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

Monitoring Times

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Scanning the Gulf of Mexico

Also:

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Shortwave is back

(and this time you'll love it even more)

A Shock to the System

When Short Wave Magazine reviewed the WiNRADiO G303i receiver, they called it "a shock to the system". Other reviewers seem to agree. What is it that makes the WiNRADiO G303i receiver so special?

The WiNRADiO G303i is the first commercially available software-defined shortwave receiver. As the entire last IF stage and demodulator are performed in software running on a personal computer, this brings about significant improvement in performance and flexibility compared to conventional receivers - as well as extraordinary sensitivity, very low phase noise, and impressive spurious signal suppression.

And there is more: The software-defined radio concept makes the G303i exceptionally well prepared for new, exciting communication technologies, such as DRM broadcasting.

What's Included?

The receiver comes as a complete hardware/software package, which installs in minutes. Just plug in the PCI card, connect its output to your sound card using the provided cable, install the supplied software, and let the world's most innovative shortwave receiver surprise you with its performance and amazing new features.

The Hardware

This elegant PCI card represents a culmination of many years of our experience with PC-based radios, designed with maximum reliability and performance in mind. No adjustable parts have been used in the design. There are two high-performace DDS units, and thousands of ultra-miniature surface-mount components delivering a performance comparable to receivers costing many times more. A custom-made gold-plated SMA connector complements the picture of quality - and as you would expect from a WiNRADiO product, an SMA-to-BNC adapter is also supplied, for your convenience.

The Software

The G303i control panel features seven different methods to tune the receiver. There are additional features such as a real-time spectrum analyzer, three scanning options, a highly accurate S-meter displaying signal strength in user-selectable units, sweeping wide-band spectrum scope, powerful memory facilities, and many others.

The optional Professional Demodulator expands the receiver capabilities yet further, by introducing additional innovative features: continuous selectivity setting (1 Hz to 15 kHz in 1 Hz increments),

interactive demodulator diagrams with real-time audio spectrum scopes and vector voltmeters, built-in performance test facilities (it even lets you measure the receiver's own sensitivity), and many others.

Additional demodulators for various applications are progressively becoming available, including the DRM demodulator.

Reviews

The receiver has attracted numerous reviews in publications world-wide. Here are quotes from several:

On spurious signal rejection: "As far as I can remember I have never found any receiver, analogue or digital, which had such cleanliness, and the WR-G303i has set a new standard for others to emulate." *[Short Wave Magazine, SWM]*

On sensitivity: "...higher than necessary in a receiver of its type..." *[SWM]* • "Much of this sensitivity is contributed by the low phase noise of the oscillator, typically -148dBc/Hz @ 100 kHz. Clearly this radio meets or exceeds the competition head on..." • "In short, the performance is superb. The sensitivity and selectivity surpassed my expectation, and there was no sight of intermod even in the presence of strong stations at night time." *[Radio &Communications, R&C]*

On variable IF bandwidth: "... a very useful feature and allows you to exactly match the filter bandwidth to the incoming signal ... once experienced never to be forgotten." *[SWM]* • The experience of being able to finely tune selectivity to suit a particular signal you are listening to is truly incredible, especially if you have been used to having just a few fixed bandwidths on your old radio." *[R&C]*

The verdict: "If I had to choose between a Collins 95S-1 and the WR-G303i (ignoring the obvious fact that the 95S-1 tunes to 2 GHz), I would take the WR-G303." *[SWM]* • "This receiver is a gadget-owner's dream! But it isn't fantasy; for the first time in consumer technology, the shortwave listener can tailor his receiver to his own requirements, independent of factory-set parameters." *[MT]* • "The WiNRADiO WR-G303 receiver, in addition to being an excellent receiver on its own right, has a certain exciting feeling about it. Perhaps this is because of the promise of a change of an entire paradigm which makes a difference between just another run-of-the-mill product and a truly innovative cult product, sparking an entirely new following." *[R&C]*

Just when you thought that there is nothing in shortwave that can surprise you anymore, here comes the new WiNRADiO G303i. It *will* impress you. We guarantee it.

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For detailed information visit:

www.winradio.com

Monitoring Times

Vol. 22, No. 8 August 2003

Cover Story

Offshore Comms in the Gulf of Mexico

By Thomas Marcotte

What's so different about communications in the Gulf of Mexico as opposed to any other seacoast? How about the fact that 30,000 people are working on oil platforms offshore, and – as the author says – 30,000 people are hard to keep quiet! An additional anomaly is that their primary mode of transportation is by helicopter rather than by boat. About 300 helicopters make a daily trek into the Gulf, transporting crews and cargo. The flights off the shore of Louisiana are the focus of this article.

On our cover: Offshore oil platforms offer a home away from home for the crews.

C O N T E N T S

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Reviews:

This month *MT* hosts quite a mixture of reviews. Perhaps the most unique is a head-to-head comparison of two popular computer-hosted receivers, the **TenTec RX-3230** and the **WiNRADiO G303i**. Reviewer Lee Reynolds admits it's kind of comparing apples to oranges, but the exercise is quite enlightening nonetheless (p.84).

Unlike the boat anchors in this month's feature article, the **Grundig Classic 960** is old only in appearance. Released a few years ago for Grundig's 50th anniversary, the radio was reportedly improved in 2002. Ken Reitz revisits the radio to check it out (p.82).

Bob Parnass has been busy again: this time he has helped develop software for the Icom IC-R10 and IC-R5 receivers – **tk10 and tk5 cloning software** (p.78) will aid in programming various functions using your computer. John Catalano looks at several programs that aren't complicated but may make your life a little easier – **Print Screen Plus, HamCalc**, and **Ad-Aware 5.62** (p.80).

For those of you hooked on metal detecting or who think it's all bunk, the **Minelab Explorer II** will make a believer out of you like it did Jock Elliott. And, yes, it uses radio frequencies...28 of 'em plus their harmonics! (p.86)

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Monitoring and the Law

Jorge Rodriguez
jorgerodriguez@monitoringtimes.com

Cut the Power and the Coax: Navigating Florida's Scanner Law

If you're visiting Florida this summer as millions of Americas do each year, bring your sunscreen and your scanner, just leave the power cord and outside antennas at home. Because scanning radios are legal in Florida so long as they are not connected to external power or antennas, even in your car. That's the opinion of the Office of the Attorney General of the State which in 1974 was asked to interpret the law which has changed very little in almost thirty years.

The Florida statute which regulates such radios is FS § 843.16 which is listed under the obstruction of justice chapter of the title on crimes. It prohibits the installation of radios in motor vehicles and businesses, which can be used to listen to police or law enforcement officers. What is interesting about the law and its interpretation since 1974 is the fact that the radio must be installed in order to be illegal and installation requires an external power source and antenna.

So says Richard Prospect, Assistant Attorney General of Florida in his response to Melbourne Police Chief Robert Cotton when he was asked to provide an interpretation of the law. Prospect advises that "... my legal research reveals no specific judicial interpretation relative to the meaning of 'installation' as used in the statute.... I have reviewed many similar constructions of the word and perhaps that which is most applicable to this issue is the one given me by an engineer of seventeen years experience with the Federal Communications Commission. His technical assessment of radio installation would be one which requires the particular unit – whether receiver, transmitter, or transceiver – to be connected to a power source and have need of an external antenna capable of rendering the unit functional" (see Attorney General Opinion 74-369; otherwise cited as OAG 074-369).

Over the years this has come to mean that the radio must be connected to some external power source and an external antenna, something radios of the time required to work, but which modernday handhelds don't need.

What legal weight or value do opinions such as this carry? While they are not controlling, primary decisions of law, they do carry the weight of so-called secondary authority. That is legal authority which can be used to persuade a Court, but is not binding on the Court. The Office of the Attorney General's web site describes such opinions as "... legal advice [to the requestor of the information] on questions of statutory interpretation and [which] can provide guidance to public bodies as an alternative to costly litigation."

