU	151.460	159.390	CDF – Mariposa
43	FKU-W	151.385	159.270	CDF – Fresno
44	TCU	151.175	159.450	CDF – San Andreas
45	AEU	151.190	159.225	CDF – Camino
46	BEU	151.250	159.405	CDF – Monterey
47	FKU-E	151.160	159.360	CDF – Fresno
48	RIV 5	154.145	154.145	Riverside Supp 5 (167.9 Hz PL tone)
49	RIV 6	154.445	154.445	Riverside Supp 6 (167.9 Hz PL tone)
50	RIV 7	154.130	154.130	Riverside Supp 7 (167.9 Hz PL tone)
51	RIV B	153.770	153.770	Riverside Supp B (167.9 Hz PL tone)
52	RIV 9	154.175	154.175	Riverside Supp 9 (167.9 Hz PL tone)
53	Empty			
54	WF 1	154.280	154.280	OES White Fire 1
55	WF 2	154.265	154.280	OES White Fire 2
56	WF 3	154.295	154.295	OES White Fire 3
57	OES TAC 1	154.160	154.160	OES Tactical 1
58	OES TAC 2	154.220	154.220	OES Tactical 2
59	CALCORD	156.075	156.075	OES CALCORD
60	CLEMARS	154.920	154.920	CLEMARS (Law Enforcement)
61	USFS Crew	168.200	168.200	USFS Crew Tac Net
62	ANF	172.375	169.950	Angeles N.F.
63	BDF	171.475	169.875	San Bernardino N.F.
64	CNF	168.750	170.500	Cleveland N.F.
65	ENF	171.525	169.950	El Dorado N.F.
66	INF	168.125	168.725	Inyo N.F.
67	KNF	164.175	164.975	Klamath N.F.
68	LNF	172.225	171.475	Lassen N.F.
69	LPF	170.550	169.900	Los Padres N.F.
70	MDF	168.750	168.150	Modoc N.F.
71	MNF	169.175	169.975	Mendocino N.F.
72	PNF	170.550	169.900	Plumas N.F.
73	SHF	171.575	169.100	Shasta/Trinity N.F.
74	SNF	171.475	169.875	Sierra N.F.
75	SNF FIRE	172.225	169.925	Sierra Fire
76	SQF	168.675	170.575	Sequoia N.F.
77	SQF FIRE	167.775	170.600	Sequoia Fire
78	SRF	168.725	170.125	Six Rivers N.F.
79	STF	168.750	170.500	Stanislaus N.F.
80	TMU	172.375	171.575	LTBMU
81	TNF	168.775	170.575	Tahoe N.F.
82	TOF	169.875	170.475	Toiyabe N.F.
83	CTNT	169.125	168.325	CAL Travel Net
84	BLM-AD	166.375	166.975	BLM Admin/Fire
85	BLM-F	166.487	167.075	BLM Fire
86	BLM V	169.400	168.525	BLM – Las Vegas
87	JTP	171.675	172.675	NPS – Joshua Tree
88	LNP	170.075	169.725	NPS – Lassen
89	SMP	172.525	171.725	NPS – Santa Monica
90	KNP	168.650	168.650	NPS – Sequoia/Kings
91	YNP	172.775	171.800	NPS – Yosemite
92	Ventura	154.100	154.100	Ventura County Dispatch
93	Vent Blue	154.010	154.010	Ventura County Tac 2 Blue
94	Vent Brn	154.325	154.325	Ventura County Tac 3 Brown
95	SB Co Pri	153.770	153.770	Santa Barbara County Primary
96	LA Co 2	154.340	154.340	LA County 2 – Valley
97	LA Co 3	154.400	154.400	LA County 3 – Antelope
98	NIFC1	168.700	167.700	USFS Command 1
99	NIFC2	168.100	168.100	USFS Command 2
100	NIFC3	168.075	168.075	USFS Command 3
101	NIFCT1	168.050	168.050	USFS Tactical 1
102	NIFC12	168.200	168.200	USFS Tactical 2
103	NIFC13	168.600	168.600	USFS Tactical 3
104	Empty			
105	Empty			
106	CDF T1	151.145	151.145	CDF Tac 1
107	CDF T2	151.160	151.160	CDF Tac 2
108	CDF T3	151.175	151.175	CDF Tac 3
109	CDF T4	151.190	151.190	CDF Tac 4
110	CDF T5	151.250	151.250	CDF Tac 5
111	CDF T6	151.325	151.325	CDF Tac 6
112	CDF T7	151.340	151.340	CDF Tac 7
113	CDF T8	151.370	151.370	CDF Tac 8
114	CDF T9	151.385	151.385	CDF Tac 9
115	CDF T10	151.400	151.400	CDF Tac 10
116	CDF T11	151.475	151.475	CDF Tac 11
117	CDF T12	151.460	151.460	CDF Tac 12
118	CDF T13	151.475	151.475	CDF Tac 13
119	CDF C1	151.355	151.355	CDF Command 1
120	CDF C2	151.265	151.265	CDF Command 2

Motorola Private Line (PL) Tones

Tone 1	110.9 Hz
Tone 2	123.0 Hz
Tone 3	131.8 Hz
Tone 4	136.5 Hz
Tone 5	146.2 Hz
Tone 6	156.7 Hz
Tone 7	167.9 Hz
Tone 8	103.5 Hz
Tone 9	100.0 Hz
Tone 10	107.2 Hz
Tone 11	114.8 Hz
Tone 12	127.3 Hz
Tone 13	141.3 Hz
Tone 14	151.4 Hz
Tone 15	162.2 Hz
Tone 16	192.8 Hz

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New Trunked Systems Underway

As the summer months fade into autumn we take a look at several new trunked radio systems that will be built over the next few years. Many of these systems will follow the APCO (Association of Public Safety Communications Officials International) Project 25 standard, while one county has decided to take a different route.

❖ Cincinnati, Ohio

The city of Cincinnati, in southwest Ohio, has contracted with Motorola for a $23 million, 20-channel APCO Project 25 digital radio system. The city's current dispatch center at police headquarters will be upgraded, along with a backup site currently under construction. Nearly 2,000 digital-capable radios will be purchased under the contract. City planners expect the system will come online in about two years, first with police, fire and emergency medical services and later with other government departments.

Installing a system with complete coverage for the 78-square-mile city will be a challenge, since Cincinnati is situated in a river valley with numerous high hills. The contract lists ten repeater sites connected to the dispatch center via digital microwave links, plus 15 towers in Hamilton County. Part of the plan is to integrate the new city radios with an existing county system.

❖ Hamilton County, Ohio

Cincinnati is located in Hamilton County, which is currently running dispatch operations in the 460 MHz band. For radio purposes the county has been divided into three sectors: East, Central and West. East Sector starts at the Clermont County line and runs west to U.S. Route 42. From there to U.S. Route 127 is Central Sector, and from U.S. Route 127 to the Indiana State Line is West Sector.

Current dispatch frequencies are:

East Sector	460.025 MHz
Central Sector	460.400 MHz
West Sector	460.175 MHz

For the past three years the county has also been building an 800 MHz Motorola Type II system, which is behind schedule and not yet fully operational. The system is expected to run in both analog and digital modes until county law enforcement agencies join the system, at which point it should switch to full digital operation. County fire and emergency medical services already have their Astro radios installed but continue to simulcast on VHF lowband at

33.900 MHz.

Frequencies for the Hamilton County trunked radio system are:
866.1625, 866.2500, 866.2750, 866.3000, 866.5375, 866.6500, 866.7875, 867.2375, 867.5375, 867.7375, 867.7625, 867.8125, 867.8500, 867.9500, 868.1250, 868.1500, 868.2625, 868.3625, 868.5625 and 868.9500 MHz.

There are also reports that the city of Cincinnati is operating a Motorola Type II radio system for the Vice Division of the Police Department. The following frequencies are listed: 866.1875, 866.2125, 866.4625, 866.5625, 866.6875, 866.8125, 866.8375, 867.0875, 867.1125, 867.3125, 867.3375, 867.6125, 867.6375, 866.5875 and 868.8625 MHz. Apparently only a couple of talkgroups are active, primarily related to surveillance.

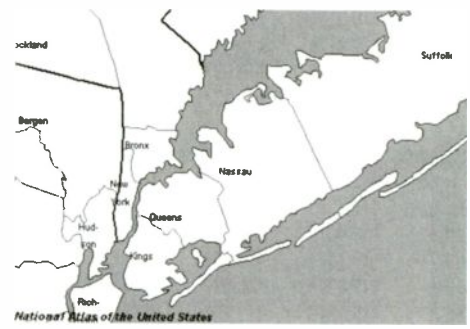
Interestingly, the Greater Cincinnati Northern Kentucky International Airport is operating a seven-channel analog EDACS system on 856.7375, 856.9375, 857.7375, 857.9375, 858.9375, 859.7375 and 860.7375 MHz. This will make for another interoperability challenge should there be a major incident in or around the airport. The Airport Police are reportedly using talkgroup 02-022 and the Fire/Rescue crews use 02-041.

Also at the airport is a Motorola Type II system operated by Delta Airlines. Frequencies listed are 938.2000, 938.6500, 938.7000, 938.7500, 939.1500 939.2500, 939.6500, 939.7000, 939.7125 and 939.7500 MHz, with talkgroups 40960 and 41008 in use for Gate Control and numerous talkgroups for Baggage Handling.

❖ Nassau County, New York

The Nassau County, New York, Police Department has received approval from the Federal Communications Commission (FCC) to build a new radio system using frequencies between 500 MHz and 506 MHz, which is normally used by television channel 19. Nassau County, covering nearly 300 square miles, is located on Long Island, just to the east of New York City.

Although the initial television channel allocations were done in 1952, since 1970 the FCC has allowed television channels 14 through 20 to be used for land mobile service in large urban areas. Channel 19 is assigned to the Philadelphia, Pennsylvania, area, but was basically unused on Long Island. Nassau County needed a waiver, since under FCC rules the base stations for such service must be within 50 miles of the center of the assigned city. The four base stations proposed by Nassau County are all between 90 and 110 miles away from Philadelphia. The FCC had granted similar waivers in the past, including waivers for various transmitters in northern New Jersey to operate on TV channel 19 frequencies. Nassau County made a successful showing that, among other things, there were no available frequencies in VHF, UHF, or 800 MHz that could be used and that the proposed system would not cause interference to currently licensed operations.



The proposed system will consist of 30 trunked voice channels, each 12.5 kHz wide, plus five conventional (non-trunked) channels for tactical use and 12 channels for mobile data applications. The system is designed to support more than 5,000 radios broken down like this:

Nassau County Police Department	2,200
Sheriff's Department	1,300
Volunteer Fire Departments	1,200
City/Village Departments	800
Emergency Medical Services	120
District Attorney's Office	100
Other Services	150

The current Nassau County Police Department radio system operates on eleven channels in the 477 - 481 MHz band (TV channel 15), which they intend to relinquish after transitioning to the new system. They currently employ more than 2,800 officers and use about 2,000 radios (500 mobile and 1,500 portable units).

Nassau County itself currently operates an EDACS system on the following frequencies: 866.1875, 866.3375, 866.5875, 866.7375, 866.8375,

866.9000, 867.1125, 867.1750, 867.9000, 868.1750 (control channel), 868.4250, 868.5750, 868.7250 and 868.6500 MHz. The system is shared by a number of county and local agencies.

◆ Oakland County, Michigan

Oakland County, Michigan, located northwest of downtown Detroit, contracted with M/A-COM for a $33 million radio system based on the OpenSky network. OpenSky is a fully digital system that uses Internet Protocol (IP) to carry voice and data traffic. Each radio frequency is divided into timeslots, allowing as many as four conversations to occur simultaneously in each channel. The State of Pennsylvania is currently installing a statewide OpenSky system, although progress reports from that effort are few and far between. M/A-COM expects Oakland County's system to be up and operating by the end of 2004, linking more than 80 agencies across the 900-square-mile county.

M/A-COM makes the claim that their OpenSky network can interoperate with other analog and digital radio systems. This will be interesting to see, since the State of Michigan is in the final phase of their APCO Project 25 system installation, having spent eight years and well over $100 million to provide statewide coverage.

◆ Uniden Digital Scanner features

Uniden has released additional information regarding their APCO Project 25 scanners, due for release in November. Both scanners, the handheld BC250D and the base/mobile BC785D, are expected to have continuous coverage from 25 MHz to 1.3 GHz, less the 800 MHz cellular telephone band. They will each have 1100 channels in 10 banks and the ability to program the delay, step size, priority, attenuation, and other settings on a per-channel basis. A nine-pin serial data connector will allow the user to program and control the radio from an external computer.

Each radio will be equipped with what Uniden calls "Trunktracker III," meaning it can natively track Motorola, EDACS and LTR systems. With the addition of a BCi 25D APCO 25 Digital Card, either radio will be able to track and

decode digital transmissions from APCO Project 25 systems.

The radios will also provide CTCSS/DCS decoding along with S.A.M.E. (Specific Area Message Encoding) weather alerts and pre-programmed service searches. Uniden is promising that the radios will be capable of scanning near 100 channels or steps per second.

◆ BC780XLT Squelch Modification

Hi Dan,

Somewhere recently I read an article that gave some tips on how to adjust the squelch threshold internally on the BC 780 XLT so as to even the spread between the squelch breaking point on VHF and UHF.

As you probably know these radios cause you to have to tighten the squelch on UHF more than is necessary on VHF, thus becoming a nuisance when trying to scan both frequencies. The VHF is too tight and/or the UHF is too loose. Internally there is an adjustment that can be made by someone with a smattering of sense, and that is the information I am seeking.

– John in South Carolina

The mismatch in squelch breakpoint between VHF and UHF on the Bearcat 780XLT radio is a common problem on early production models. I have heard that this problem has been fixed, or at least greatly reduced, on later models.

Internally, the radio has a number of internal potentiometer settings:

RT-1 S-meter Narrow FM/FM
RT-2 Squelch Wide FM
RT-3 Squelch Narrow FM
RT-4 S-meter Wide FM
RT-5 Tone decode frequency for the weather alert
RT-6 Frequency for reference oscillator for Phase Lock Loop and 3rd mixer
RT-7 Squelch FM
RT-8 Tune voltage for the 108-137 MHz filter
RT-9 Tune voltage for the 137-174 MHz filter

The idea for the squelch modification is to adjust RT-3 (Narrow FM squelch threshold) until the minimum squelch (the "breakpoint") is the same in both VHF and UHF. I do not own a 780XLT so I have not tried this modification personally. I would not recommend this or any other hardware modification for anyone who is not familiar with electronics. As always, any modifications are done at your own risk, so if your radio doesn't work after trying this, it's not our fault!

Anyway, here is the procedure:

Part A: Set up the radio
1. Select a UHF frequency such as 445.0000 MHz.
2. Set up a channel at the UHF frequency in regular FM mode.
3. Set up a second channel at the same UHF frequency, but in Narrow FM mode.

Part B: Check the current settings
1. Select the regular FM channel.
2. Adjust the squelch knob to the minimum (breakpoint) setting.
3. Switch to the narrow FM channel.
4. Check the squelch setting.
5. If the settings are the same, no adjustments are necessary.
6. If the settings are different, perform the steps in part C.

Part C: Adjust the Narrow FM setting
1. Remove the back cover
2. Identify RT-3 (Narrow FM squelch adjustment)
3. Select the regular FM channel.
4. Adjust the squelch knob to the minimum (breakpoint) setting.
5. Switch to the narrow FM channel.
6. Carefully adjust RT-3 until the squelch just cuts in (the exact point where radio goes quiet)
7. Switch between the two channels to confirm that the setting is correct.

That's all for this month. I welcome your questions and comments via e-mail at *danveeneman@monitoringtimes.com*, and I've got more information and links 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

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VHF Marine Band Encryption

Recently our intrepid *Scanning Report* columnist, Bob Wyman, heard a first, at least for his part of the country – encryption in the VHF marine band. He noted on 157.050 the U.S. Coast Guard station in Miami with radio checks of encrypted system and in clear. "It is the first time I have heard encryption on the VHF marine frequencies," Bob noted. And I agree, Bob. I have not seen any reports of marine band encryption to this point. It is probably is related to their new post-9/11 missions.

If anyone else is hearing encryption in the VHF marine bands I would like to hear from you. Watch the following frequencies closely for any scrambled activity: 157.050, 157.075, 157.100, 157.125, 157.150, and 157.175 MHz. Thanks, Bob, for sending in your observations.

❖ Loves the Dobbins Info

Another one of our regulars is Rod Jones, my neighbor to the south in Atlanta. Rod wrote, " I loved your article on Robins AFB in the July issue. It's nice to see something close to home. I just wanted to pass on that recently a change was made for the AFRC Command Post frequency; it is now 372.175 instead of 252.1 for call sign "Gunrunner." It is not used often, but once in while you will hear someone calling it."

Thanks, Rod, for the update.

❖ Aircraft Inventory on Cape Cod

A close friend who wished to remain anonymous passes along the following observations regarding aircraft based or flying out of the Coast Guard Air Station Cape Cod/ Otis ANGB (KFMH).

HU25 Dassault Falcon 20 "Guardian" Jets

CG2105	Active
CG2109	Active
CG2115	Not heard
CG2121	Active
CG2126	Not heard
CG2130	Active, new arrival
CG2131	Active, new arrival
CG2140	Active, new arrival

❖ Southeast United States Intercepts

Quite a few of the infamous Southeast Milcom gang have been catching some great milcom action recently. Here are some of the frequencies being heard in this part of the world.

10.780	Razor 66 (E-8 JStars) working Cape Radio (USB)
	Nightstar Bravo (E-8 JStars) working Cape Radio (USB)
	Strikestar (E-8 JStars) working Cape Radio with phone patch to Pyramid (USB)
38.750	Strikestar (E-8 JStars) working Fury 06
120.950	FACSFAC Jacksonville (Sealord)
139.550	Falcon 11/21 air-to-air (20FW/55FS Shaw AFB)
141.750	Venom 41 flight air-to-air (20FW/78FS Shaw AFB)
	Nightstar working Hoke 41/42
225.275	Stargate (E-8 JStars) working Viking 02/Bulldag 05
225.725	Strikestar (E-8 JStars)
228.050	Brigham (AWACS) working Razor 33 (E-8 JStars) both clear and encrypted comms
228.400	Townsend Range, GA (R-3007)
235.100	Razor 68 (E-8 JStars) working Happy 52 (tanker) (AR-328)
236.000	Strikestar (E-8 JStors)
239.800	NASA 916 (T-38 Johnson Space Center) working Langley Metro (Weather)
251.600	Razor 21 working Giant Killer (FACSFAC Virginia Capes)
252.000	Aerial Refueling
254.350	FAA ARTCC Atlanto – Athens remote
245.500	Duke Field Air Force Special Ops AC-130 aircraft reported here
257.875	Possible new FAA ARTCC Miami frequency
265.400	Venom 41 flight (20FW/78FS Shaw AFB) [This is o NORAD freq-LVH]
268.700	Venom 21 requesting the Snowbird MOA passed to 290.800
284.500	FACSFAC Jacksonville (Sealord)
288.900	Dragnet Victor (AWACS) [This is an interesting USAF nationwide assignment worth keeping in your scanner-LVH]
300.700	NASA 916 (T-38 Johnson Space Center) noted here working unidentified station
311.000	Various aircraft with tactical colls and Emergency Action Message (EAM) broadcast. {ACC – Command Post Primary nationwide-LVH]
	Sentry 35 aka Chalice Alpha working Raymond 19 (Robins AFB)
313.700	FACSFAC Jacksonville (Sealord)
319.000	FAA ARTCC Miomi – Vero Beach remote
324.650	Nightstar Charlie Tango (E-8 JStars) working Darkstar (AWACS) [This is an AWACS voice coordination freq nationwide]
335.800	Strikestar (E-8 JStars)
336.900	Howler 41 (possible F-15 from Seymour Johnson AFB) working Dark Cloud (mentioned working with Nightstar)
354.200	Aircraft this freq working with Dragnet Victor (AWACS) [This is an ACC air-to-air flight support frequency nationwide]
354.300	Poinsett Range Range Control/Operations, South Carolina (R-6002)
359.500	Wideband FM transmission
364.200	Nightstar Bravo (E-8 JStars) and Dragnet Victor (AWACS) [NORAD Airborne Intercept Command and Control-LVH]
371.950	Venom 41 flight returning to Dobbins AFB (20FW/78FS Shaw AFB)
372.150	Possible E-8 JStars encrypted discrete Also Nightstar Charlie Tango (E-8 JStars) working Darkstar (AWACS)
374.550	Wideband FM transmission
376.125	Strikestar (E-8 JStars)
	Howler 42 noted here (possible F-15 from Seymour Johnson AFB)

Coast Guard Cutter **Tampa.** *Courtesy US Coast Guard*

Legend:

ACC	Air Combat Command
ARTCC	Air Route Traffic Control Center
AWACS	Airborne Warning and Control System
FAA	Federal Aviation Administration
FACSFAC	Fleet Area Control and Surveillance Facility
JSTARS	Joint Surveillance Target Attack Radar System
MOA	Military Operating Area
NASA	National Aeronautics and Space Administration

Many thanks to our southeast *Milcom* contributors – Clay Gibbs, Rod Jones, Big Mac, Jack Metcalfe, Jack NeSmith, Jack Painter, Duke Rumley, Mark Shelton, Allan Stern, Robert Wyman.

◆ *Milcom* Frequency Changes

Regular reporter, Jack NeSmith, also checked in with the following official aero frequency changes recently reported on the internet. Thanks, Jack, for the valuable input.

Birmingham International, Alabama (KBHM)
New Atlanta ARTCC remote communicotions air-ground facility (RCAG) frequency. Changed from 307.225 to 350.325.

Dade County-Homestead Regional, Florida (KHST)
Ground controlled approach system (GCA) frequency 123.800/339.300

Miami International, Florida (KMIA)
Remote transmitter/receiver (RTR) 133.700
Ground control 121.800

MCAF Kaneohe Bay, Hawaii (PHNG)
Clearance delivery frequency is 300.400

Campbell AAF, Kentucky (KHOP)
Approach control from 255.600 to 269.525 and 277.500 to 307.025
Campbell tower from 241.200 to 278.800
Campbell ground from 261.250 to 266.800
Eagle Radio from 242.400 to 285.625
EOD tower from 280.900 to 290.450 (This is the Sobre Army Tower KEOD)
Pilot to dispatch from 356.400 to 230.100
Metro (Weather) from 344.600 to 343.300

Polk AAF, Louisiana (KPOE)
Tower 119.000
Radar traffic advisories 123.700/261.300

New Orleans NAS-JRB/Alvin Callender Field, Louisiana (KNBG)
Base operations frequency changed from 384.250 to 379.150.

Holloman AFB, New Mexico (KHMN)
Metro (Weather) changed from 344.600 to 346.550

MCAS Cherry Point/Cunningham Field, North Carolina (KNKT)
Approach control (West) 306.600
Clearance delivery 316.125
Ground control 239.025
Metro (Weather) 343.500

Simmons AAF, North Carolina (KFBG)
Range control (R-5311) 246.000

Seymour Johnson AFB, North Carolina (KGSB)
ACC SOF frequency from 314.200 to 376.100
Automatic terminal information service (ATIS) changed from 273.500 to 317.625
Metro (Weather) frequency changed from 375.200 to 323.925

MCAS New River/McCutcheon Field, North Carolina (KNCA)
Ground controlled approach system (GCA) frequency changed to New River approach control primary 279.575
Ground control primary 254.275

MCAF Quantico/Turner Field, Virginia (KNYG)
Dulles approach/departure control 124.650/390.900 and 127.050/312.200
Ground control 121.750/340.200
Metro (Weather) 355.300
Tower 118.600/360.200

◆ Military Call Sign Digest

Table 1 is a list of call signs that have been recently monitored in the *Milcom* bands. And that does it for this edition of the *MT Milcom* column. To all our reporters, many thanks for sharing your information with the rest of our *MT* family of readers. Until next month, 73 and good hunting.

Table One: Recently Monitored Call Signs

Angel ##	USMC F/A-18 VMFA-321 NAF Washington (Andrews)
Army 052	USA UC-35 #01052 Army OSACOM Det Andrews AFB
Ball ##	USAF T-37B 71FTW Vance AFB, OK
Bevis ##	USAF OA/A-10A 917 Wing/47FS Barksdale AFB, LA
Bicep ##	USAF F-16 177FW/119FS Atlantic City IAP, NJ
Buckeye ##	USAF F-16 178FW/162FS Springfield-Beckley MAP, OH
Cobra ##	USN EA-6B VAQ-209 NAS Washington, DC (Andrews)
Congo 65	USAF UV-18A US Air Force Academy, CO
Cowboy ##	USMC F/A-18 VMFA-112 NAS/JRB Fort Worth, TX
Death ##	USAF B-2A 509BW Whiteman AFB, MO
Devil ##	USAF F-16 177FW/119FS Atlantic City IAP, NJ
Duke ##	USAF T-38A 71 FTW Vance AFB, OK
Fitz ##	USAF OA/A-10A 917 Wing/47FS Barksdale AFB, LA
Hammer ##	USAF F-16 177FW/119FS Atlantic City IAP, NJ
Jazz ##	USAF F-15 159FW/122FS NAS/JRB New Orleans, LA
Kaiser ##	USAF F-16 162FW/195FS Tucson IAP, AZ
King ##	USN E-2C VAW-116 NAWS Point Mugu, CA
Knight ##	USMC F/A-18 MCAS Miramar, CA
Lobo 197	USMC C-9 VMR-1 MCAS Cherry Point, NC
Luzon ##	USAF T-37B 12FTW/559FTS Randolph AFB, TX
Moce ##	USAF OA/A-10A 917 Wing/47FS Barksdale AFB, LA
Moi Toi ##	USAF F-15 154 Wing/199FS Hawaii ANG Hickam AFB, HI
Mazda ##	USAF C-17 925FW/706FS NAS/JRB New Orleans, LA
Mint ##	USAF F-16 127 Wing/107FS Selfridge ANGB, MI
Mussel ##	USAF UH-1 1st Helo Squadron Andrews AFB, MD
NASA 806	NASA ER-2 Dryden Space Center, CA
NASA 901	NASA T-38 Johnson Space Flight Center, Texas
NASA 916	NASA T-38 #60-8382 Johnson Space Flight Center, Texas
NASA 917	NASA T-38 #66-8383 Johnson Space Flight Center, Texas
NASA 918	NASA T-38 #66-8284 Johnson Space Flight Center, Texas
Navy 691	USN C-20D #163691 VR-1 NAF Washington (Andrews)
Navy 692	USN C-20D #163692 VR-1 NAF Washington (Andrews)
Navy AX 391	USN C-130T VR-53 NAF Washington (Andrews)
Navy PZ ###	USN P-3 VP-94 NAS/JRB New Orleans, LA
Navy RG 641	USN C-20G VR-51 MCAF Koneohe Bay, HI
Navy RU-587	USN C-9B VR-55 NAWS Point Mugu, CA
Navy TP 38	USN C-12 Navy Test Pilot School (NTPS) NAS Patuxent River, MD
Pain ##	USAF T-1A Vance AFB, CA
Pujoe ##	USAF 347 Wing? T-6A Moody AFB
Raider ##	USN F/A-18 VFA-125 NAS Lemoore, CA
Rats ##	USAF KC-135 452AMW/336ARS March ARB, CA
Reach 0445	USAF C-5A #70-0445 433AW/68AS AFRC Kelly AFB, TX
Rider ##	USAF T-38A 71FTW Vance AFB, OK
Rival ##	USAF F-16 140 Wing Buckley ANGB, CO
River ##	USN F/A-18 VFA-204 NAS/JRB New Orleans, LA
Rocket ##	Civilian Contractor F-16 Lockheed Test NAS/JRB Fort Worth, TX
Rocket ##	USAF F-15 4FW/336FS Seymour Johnson AFB, NC
Rocket ###	USN T-2C/T-39G VT-86 NAS Pensocola, FL
Rodeo 205	USN UC-12B NAS/JRB Forth Worth, TX
Roller ##	USAF 152AW/192AS Reno-Cannon IAP, NV
Smoke ##	USMC VMFA-134 MCAS Miromar, CA
Snoke ##	USAF F-16 177FW/119FS Atlantic City IAP, NJ
Stud ##	USAF F-16 140 Wing Buckley ANGB, CO
Tuff ##	USAF B-52H 2BW/11BS Barksdale AFB, LA
Vandy ##	USAF T-38A/VN 71FTW/32FTS Vance AFB, OK
Venus ##	USAF C-20B 86AW/99 AS Andrews AFB, MD
Wooden ##	USAF KC-135 43ARG Molmstrom AFB, MT

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End of an Era

Those of you who've been around for a few years probably remember the days of the "full-service" radio station. You'd hear light music, local information, sports, church services, and at night, special music programs. These days, such stations have pretty much vanished from the dial. Younger listeners probably have no idea there once were stations that played more than one kind of music!

The last such station in the greater Nashville area disappeared at the end of June. WDBL-1590 and WDBL-FM 94.3 were sold and taken off the air pending a new format (not yet announced at deadline). The station, located about a mile west of Springfield, Tennessee, had served Robertson County listeners for over 50 years.

Robertson County is a diverse rural community. WDBL's schedule included plenty of informative spoken-word programming, interspersed with a variety of music. Most guides listed the format as country. There was also a late-night soul music program, as well as late-morning oldies and afternoon light adult rock. At midnight, WDBL actually signed off the air until 5am. With my rather large antennas, I can routinely receive well over 100 different radio stations every day – WDBL is the only one that actually signed off!

WDBL will return to the air under control of Saga Communications. No plans have been announced but you can probably assume it will program to an audience in Nashville. I rather suspect WDBL-AM will not be resurrected at all. Sure hope you've already logged it!

❖ TV DX Record

A new, and probably unbeatable, TV DX record has been set. Would you believe, reception of UHF TV stations from over 10,000 miles away? It's been done...

The first to try this new method of reception was Ian Roberts of South Africa. Using an Icom R-8500 and a Yagi antenna for the 50 MHz ham radio band, Ian succeeded in receiving the channel 2 station in western Kenya. That's roughly 3,000 kilometers – 1,800 miles. However, Ian's record didn't last long. Tony Mann of Perth, Western Australia, was next to try. Using a 22-element Yagi, a preamplifier mounted at the antenna, and an R-7000, Tony tried for U.S. UHF stations. And succeeded. The first station received was KWBT channel 19 in Muskogee, Oklahoma. He's since received ten more stations from eight states.

Of course, no TV station covers 10,000 miles during normal reception. Nor do sporadic-E or tropospheric openings allow that kind of reception. F-layer propagation might allow a channel 2 signal to cover long distances, but at UHF F-layer propagation is impossible. So how did Ian and Tony receive these signals? They used the moon...

In 1946, WSM-650 chief engineer Jack DeWitt, working with the Army, succeeded in bouncing a radar signal off the moon. Since then, radio hams have done the same thing many times. "Moonbounce" signals are incredibly weak. Hams use the highest allowable power and the largest possible antennas to beam the available power at the moon. They also concentrate the available power in a small sliver of the spectrum. This reduces the amount of noise entering the receiver, causing the signals to stand out. (See *On the Ham Bands*, June 2002)

TV stations do use 100-200 times the power permissible to hams. However, they don't beam their signals to the moon – there's nobody watching up there! TV stations spray their power in all directions. They also don't concentrate their power in a small part of the spectrum; they must use more than 4 MHz of bandwidth to deliver a decent color picture. This means that receiving a TV signal by "moonbounce" is actually considerably more difficult than receiving a radio ham.

Ian and Tony countered this problem by using digital signal processing techniques. This allows them to monitor an extremely small band of spectrum, eliminating noise while seeing what small part of the TV station's signal appears in that band. They also used computer techniques to predict exactly when – and where on the dial – the TV signals would appear.

When you bounce a signal off a moving object, the reflected signal will be on a slightly different frequency. (That's how police speed radar works.) You can predict exactly how the movement of the moon will affect the apparent frequency of a TV station, given the location of that station's tower. Of course, when you try to receive a moon-reflected TV signal, you will only receive it when the moon within view of both the transmitter and receiver! This, too, can be predicted by computer.

Both DXers have long experience in precise measurement of the frequencies of VHF TV stations. Tony has extended his capabilities to UHF. In most cases his measurements compare precisely to predictions. (Two measurements involving suspected WNDU-TV South Bend, Indiana, and KUVS Modesto, California, are somewhat in error. We suspect the transmitters are drifting.)

This reception is quite an accomplishment. Please join me in congratulating these two DXers!

❖ Bits and Pieces

- David Lomady WD8CKK asked about the FM antenna that appears in my September 2001 column. This antenna is a ChannelMaster Stereo Probe 9. Unfortunately, it's been discontinued, though, some distributors might still have stock. Check with a local TV repair shop; they might have some ideas. Antenna Performance Specialties (**http://www.antennaperformance.com**) sells two FM antennas which have received excellent reviews from DXers.
- If you're interested in domestic-band radio, you need to check out Scott Fybush's site **http://www.fybush.com** . The "New England Radio Watch" will help keep you in touch with changes on the dial up there. But the part I go to first is the "Tower Site of the Week"!

Are there any interesting, old-style radio stations in your area? Write: Box 98, Brasstown NC 28902-0098, or by email to *dougsmith@monitoringtimes.com*. Good DX!

Now-silent WDBL-1590/94.3 Springfield, Tennessee.

OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

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Star Star Broadcasting Station

Longtime clandestine station **Star Star Broadcasting Station**, widely and apparently erroneously known in the DX community as the New Star Broadcasting Station, is noteworthy for its numbers transmissions during the middle of programming. In *Clandestine Radio Watch* #111, Toru Yamashita of Japan notes that he received an e-mail reply from this station confirming the Star Star Broadcasting Station ID, using **w2789@hotmail.com** as an address to reach the station. The anti-Chinese slant of the station is pro-Taiwan.

It is not known if the numbers transmissions are genuine "spy" broadcasts, or if they are being sent to intimidate or arouse curiosity among the Chinese. They use frequencies such as 13750 and 15707 kHz, and are best heard in North America around local sunrise.