However, such opinions are not law. "They are advisory only and are not binding in a court of law. Attorney General Opinions are intended to address only questions of law, not questions of fact, mixed questions of fact and law, or questions of executive, legislative or administrative policy." Just like the information in this column, which is not legal advice, Attorney General Opinions are not a substitute for the advice and counsel of attorneys.

In 1989, Attorney General Robert Butterworth of Florida was again asked to interpret the statute at the request of Police Chief Peter Petracco of Boca Raton, Florida. At issue this time was a question about whether the Florida law prohibiting installed scanners in vehicles and businesses applied to radio and television stations. The "to the point" opinion of the Attorney General was that: "The installation [and remember in Florida installation means connected to external power and an external antenna] of a police band radio monitor in a business establishment or motor vehicle, except in emergency or crime watch vehicles or in a place established by federal, state, county or municipal government for governmental purposes, by a person other than a radio or television station [see Attorney General Opinion 60-31 and 89-44; otherwise cited as OAG 60-31 and OAG 89-44] or a holder of a valid amateur radio operator or station license issued by the Federal Communications Commission, violates [the Florida law].

As in other states, visitors and citizens should consider keeping a copy of these opinions and the Florida statute in their vehicle, along with any other relevant paperwork, such as your FCC license, media credentials, etc. if you have an installed radio. Don't expect the officer on the street to be aware of these nuances in the Florida law. And don't expect him or her to readily be able to tell the difference between a family radio service (FRS) two-way and a handheld scanner or other commercial two-way radio.

Finally, these laws apply to government action by government people. So in these times of heightened awareness and concerns about terrorism, be prepared for different rules at any of the many private tourist attractions in Florida – especially Walt Disney World in Orlando. Years ago, Disney security would tell guests they saw with two-way radios and scanners that the equipment was not allowed in the parks. Whether it was an official company policy or the position of the on-duty security person could never be determined. However, as private property Walt Disney World, Bush Gardens and the many other private tourist venues in Florida have a right to restrict who and what enters their property for the safety of all of their guests.

*The actual Language of the Florida Law can be found at: **http://www.flsenate.gov/Statutes** under the headings Title XLVI, Crimes Ch.775-896, Chapter 843, Obstructing Justice, Section 16.*

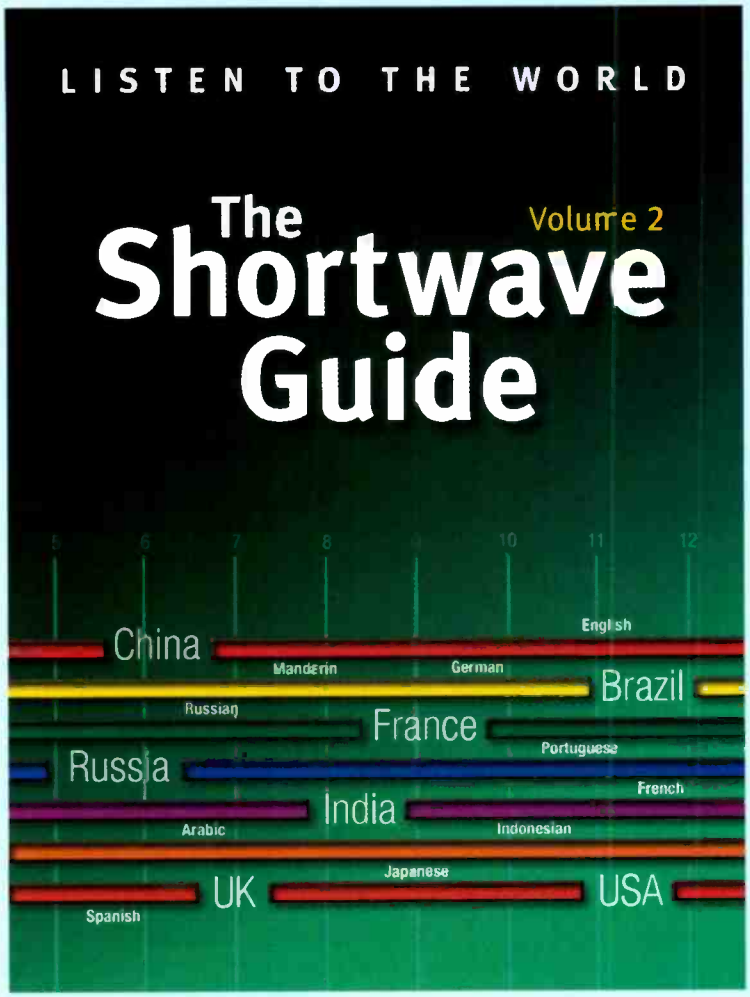
*The actual opinions of the Attorney General can be found at **http://myfloridalegal.com/opinions**.*

◆ Is that Old Frequency List Illegal?

This past June, *Monitoring Times* learned days before passage that a Nevada anti-terrorism law contained a provision concerning scanner monitoring. Assembly Bill AB441 was found to contain a provision which in times of emergency could have allowed the governor to declare certain information including radio frequency lists confidential and possession of such lists illegal.

Originally, AB441 could have made the publication, sale and possession of emergency response radio frequencies illegal if Nevada's Governor declared the information confidential because of a terrorist threat. Since such information is widely available, such a restriction was determined to be difficult, if not impossible, to enforce. Scanner hobbyists and the amateur radio community in Nevada flooded their elected state representatives in the days before passage with calls, letters, faxes and emails complaining about the provision and got the bill changed. (*See Closing Comments - ed.*)

The new edition of *The Shortwave Guide* published June 2003



224 pages of color bar graphs showing A03 and domestic frequencies (including tropical bands) by UTC and language, contact details for international broadcasters and other essential reference material

Find out more by visiting www.wrth.com

What they said about Volume 1 . . .

"The 02 edition of *The Shortwave Guide* is easy to use, most informative, and makes DXing much more rewarding." (Richard Pool, USA)

"This brand new volume is very easy to read and you can make quick reference for any and every shortwave frequency. *The Shortwave Guide* is outstanding and a very valuable addition to the current library of every DXer, shortwave listener and international radio monitor." (Adrian Michael Petersen, AWR Wavescan 400)

"The radio hobby needs more quality publications of this type." (Fred Osterman, Universal Radio)

"*The Shortwave Guide* is great, [and] compact for travel." (P Donegan, California)

"You must not have checked out the new *Shortwave Guide*, which shows 6105 at 1000-1400 . . ." (Glenn Hauser, DXLD)

"It was really a pleasure to check out *The Shortwave Guide*. Your language specifications are excellent." (Anker Petersen, DSWCI)

"I must say I am really impressed with your new book, I really love the coloured bar graph method of listing stations and frequencies." (M Stevenson, Australia)

"Thank you for publishing *The Shortwave Guide*. It is a dream come true!" (R Ochs, USA)

Get your copy now!

LETTERS TO THE EDITOR

TenTec RX-320 Feedback

"I have a TenTec RX-320 and enjoyed the article by Lee Reynolds in the June *MT* but would have enjoyed it even more if he had included the web sites for the noncommercial sites."

– *Paul Hampton*

Lee Reynolds explains he didn't include URLs for the noncommercial sites because he knew they tend to change frequently. Tom Lackamp, author of the SCAN320 software expresses his appreciation below to Lee for the article and also for not publishing his personal website, which has a bandwidth limit. (We recommend a Google search to find the program you're interested in downloading.)

"First of all, Sir, my hat's off to you. You're a fine, fine writer. Not only is your article terrific, your writing style is truly wonderful. Lively, vibrant writing. You prove that technical stuff doesn't have to be dry and boring.

"I really like your concept of reviewing both the hardware and software together. There have been lots of reviews of the RX-320, just mentioning the radio and the TenTec software. You're the first to acknowledge that the RX-320 has many faces, and explains how and why that is. You're the first to give your readership an idea of what radio/computer integration really means.*

"As a software author, I was delighted to see your side-by-side comparison of some of the packages. I get deeply into the details ('How should this particular button *really* work?') and never see the big picture. Reading your article gave me a real appreciation of how the other software authors approached the problems and opportunities presented by the RX-320 environment. Very interesting and educational.

"... PS - I'll give you some more perspective on the performance of the RX-320: I own three SW receivers: RX-320, an R8B, and a 7600G. The 7600G is my portable-only radio. I tuck it into my briefcase or my parka pocket, and listen to SWBC stations or planes flying over the Pacific. Wonderful little rig.

"My main radio is the RX-320/Scan320, which I use for chasing utes. That combination gives me the most "bang for the buck" for each listening hour.

"The R8B is my secondary receiver. I don't operate it from the computer, just from the front panel. I use it to tune in the occasional SWBC program, but mostly for long-term single channel monitoring of any particular ute frequency.

"So.... is the RX320 a better receiver than the R8B? Well, for program listening, definitely no. That synch detector and utterly superb audio turns weak SWBC broadcasts (such as Channel Africa on Saturday mornings) into armchair copy. But SWBC 'isn't my thing.' I'm a ute chaser, through and through. Is the RX-320 and Scan320 better than the R8B for chasing utes? You betcha!"

– *Tom Lackamp*

* Actually, John Catalano has been covering computer-based radios in MT since the mid-90s, but they are just now gaining wider acceptance - ed.

WCBS Correction and Scanning

"Just got the June Issue of *MT* and must comment on a few items in the issue.

1. Re: the restrictive *Monitoring Laws in NY*: I believe it after hearing on WCBS-880 AM, NYC, that the cops ticketed a pregnant woman for resting on the stairs in the subway. From what I've been hearing, NYC is a good place to stay away from unless you've got very deep pockets during Mayor Bloomberg's Ticket Blitz.

2. In the article on AM stations that carry various baseball teams games: If WCBS is on 660, what's the station calling itself WCBS on 880? I think the writer's cat messed with his table of stations.

*(Ken says it would be too tempting to blame it on the cat ... the lines were indeed garbled. New York **Mets** station **WFAN** is on 660 kHz, and New York **Yankees' WCBS** is on 880 kHz - ed.)*

3. Re: *Scanning Report*, Don't Abandon VHF & UHF...: There was an article in both the *Bangor Daily News* and the *Central Maine Morning Sentinel* that was developed out of a copy of a report done by a consulting firm for the State on its Public Safety Radio System. The upshot of the report was that it will cost Maine over $2mil. to replace the existing radio system, the bulk of the cost being new towers built or space on existing towers leased.

The report also said that going to the 800 MHz band would not be good for the state as we're too rural up here for it to work. The report also cited QRM from other states fouling up our system in the form of skip. (Note: The Maine State police in Scarborough shifted from 154.665 to 156.150 to get away from QRM coming from N.H.) Most local governments are not aware of the FCC mandated change and have set aside no monies for the changes in radios to occur.

4. Speaking of Local Government, My local PD is having a terrible time with the new State Mandated Regional dispatch as we are getting QRM from another agency on either our own freq. or one nearby that is causing calls to and from the base in Skowhegan to be cut off in mid word sometimes when this other agency keys up with its more powerful system (Note: Usually the county seat is where the regional dispatch in Maine is, usually thru the County Sheriff's office. It's supposed to save $$ you know.)

"Enjoy *MT* very much. Keep up the good work."

– *Don Hallenbeck, KME1CW, KAAK-0783*
Pittsfield, Maine

Skip Arey (aka Rev. Thomas Arey) was presented with The Humanitarian Award from The Chapel of Four Chaplains for his service as a chaplain at Ground Zero. An award that's well-deserved, we're sure. That can't have been easy duty!

Junk Shop Challenge

"My name is Bill Patalon, and I'm a long-time SWL and DX hobbyist who just this past February returned to the hobby in full-force after a hiatus caused by graduate school, a book deal, marriage and a new house (all of which were great, too, but I sorely missed my beloved hobby).

"The reason I'm writing is that I absolutely loved your May *Beginner's Corner* column, and have taken up your '$50 Junk Shop AM Challenge' in full-force. I've always enjoyed occasionally DXing with older equipment anyway, so this was a perfect challenge for me to meet. As a matter of fact, I had only recently picked up a DX-66 on Ebay for less than $15, adding it to a collection of other old multi-band jobs I like to use from time-to-time (the others being one of Zenith's solid-state Trans-Oceanic radios, another pristine Realistic DX portable and a Midland portable).

"I did just what you suggested, purchasing the Radio Shack AM Loop – and really lucked out: Apparently, they are discontinuing

it for an upgraded model (at least the one I picked up at the Bel Air, MD, Radio Shack store, where I am much-loved as a contributor to their corporate profits). I got it for just under $10. It works terrific, and I last week got to work DXing the AM band.

"*MT* is a great magazine. I use it so much that I've found that I need to make a photocopy of the SW schedules, or the magazine is dog-eared and nearly destroyed by the time the next issue comes out. I read everything, including the ads.

"I'm a journalist myself – a business writer for *The Baltimore Sun* – so I know good work when I see it. Columns such as the one you just did are terrific ideas because they spur interest and activity in this great hobby of ours. It's reader interaction at its best. I really cannot compliment you enough.

"I'll close this out by thanking you again for a fun 'assignment'; I hope to see *MT* doing more such work in the near future. And I look forward to hearing back from you, with the real hope I can be of service to you in reporting the results of your issued challenge."

– William (Bill) Patalon III

Power Line Pirates?

The Federal Communications Commission is always big news in the pirate radio world. But, right now there is unusually big news from the FCC. The Commission, which recently voted to allow a few giant media corporations to take over the licensed broadcasting stations in the United States, is not stopping its attack on the general public after that outrageous anti-American decision.

As David Crawford reports from Florida via DXplorer, the FCC now proposes to implement "Broadband over Power Line" technology in the United States. Crawford notes that this system would "couple high-frequency radio signals to parts of the power grid and use existing power lines as the transmission medium to deliver broadband and Internet services" to homes.

In an FCC "Notice of Inquiry," the FCC itself admits that this system would have a tremendous potential for interference to radio and television reception in the United States.

The complete FCC Notice of Inquiry in this matter can be viewed at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-100A1.doc. Individuals can make comments on this proposal via http://www.fcc.gov/cgb/ecfs/ on the internet. *(See also On the Ham Bands, p.72 - ed.)*

What do you think? Should the FCC allow the power companies and internet providers to go into the pirate radio business, producing interference to your own televisions and radios? There is currently very little coverage of this vitally important issue in the news media outside *Monitoring Times*, so the FCC needs to hear from you.

- George Zeller, Outer Limits

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

Controversial Media Ownership Rules

On June 2nd, the Federal Communications Commission voted on a revision to its broadcast ownership rules, but virtually no one seems happy with the results. Media moguls wanted more deregulation, small companies and consumer advocates wanted more regulation, and Congress wanted it both ways. Even the FCC isn't entirely happy, voting two against three along party lines.

According to the FCC report, the changes are not major, and are based on a newly-established "diversity index" which they hope will help prevent the rulings being overturned in court, as previous attempts to revise ownership rules have been. Most likely to face challenges both in Congress and in court is the national TV ownership cap, which was raised from 35 percent of a local market to 45 percent. In response to arguments that greater consolidation leads to less diversity and loss of local news, the FCC argued that the record shows that broadcast network owned-and-operated stations have a better record of local news production than do network affiliates.

The new rules retain the radio ownership limits at the current level, but change how it defines a local market. As to cross-ownership, the new rule allows no cross-ownership between TV, radio and newspapers in markets with three or fewer TV stations. There is some restriction on cross-ownership in areas with four to eight stations, but no restriction at all on cross-ownership in markets with nine or more TV stations.

The FCC concluded that in larger markets citizens have a variety of sources for news. "Moreover, the FCC found that greater participation by newspaper publishers in the television and radio business would improve the quality and quantity of news available to the public."

FCC Too Dependent

The FCC has an "incestuous" relationship with the industries it regulates, the Center for Public Integrity charged in a report released May 22nd. The center found "a disturbing dependence by the FCC on outsider information providers," the report said. "The agency should have the resources and the staff to collect its own information."