❖ Pirate Station Patterns

North American shortwave pirate radio stations continue to congregate on frequencies near 6955 kHz. But, several stations are moving down 5 kHz or more to avoid occasional interference on 6955 kHz itself. Some pirates use AM modulation, but others use sideband modes, mainly upper sideband, with a handful in lower sideband mode. With Labor Day and Halloween coming up, it always pays to remember that pirate station activity normally soars around major holidays.

❖ Radio 510 Schedule

DJ Stevie of the Swiss Europirate **Radio 510 International** announces his current schedule as Saturdays and Sundays from 0830-0930 UTC. The frequency to check is 13840 kHz. He also provides station information at his web site, using **http://www.radio510.org** as its internet URL.

❖ Radio Americas

Believe it or not, a copy of the decades-old QSL from the CIA's 1960's Swan Island clandestine **Radio Americas** that we picture above recently sold on e-bay for hundreds of dollars.

❖ What We Are Hearing

Our readers heard all of these North American pirate broadcasters this month:

Captain Morgan- We don't know much about this relatively new operation, which has been heard by multiple DXers with rock music programming. (None)

KDAZE- Here's another relatively new broadcaster, which has been discussing low power radio with announcers Ren and Stimpy. (Uses KDAZE6955@yohoo.com e-mail)

KIPM- Alan Maxwell's complex psychological dramas continue to generate as much controversy in shortwave radio as the Brother Stair case has generated in South Carolina. Maxwell's shows normally probe the borders of sanity. (Elkhorn)

KRPS- It's not fully clear if this one is a pirate or a political clandestine, since its main programming so far has been ads for a decriminalization of marijuana initiative that is scheduled for a vote in Nevada. The call letters have not been enunciated clearly, so maybe the announcers are sampling the product. (None)

Laser Radio- After a series of test transmissions during the summer on 5935 kHz, this europirate announced a web site for information on future plans at **http://laserradio.net** on the internet. They are better known to DXers as "Laser Hot Hits."

Mystery Science Radio- Announcer Cherokee Jack's "Mystery Science Theater" has been borrowing quite a bit from Monty Python lately. (Elkhorn)

Oxycontin Radio- Their format remains somewhat muddled on this station, but they have been playing TV audio with dance and rock music with pirate radio discussions, sometimes with cameo IDs by other pirate operators. Their slogan is "Drugs that Make Sense." (None)

Radio Bingo- The radio bingo game still is inevitably won by John T. Arthur, but lately their programming has consisted of mythical searches for the fugitive Steve Anderson. (Merlin)

Radio Free Speech- Bill O. Rights has been back lately, with parody and comedy shows. His signature tune is an "O Francis Scott Key" parody of the USA national anthem. The station is often active around holidays, and this summer was no exception. (Belfast)

Radio Free Texas- This ID is a venerated station name in pirate radio history. The latest incarnation of this one has only been noticed so far with air checks, so their format is unknown at MT deadline time. (None known)

Radio Neptune- The "Universal Service" from this pirate is sometimes picked up by Europirate relays. They also get on the air occasionally from North America. (Blue Ridge Summit)

Radio Time Machine- This new one programs historical broadcasts from pirate radio archives. A recent show played bits from the famous Radio Caroline. (Elkhorn)

Radio Nonsense- Somebody has been broadcasting tapes of old classic productions from Joe Mama, who is now unfortunately deceased. (None)

Radio Tunetron- This new one has not been widely heard, but it did put out a good signal with a rock music program on parts of the east coast. (None)

Sycko Radio- They offer a rock music format, sprinkled with pirate radio commentary and some of the slickest jingles on shortwave radio today. (Still none)

Voice of Captain Ron Shortwave- Captain Ron has showed up lately with cameo IDs on other pirates, but he still transmits his own shows with pop music and drama parodies. (Uses captainron6955@hotmail.com e-mail)

Voice of the Abnormal- They mix rock music with parody ads, and sort of a slogan of "it pays to be abnormal," but it is not clear how it pays. Their songs fit the station name, with titles like the Roll Another Reefer Polka. (Elkhorn)

Voice of the Angry Bastard- This intimidating station name is not well correlated with their musical format, hosted lately by a fellow named Mojo Nixon. (Belfast)

Voice of the New World Order- This one has been mixing rock music with commentary on the pirate radio scene, all loosely organized around a New World Order political theme. (Uses vonwoun@yahoo.com e-mail)

WHYP- James Brownyard's recreation of an old medium wave station in North East, PA, mixes pirate rock music parodies with temperatures for Lake Erie cities. Hey, they're accurate at least once a year. This is the most active pirate station on the air today; holiday shows during the summer marked their fourth anniversary. (Providence)

WMPR- Their "dance party" format has expanded to include a variety of rock music selections with male and female announcers giving the call letter IDs. When they are heard, their signal gets out well. (Still none)

❖ 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 mail forwarding and 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 69, Elkhorn, NE 68022; and PO Box 293, Merlin, Ontario N0P 1W0, Canada. Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletin for sending pirate loggings with a hope that pirates might QSL remains *The ACE* ($2 US for sample copies via Belfast) and the e-mailed *Free Radio Weekly* newsletter, still free to contributors via **yukon@tm.net**.

Thanks

Your loggings and news are always welcome via 7540 Highway 64 West, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Jerry Berg, Lexington, MA; Kyle Brown, London, UK; Rich D'Angelo, Wyomissing, PA; Ross Comeau, Andover, MA; Gerry Dexter, Lake Geneva, WI; Harold Frodge, Midland, MI; William Hassig, Mount Prospect, IL; Maharishi Hashishi, Belfast, NY; Vince Havrilko, Osan AFB, Korea; Harry Helms, Ridgecrest, CA; Roger Dale Huff, Norfolk, VA; Harald Kuhl, Germany; Ben Loveless, Bloomfield, MI; Greg Majewski, Oakdale, CT; Bill McClintock, Avon Lake, OH; Lee Reynolds, Leppster, NH; Martin Schoech, Merseburg, Germany; Lee Silvi, Mentor, OH; Bud Stacey, Setsuma, AL; D. J. Stevie, Basel, Switzerland; Robert E.Thomas, Bridgeport, CT; Niel Wolfish, Toronto, Ontario, and Joe Kenneth Wood, Gray, TN.

Kevin Carey, WB2QMY
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Are You Ready?

In September, thunderstorm static remains a strong factor in most parts of the country. It won't be long however, before the cooler evenings of fall set in and reception – especially on the lower bands – will become noticeably quieter. Will you be ready for the upcoming season? Now is the time to check over your antennas and equipment to make any necessary repairs or improvements. It is also an excellent time to review your printed and online references to make sure they are up to date.

❖ Printed Resources

In addition to the monthly updates we give here in *Monitoring Times*, there are several other resources that new or veteran listeners will want to consider having. For anyone interested in the frequencies below 500 kHz, I highly recommend a subscription to the *Lowdown* journal, the monthly publication of the Longwave Club of America (LWCA). This journal has been published since 1974 and is the "granddaddy" of all longwave publications. In it, you will find articles ranging from highly technical construction projects to tutorial-level topics and historical profiles. There is also consistent coverage of the license-free lowfer band, natural radio, beacon loggings, and much more.

At press time, membership dues for the LWCA are $18.00 a year in the US, $20.00 a year in Canada and Mexico, and $26.00 a year for overseas members. These rates include a copy of *The Lowdown*, sent by First Class Mail in the United States and by Airmail elsewhere. All remittances must be in U.S. funds. Send orders or inquiries to The Longwave Club of America, 45 Wildflower Road, Levittown, PA 19057.

A directory of beacon stations is another must for longwave listeners. When you hear a new station, you will naturally want to identify it and determine its location and distance from you. For North American listeners, the *BeaconFinder* guide lists virtually all U.S., Canadian and Mexican stations, as well as several "DX" stations that are logged here when conditions are good.

I began publishing the *BeaconFinder* in 1998 after I noticed a shortfall in up-to-date beacon guides for North American listeners. By concentrating solely on North America, it was possible to produce a smaller, easy-to-use guide that was less expensive than many others on the market. It has remained a popular resource over the past four years. The *BeaconFinder* contains over 60 pages of listings, and comes ready for 3-ring binding. Copies of the guide are available for $11.95 postpaid (U.S. funds) from: Kevin Carey, P.O. Box 56, West Bloomfield, NY 14585. An advertisement for the booklet and its companion *Sounds of Longwave* tape can be found elsewhere in *MT*.

European listeners will benefit from a copy of Robert Connolly's *Non-Directional Beacons Of Europe*. It lists frequencies, callsigns, and locations of over 2,800 aero and marine NDBs and is an ideal reference source for decoding beacon callsigns very quickly. Geographic coverage is from Greenland and East Coast Canada to Arctic Russia, to the Persian Gulf, to 10 degrees North in North Africa, including the Azores, to the West of Ireland, to Greenland. Pricing for the guide depends on the shipping destination and the method of payment used. For complete information, visit Robert Connolly's web site at http://www.kilkeel7.freeserve.co.uk/publicat.htm.

❖ Online Resources

One disclaimer should be made before discussing online resources: Web site addresses (URLs) are subject to frequent change! More often than not, when a list of LF-related websites is published, some of the addresses will be out of date by the time you receive the printed copy. I verified each of the URLs below at press time, but no guarantee is made that all of the sites are still active. Should you discover a "dead" link, the best recourse is to use a search engine such as http://www.google.com or http://www.altavista.com to search for keywords covering the items of interest to you.

The following websites are a small sample of what exists on the web for longwave enthusiasts. You will undoubtedly discover more sites as you search the web on your own or follow the links given on many of the sites below. Have a favorite LF site that we've missed here? Just send me the details and I'll cover it in a future issue.

1. Longwave Club of America *(highly recommended)*: http://www.lwca.org/
2. Stephen P. McGreevy's Natural Radio Site *(highly recommended)*: http://www.auroralchorus.com/natradio.htm
3. Lyle Koehler's Lowfer Page *(highly recommended)*: http://www.computerpro.com/~lyle/
4. Alan Gale's Beaconworld website *(highly recommended)*: http://www.altair.org/natradio.htm
5. History of aviation beacons: http://www.navfltsm.addr.com/ndb-nav-history.htm?
6. Airnav online listing of many N. American beacons (does not list "compass locator" beacons): http://www.airnav.com/navaids/
7. Altair's Natural Radio Projects: http://www.altair.org/natradio.htm
8. Les Rayburn's 1750 meter and medfer resource: http://www.highnoonfilm.com/xmgr/
9. Solar Flare Detection by Radio: http://www.hia.net/kjsmith/radio/r0ctnts.htm
10. LF Engineering Co. Homepage: http://www.lfengineering.com/

❖ Morse Code Chart

A nice thing about chasing beacons is you don't have to be an expert in Morse Code to identify them. Beacons send their IDs slow enough so that you can simply jot down the dots and dashes as you hear them and look them up on a Morse Chart. We've included a clip'n save chart in this issue for those who are new to the code or want to brush up on certain characters.

MORSE CODE

A	•—	N	—•	1	•————
B	—•••	O	———	2	••———
C	—•—•	P	•——•	3	•••——
D	—••	Q	——•—	4	••••—
E	•	R	•—•	5	•••••
F	••—•	S	•••	6	—••••
G	——•	T	—	7	——•••
H	••••	U	••—	8	———••
I	••	V	•••—	9	————•
J	•———	W	•——	0	—————
K	—•—	X	—••—		
L	•—••	Y	—•——		
M	——	Z	——••		

Figure 1. Morse Code Chart

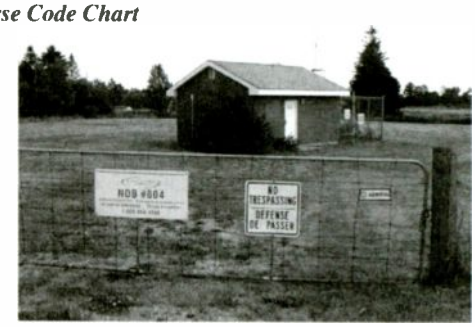

Figure 2. Beacon "KZ" 248 kHz, Buttonville, Ontario. Courtesy of Ken Alexander (ON)

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Size: 10$^{1/2}$" Wide x 7$^{1/2}$" Deep x 3$^{3/8}$" High

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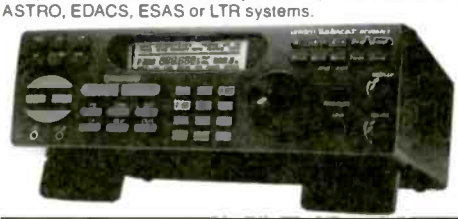

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Trunk Lockout • Trunk Delay • Cloning Capability
10 Priority Channels • Programmed Service Search
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Frequency Coverage:

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Bearcat 245XLT 300 ch. Trunktracker II handheld scanner	$189.95
Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner	$89.95
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Size: 2$^{1/2}$" Wide x 1$^{3/8}$" Deep x 6$^{1/8}$" High

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The AOR AR8200 Mark IIB is the ideal handheld radio scanner for communications professionals. It features all mode receive: WFM, NFM, SFM (Super Narrow FM), WAM, AM, NAM (wide, standard, narrow AM), USB, LSB & CW. Super narrow FM plus Wide and Narrow AM in addition to the standard modes. The AR8200 also has a versatile multi-function band scope with save trace facility, twin frequency readout with bar signal meter, battery save feature with battery low legend, separate controls for volume and squelch, arrow four way side rocker with separate main tuning dial, configuarable keypad beep/illumination and LCD contrast, write protect and keypad lock, programmable scan and search including LINK, FREE, DELAY, AUDIO, LEVEL, MODE, computer socket fitted for control, clone and record, Flash-ROM no battery required memory, true carrier re-insertion in SSB modes, RF preselection of mid VHF bands. Detachable MW bar aerial. Tuning steps are programmable in multiples of 50 Hz in all modes, 8.33 KHz airband step correctly supported. Step-adjust, frequency offset, AFC, Noise limited & attenuator, Wide and Narrow AM in addition to the standard modes. For maximum scanning pleasure, you can add one of the following optional slot cards to this scanner: CT8200 CTCSS squelch & search decoder $89.95; EM8200 External 4,000 channel backup memory, 60 search banks. $69.95; RU8200 about 20 seconds chip based recording and playback $69.95; TE8200 256 step tone eliminator $59.95. In addition, two leads are available for use with the option socket. CC8200 personal computer control lead $109.95; CR8200 tape recording lead $59.95. Includes 4 1,000 mAh AA ni-cad batteries, charger, cigarette lighter adapter, whip aerial, MW bar antenna, belt hook, strap and one year limited AOR warranty. Enter your order now at http://www.usascan.com.

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ON THE HAM BANDS

THE FUNDAMENTALS OF AMATEUR RADIO

T.J. "Skip" Arey, N2EI
tjarey@monitoringtimes.com

Emergency Responders Learn from 9/11

With this issue of *MT*, one year has passed since the events of 11 September 2001. Because of my commitments as a state government employee in the aftermath of the events, I was unable to become directly involved in the immediate amateur radio support that was provided to the scene at the World Trade Center. I was later honored to be part of the recovery effort at "Ground Zero" in a different capacity.

In the past year, there has been a lot of opportunity to review how ham radio can and does respond in matters of national disaster and concern. We have a great deal to be proud of. The spirit of service to community has never been in doubt in the amateur radio community. All too sadly, given the state of the world around us and the continued threat represented by international and domestic terrorism, it is likely that amateur radio will be called into service again in the future.

The magnitude of destruction of the World Trade Center buildings will be discussed for many years to come. From a radio communications perspective, the buildings themselves were an integral part of the area communications network. When the buildings collapsed, a gap in communications existed in the very spot where communications was so sorely needed. Once again, we saw how rapidly cellular phone service can be swamped beyond usability due to the sheer number of attempted calls.

While public safety systems reacted and returned service, amateur radio was able to serve as a practical communication adjunct – a service that has always been our hallmark.

The Amateur Radio Emergency Service (ARES) quickly mobilized to provide communications support at the World Trade Center site, assisting the Red Cross and incident management officials. Similar efforts supported the rescue and recovery efforts at the Pentagon. For over two weeks, in the aftermath of the attacks, the ham radio community brought its skills and abilities to the task at hand.

❖ Lessons Learned

Top on the list, HANDIE-TALKIES DON'T CUT IT! Reliable communication with a five watt or less VHF transceiver (using an inefficient "duckie" style antenna) largely depends on the presence of one or more repeaters. All well and good until you find yourself in a situation where the disaster occurs outside of normal repeater range or the repeaters themselves are brought down by the event.

The hams operating in support of the Pentagon rescue effort had the luxury of good repeater coverage. At the World Trade Center site, volunteer hams were advised that they should bring mobile transceivers with higher power capabilities. Once a local net is established, handie-talkies might be useful for short range tactical communication, but they are probably not a good primary communications tool in a crunch. If you are making use of talkies for "tac" work, be sure to have at least two battery packs and a charger with you. Some rigs have an auxiliary battery case that can be filled with regular alkaline batteries. These are always useful in a pinch.

Higher transmitter power levels also mean a need to consider where your operating power is coming from. A mobile rig will do just fine as long as there is gas in the car to turn the alternator. And then it will still be okay until the battery runs down below functionality. Then what? Give consideration to configuring the rig so it can be pulled out and used with other power sources. I keep all my emergency gear set up to run off AC mains and auto/marine batteries. It's not hard to carry around a power converter and various cabling in a small "go bag."