ARRL Joins Citizen Corps

The American Radio Relay League (ARRL) has been recognized as an official affiliate of President Bush's Citizen Corps initiative. Michael D. Brown, Under Secretary of Homeland Security for Emergency Preparedness and Response, announced the partnership at the ARRL National Conference June 21st. The agreement adds the ARRL as an affiliate to the four charter Citizen Corps programs: Neighborhood Watch, Volunteers in Police Service, Community Emergency Response Teams (CERT), and Medical Reserve Corps.

Under the direction of the Federal Emergency Management Agency (FEMA), which is part of the Department of Homeland Security, Citizen Corps is a community-based initiative to engage all citizens in homeland security and community and family preparedness through public education and outreach, training opportunities, and volunteer programs. Programs under the Citizen Corps umbrella include federally sponsored programs and other activities that share the goal of helping communities prevent, prepare for, and respond to all hazards.

Other Citizen Corps affiliate programs include the National Safety Council, Points of Light Foundation, National Voluntary Organizations Active in Disaster, National Volunteer Fire Council, National Fire Protection Association, Save A Life Foundation, and The U.S. Junior Chamber as Citizen Corps affiliate programs.

The ARRL's partnership will raise public awareness about the use of Amateur Radio as a public safety resource, provide training and accreditation for Amateur Radio Emergency Communications, as well as assist Citizen Corps Councils with public education, training and volunteer service opportunities that support first responders, disaster relief organizations, and community safety efforts.

Marine Voice Goes Silent

Reader Tom McKee reported that MariTEL Corporation discontinued voice service effective June 6. The company controls seven to nine 25 kHz channel pairs over much of the United States, and had planned to expand into a VHF public coast ship-to-shore voice communications network that relied on digital selective calling technology. However, with the proliferation of cellular, PCS and other wireless technologies, it now believes the maritime community will benefit more from its proposed data system.

Tom McKee says, "This company provides VHF marine communications along the Mississippi (and in many other areas of the country) through remotely operated stations." MariTEL has provided voice service for 30 years, but "predecessor station WJG in Memphis was in the marine voice communication business for more than 55 years, as I remember listening to them on high frequency AM in 1948."

MT asked Tom what towboats and other Mississippi traffic now use for voice communications. McKee said, "Watercom (**http://www.mobex.com/WCOM.htm**) based in Jeffersonville, IN, is probably the leading provider of telecom services for the towboats. They have a fully automated system for full-duplex voice and data through remote stations in the 216-220 MHz band. Coverage includes the Gulf Coast from FL to TX and up the Mississippi and Ohio rivers. I believe that this service is planning an upgrade to provide the fast data communications capability now desired by the boat operators. Of course, MariTEL is still in the marine data communications business, too.

"Satellite service (Qualcomm, Inmarsat, etc) is utilized by some of the towboat companies to get voice plus fast data. This is similar to the service utilized by some of the trucking companies.

"Some of the smaller towboat companies are still using the 4, 6, and 8 MHz marine utility channels for voice comms between the boats and company headquarters. Of course the VHF marine channels are the means for voice communications between boats and between boats and locks, etc.

"The move away from voice comms has been the result of the introduction of computers into the pilot house and the need for fast data communications to allow the PCs to connect to company headquarters and the Internet. There is much information on the internet about river conditions, lock delays, boat positions, etc. Some of the river chart books have been computerized on CD-ROM for display on PCs and the others are in-process.

"It's all a real improvement for the boat companies and pilots, but I sure do miss listening to the river traffic on HF as I used to do."

Doug Robertson of Oxnard, California, adds, "My newly added marine VHF with digital selective calling now has no radiotelephone service provider... Technical changes will only succeed if they are economically viable. The demise of MariTEL's service proves the adage."

Aug 9-10: Lexington, KY
Bluegrass ARC Hamfest and Computer Show and ARRL KY state convention at the Central Kentucky Technical College (Leestown Road), 8a.m-4p.m, admission $6. Exhibits, tailgating, VE testing, forums, refreshments. For more info Fernie Williams KE4MAI, PO Box 4411, Lexington, KY 40544-4411; 859-245-2140; hamfest@bluegrassars.org or visit http://www.bluegrassars.org

August 16th: Huntington, CA
SCADS Annual Picnic at the Huntington Central Park in Huntington Beach at Central Park Drive East at Edwards Street; starts at 7am and lasts to around 4pm PDST. Further information call 714-522-6434 or email billfishernow@netzero.net. Map at **http://groups.yahoo.com/group/scads**. Bring portable radios, antennas and accessories plus picnic food and cold drinks, and a Radio Friend!

August 16th: Madison WI
The 10th Annual Madison Get-together for DXers and Radio Enthusiasts will be held at the home of Bill and Nina Dvorak, beginning at 1 PM. Good fellowship and lots of DX talk in an informal atmosphere (last year drew 26 DXers). For more information, e-mail Bill Dvorak at dxerak@aol.com (please include "Madison DX GTG" in the subject line).

COMMUNICATIONS

Commercial Spectrum Enhancement Act

The U.S. House of Representatives voted to create a trust fund to help move spectrum from the government to the private sector. The measure will allow the government to sell to commercial users spectrum now used by federal agencies, and apply the proceeds toward the cost of moving those agencies to another piece of spectrum. The Commercial Spectrum Enhancement Act must be approved by the Senate and signed by the President before becoming law.

Under current law, a commercial venture must win a spectrum license at a Federal Communications Commission (FCC) auction and then negotiate with an affected federal agency for the price and timetable for the agency to move to another band. The new bill requires a cost estimate and timeframe for relocation to be established before the auction. The FCC then will auction the spectrum, but cannot close until the bidding equals at least 110 percent of the estimated relocation cost. The winning bidder's money will be placed in a trust fund and the relocating agency will draw from that fund.

Spectrum Management Study

Seems like the military and FCC just did this, but President Bush announced a new year-long study to improve the management of radio frequency spectrum to keep pace with the expanding technologies. The review, which will be directed by the Commerce Department, will likely focus on the 1755- to 1850 MHz band now held by the military. These frequencies are adjacent to those used by domestic wireless phone services and include frequencies that the World Radio Conference earmarked for next-generation wireless services. Public safety agencies are also interested in that spectrum.

NYC TV Still Struggling

A group of television broadcasters have signed an agreement to put at least 22 television antennas atop the 1,776-foot spire planned for the World Trade Center site. However, until completion of the WTC spire in 2008, the broadcasters have been using outdated backup equipment at the Empire State Building. The group had requested a temporary tower on Governor's Island, but the mayor did not support the plan. Another proposal to build a 2,000-foot tower in Bayonne, NJ, was put on hold after the FAA review said it would involve rerouting planes at three area airports.

The Anderson/Rudolph Connection

Steve Anderson of Pulaski County, Kentucky, pled guilty May 30th to federal weapons charges. Pulaski admitted in federal court that he illegally possessed a machine gun, carried and fired a gun during a crime of violence and possessed unregistered firearms, according to the U.S. Attorney's Office. Anderson faces at least 10 years in federal prison.