Even with good wattage and a reliable power source, often you are only going to be as effective as your antenna. Even though I have permanent antennas mounted on my cars, I always keep a spare "mag-mount" antenna handy. They can be set up almost anywhere and serve to improve your ability to communicate. I also carry a simple "J-Pole" antenna cut from TV twin-lead and attached to about 30 feet of RG8-X coax. You can find the design in dozens of antenna books. This simple set-up can be tossed up into a tree or over a lamp post to significantly improve line-of sight communication range.

Don't forget a couple of common coax "tweenies" and barrel connectors. You may be able to jury-rig a better antenna situation on site if you're properly equipped.

Try as they might to stay open, you should expect the local Radio Shack to be closed for the duration of the emergency. You will want to make sure you have adequate spare fuses, connectors and other needful things to avoid down time. A small set of basic tools and a soldering iron that runs on 12 volts will be appreciated by those who came on-site without such tools.

With 50 watts of power on 2 meters and 35 Watts on 70 Centimeters, the Yaesu FT-7100 would be a great mobile emergency rig.

❖ Individual Preparedness

If you plan on volunteering to provide amateur radio services at or near the scene of a disaster, there are a number of things you need to consider.

First and most important: DO NOT FREELANCE! Emergency response and management is always an organized effort even in smaller events. All disaster level events will rapidly come under a formal Incident Command structure. The best way to become involved as an amateur radio operator is to have prior knowledge of your local ARES and RACES systems. Find out who directs these programs and the frequencies of your local, state and regional networks. In a true emergency, these networks will undoubtedly be activated. Net control stations will provide you with information.

The best way to know the proper protocols for participating in such a net is prior practice during scheduled drills. If you just get on the air and start transmitting, at the very least you will be considered a nuisance. At most, you will be impeding an emergency operation and that often carries very serious penalties.

Another source of information will be ARRL on-air and on-line bulletins. You can find out more about these by visiting **http://www.arrl.org** .

If volunteers for on-site disaster service are called for, it's important to realize that this kind of thing is not for just everybody. For example, the hams working at the World Trade Center site were asked to pull 12 hour shifts. Initial conditions on site were charitably called a "War Zone." Support services materialized relatively rapidly in this event but it would not be unusual to be without food, water, and other supportive services for between 24 and 48 hours. You might well be expected to supply your own personal resources throughout the length of the volunteer effort.

If you have any personal medical needs, you will want to be sure to have an adequate supply of your medications, etc., for the duration of your shift. You will also need to understand that some environments (such as the World Trade Center site) are "high dust and debris" areas. If you have a medical condition involving respiratory prob-

lems you may not want to participate directly on site.

Also, without going into detail, disaster sites are not pleasant places. Many of the sights, sounds and even smells can be very disturbing. Even highly trained professionals have difficulty in such an environment. However, they usually have specialized training and a formal support structure that helps them to cope. Seriously give consideration to how you might handle yourself in the presence of the aftermath of violence and death. You will not be doing anybody any good service if resources need to be diverted to provide you with aid.

Okay, I haven't gotten up on this soapbox for a while, but it's time once gain. Part of your individual preparedness plan should be upgrading your basic license. Many emergency scenarios allow you to operate under the auspices of the highest licensed amateur radio operator at the station location. Why not solve any questions concerning this by BEING the highest class license on scene? Why not pick up the latest study guide and begin moving up the ranks?

❖ Ham Community Preparedness

The events of last September brought about a lot of rethinking in the world of emergency preparedness. As a veteran of countless emergency service drills both as a radio operator and as an EMT, we found ourselves well trained for a "mass-casualty" event that would have swamped area hospital services. This was always thought to be the most likely scenario. In New York on 11 September 2001, the hospitals and the emergency service systems were ready but the disaster didn't fit the planning. The vast numbers of "wounded" just didn't materialize in the manner that training considered. So most agencies, ARES and RACES groups as well, have been spending a lot of time developing new plans to take into account response to high profile terrorist events.

The fundamental skills of amateur radio emergency communications will not change a great deal in these new scenarios. A net, is a net, is a net. But greater flexibility needs to be practiced. The ability to "flow" with the events may, for example, mean getting comfortable with a net manager handing off control to someone who may not be the best trained at the moment but may simply be the ham who is in the right place at the right time. Therefore, the better trained we become as a group, the better we will all be able to serve.

We probably need to reacquaint ourselves with the basics of good old-fashioned traffic handling. Many of the conceived terrorist scenarios could result in communications breakdown or over-burdening on a regional scale. As a group, we have always excelled at "health and welfare" communications. If an area became cut off or quarantined for a period of time, being in a position to help folks let their relatives know they are okay is a great service.

❖ International Awareness

There is something else about the radio hobby that often gets discounted but I have always maintained is important. As a group, we tend to be a great deal better informed about the world around us. Many of us monitor International Shortwave broadcasts and, on a more local level, VHF/UHF public safety frequencies. Even casual attention paid to such things can help a person develop an understanding of the larger environment. Being well-informed means you are more likely to respond responsibly as events occur.

Remember that Amateur Radio is a service. On any given day we can be called upon to help locally, regionally, even nationally. Our history in this area stands proudly with the many other service agencies that have responded in the past and who will proudly and effectively respond to future events.

UNCLE SKIP'S SEPTEMBER CONTEST CORNER

ARRL September VHF QSO Party
1800 UTC, Sep 14, to 0300 UTC, Sep 16
YLRL Howdy Days
1400 UTC, Sep 20, to 0200 UTC, Sep 22
Panama Anniversary Contest
1200 UTC to 2359 UTC, Sep 22
Fall QRP Homebrewer Sprint
0000 UTC to 0400 UTC, Sep 23
Texas QSO Party
1400 UTC, Sep 28, to 0200 UTC, Sep 29
1400 UTC 2000 UTC, Sep 29
Louisiana QSO Party
1400 UTC, Sep 28, to 0200 UTC, Sep 29
1400 UTC 2000 UTC, Sep 29
Alabama QSO Party
1800 UTC to 2400 UTC, Sep 28

Marc Ellis
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Firing Up Our Voltohmists

In the last couple of columns, we introduced you to the vacuum tube voltmeter (VTVM), discussed its usefulness to the radio restorer, and examined the innards of two typical units: the RCA Junior and Senior Voltohmists. Either of these instruments would make an excellent addition to your arsenal of test equipment. So far, their restoration has not progressed beyond the examination stage, but this month we'll heat up the soldering iron and go to work, starting with the Junior Voltohmist.

❖ The Junior Voltohmist

The first order of business was to recap the unit. In the Junior Voltohmist, most of the wiring – except for that associated with the selector switches – is done on a shelf-like phenolic deck mounted just under the meter movement. The tubes, power transformer, a calibration control, and three of the four capacitors are mounted on top of the deck. The interconnecting wiring is located below.

The above-deck capacitors included the power-supply electrolytic and two of those notoriously leaky old-style wax-covered paper units. I had intended to replace the electrolytic, even though it was new, because its voltage rating was 450 rather than the 250 called for in the parts list. Voltage ratings of paper capacitors are not critical as long as they are *at least* the value called for. With electrolytics, however, full capacity may not be developed when operating much under rated voltage.

I had to compromise on the electrolytic, however, because my usual mail order capacitor source didn't have a 250-volt one on hand to include with the bulk order I was placing. Single caps are a little difficult to purchase by mail, so I'm leaving the 450-volt unit in place and will keep my eyes open during the upcoming flea market season for a 250-volt unit of the correct capacity.

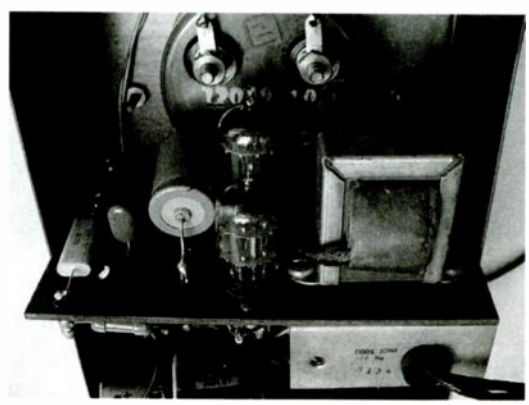
The two wax paper units were removed from the top of the board by clipping their leads as close to the caps as possible. These were replaced with modern units whose leads were neatly soldered to the stubs of the old leads protruding up through the board. The fourth capacitor was mounted under the board in a difficult position to reach. And, since it was a molded-plastic rather than a wax type, I decided to take a chance on it and leave it in place. Later, I changed my mind, as you will see.

I already knew that the ohmmeter battery (an alkaline D-cell) was still ok, so this essentially completed the soldering-iron work on the unit. But I was still stuck with the workable but very unappetizing crushed-and-taped-up probe. Here my junk box bailed me out. Years ago, I had purchased a signal generator for parts, and the test lead it came with (not the right one!) was a generic VTVM probe of just the type I needed – complete with switchable 1-megohm resistor (see last month's column). Even the connector at the instrument end was correct.

Now I was ready to turn the unit on and try it out. Referring to the owner's manual, I made the preliminary adjustments as outlined and found that the instrument was behaving normally. Then I turned to the maintenance section at the end of the manual and ran through the simple procedures for checking the mechanical zero setting, the electrical balance between the "+ volts" and "-volts" functions, the d.c. and a.c. zero checks, and the calibration (which is done on d.c. only using a known 58-volt source). Everything operated within parameters, and the d.c. calibration control required only the tiniest tweaking.

❖ Recapping the Senior Voltohmist

The Senior unit being a little more complex, its parts and wiring are mounted on *two* shelves, placed above and below the meter case, respectively. The upper shelf (metal rather than phenolic), is set up in an opposite manner to the one in the Junior Voltohmist. The tubes, calibration potentiometers, etc. are mounted *underneath*, with the small parts and wiring quite accessible on the top surface. All but one of the capacitors are located on top, and that one (a large .1 ufd @ 1000-volt unit) was fastened to the back of the meter case and also quite accessible.



Top view of Junior Voltohmist parts deck shows electrolytic capacitor (just to left of tubes) as replaced by previous owner and the two new paper capacitors (to left of electrolytic).

Only the .1 ufd unit was wax-covered; the four other paper capacitors were molded plastic types. The fifth capacitor was the power-supply electrolytic (a readily-obtainable 10-ufd @150 volt unit). I was going to leave the molded-plastic caps alone, figuring that their cases had probably adequately resisted the destructive infiltration of water vapor. But then something occurred that made me change my mind. It seems that Richard Lee, Vice President of the New Jersey Antique Radio club, had noticed in last month's column that I was working with a copy of the Senior owner's manual downloaded from the internet and not as clear as it might be.

Richard very kindly decided to send me an original manual for the Senior, telling me that it contained some interesting notes made by the former owner. Looking these over, I found that he had discovered that not only the .1 ufd wax-covered unit, but also one of the molded plastic jobs, were leaky.

I disconnected one of the latter and connected an ohmmeter across it; it showed no noticeable leakage even at the ohmmeter's highest range. However, when I got out my Sprague capacitor tester, which checks for leakage with operating voltage applied, I found that the capacitor did not even close to meeting minimum standard. So, in addition to the .1-ufd wax unit and the electrolytic, out came all four molded plastic units – to be replaced with new ones. Later, I even went back and changed out the difficult-to-reach molded plastic unit under the shelf of the Junior Voltohmist.

I had to improvise a replacement for the .1 ufd wax unit because my supplier did not have one on hand with the required 1000-volt rating. Instead, I ordered two .22 ufd @ 630-volt capacitors. Putting them in series would give me a 1260-volt capacitor of .11 ufd capacity. Close enough! The original capacitor mounting stud on the back of the meter case was used to secure a small terminal lug that gave me a spot to make the midpoint connection between the two capacitors. The free ends were then connected in place of the leads from the old .1-ufd unit.

Finally, I unsoldered the dead alkaline "C" cell serving as the ohmmeter battery and soldered in a new Mallory replacement.

The Junior Voltohmist buttoned up in its case and ready to go back to work.

❖ Testing and Calibration

After turning on and warming up the Senior Voltohmist I attempted to make the prior-to-use adjustments, which are similar to those for the Junior Voltohmist. Much to my surprise, the meter was dead! Rotating the electrical zero adjustment control did not budge the meter pointer from its resting position; neither did shorting the meter leads on any of the resistance measuring ranges. Getting out my multimeter, I found than the voltage at the plus side of the filter cap was a few volts higher than spec. Moving over to the plates of the 12AU7 tube used in the instrument's bridge circuit, I found a negative voltage on each one instead of the expected 46-volts positive.

After a bit of head scratching, the answer turned out to be embarrassingly simple. The lead carrying plate voltage from the "+" side of the electrolytic cap to the 12AU7 had been cut. Careful as I was, I must have snipped it off when I removed the old electrolytic. Reconnecting the lead brought the instrument back to life, and I was ready to proceed to the calibration phase.

The Senior Voltohmist calibration procedures include a mechanical zero adjustment and "+ volts" and "-volts" electrical balance checks similar to those done on the Junior instrument. These went smoothly, as did the d.c. calibration procedure – which measures a known 50-volt source with the instrument set on its 50-volt-d.c. range. Unlike the Junior Voltohmist, however, the Senior unit is also calibrated for a.c. This involves the measurement of a known 50-volt a.c.source on the instrument's 50-volt-a.c. range.

Here's where I ran into trouble again, because I discovered that the instrument was dead on all a.c. ranges! The pointer wouldn't budge regardless of the applied a.c. voltage. Looking over the schematic, I saw that the a.c. signal to be measured traveled through an 18.9-megohm 2-watt carbon film precision resistor before passing to the resistance network associated with the range switch. If this resistor were to be open, the meter would definitely be dead on all a.c. ranges. Luckily, the resistor was included in the wiring on the upper shelf and easily accessible. An ohmmeter check showed that the resistor was indeed open.

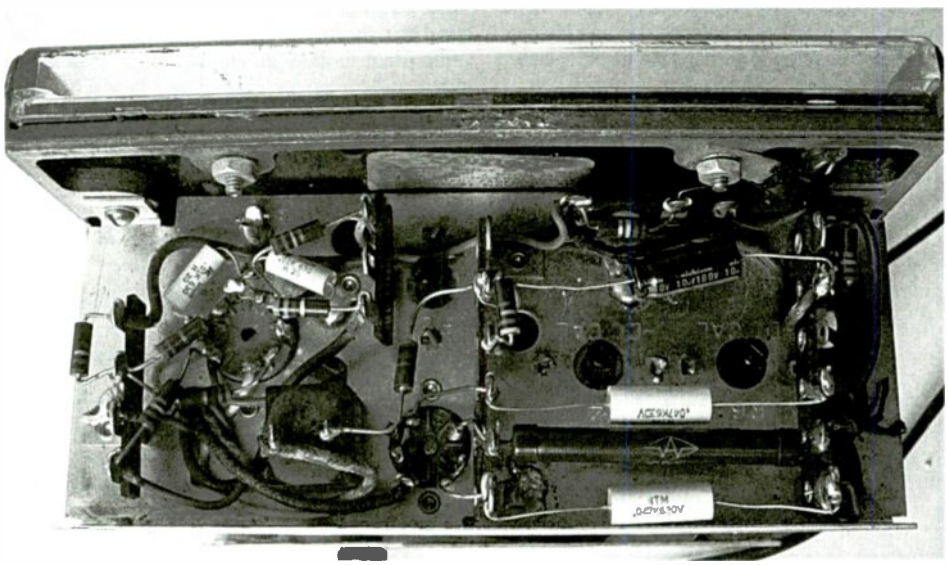
I don't just happen to have an 18.9-ohm precision resistor in my parts drawer, but I did find a 20-megohm unit that could be used to determine if I had found the trouble. I clipped it across the suspected unit and saw that I could now obtain some sort of reading on all a.c. ranges. Apparently this is the only resistor that was in trouble.

If such is the case I'm relieved! All of the other precision resistors in the a.c. measuring ranges are buried between the tightly-spaced wafers of the range switch. Replacing any of them would mean dismantling the switch, wafer by wafer – in the process undoing many connections that would be very difficult to keep track of without an elaborate diagram. Chances of miswiring and creating a very difficult-to-resolve problem would be very good. This would be a very good reason for putting the instrument on the shelf to be used as a parts set in case a better one came along someday.

Fabrication of a replacement for the precision resistor will have to wait until next time, but it might not be too tough. Like most digital multimeters, mine measures to two decimal places. I plan to find a large resistor close to the right value but under it by a bit. Then I can experiment with various small-value series resistors from my parts horde until I find one that adds up to 18.9 megohms +/- 1% (the original tolerance of this resistor as given in the parts list).

Once that's done, the a.c. calibration can proceed. However, there's one last step: the "a.c. compensation adjustment," that I'll probably have to take on faith as not necessary. I'm not sure of the purpose of this adjustment (not required on the Junior Voltohmist), but it calls for a test voltage source of 150 at about 100 kHz. I have no idea of what manner of instrument might provide this. Maybe one of our readers can help me out.

Also on ice until next time will be the cosmetic clean-up and case repainting. I really won't be motivated to do these things until I'm satisfied that I have a working instrument.