Eric Robert Rudolph, the prime suspect in

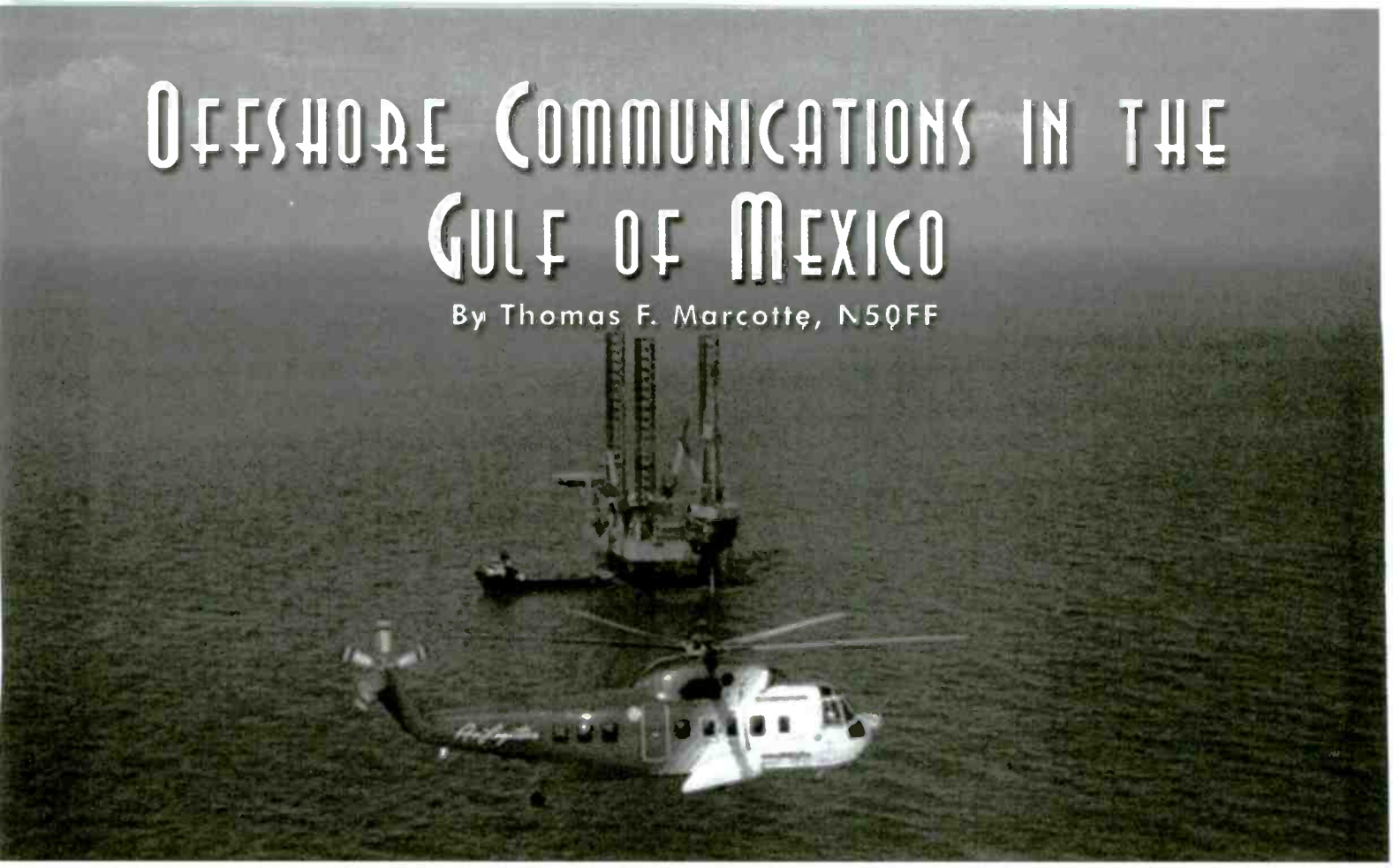
several fatal bombings, including the July 27, 1996, bombing at Atlanta's downtown Olympic Park, was arrested May 31st after five years evading authorities.

What do these men have in common besides their politics and making the news the same weekend? Not only were both on the FBI's "Most Wanted" list, they were both apprehended in Cherokee County, less than ten miles from *MT* headquarters at Brasstown, NC! Bob Grove captured the media frenzy in downtown Murphy on June 3rd.

"Communications" is compiled by Rachel Baughn, Editor, from newsclippings and email reports contributed by our readers. Many thanks to this month's reporters: Anonymous, Ballston Spa, NY; Bill Hochstatter, Colfax, WA; Doug Robertson, Oxnard, CA; Brian Rogers, Melvindale, MI; George Sala Sr, Manheim, PA; Sterling Marcher, La Mirada, CA; Cleve Svetlik, Pepper Pike, OH, and *W5YI Report*. And, via email: Time Ayris, Don Hallenbeck, Maryanne Kehoe, Nick Leggett, Rick Lindquist, Ed Muro, Jerry None, Mike Reynolds, Larry Van Horn, Edward Walsh, Chuck Yarbrough, Ed Yeary, and *Mobile Radio Technology*.

Offshore Communications in the Gulf of Mexico

By Thomas F. Marcotte, N5OFF



Did you know that at any given time there are up to 30,000 people working on oil platforms offshore in the Gulf of Mexico? How do all those people get around? Mainly, by helicopter – over 300 of them. This article will focus upon aircraft communications off the Louisiana coast.

Unlike in New York or Los Angeles, where helicopter transportation is a luxury, in the Gulf of Mexico it is a necessity. Although the ships are spartan compared to their executive brethren, the aircraft are equipped with the latest in communications and safety systems. You won't find a DVD player or bar built in, but you will find some sophisticated communications and flight tracking gear.

The week offshore for a typical worker starts with a drive to a shorebase near the beach, such as Venice, Fourchon, Leeville, Intracoastal City, Morgan City or Cameron in Louisiana, or Houston, Galveston or Corpus Christi in Texas. Bases are located near the beach because helicopter flight is very expensive, with flight over land being discouraged. The passengers and bags are weighed, and everyone loads up for their trip to work, sometimes up to 150 miles from shore. Empty seats on a helicopter are not uncommon due to the combined weight of men, bags, and fuel reserves. When the crew arrives offshore, they can expect all the comforts of home, including hearty meals, movies, exercise gear, and internet access.

The larger helicopters, such as the Sikorsky S-76 and S-61N, and the Bell 214 and 412, are based on land and fly out each day. However, some smaller helicopters, such as the Bell 206 series or BO-105, might sleep offshore for use as a "field ship," only going in to shore for a crew change or maintenance. Field ships generally have a mechanic or a multitalented pilot/mechanic available offshore to handle nightly maintenance and the requisite engine wash to remove salt spray. It can be a long day for a pilot if he is his own mechanic.

Aircraft Operators

Petroleum Helicopters (PHI) of Lafayette, LA, is the largest operator of contract helicopters. Other significant operators are Air Logistics, ERA, ChevronTexaco, Tex-Air, Evergreen and Rotorcraft Leasing. ChevronTexaco is a bit atypical as, unlike most oil companies which lease helicopters, it owns and operates its own aircraft fleet from a base at Picayune, Mississippi. The pilots are employees of the oil com-

pany instead of a helicopter company. ExxonMobil also operates some of the helicopters they use. Both companies mix in contract helicopters to smooth out the load.

There are also a fleet of fixed wing aircraft on the Gulf Coast which support the inland oil industry. ChevronTexaco operates one Cessna 206 floatplane as a helicopter parts and liaison hack. Southern Seaplane of Belle Chase operates a fleet of floatplanes, communicating with them on 151.895 MHz FM. Menhaden fishing companies use a gaggle of Cessnas offshore to spot fish, buzzing around the schools, not unlike cowboys around a herd of cattle.

Most helicopter pilots come with a military background. Some pilots also pull duty as military reserve pilots, so with their company and military training, their currency is top notch. No rookies here.

Naturally, the helicopters need to communicate with their owner's bases and with those of the customers. The customers are usually the oil producing firms, such as Shell, ExxonMobil, ChevronTexaco. Kerr McGee, and many other familiar oil companies. Other helicopter customers include government agencies such as the United States Coast Guard (USCG) and the Minerals Management Service (or MMS, a branch of the Department of Interior), Acadian Ambulance, and the occasional research organization (turtle watchers, eagle counters, etc.).

Most helicopter operators communicate with their bases for flight following on standard VHF/AM aircraft radios, typically in the 128.825-132.000 MHz band. Tex-Air uses VHF Hi band for this purpose, however, which is unusual. High Frequency (HF) radio is virtually nonexistent in civilian aircraft operation in the Gulf of Mexico (although quite common on supply and crew boats). The only instance the author witnessed of HF operation in a civilian owned aircraft was a PHI Bell 206L leased to the USCG (Coasties on routine business don't typically rate a rescue helo). It was equipped with a Sunair HF radio, fixed tuned to the usual USCG aircraft frequencies. It had a stinger antenna mounted in the baggage compartment pointing aft. PHI will equip helicopters for overseas use with HF radios, using the zig zag antennas seen on military helicopters, but these rarely see service in the Gulf of Mexico.

Oil Company Radio Equipment

The customers of the helicopters have their own radio systems for oilfield operations, and the helicopters are usually set up to communicate with these customers. Radios may be as simple as a Wulfsberg Electronics Flitefone 40 (six presets), all the way up to the more sophisticated Wulfsberg Flitecomm and Flexcomm system with two or three bands (fully programmable in each band). Systems can use either the C-962 or C-1000 control head. The top of the line system utilizes the sophisticated C-5000 control head.

Oil company frequencies are included in the frequency list below. Oil companies are granted a wide variety of licenses in several bands by the FCC, but to be sure, many of the frequencies are silent. The list below attempts to capture only active frequencies. Some of the frequencies are active with no apparent license listed by the FCC.

Operation in the VHF low band (33 MHz area) was once very common before the prevalence of offshore telephone service. Twenty years ago oil companies needed to be able to call in to shore offices directly by radio, and thus needed the utility of the longer range 33 MHz band. Radio techs did not care for the frequencies in the 33 MHz range because, as was told to the author, "you could talk to California on your lunchbox radio, but you couldn't talk three miles." The antennas are quite large and more difficult to install than those for higher frequencies.

These days only the 48-49 MHz frequencies remain in widespread use in the low band due to skip nuisance on the lower frequencies. Devon uses 49.04 MHz as its main frequency in Intracoastal City, LA, and it is active every day with a strong signal component to the north. This might make a good frequency to monitor for six meter band openings from Louisiana. Another good six meter marker is the Merit frequency of 49.3 MHz. Most companies use simplex mode; however, Newfield uses VHF repeaters in the VHF band.

Flitefone 40s (RT-19 transceiver) with remarkably small rod antennas are typical for helicopter low band work. As with most services, things are moving up (in frequency). Companies operate VHF Hi band (with the RT-15 transceiver) and UHF (RT-16B transceiver) within the Wulfsberg Flitephone 40 range.

ChevronTexaco uses an array of UHF/FM repeaters on several different frequencies to cover its offshore operation. Distant fields share a group of frequencies, separated by different digital private line codes (DPLs), so that each offshore field hears only its own traffic. Helicopters are equipped with Wulfsberg Electronics Flexcomm C-5000 controllers and RT-406F UHF and RT-138(F) VHF fully programmable radios. The company is licensed on many frequencies in both bands, and uses the VHF side to talk to vessels on marine channels when necessary.

These airborne radios are limited to ten watts of power and transmission below 5280 feet of altitude by FCC regulation (Title 47 of the Code of Federal Regulations, part 90.423). From an altitude of 1000 feet the expected range is about 40-50 miles or so, considering that the antenna on the offshore platform will typically be from 70 to 120 feet above the water. The author has never known a pilot to be aware of the altitude restriction on FM transmission (there is usually enough to worry about already). To

be sure, from altitude on a busy FM frequency, it seems like the whole world is coming in.

Oil companies use gain antennas on the platforms pointed north to enhance communications with helicopters and shore stations. Likewise, shore bases have directional antennas pointed south. Older offshore platforms that have seen various project operations and mergers come and go are littered with abandoned gain antennas and hardline for just about every available band. There is no shortage of antennas to hook into for temporary ham or monitoring operation on the older platforms. Radio equipment is often abandoned in place when band changes are made. It costs more to fly out to retrieve the radios than the radios are worth, so they are often left to collect dust for years.

Some oil companies also operate VHF/AM stations offshore to complement their company FM systems. This allows the USCG, Minerals Management Service, Acadian Ambulance, pipeline company or other agency to call them ahead of time to arrange deck space to land (or more importantly, lunch). Nearly all VHF/AM licenses (with a few exceptions) are held by Aeronautical Radio, Inc (ARINC), but are operated by either the helicopter company or the oil company. The frequency table below identifies the actual user of each frequency. Some frequencies are virtually exclusive to the listed operation, while on others the occasional airliner can be heard calling a distant base up to 450 miles away. Marine VHF/FM radios are also common on the platforms to enable the crew to talk with marine vessels and the USCG if the need arises.

Flight Planning

Communications on the listed frequencies are pretty business-like. Helicopter company pilots typically file their flight plans with their own radio operators using a standard format. The format includes origin, destination, ETA, souls on board, and remaining fuel. Calls such as "beach out" or "beach in" (i.e. crossing the beach, similar to the Navy's "feet wet" or "feet dry") are common. Each helicopter company has a unique transponder code or "squawk" so that the FAA or Customs Service can at any given time verify how many ships that company has up. (Funny how transponders get polled over a hundred miles from land! AWACS? Customs?) When the ship arrives at the destination the pilot will (hopefully) close the flight plan. If he does not close the plan, a search is initiated, by telephone first. Many a red-faced pilot has gotten that offshore phone call of admonishment for not closing his flight plan. D'oohhhh!

In the past, radio operators were staged at strategic locations offshore to take, relay and close flight plans for pilots. PHI once had an HF radio operator network on frequencies 4550 kHz and 8070 kHz USB for the purpose of forwarding flight plans when a ship would transition from one sector of the Gulf to another. Radios were fixed tuned and used a simple fiberglass whip and tuner. This HF network has since gone silent. The advent of multiple telephone lines available offshore (including computer networks and internet access) have allowed these operators to be increasingly centralized. Radio operators look after multiple transceiver sites on offshore platforms via remote control stations. They can monitor and transmit on these sites from the comfort of an inland office.

Most companies ground their ships by 30 minutes before sunset, allowing enough time for a late day search and rescue (SAR) if necessary. Night flights are made when necessary, but are not encouraged. Most operations fall under visual flight rules (VFR); however, instrument flight rule (IFR) flight is available with the larger ships. The FAA has remote transmitter sites offshore for calls to flight service stations and to the Houston Center air route traffic control center.

Offshore Louisiana Aircraft Frequencies

Thomas Marcotte N5OFF

MHz	User
37.900	S. Cameron Hospital, Air Med and USCG use.
48.720	Columbia Gulf Pipeline 110.9 PL
48.800	Trunkline Gas Pipeline
48.820	Texas Eastern Pipeline
49.040	Devon
49.300	Merit PL 192.8
118.675	Seaplane Chit Chat
120.350	Houston Center ARTCC Remote, Offshore Vermilion
122.250	Deridder FSS Remote Offshore Eugene Island 309
122.600	Deridder FSS Remote Offshore Vermilion 245
122.700	Shell, Phillips, Vastar
122.725	Chevron Texaco enroute, bases and platforms
122.825	Fourchon Flight Plans
122.850	Common Advisory, Intracoastal City
123.025	Chevron Texaco Chit Chat
123.050	Comm. Advisory, Morgan City, Cameron, Industrial-Scott
123.075	Chevron Texaco, Leeville
123.400	Chit Chat
123.450	Chit Chat The Numbers
128.850	Common Advisory, Fourchon, Leeville, Intracoastal City
128.975	Rotorcraft Leasing, Venice (also NW Airlines, Memphis)
129.100	PHI Base, Lafayette, Houma, Galveston
129.150	PHI Base, Intracoastal City
129.425	PHI Enroute, Rockport
129.575	ERA Enroute
129.650	Industrial Helicopters, Boses
129.700	Air Log Enroute, Houma
129.800	Rotorcraft Leasing, Sabine Pass
129.825	Exxon Mobil
129.850	Air Log Enroute, Corpus Christi
129.875	Air Log Enroute, Sabine Pass
129.950	PHI, Cameron
129.975	ERA, Venice
130.125	Exxon Mobil
130.150	Fish Spotters (fixed wing)
130.225	PHI Enroute, Cameron
130.300	Air Log, Amelia, Galveston
130.325	PHI Enroute, Morgan City
130.400	ERA Enroute, Houma, Morgan City
130.550	Shell Tension Leg Platforms (also Air Mexico)
130.650	Fish Spotters (Cessna fixed wings)
130.675	PHI Enroute, Intracoastal
130.750	Evergreen
130.825	Air Log Enroute (also Continental Ramp, Houston)
130.850	Air Log Enroute
130.875	Air Log Enroute
130.925	ERA, Enroute
131.025	Rotorcraft Leasing, Intracoastal City
131.050	Air Log Bases
131.150	PHI Enroute, Ship Shoal
131.300	Air Log Enroute, Cameron
131.400	Terrebone General Hospital, Houma
131.525	Fish Spotters (Cessna fixed wings)
131.575	ERA Bases
131.725	El Paso Energy
131.875	Shell Ops, Houston
151.520	Tex-Air Flt Plans (for Devon and Forest Oil) PL 79.7
151.895	Southern Seaplane, Belle Chase PL 103.5
152.285	Apache DPL 032
153.2825	Noble/Samedan PL 82.5
153.320	El Paso Energy PL 82.5
153.515	Newfield (repeater out) PL 118.8
153.560	Forest Oil PL 91.5
153.635	Dominion PL 156.7
155.220	Acadian Ambulance Air Med (PHI) PL 186.2
155.280	Acadian Ambulance Air Med (PHI) PL 186.2
155.295	Acodian Ambulance Air Med (PHI) PL 186.2
155.340	Acadian Ambulance Air Med (PHI) to Hospitals
156.425	Anadarko Helos to boats, Marine CH 68
157.050	USCG Ch 21A, Primary Radio Guard
158.160	Newfield (rpt in) PL 118.8
158.280	Pogo PL 136.5
158.295	Anadarko Petroleum PL 203.5
158.370	Exxon Mobil PL 107.2
159.555	Stone Petroleum PL 100
166.375	Air Log for US Dept of Interior, MMS, no PL
173.250	Ocean Energy PL 82.5 (purchased by Devon)
173.300	Kerr McGee PL 146.2
381.800	USCG Secondary Camms
451.350	Chevron Texaco rpt out
451.950	Chevron Texaco rpt out
451.975	Chevron Texaco rpt out
452.000	Chevron Texaco rpt out
452.025	Chevron Texaco rpt out
453.000	Chevron Texaco rpt out
456.800	Chevron Texaco Talk Around