Top view of Senior Voltohmist Parts Deck shows the four new paper capacitors (light-colored units) as well as the new electrolytic (dark-colored unit behind panel at right). The open 18.9-megohm resistor is the long unit between the two paper capacitors at bottom right.

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A Brief History of Antennas

The earliest use of an antenna of which I am aware was the vertical receiving conductor of Joseph Henry around 1843. Before radio communication was even imagined he used this antenna to receive the electromagnetic (EM) waves emitted by distant lightning bolts. He connected a coil of wire in series between this antenna and the earth (fig. 1). Changes in the magnetic state of a needle placed in this coil were used to detect when EM waves had energized the antenna. Benjamin Franklin similarly received EM waves from distant lightning with his famous kite tether around 1852, and detected their presence by a spark.

Doubtless, induction played a large part in the results obtained by both researchers. Nevertheless, energy due to the medium and short wavelengths from distant strikes would have reached those antennas by radiation rather than induction. However, at that time the idea of EM waves was not yet part of the thinking of the scientific world.

By the way, don't try Franklin's experiment at home: direct lightning hits killed some experimenters who tried to replicate his results!

❖ Antennas and Precursors to Wireless Communication

In 1846 James C. Maxwell reported his famous mathematical equations, and, using them, predicted the existence of those very mysterious things we now call "radio waves" or "EM waves." Later, in 1888, Henrik Hertz demonstrated those waves. Then, in 1893, the legendary Nicola Tesla invented a practical wireless system using EM waves. This was a year before Marconi began work which led to his development of wireless communications. And there were others near that time who independently constructed wireless systems. On the other hand, it appears that in 1880, prior to the work of Hertz and all the other "inventors" of radio, Amos Dolbear produced a complete, functional, EM-based radio system.

Initially, influential scientists of the day convinced Dolbear that his communication system functioned by induction rather than EM waves. Greenleaf W. Pickard was the highly-respected engineer who invented the crystal EM-wave detector. He became well acquainted with Dolbear's work and equipment. On this basis he refuted claims that Dolbear's work depended on induction, stating that it was actually based on EM waves.

Whatever the case for priority of the discovery of radio we still call the grounded, vertical, quarterwave antenna the "Marconi," and the halfwave, horizontal dipole is known as the "Hertz" antenna. Both these antenna designs are much utilized in today's communications. Tesla, in connection with his plan to transmit useful amounts of electrical power without any connecting power lines, developed an antenna which looked something like a gigantic mushroom. I am not aware that his design is being utilized today.

Dolbear's original antenna was a vertical wire. Again I am not aware of any antenna design in use today which bears his name. On the other hand, in 1909 Pickard wrote:" ... the invention of the antenna may safely be ascribed to Dolbear." Reginald Fessenden, another famous wireless pioneer, writing on the history of wireless said: "Dolbear has given us the vertical antenna." Concerning the use of the term "antenna," which replaced the earlier term "aerial," priority is often attributed to Mahlon Loomis, a dentist turned inventor.

❖ Directivity and Gain

Almost all antennas exhibit some differences, however small, in how well they perform in transmitting to or receiving from different directions. When an antenna's response gives significant emphasis to specific directions we say that it is "directional." Antennas with highly directional properties are frequently called "beam antennas."

Hertz developed the first beam antenna: a reflector-design predecessor of modern-day dish antennas. He also demonstrated the wave-directing properties of dielectric lenses which led to development of dielectric-beam antennas. Later, for the longer waves, Marconi developed the Inverted-L, a wire-beam antenna. He and his engineers also developed perhaps the most legendary of all antennas: the Imperial Beam antenna once used by the British Empire for worldwide communication. Other early beams developed by radio pioneers included the various phased-array beams, as well as the Beverage, long-wire, the V, and the rhombic beams.

All of these beam antennas required a fair amount of real estate to erect. But following the work of Yagi and Uda in the late 1920s, attention turned to smaller beams with parasitic elements. Parasitic elements are elements which are energized by induction rather than being directly connected to the antenna feedline as are elements of phased arrays. Spacing of parasitic elements from the driven element had early-on been a quarter wavelength. Then in 1937 George Brown reported an important discovery: it was possible to reduce this spacing to both increase a beam's gain, and reduce its size.

❖ Antenna Resonance

In the early days of wireless communication the antenna was the only tuned circuit in the system. Thus it was the tuning characteristics of the antenna which selected the signal's frequency from the broad spectrum supplied to it by the spark-gap transmitters then utilized. Around 1920, use of Lee DeForest's new vacuum tube led to the ability to produce transmitters with an essentially single-frequency output. Now it was important to design antennas which were tuned to the specific frequency of the transmitter's output. Resonant antennas, and the means to design them, became quite important in antenna engineering. This led to

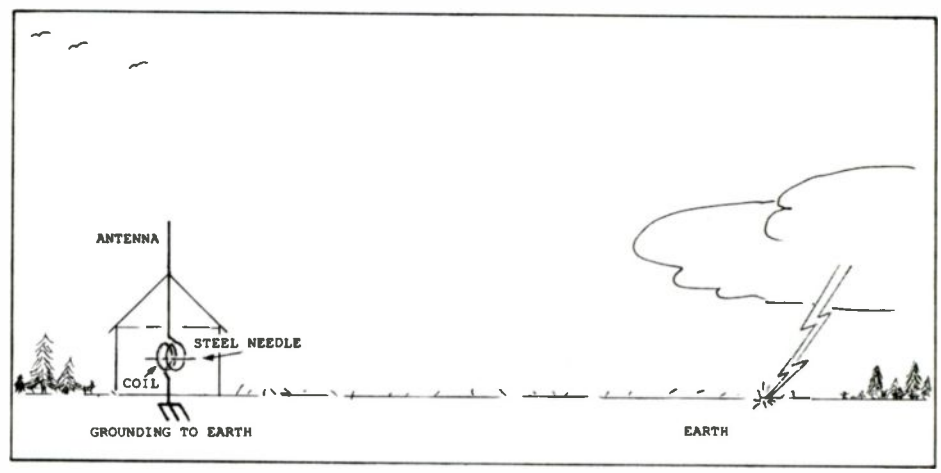

Fig. 1. A schematic representation of Henry's early antenna system and receiver. Depending on the received wave's instantaneous electrical polarity as it weakened, the needle's magnetic polarity was sometimes left reversed.

This Month's Interesting Antenna-Related Web site:

Here is a thorough and interesting history of radio:
http://www.northwinds.net/bchris/

If you'd like to re-create some of the old wireless inventions take a look at:
http://home.earthlink.net/~lenyr/index.html

the development of an extensive mathematical basis for resonant antenna design.

❖ Radio Direction Finding Antennas

Antennas which are utilized for radio direction finding (RDF) must be highly directional. In the early days of wireless, rotatable-loop antennas were used for RDF. The Bellini-Tosi loop design was employed extensively by Marconi and others for RDF work such as locating sinking ships at sea, or enemy wireless transmitters in wartime. Later (1919) the Adcock phased-array antenna became popular for RDF applications.

A different class of RDF antenna system employs multiple, fixed-position, directional antennas arranged in a circle with their response patterns pointing away from the circle's center. A means of switching between these elements is provided. The directional heading of the element which is receiving the strongest level of the signal in question indicates the signal's direction of arrival. Some early installations of this sort utilized Marconi's inverted-L antenna. One very impressive, circular, RDF installation utilizing vertical elements is the famous "elephant cage" circular array; so named for its appearance.

A more-recently developed type of RDF antenna depends on the Doppler effect produced by an electronically "rotated" circular array of antennas. For use in tracking-down illegal transmitters these systems are often mounted on an automobile roof, or even hidden inside vans with non-conductive bodies.

❖ Wideband and Multiple-Frequency Antennas

The use of multiple, different-length antennas fed by one feedline must have been recognized rather early as a means of allowing multiple-frequency coverage with one antenna system. Multiple-frequency antennas were also developed utilizing tuned circuits called "traps," as well as with the lower-loss linear-loading technique.

During the 1930s the well-known wideband rhombic and V antennas were developed. Around 1946 Kandioan reported development of the currently popular wideband, non-directional, discone antenna. In 1955 J. Dyson, following the ideas of V. H. Rumsey, developed frequency-independent antennas such as the self-complementary, spiral antennas. This work was extended by R. H. DuHamel, and then by D. E. Isbell, ultimately leading to directional, frequency-independent antennas such as the log-periodic, dipole array. All of these frequency-independent antennas provide continuous frequency coverage over broad segments of the radio-frequency spectrum.

❖ And So

This review is necessarily incomplete. For instance, the work on radar antennas during World War Two and the currently important planar and adaptive antennas are not discussed. Yet, even from this very brief review we can see that the history of antennas is both extensive and fascinating.

RADIO RIDDLES

Last Month:

I asked: "What single-wire antenna is considered to be essentially a very leaky, two-conductor feedline which utilizes the earth as one of its conductors? Hint: This is a highly directional, very long, low-noise antenna."

The antenna that fits this description is the "Beverage" antenna developed by Harold Beverage and his co-workers. Broadcast band DXers know this antenna as highly-directional, but usually too long to erect on their available real estate. When space can be found, this antenna can provide a degree of directionality that must be experienced to believed.

This Month:

Actually there were "antennas" in existence before Henry's or Franklin's use of antennas. These "antennas" were naturally occurring phenomena, and they received the EM waves emitted by lightning over the eons of pre-historic time. And the lightning must have utilized some kind of transmitting antenna from which the waves were propagated – right? What were these natural antennas which co-existed with the dinosaurs, and even earlier?

You'll find an answer for this month's riddle, another interesting, antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then, Peace, DX, and 73.

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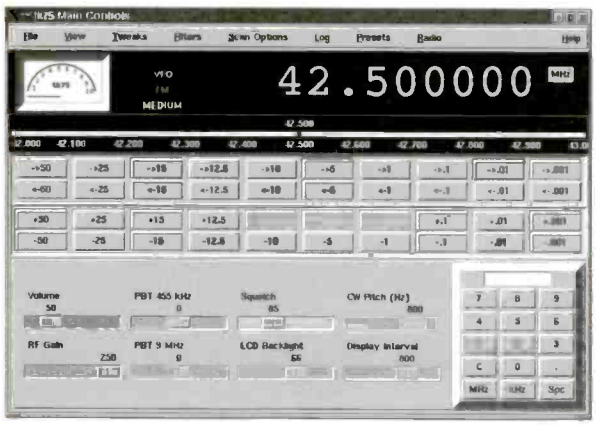
Tk75 - Software for the ICOM IC-R75

The ICOM IC-R75 is a popular tabletop shortwave receiver which, except perhaps for the synchronous AM reception, is a good performer and provides several features listeners want. The IC-R75 found its way into even more homes after ICOM slashed the price and offered a free DSP (digital signal processor) option as a bonus.



Frequency coverage starts at 30 kHz and extends up to 60 MHz, an asset for the scanner hobbyist who likes to monitor the 30 - 50 MHz VHF-low band. You can search between one pair of frequency limits or scan some or all of the IC-R75's 100 memory channels. The IC-R75 has two scan speeds and I measured an 18 channel/second memory scan rate at the higher of the two settings.

There are only two scan resume settings: cancel the scan upon hearing a signal, or pause on active frequencies. The latter setting resumes scanning again after 10 seconds even if the frequency is still active. You cannot force the receiver to "stay put" for an entire transmission and start scanning after the carrier drops.

You can program attenuator and preamplifier settings for each channel. There are three choices for the preamplifier: off, 1, and 2. As the graph shows, VHF-low band FM sensitivity is very good when preamplifier 2 is selected. A few birdies can be heard while tuning the 30 to 50 MHz range, but they are not strong or numerous enough to be a bother.

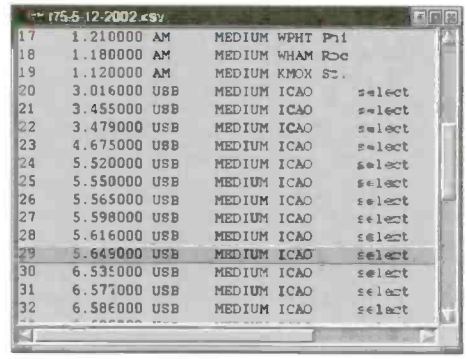
Unlike the upscale IC-R8500 model, ICOM does not include a schematic diagram with the IC-R75. The computer interface commands are clearly documented in the instruction manuals, which is a blessing.

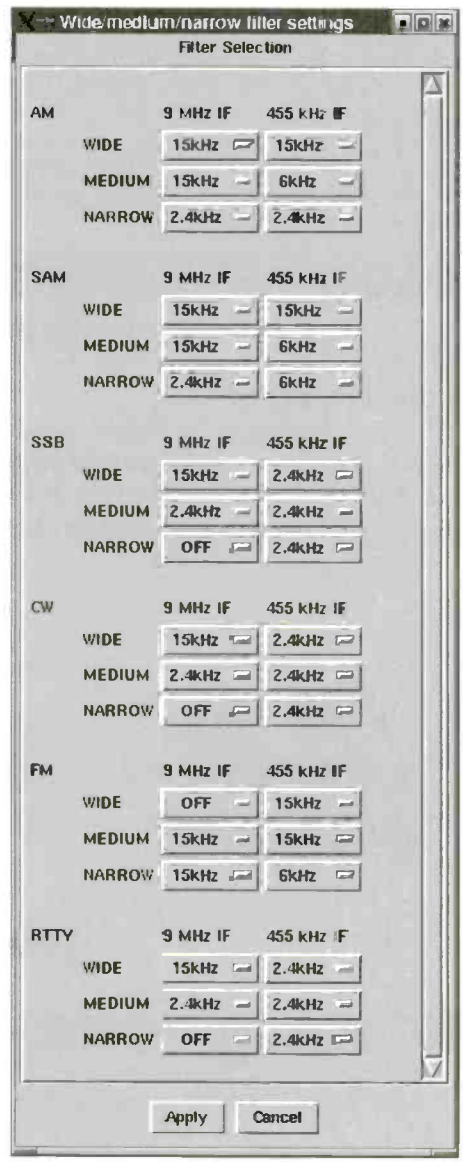
Software Control

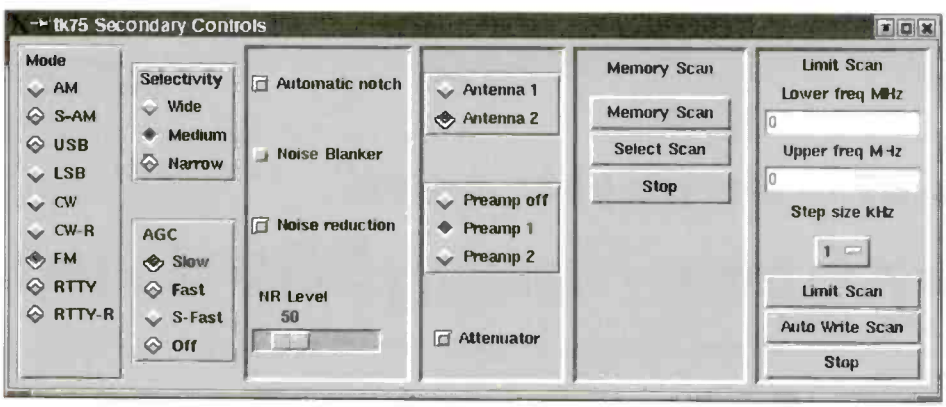
You can buy commercial control programs for the IC-R75 from ICOM or third party software companies, but all of them require the Microsoft Windows operating system. I use the free and more stable Linux operating system instead and wrote tk75 control software.

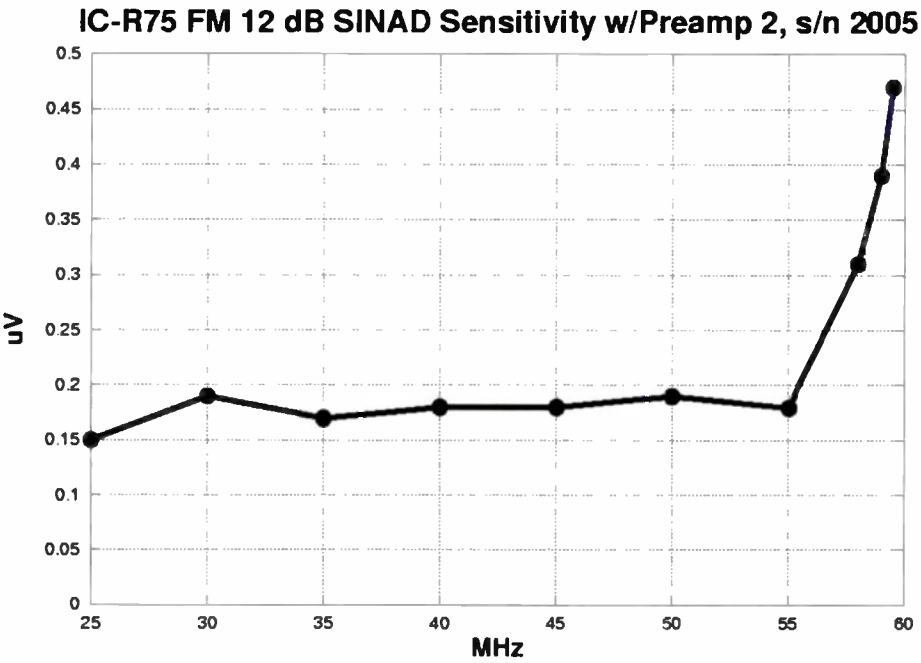
Tk75 is the 5th in a series of freely downloadable radio software I wrote which works on Linux, MacOS X, Windows, openBSD, and various other operating systems:

tk75 - ICOM IC-R75
tk120 - Yaesu VR-120 (August 2002 *MT*)
tk500 - Yaesu VR-500 (July 2002 *MT*)
tk545 - Japan Radio NRD-545 (June 2002 *MT*)
tk8500 - ICOM IC-R8500 (April 2002 *MT*)



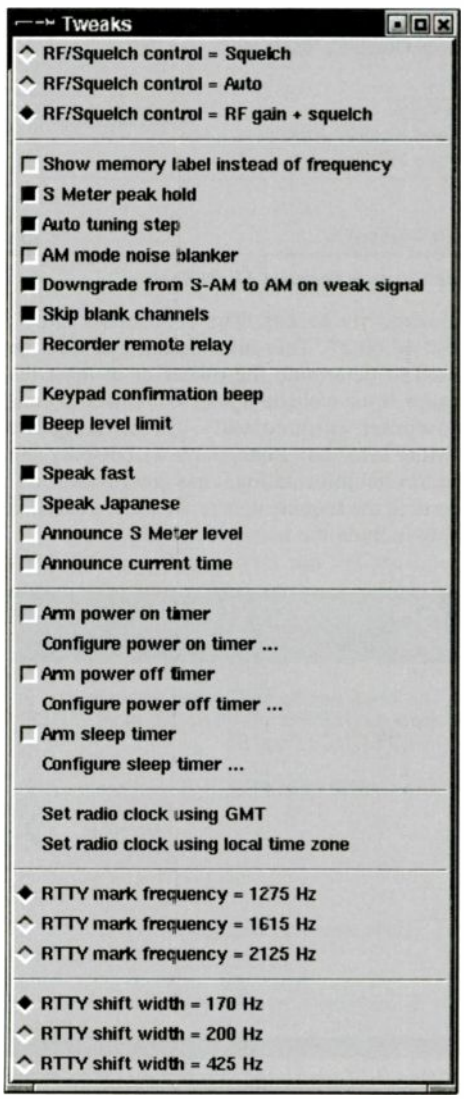


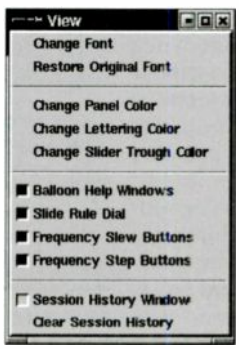




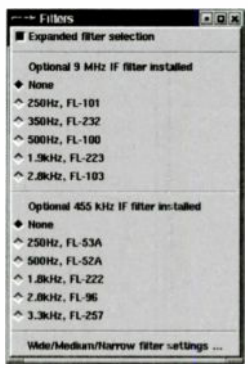
The Basics

Tk75 lets you control almost all the functions of an IC-R75. Like my other "tk" radio programs, you can read the memory channels from the receiver and export them to a csv (comma-separated values) file. Likewise, you can import memory channels from a csv file and write them to the receiver. A spreadsheet or text editor program can be used to create, print, or change a memory channel file, which can be imported into tk75.





Tk75 supports all the IC-R75's scan types: memory, select, limit, and auto memory write. Limit and auto memory write scanning with tk75 software is simpler than using using the radio's front panel due to the ease of choosing the search limit frequencies and step size.



Tk75 employs the same scanning strategy as tk8500; the radio scans at its own pace and the software polls the receiver at a user adjustable rate to determine if it found an active frequency. Once the receiver pauses, the software displays the frequency, mode, and signal strength.

Modern ICOM receivers offer many times more features than knobs and switches. They provide a "Set Mode" menu system to tweak many of the settings, e.g., on/off/sleep timers, scan speed, CW pitch, RTTY frequencies and shift, speech board parameters, etc. It's much easier to set up and change these settings using tk75 software than navigating the Set Mode via the radio's front panel controls.

The IC-R75 has two empty slots to accommodate optional 9 MHz and 455 kHz IF filters. Further, the radio has narrow, medium (normal), and wide selectivity settings and you can choose which filters to use for each selectivity value on a per-mode basis. The combination of IF, filter, selectivity setting, and mode is complicated to visualize and cumbersome to configure using the radio's front panel controls. I created applets within tk75 to ease filter setup.

Getting It

The tk series of programs are open source software (http://www.opensource.org), licensed under the GNU General Public License. You can download, use, and modify the software free of charge from my web page at http://www.pornass.org. I don't warrant the software, but it won't cost you anything.

I use the Tcl (Tool Command Language) and Tk tool kit, known collectively as Tcl/Tk, because it's a powerful scripting language which works on several operating systems and costs nothing. Tk75 uses no "secret" algorithms or cryptic data file formats. Making the source code available permits you learn by reading the design, make changes to suit your needs, and fix bugs yourself.

Thanks

Thanks to Bob Grove for lending me an IC-R75 so I could develop tk75 software.

John Catalano, PhD
johncatalano@monitoringtimes.com

Computer-Internet Firewall Protection

In the past few columns we have used some very useful and interesting Internet programs. I find the Internet indispensable for both personal and business use. It is equivalent to numerous valuable assets right at my fingertips. The Internet is like having a direct line to a major library that never closes. It is a real-time (almost) snapshot of what is happening around the world and right next door. It provides me with almost instant communication to anyone, anywhere, who is also on the Internet. Just ten years ago this much information and communications power for the common person would have been inconceivable.

However, the more I use the Internet the more suspicious I become that more of our personal information and data is being sent out than we realize.

The Need for a Wall

Although I was technically aware of firewalls and have used them in industry, I never felt the need to use them at home ...that is, until now. The awful feeling of having your modem start sending out data when you have not commanded it to is very unnerving.

Programs called "firewalls" create a "barrier" between a computer's ports and the outside world. In the case of the Internet, the firewall program blocks all incoming and outgoing data unless they meet conditions set by the user. These conditions can take the form of a manual approval of communications once the firewall program alerts the user to what connection is being requested to be made by what internet site. A list of frequently accessed sites can be logged into the program so that connection is automatic.

A Free Firewall

ZoneAlarm is one such firewall program that is available in two forms on the Internet at http://www.zonelobs.com . We downloaded the free version and gave it a try.

Downloading the 3 Gig self-extracting file takes a while using a dial-up connection, but installation is simple, easy and quick. ZoneAlarm's main screen with the Programs Panel selected is shown in Figure 1.

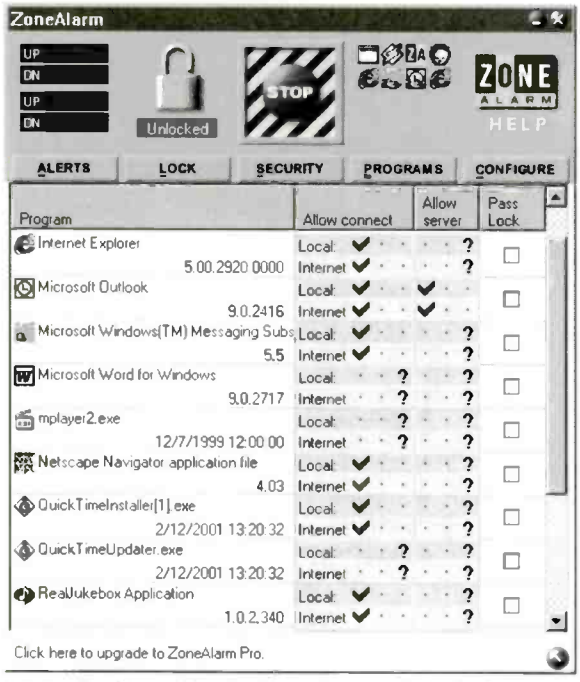


Figure 1 – ZoneAlarm's Main Screen with the Programs Panel Selected

Here, a list of your programs which have attempted to connect to the Internet are displayed. If the cursor is placed over a program entry much more information concerning the program is displayed. The user can control which program may have Internet access by right clicking on the box to the right of each program. Then they can choose the level of access each program may have: Allow, Disallow or Ask. The Pass Lock selection allows the user to define which, if any, programs may have access at all times even if the Internet-stopping Automatic Lock function is selected.

Hey! What's Going On?

The Protection Alert screen, Figure 2 suddenly popped up on the screen while I was on the Internet but busy typing in my MS Word program. A site has tried to access my computer but ZoneAlarm is on guard and blocked its access. The requesting site is 200.44.86.27. This information can then be used to determine the owner or at least the name of the website trying to connect to your computer automatically. By clicking the "More Info" box ZoneAlarm will display any additional information it has determined concerning the requesting site. In some cases this may include the name of the site.

Just for the record, a Protection Alert

Figure 2 – ZoneAlarm's Protection Alert Screen

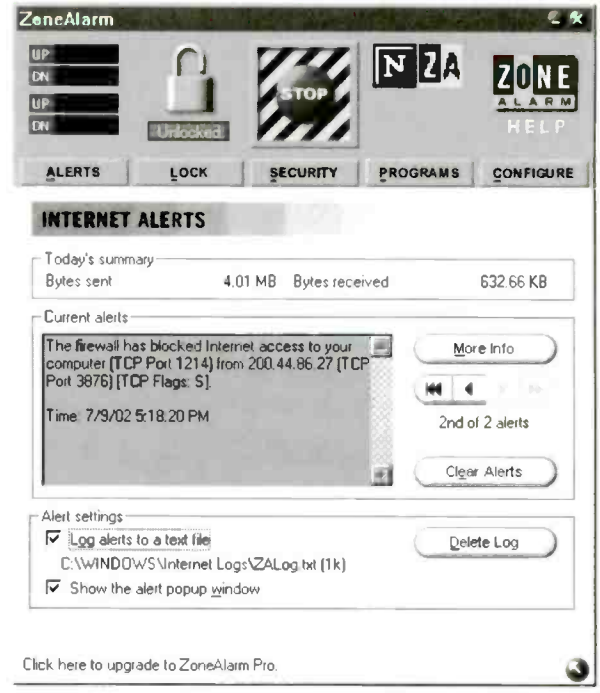


Figure 3 - ZoneAlarms's Internet Alerts Screen

with this same site appeared every 15 minutes that I was connected to the Internet! Thanks to ZoneAlarm I have enough info to now find out what is going on.

All Secure and Safe

The Security Setting Panel allows the user to set the levels of security. For example, in the High Security setting all computer ports not in use by an authorized program are blocked and cannot be accessed, thus stopping programs from accessing the data on your computer without your permission. This is called the Stealth Mode of operation.

The Internet Alerts Panel, Figure 3, of ZoneAlarm will give the user the ability to review any and all Alerts that occurred during the current Internet session. Also this screen allows the user to save Alert messages to a text file. This is very handy if you want to keep a record of unwanted repeat access "offenders."

By clicking on the Advance button on the Security Panel the user can customize the advanced firewall features for use with computers connected to local area networks (LANs).

Additional Functions

Known and verifiable Internet provider (IP) addresses that are trustworthy can be stored in the Local Zone so that ZoneAlarm will automatically recognize them and let them have access.

Another feature, MailSafe, checks email attachments for viruses. It will allow you to quarantine emails until you either check them for bad guys, read then as-is or delete them.

For a free program, ZoneAlarm does a great job giving Internet users a measure of security and peace of mind.

"QSLing" Websites

When we looked at AirNav Internet Lite a few months ago, I was amazed at the almost real-time in-flight commercial aircraft data that the program was displaying. The surprising thing was that the source of this data was not my receiver's interception of ACARS radio transmissions. Instead it was collected worldwide and being set over the Internet. But where, and who, exactly was providing this data? The ability to identify "who" we are connected to would be a very useful utility. It would be just like getting a QSL from each website we visited.

Well, a few souls out there took up the challenge to find the source of the aircraft data. One reader, Dallas Eschenauer, has sent along the website of a freeware program, which will enable you to do some website sleuthing. "My Vital Agent" is a program that traces and displays the network path of your Internet connection. The domain and host name will be displayed, and lots more.

Give it a try at http://www.myvitalagent.com The Lucent website requires a form to be filled out before the program can be downloaded. Getting to the download gave me more problems than the program! Figure 4 displays the heart of the program.

Figure 4 – My Vital Agent – A Need-To-Have Utility

The display clearly shows that I was connected to the Hotbot search engine (see the tag on the right-hand side computer/server symbol neat the top of the screen). The identity and details are displayed of each network element by placing the cursor over each symbol. Here, the top section is shown in the Web mode. However, by clicking on the arrows at the top right this section can display six other modes. These display info on Modem, DNS, Email, FTP, RealPlayer and Websecure.

The next section down displays the amount of traffic sent and received, along with the average data speed.

Check out My Vital Agent. You will not be disappointed. It works so great I think I will keep it as a vital part of my Internet software.

Now I've tipped you to this simple-to-use valuable utility, run AirNav Internet Lite and find out for yourself the source of the in-flight aircraft data. Let me know how you make out.

Readers' Feedback

Our May story on Ad-Ware, the anti-spyware program, generated quite a bit of reader responses.

Monte Carroll writes that running Ad-aware made a big difference on starting his Internet "Downloading and running Ad-aware confirmed my suspicions. Luckily, the program found only one unauthorized sharing program. I deleted it, rebooted, and started Internet Explorer. It loaded quickly, without all the time-consuming hard drive activity I had noticed previously."

Monte, you were not alone. Over twenty readers emailed me with similar experiences.

Program Eats Program

Peter Craig sent me some info he uncovered which says that new programs which grab your computer's information are also detecting the presence of Ad-aware and deleting! The program mentioned was a multimedia program called RadLight, which I have not used.

It reminds me of a 1970's movie where two computers took over the world. I think it was called Colossus: The Forbin Project. Boy, soon it will be computer versus computer and users will be superfluous! I think I'll unplug this computer just to make sure. Till next time.

A Simple Ferrite Loop Antenna

By Richard Q. Marris G2BZQ

This simple External Ferrite Loop Antenna plugs into the antenna socket on the receiver. It covers from 1600 to 4000 kHz, but this waveband can be expanded, as will be explained. Any reader with a plentiful junk-box can make it at nearly zero cost. Even if you have to buy all the bits and pieces, it is still very low cost. Best of all, it works!

Those of us who for one reason or another specialize in investigating, listening to, or even operating a hobby radio station on the frequency spectrum from VLF to around 4000 kHz, will know that the biggest problem is NOISE. Noise is either atmospheric or manmade. (Yes, man can be his own worst enemy!)

Atmospheric noise can be from the crashes and bangs of a violent electrical storm, or background atmospheric noise which rises and falls, depending on the time of day, the season of the year, and more complex solar conditions. It is a complex subject, and interested readers should study appropriate textbooks on the subject.

Manmade noise can be diabolical, and is usually worse for those living in more-populated areas. It can be caused by a variety of things, such as thermostats, light dimmer switches, TVs, computers, vacuum cleaners, electric tools, noisy house wiring, cars, and other such items, including lawn mowers. In fact, we are surrounded by manmade electrical noise, and it is entirely our fault. As the expression "man made" indicates – we make the noise ourselves.

Loop antennas are directional, and provide one way to minimize the effects of noise, as long as the desired signal does not originate in the same direction as the noise.

Description of the Loop Antenna

Figure 1 shows the schematic of the loop. It consists of a nickel zinc ferrite rod, onto which is wound the antenna coil L1, which is tuned by a variable capacitor C. This simple, tuned circuit is coupled to the receiver (RX) by means of a length of coaxial feedline, connected to coupling coil L2 at one end, and plugged into the RX input socket at the other.

A perspective of the wound ferrite rod is shown in figure 2. The completed loop antenna is shown in Figure 4.

So, it will be seen that this simple little loop can be used indoors or outdoors for portable or vacation use.