Every helicopter flying over water is equipped with inflatable floats, which the pilot will arm below an airspeed of about 50-60 knots. If power is lost, an autorotation to the water is made, and the floats are inflated, keeping the ship floating upright (theoretically) until help arrives. Each ship has at least one raft and an emergency locator transmitter. Every person wears a Mae West vest at all times while flying over water.

ChevronTexaco uses a satellite based tracking system linked to GPS which displays the current location of each aircraft on computer monitors at its bases. This is a great feature if a search needs to be initiated, and eases the flight tracking workload. Hardware is engineered by OuterLink Corporation of Concord, MA, and includes for each helicopter a satellite transceiver, a cockpit display, and two flat antennas. The system is capable of polling aircraft every ten seconds. The system acquires the aircraft data, relays it to OuterLink, which then transmits it to the internet for customer use.

Fun with Airband Radios

As in most aircraft operations, pilots often have their "special" channels where they go to discuss things such as weather, beer call, company management, and job openings at other companies. Common frequencies 123.400 and 123.450 MHz carry 90 percent of this banter, but anywhere between 122.700 and 123.575 MHz can be fair game for "unofficial business."

The author once flew with a pilot who used a "channel two" of 135.775 MHz to speak with his buddies. Not exactly a compliant allocation for air to air chat. Surely Houston Center did not appreciate the extra traffic. A frequency card once noted in a civilian aircraft included the AM frequencies 140.100, 149.850, and 151.900 MHz! Communications were never heard here by the author, but obviously these frequencies are a bit unusual, being above the civilian airband limit of 136.975 MHz. The Collins VHF-20B and some versions of the Bendix King KTR-908, both common helicopter radios, will go to a high frequency of 151.975 MHz AM. Perhaps this excursion was an honest mistake. It is not uncommon for a high flying jet to call down to the Gulf pilots they once worked with just to check in and say hi. These high flyers blanket the whole Gulf with their chatter.

Pirate FM transmissions from fishing boats are common in the two meter ham band (147.400 MHz) as well as in the VHF high business band. Pilots can't resist messing with the pirates on their company FM radios, attempting to match the foreign tongues of the fishermen.

The offshore industry is a busy place with lots of monitoring opportunities. With this many aircraft moving so many people daily, there is always something interesting to hear. If you are ever on the Gulf coast or cruising, tune in. You won't be disappointed. Thirty thousand people are hard to keep quiet.

Links for more info:

Air Logistics	http://www.olog.com
Petroleum Helicopters	http://www.phihelico.com
Wulfsberg Electronics	http://www.wulfsberg.com
ERA Aviation	http://www.era-aviation.com
OuterLink	http://www.outerlink.com

End Notes:

Thomas Marcotte is a registered professional mechanical engineer, extra class amateur, and a fixed wing pilot. He has worked as an engineer in the offshore industry for 22 years.

All photos are courtesy of Air Logistics.

Parade of the Boat Anchors
Part 2 - Medium and High-Priced Receivers

By Marc Ellis

Welcome to Part 2 of this "Parade of the Boat Anchors." For those who may not know, the term "Boat Anchor," or "BA," is often applied to heavy old communications equipment and other antique tube gear. You may hear it used either derisively or affectionately, depending on the interests of the person speaking. I'm one of those who respond to the allure of these weighty communications artifacts and thought it would be fun to review, for "*MT*" readers, some of the vintage ham and SWL receivers commonly found at hamfests and antique radio meets.

Part 1 of this article (July 2003 issue) concentrated on simpler, originally low-priced, "starter" sets. Most of those covered were manufactured during the period from the late 1930s to the late 1940s, with a few more recent exceptions. Much of the commonly-found vintage communications gear was produced during this period. Here in Part 2 we'll discuss some of the medium- and high-priced receivers, and a few more of the lower-priced sets, produced during generally the same time period. They are arranged roughly in chronological order of release.

Once again, I want to thank Curator Ed Gable of the Antique Wireless Association Museum for giving me the opportunity to supplement the examples from my own collection with photographs of gear from the museum holdings. You'll find more information on the museum in the sidebar accompanying this article.

Before moving into the time period of interest, I can't resist beginning Part 2 with two earlier, and relatively rare, sets that have become icons in the radio collecting community: The Pilot Super Wasp and the National SW-3.

PILOT A.C. SUPER WASP

General: Introduced in 1929 as a kit, this set was immensely popular with shortwave radio fans. Even the onset of the Depression failed to depress sales significantly, since the hobby of SWLing could be enjoyed at home, at no cost beyond the initial investment in the receiver. Thousands were shipped all over the world. The radio could be purchased in a battery-operated version or one designed to be powered by a separate a.c. supply (available as an accessory). A cabinet was not included, but one could be purchased in the aftermarket. *Tuning range*: 600 kHz - 20 MHz in five bands (utilizing five pairs of supplied plug-in coils). *Dimensions*: 18"w X 7 1/2"h X 9 1/2"d. Brown silk-screened wood grain panel. *Original prices:* $29.50 for battery version; $34.50 for a.c. version; $16.50 for a.c. power pack.

Circuitry: One r.f. stage; regenerative detector; two stages of audio; separate speaker (not supplied). *Tube Complement*: **battery version** 22 r.f. amplifier; 01-A detector; 01-A first audio; 01-A audio output **a.c. version** 24 r.f. amplifier; 27 detector; 27 first audio; 27 audio output.

NATIONAL SW-3

General: The SW-3 made its debut in 1932 as a less-expensive version of the earlier SW-5. More attuned to Depression-era budgets, it was minus the SWL's push-pull final audio stage. (The numeral in the model numbers refers to the number of tubes.) Because of its high-quality construction and optional ham-band bandspread coils, the SW-3 was a great favorite among the amateur radio fraternity. It was in production for fifteen years with occasional tube complement upgrades. This engaging little radio operated from batteries or a separate a.c. power pack. It has become a symbol of the golden age of ham radio and is much sought after by collectors today. *Tuning ranges*: various between 100 kHz - 30 MHz depending on selections made from the 13 sets of optional general coverage coils. Bandspread coils also available for the 10, 20, 40, 80, and 160-meter ham bands. *Dimensions*: 9 3/4"w X 7"h X 9"d. Black crackle finish. *Original prices:* $20.85 less tubes and coil sets; $26.50 for a.c. power pack.