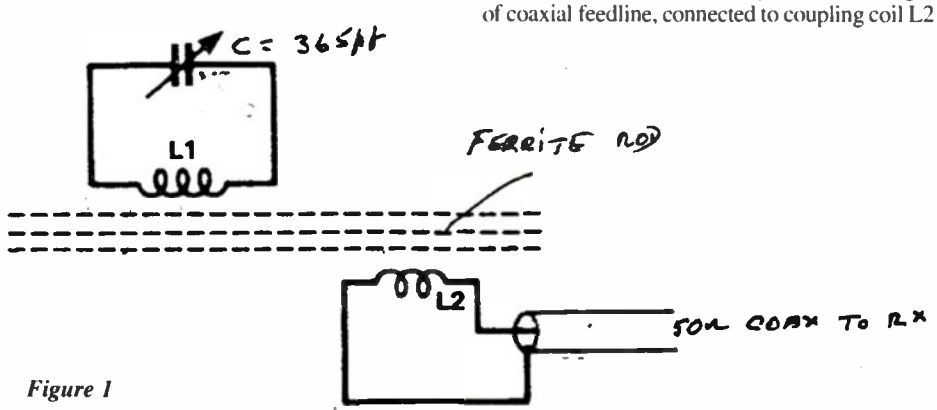


Figure 1

Figure 2

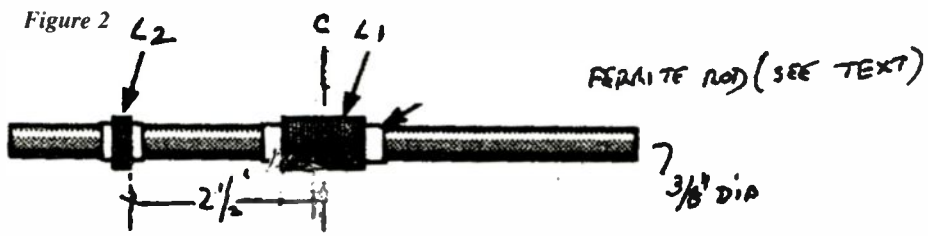
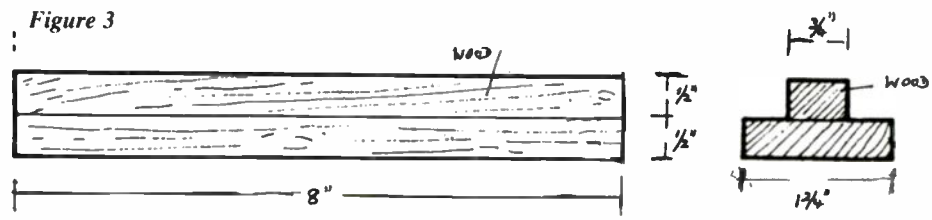


Figure 3



Construction

The heart of the design is the ferrite rod, which must be a nickel-zinc mixture. An ideal junk box item would be an 8" x 3/8" diameter (or 7-1/2") rod salvaged from an older mediumwave receiver. Just strip off the existing windings.

If purchasing a rod, we can recommend the 61-mixture rod (7-1\2" long x 0.375" diameter) from Amidon Associates. Antique Electronics Supply also sometimes offers rods with and without windings. At the time of writing, they offer a wound 7-1/2" long x 0.375 diameter rod, 61 material, with a medium wave winding on it, Catalog No. P - FR2. If you can obtain one, then just strip off the existing winding.

Do not use 33 material rods, presently available on the surplus market.

The ferrite rod is mounted on a simple timber boom (Fig 3 & 4). Use either plastic-coated Terry Clips or PVC "P" clips. The whole assembly is mounted on any convenient plastic box, which must be large enough to house the variable capacitor (preferably with a simple slow motion drive). (See Figure 4).

L1 consists of 30 turns of 26 SWG (UK) enamel copper wire. This has an outside diameter of 0.45 mm. The American equivalent should be 25 AWG.

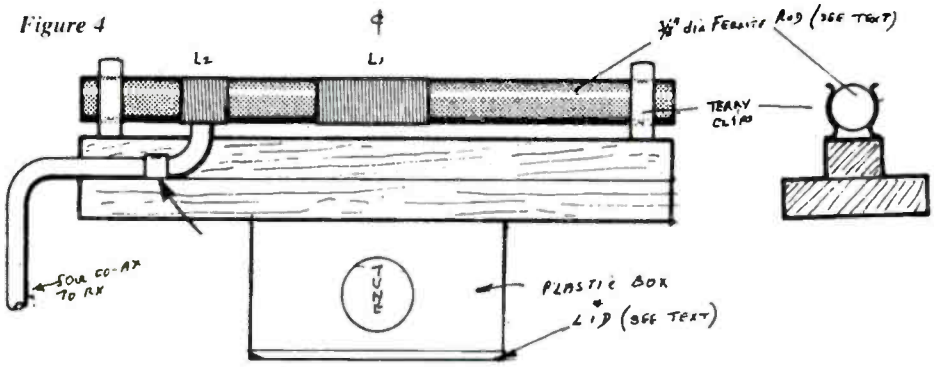
First, obtain self-adhesive labels and cut to 2" wide. Wind this around the center of the rod until you have built up a diameter of 0.44" (7/16"). The 30 turns should be spaced to approximately one wire diameter. L2 consists of 16 turns of the same gauge wire, but closewound. It should, once again, be wound on a self-adhesive label material, built up to the same diameter as for LI. The best position for L2, relative to LI, is shown in Figure 2. This was found by experiment.

As will be seen in schematic Figure 1, the variable capacitor used was 365 pf. Other values can be used for alternate frequency ranges. See later.

Testing and Operation

If the antenna has been built exactly to the drawings and text, it should cover from approximately 1600 kHz to 4000 kHz. It will be seen

Figure 4



that the coverage starts just inside the HF end of the mediumwave band, using a 365 pf variable capacitor for tuning. If a 500 pf is available, then use it. A few kHz will be taken off the HF end of the frequency range, and the lower frequency end will be brought into the mediumwave band. If a 2-gang x 365 pf variable capacitor is available, then wire the two sections in parallel, which will give a total tuning capacity of 730 pf. Coverage should now be over the mediumwave band to around 3900 kHz.

The actual final coverage will depend on the actual ferrite rod used and how closely the winding details are followed (wire gauge, diameter of the winding, and accuracy of the spacing between turns). In all cases, it is advisable to build a simple slow-motion drive into the plastic box. The coaxial feedline used is RG58, and this should be kept as short as convenient ... say, 4 feet long.

To test the ferrite loop, plug the coaxial feedline into the antenna socket of the receiver. Tune the receiver to about 1600 kHz, and rotate the loop's variable capacitor for maximum signal. A convenient signal can be provided with a pocket calculator alongside the ferrite rod. This will produce a "hash" which will be maximum when the loop and receiver are on the same frequency. Repeat with the variable capacitor at minimum capacity, and locate the high frequency end of the loop frequency range.

Next, tune in signals at various parts of the frequency spectrum, and resonate the loop to frequency, at which point the signal level should increase quite dramatically. Next, rotate the loop through 180 degrees. Being directional, the maximum signal should be when the long side of the ferrite loop is towards the station. On all except the strongest signals, the signal should be nearly zero when the end of the rod is towards the station. Make certain that the little ferrite loop is away from house wiring and other potential sources of electrical noise interference.

It is not advisable to use this external ferrite loop with receivers already containing an in-built ferrite loop antenna, unless you are prepared to rotate both the receiver and external loop in unison. It can be done, but it is a tricky operation at best.

Conclusion

This little external loop antenna can be very useful for those readers living in an apartment or other location with a "no external antennas here" syndrome. It is also very useful when operating outdoors or when on vacation.

Next month we'll show how to build a ferrite loop antenna for the longwave band.

Jock Elliott KB2GOM
jockelliott@monitoringtimes.com

C. Crane's Versatile FM Transmitter

The scene: Merlin's cave, the present day, somewhere deep within the British Isles. The old wizard goes quietly about his studies when suddenly a young man rushes in.

"Master, you must help me." he cries. "I need your best wisdom, your highest incantation!"

"What is it you need?" Merlin asks.

"I need to know how to make MP3 audio play through my car stereo," comes the answer.

Merlin shakes his head sadly. "Alas, for that, you need really heavy magic."

Fortunately for anyone who ever wanted to get audio from one electronic device to another, the folks at C. Crane Company have come up with a gizmo that is so slick and works so well that the results are, indeed, heavy magic.

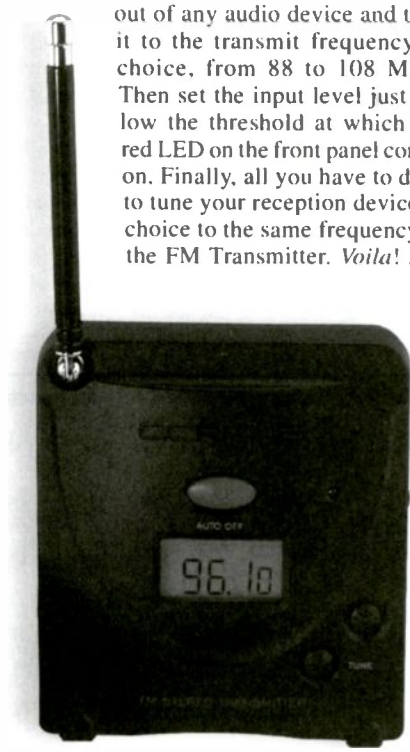
The C. Crane FM Transmitter is the brainchild of Chris Justice at C. Crane and Mr. Pai from Sangean. It's a full stereo FM transmitter that can be plugged into any electronic device with an audio output and used to transmit to any FM broadcast band device within about 70 feet.

Consider the possibilities:

Transfer – without wires – MP3 audio to your car or home stereo system.
Listen to streaming audio from your computer on your kitchen radio.
Send satellite radio audio to your home stereo system.
Listen to your favorite shortwave tabletop receiver or base scanner while mowing the lawn.
Hear the audio from TV when there is lots of background noise.
Connect a portable CD player to your car stereo,
and the list goes on and on.

The C. Crane FM Transmitter measures just 3.125" W x 3.5" H x 1.125" D and weighs 5.8 ounces. On the front panel is a red On/Off button, Up and Down tuning buttons, a .5" x 1" liquid crystal display, a red light emitting diode and a small telescoping antenna. On the right side is a thumbwheel for setting input level. On the left side is the Audio In wire and a jack for the wall wart power supply. On the back panel are four soft rubber feet and a hatch for installing two optional AA batteries. The bottom panel also has four soft rubber feet in case you want to stand the unit upright.

The operation of the FM Transmitter is deceptively simple. Just plug the transmitter into the headphone jack or line out of any audio device and tune it to the transmit frequency of choice, from 88 to 108 MHz. Then set the input level just below the threshold at which the red LED on the front panel comes on. Finally, all you have to do is to tune your reception device of choice to the same frequency as the FM Transmitter. *Voila*! Audio is transferred, through the magic of wireless FM transmission, from one device to another.



I tried the FM Transmitter at my home in upstate New York, and it worked like crazy. I have a small television that has an earphone jack. I plugged the FM Transmitter into it and tuned the TV to a cable channel that I can't get through the broadcast airwaves.

For my portable reception device, I used the Sangean DT-300VW Digital Radio ($79.95 from C. Crane), which receives TV/AM/FM-stereo and weather. I plugged my "usual" headphones, a pair of Radio Shack walkman-style communications headphones, into the DT-300VW.

The most time-consuming part of the entire exercise was trying to find a clear channel on the FM broadcast band. In the Albany-Schenectady-Troy area of NY, there are many stations on the band, but eventually I found a spot on the dial where there was no clear station, although I could hear some very muffled modulation in the background. I tuned the FM Transmitter to the same frequency, and – bingo! –I was instantly listening to the direct-from-cable-TV baritone of some infomercial huckster who was convinced that my life would be infinitely better if I just had his "Lard Buster" product.

I wandered through the rooms of the house. Yup, the Lard Buster was still with me, loud and clear. Then I went outside, circumnavigated our cottage, and the audio from the TV was still coming in strong. Only at the extreme edges of our half-acre lot did the signal fade.

I went inside and retuned the FM Transmitter and the DT-300VW to 89.6, a frequency that is dead quiet in our area. The results were even better. The audio was crisp, clean and easy on the ears, even out to our mailbox, which must be about 75 feet from the transmitter.

The bottom line: if you need to get audio from one device to another and want to do it in a wireless, user-friendly way, the C. Crane FM Transmitter delivers the goods with aplomb. The price is just $99.95, and I give it my hearty recommendation.

MT REVIEW

AVCOM PSA-2400A Spectrum Analyzer

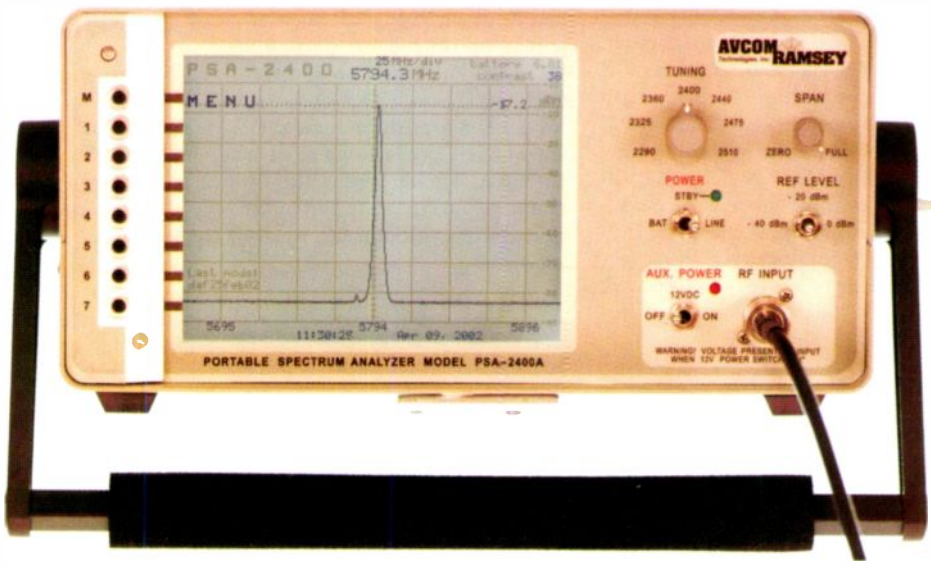
By Bob Grove

AVCOM of Virginia, well known for their affordable, high-quality spectrum analyzers, has announced the release of a product specifically designed for field measurements of the rapidly-growing 2.4-2.5 GHz wireless LAN spectrum.

With the rapid release of wireless LANs, Wireless video cameras, ISP wireless networks, broadcast links, and other unlicensed users, the frequency range 2400-2483.5 MHz has become flooded with users, resulting in predictable chaotic interference. (See our August *Closing Comments*.) Only a spectrum analyzer can reveal in detail the co-channel interference.

The new AVCOM PSA-2400A is extremely lightweight at only 8 pounds as compared to competitors (including other products of its own!), and comfortably compact as well, measuring a mere 9.5"W x 4.5"H x 9.5"D. Viewable in bright sunlight and even backlit for nighttime use, the high-contrast LCD screen (5.7" diagonal, 1/4 VGA) offers sharp resolution of the swept image. Its three-way power supply (85-264 VAC @ 47-440 Hz; 9-15 VDC; internal 6V gel cell battery) makes this versatile test instrument a natural for the field technician.

An on-screen menu offers seven different functions which can be modified for custom display characteristics.



◆ Specifications

Switch-selectable reference levels of 0, -20, and -40 dBm allow the operator to choose the sensitivity baseline for the environment. A BNC connector accepts any conventional interconnection of user-provided antennas (whips, stubs, flat plates, etc.).

The span can be adjusted from better than 100 MHz full-sweep coverage (from below 2.4 to above 2.5 GHz), to narrow, single-signal sweep for visual analysis, identification, and adjacent-signal separation. The screen automatically tracks and displays the upper and lower frequency limits for the continuously-adjustable sweep width, as well as the center tuned frequency.

◆ Our field test

A frantic phone call from a major university gave me an excellent opportunity to test the new 2400. They had recently installed an expensive and elaborate wireless LAN system for their business computer array, and erratic breaks between the access point and the individual terminals were really fouling up the works.

I brought several pieces of equipment to the site just in case: A frequency counter, an RF detector, and the AVCOM PSA-2400A. Starting at the access point, I attempted to get a reading with the frequency counter, but the digital, packet nature of the signals didn't allow enough capture time for a frequency display to lock. While the RF detector buzzed encouragingly, it didn't really provide any useful information.

Turning on the AVCOM, however, showed everything we needed: The high-level pulses of the access point LAN as it talked to the terminals, the weaker return pulses from the network computers, and, sure enough – an unknown, wideband signal right on top of the other signals!

Were there any PCS devices operating in the area? No. Any other obvious in-band transmitters? No. It was time for a walk through the building.

With the spectrum analyzer in hand, we walked into any engineering lab facility: the phantom signal grew stronger. As we passed one particular office, the signal rose enormously: we were close. No such signal was seen on the engineer's $4000, specially-equipped PDA designed for monitoring the system.

I looked up toward the top of the wall, and there it was – a wireless security camera! We pulled out the plug and the signal disappeared. Full operation of the LAN was restored with no further disruptions from the wayward video cam.

Impressed that the new AVCOM PSA-2400A revealed so much information in such a short time, I decided that this is one instrument that needed to be put into the Grove on-line catalog.

(AVCOM PSA-2400A spectrum analyzer, $2749.95 plus shipping from Grove Enterprises.)

What's NEW

Tell them you saw it in Monitoring Times

One Speaker: Six Radios

Most handheld and communications receivers aren't equipped with the best-sounding speakers, so most users end up connecting them to an external speaker for higher-quality sound and more intelligible speech. However, this can be a hassle if you have multiple receivers and transceivers in your radio shack. B & D Enterprises' new SCAN•A•MIX model BX1 accepts and combines up to six audio signals into one speaker output. By combining all receiver audio into one, an external speaker will not be needed for each receiver or transceiver.

The BX1 is especially ideal for listening to the low audio output of portable units, since it contains a 2.5 watt RMS audio amplifier. The source receiver or transceiver can operate at a lower volume level to reduce audio distortion.

There is a convenient front panel switch to mute all audio out of the BX1, enabling you to instantly mute all radios. You can even mute overnight, for example, and restore audio at your preset levels with the push of one switch. A large front panel LED indicates normal (green) or muted (red) operation.

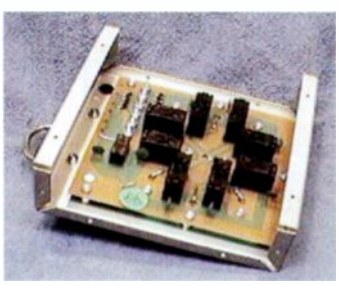
The BX1 is easy to use and operate – simply plug the speaker output from your gear into one of the BX1's inputs and plug your speaker into the BX1 speaker output.

The BX1 Scan A Mix is $129 plus shipping from B&D Enterprises at **http://www.bdenterprises.com** (PO Box 28362, San Jose, CA 95159; (408) 246-6231).

One Radio: Eight Antennas

Equipment flexibility in the radio shack is the fond desire of most hobbyists, and having the luxury of choosing between antennas optimized for particular HF bands can make a real difference in DXing. The Dunestar Model 808 8-position remote HF antenna selector is mounted at the antennas, which means the operator doesn't have to run a pipe full of coax through the wall of the shack.

The Model 808 uses sealed 12vdc relays and a diode matrix select system to control the 8-positions on a 6-wire control cable. The relays operate reliably down to 9vdc. Unused antenna positions are grounded. The enclosure is all aluminum (black over gray) for maximum durability. Mounting is by a single U-bolt for simplicity and ease of installation. Connectors are UHF-type. Power handling 3kW. Requires 12VDC nominal at 200-ma maximum.



The indoor Control box is a 9-position rotary switch (Off and eight antenna positions) with diode matrix housed in a black over gray aluminum enclosure.

Model 808 is $299 from Dunestar Systems, P.O. Box 37, St. Helens, OR 97051 U.S.A; 1-800-457-1690, orders; 1-503-397-2918, information; **http://www.QTH.com/dunestar**, email *dunestar@QTH.com*

The All Canadian Baby Boomer Quad

Like hundreds, if not thousands, of other hams, I participated in that annual jamboree of amateur radio fun called Field Day. Operating as VE3XR on 20 meters from a school bus parked in a field in Brampton, Ontario, I had the opportunity to try out a new Canadian-built antenna from Degen Designs.

The antenna is called the "Baby Boomer Quad," also nicknamed "BBQ." The BBQ is a triband (10, 15 and 20 meters), reduced size, quad antenna with a single 50 ohm coax feed point; it does not require an antenna tuner. Weighing less than 30 lb it is designed for rooftop mounting using light-duty rotors and can be assembled and erected by just one person. The BBQ can be taken apart and packed in a box measuring just 8 inches square and 8 feet long.

Talking together at Field Day, the designers of the BBQ – father and son team Erwin and Guenther Schweigl – told *MT* that the development of the antenna took four years of computer modeling and field trials to perfect. The BBQ is designed for low wind loading and high durability. The high quality of construction results in a hefty price tag of CDN$998, but the investment provides a high performance antenna suitable for discrete use in space-limited urban environments.

And the performance at Field Day 2002? VE3XR doubled the number of contacts over the previous year!

For more information go to **http://www.degendesigns.com**; send e-mail to info@degendesigns.com; write Degen Designs, c/o G. Schweigl, Bramalea, ON, Canada L6S 1S9; or call 905-790-1698 Eastern Standard Time.

Sadly, I learned that, only three weeks after Field Day 2002, Degen Designs founder, Erwin Schweigl VE3CVS, became a silent key. The business will be carried on by his son Guenther.

– Reviewed by John David Corby, VA3KOT

Rebels on the air: An alternative history of radio in America

by Jesse Walker

New York : New York University Press, 2001

ISBN: 0-8147-9381-9.

$24.95.

When radio broadcast licenses come up for renewal, there's usually some statement about "public airways" and "serving the public interest" and other phrases that foster the impression that the license-holders are stewards of the publicly owned airwaves.

That may be true, technically, but given the reality of American society, broadcasters are giving precious little back to the American public in return for the privilege of making a profit selling advertisements and programming mostly uninteresting music, talk or sports radio. The author of *Rebels on the Air* would say that in America the state has socialized the airwaves on behalf of big business. Additionally, there are non-profit broadcasters who "are essentially elitists transmitting experimental or radi-

What's NEW

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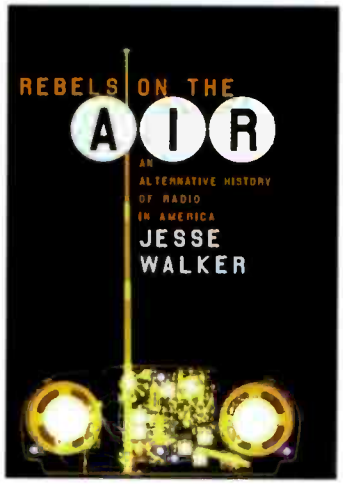


cal fare for limited audiences."

Both types of broadcasters have lobbied the U.S. government to assure that their monopolistic status remains intact. Both groups, whether commercial (Clear Channel B/C or Infinity B/C) or non commercial (NPR or PRI), have stood against innovations in radio broadcasting which would give us a "freer media landscape...one that would allow us greater freedom to choose, to create and to escape."

Walker wrote this book to show how and why those three liberties have been constrained and to describe those times and places where innovators have managed to break through those constraints and create genuinely diverse, expressive or immediate radio.

The story of early radio broadcasting is a fascinating one and well told. The evolution of government control of this new medium was not far behind its creation with the Radio Act of 1912, which was passed in response to the *Titanic* disaster. The Progressive Era was manifested by a partnership between "giant enterprises and giant government."

World War I saw government control of broadcasting grow, but even as "the hams were militarized...the military were invaded by hams." Many of these radio amateurs found employment with broadcasters, but the potential of having hundreds or thousands of diverse, entertaining and informative radio stations was never achieved because of corporate and government collusion to manipulate radio for maximum profit. Numerous examples of the corporate-regulatory axis are given where one technology is favored over another. Not often did the listening public benefit.

One alternative to mainstream radio is pirate radio on shortwave, but it is dismissed as being a "sub-subculture of clandestine broadcasters whose unlicensed programming ranges from counterculture comedy to neo-Nazi rants. But foreign shores and shortwave are ignored by most Americans."

The other alternative is "micro radio" whose history is recounted in a lively fashion in Chapter 9. There follows a chapter on the "FCC Wars" where we read of the struggle between the National Association of Broadcasters, satellite radio, micro radio and government regulators.

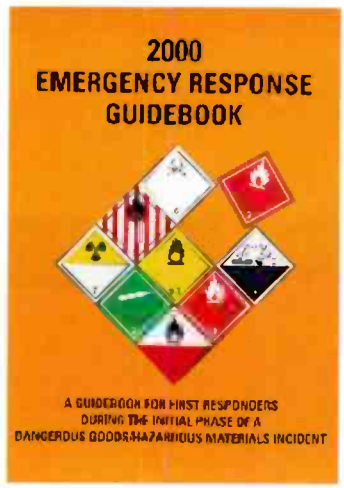
Finally, the author sketches the history of a radio medium, which for a short time, allowed the average citizen access to the airwaves – Citizen Band Radio. Its decline coincided with the rise of the Internet, with its anonymous chatrooms and easy access. Yet, the author concludes that the mass media will face its greatest challenge from the "flood of truly independent art, reporting and commentary of the cultural renaissance whose most exciting fare is the micro radio network."

Stay tuned.

– Reviewed by Martin Gallas, martin@csj.net

2000 Emergency Response Guidebook

John Mayson called our attention to a publication of interest to anyone involved in fire and rescue or other emergency response units. The *Emergency Response Guidebook* (ERG2000) was developed jointly by the US Department of Transportation, Transport Canada, and the Secretariat of Communications and Transportation of Mexico (SCT) for use by firefighters, police, and other emergency services personnel who may be the first to arrive at the scene of a transportation incident involving a hazardous material. It is primarily a guide to aid first responders in (1) quickly identifying the specific or generic classification of the material(s) involved in the incident, and (2) protecting themselves and the general public during this initial response phase of the incident. The current ERG is dated 2000 but it's updated every three years to accommodate new products and technology.



DOT's goal is to place one *ERG2000* in each emergency service vehicle, nationwide, through distribution to state and local public safety authorities. To date, more than seven million copies have been distributed without charge to the emergency responder community. Copies are made available free of charge to public emergency responders through the state coordinator (U.S. only) nearest you. In Canada, contact CANUTEC at 613-992-4624 or via Internet at *canutec@tc.gc.ca* for information. In Mexico, call SCT at 52-5-684-1275. Copies in English or Spanish are available commercially through the GPO Bookstores and other commercial vendors. You can also find the text on line in pdf format at http://hazmat.dot.gov/gydebook.htm

Radio Rumors

• ICF 2010. Is it, or isn't it? Discontinued, that is. Not even your dealer knows for sure...

A Grove customer detailed his inability to have his defective 2010 replaced; instead, he received a SW1000T (which he likes). Sony said there were none left in stock.

A reader says "a local store that sells these radios just received today a shipment of new ICF2010 radios."

An MT staff writer says he believes "Sony has one production run of the 2010 a year, solely to supply the US market."

MT editor Rachel Baughn contacted Rachel Branch at Sony who said "That is not a current model."

So is it, or isn't it? Better get 'em while you can...

• Readers should be aware that it is illegal for companies to take orders for or even to publish a price for new radios which have not yet been FCC type accepted (such as the new Uniden APCO compliant scanners). Customers are understandably confused when some dealers appear to be lagging behind the competition by not posting prices, but they're not being secretive: it's the law.

• From http://www.grove-ent.com/rodiorumors.html: A call to AOR reveals that the **AOR APCO P-25** will probably be available within a few months. It is primarily designed to fit the Motorola HT to make it APCO compatible. A unit for scanners may be produced later, but a closer follow-on will be one built into the new ARD5000.

The ARD5000 is expected to be in production by the first of next year and will be able to follow APCO-25 trunking. Another product, the long-awaited **JT2000 super receiver**, is now a working prototype; expect this to hit within the next few months. It is a truly incredible, cutting-edge receiver. No info yet on specifications or pricing

Books and equipment for announcement or review should be sent to " What's New?" c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to mteditor@grove-ent.com.

HERE'S WHAT OUR READERS ARE SAYING ABOUT *MT EXPRESS*:

"No doubt about it, the future is here! Sure nice to get the magazine so early, this has got to be the way! Thanks for a great job!"

- Charles (Chuck) Boehnke
Keaau, Hawaii

"You and the MT staff that put this project together have done a FANTASTIC job. You would seem to be the leaders in the field presenting material in this manner so it can be archived so easily. This is the way to receive a magazine."

- Don Nauer

INDEX OF ADVERTISERS

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What's New	Rachel Baughn	editor@monitoringtimes.com

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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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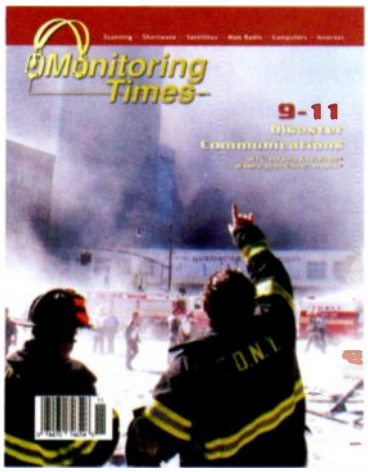

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Closing Comments

Is Hobby Radio Dying? Two Perspectives...

by Bob Grove

None of us wishes to think of a hobby in which we have invested time, money, and interest as obsolete, or even merely obsolescent. Clearly, the hobby electronic marketplace is somewhat lethargic; unquestionably, the general economy's impact on discretionary spending has much to do with this stagnation. But we've been through that before and survived; why not again?

To learn how *MT* readers feel about purchasing, we mailed a questionnaire to *MT* readers who had not recently made purchases from Grove Enterprises. Hundreds of replies came back, many of which are still being read. It was a very informative exercise.

One commentary in particular stood out since it revealed some fresh concerns that we have not previously addressed in any depth. Let's take a look at this well-considered response from reader Doug Matthews:

"Why isn't more purchasing done? There probably isn't one overall answer. I've asked a few friends and was told the following:

"A lot of radio transmissions have changed in the last few years. They've gone digital or to satellites; neither method is easy to monitor, some are even illegal.

"Good monitoring equipment has gone up in price. A couple hundred dollars used to buy top-of-the-line amateur/ hobby equipment, but now computers are needed, and good monitoring equipment and decoding suites cost well over a thousand dollars.

"The Internet is more interesting, and (apparently) endless. Cable and satellite TV offer hundreds of channels. And there are still only 24 hours in a day for doing everything.

"To summarize: More and more radio content gets less and less accessible and legal to monitor, and there is so much more competition for a person's free time. And so the hobby declines."

There are other perspectives on this issue. So far as rising expenses for good monitoring equipment, remember that the general cost of living has increased, and that a dollar buys less now than it did years ago. Even with that, the decades-old and revered Electra Bearcat BC300 cost over $300, yet can't begin to compare with the current Uniden BC-780XLT at far less cost. And for shortwave, try to find a price-comparable receiver back then that matches the current Icom R-75. Then there's the WiNRADiO offerings with all the remarkable advancements for your host computer.

We are at a point in the evolution of communications that we must accept the computer and the Internet as integral parts of our modern listening post. This isn't all bad news. While radio is susceptible to static, weak signal reception, propagational distortion, intermodulation, electrical interference, and other anomalies, the Internet brings an inexhaustible supply of broadcasting, talk radio, music, law enforcement rebroadcasts and more. And we haven't even touched on satellites.

Larry Van Horn, *MT*'s intrepid assistant editor, has more on the subject:

"I read with great interest Mr. Matthews' comments and, as much as I respect his viewpoints, I could not disagree with them more. I am starting to see a destructive trend, a fatalistic point of view emerging among radio hobbyists and the dealers as well.

"For a while it seemed like we all went into mourning, but it ain't dead yet, folks! Let me provide another perspective on the issues raised by the respondent:

"Some transmissions have, indeed, moved to satellite, but they have been rapidly replaced by other terrestrial services grabbing up that precious, vacated spectrum space. While many services, especially on shortwave, have gone digital, decoding software is coming on line as fast as these new digital modes pop up.

"In 30 years of exploring the spectrum, I have never found more to monitor than I do now. Some of the best monitoring I have done in years has been in the last 2-3 years, and I live in one of the most rural areas of the United States."

"This hobby is far from dying. As I finish up the new edition of the 'Grove Shortwave Directory' and the MT series 'Who's Who in the Spectrum,' it is quite clear to me that there is actually more to hear now than ever before. And the equipment is here as well – trunk tracking scanners, analog scanners to 2 GHz and beyond, satellite receivers for video, audio, ham, and weather images that we could only dream about a few short years ago.

"I can monitor police, fire, ambulances, aircraft, ships at sea, national railroads, taxi companies, oil companies, drug runners, drug interdiction, spy numbers stations, search and rescue, US military aircraft worldwide, even the infamous Al Queda terrorists in the Philippines.

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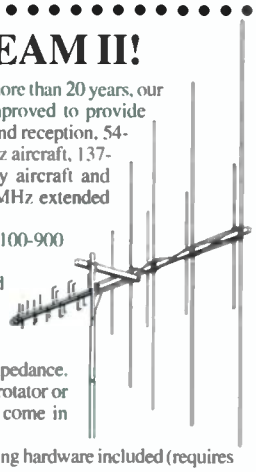

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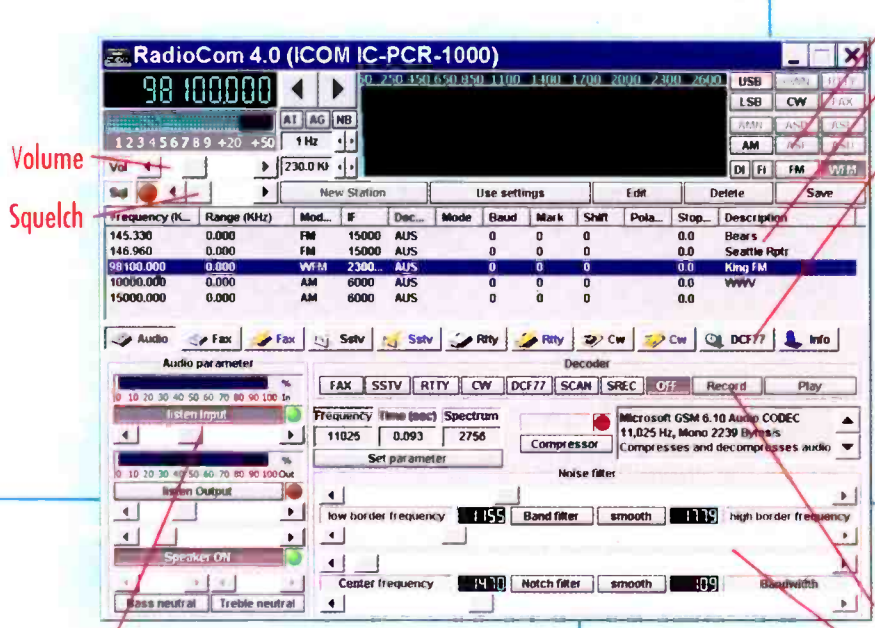

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