Circuitry: One r.f. stage; regenerative detector; one stage of audio; headphone operation only. *Original Tube complement*: **for battery operation** 36 r.f. amplifier; 36 detector; 37 audio output **for a.c. or a.c./battery operation** 35 r.f. amplifier; 35 detector; 27 audio output.

NATIONAL HRO-5TH

General: The fabulous National HRO, a marvel of mechanical and electronic design, was first introduced in 1935. It remained in production (with many upgrades and variants) until 1964, when production ceased on the HRO-60. All used plug-in coil bandswitching and the remarkable "PW" micrometer dial

which, with its associated gearbox, read out 180 degrees of variable capacitor rotation on a scale that was effectively 12-feet long. The radio pictured, an HRO-5TH, is a style manufactured during World War II – but very similar in appearance to all models produced from 1935 to 1947. *Tuning Ranges:* dependent on the choices made from the many available coil drawers. The standard set of four (A through D) covered the range of 1.7 - 30 MHz between them. *Dimensions:* 17 1/4"w X 9"h X 12"d. Original Prices: $168.00 when introduced in 1935; $300.00 range in 1947.

Circuitry: Features and tube lineup varied over the years. Model illustrated has two r.f. stages; two i.f. stages; separate mixer and local oscillator; crystal filter; combined detector and AVC stage; first audio amplifier; noise limiter; audio output stage; CW oscillator; "S" meter. Requires separate power supply and speaker.

HALLICRAFTERS SX-25 "SUPER DEFIANT"

General: The SX-25 appeared in 1940 and belongs in the same series as the less-expensive S-20R covered in Part 1 of this article. One other radio in the series, the SX-24 "Skyrider Defiant," was priced between these two sets. However, the SX-25 offered so much more for just a modest increase in price that it seems to have eclipsed the SX-24. I've seen many "25s" on the tables at radio meets, but am not sure I've ever seen a "24." *Tuning range*: 540 kHz - 42 MHz in four bands. *Dimensions*: 19 1/2"w X 9 1/2"h X 9 1/8"d. Grey wrinkle finish. *Original price:* $95.00 less speaker.

Circuitry: Transformer-powered superhet. Two r.f. stages; two i.f. stages; push-pull audio output; bandspread; "s" meter; crystal filter; BFO; noise-limiter; speaker separate. *Tube complement:* 6SK7 (2) 1st and 2nd r.f. amplifiers; 6K8 oscillator/mixer; 6SK7 (2) 1st and 2nd i.f. amplifier; 6SQ7 detector/AVC/1st audio; 6H6 noise limiter; 6SQ7 phase inverter; 6J5 BFO; 6F6 (2) audio output; 80 rectifier.

HALLICRAFTERS SX-28 "SUPER SKYRIDER"

General: This 1941 offering was the next step up from the SX-25 just discussed. It was quite a radio indeed. Hallicrafters authority Max de Henseler writes that the SX-28 "...set a new high in standards of performance for communications receivers." At the time of release it was Hallicrafters' top of the line. The SX-28A, a version enhanced for the military, appeared in 1944. *Tuning range*: 540 kHz - 42 MHz in six bands. *Dimensions*: 20 1/2"w X 10"h X 14 3/4"d. Black wrinkle finish; most models had a black mock-leather front panel. *Original price:* $159.50 less speaker.

Circuitry: Transformer-powered superhet. Two r.f. stages; two i.f. stages; push-pull audio output; bandspread; "s" meter. crystal filter; BFO; noise-limiter; speaker separate. *Tube complement:* 6SK7 (2) 1st and 2nd r.f. amplifiers; 6SA7 mixer; 6SA7 oscillator; 6L7 1st i.f. amplifier/noise limiter; 6SK7 2nd i.f. amplifier; 6B8 detector/s-meter amp., 6B8 AVC amp.; 6SK7 noise amp.; 6H6 noise rectifier; 6J5 BFO; 6SC7 first audio; 6V6 (2) audio output; 5Z3 rectifier.

RADIO MANUFACTURING ENGINEERS RME-43

General: I've had to resort to an advertising photo to include an example by this smaller, but definitely quite active, communications receiver manufacturer. The RME 43 appeared in 1941 along with its sister set, the RME-41, which was identical except for omission of the crystal filter and "S" meter. As you can see, this company's product styling was quite distinctive and unique. Also unique was its use of Loktal tubes, not generally seen in communications receivers. *Tuning range*: 540 kHz - 33 MHz in six bands. *Dimensions*: 22"w X 12"h X 11"d. Grey wrinkle and black finish. *Original price*. $110.00 less speaker.

Circuitry: Transformer-powered superhet. One r.f. stage; two i.f. stages; bandspread; "s" meter; crystal filter; BFO; noise-limiter; speaker separate. *Tube complement:* 7B7 r.f. amplifier; 7J7 oscillator/ mixer; 7B7 (2) 1st and 2nd i.f. amplifier; 7B6 detector/BFO; 7C7 first audio; 7A6 limiter/AVC; 7C5 audio output; 80 rectifier.

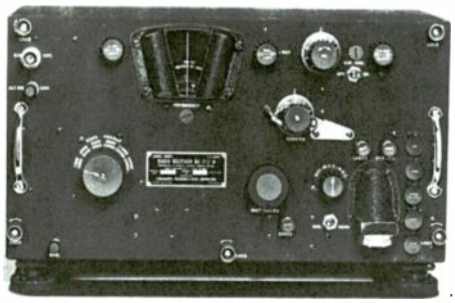
MILITARY BC-348

General: The BC-348 was used for radio beacon reception and long-range communications on bombers and other heavy military aircraft during World War II. The model pictured is actually a BC-224, which is identical in appearance to the BC-348 and very similar electrically, but not quite as common. After the war, this quality general-coverage receiver became available as surplus at modest prices. Though the sets were dynamotor-powered from the aircraft's 14- or 28-volt d.c. system, construction and installation of an a.c. power supply was a relatively simple matter. Soon thousands of these radios found their way into ham and SWL radio shacks. *Tuning range*: 200 kHz - 500 kHz and 1.5 kHz - 18 MHz in five additional bands. *Dimensions*: 18"w X 9 1/2"h X 10 1/2"d. Black crackle finish. *Original surplus price:* Vicinity of $50.00.

Circuitry: Dynamotor-powered superhet. Two r.f stages; three i.f. stages; crystal filter; BFO; speaker separate. *Tube complement (except for J, N and Q models)*: 6K7 (2) 1st and 2nd r.f. amplifiers; 6J7 mixer; 6C5 oscillator; 6K7 1st i.f. amplifier; 6F7 (pentode section) 2nd i.f. amplifier; 6B8 (pentode section) 3rd i.f. amplifier; 6F7 (triode section) BFO; 6B8 (diode section) detector; 41 (audio output). *Tube complement (J, N and Q models)*: 6SK7 (2) 1st and 2nd r.f. amplifiers; 6SA7 oscillator/mixer; 6SK7 (2) 1st and 2nd i.f. amplifier; 6SJ7 3rd i.f. amplifier; 6SR7 detector/AVC/BFO; 6K6 audio output.

MILITARY BC-312 and BC-342

General: The BC-312 (dynamotor powered) and BC-342 (same set, but a.c. powered) were also World War II military sets. The photo is from a technical manual. In contrast to the BC-348 aircraft receivers, these sets were used in fixed and mobile ground stations. Electrically similar to the BC-348, the '312 and '342 lacked the weight constraints of an aircraft radio and were more massive in construction. With no need for aircraft beacon reception, they also lacked the '348's low-frequency band. The BC-312/342 was a bit less common on the postwar military surplus market than the BC-348, but nevertheless became widely used by hams and SWLs. *Tuning range*: 1.5 kHz - 18 MHz in six bands. *Dimensions*: 18"w X 10 7/8"h X 9"d. Black crackle finish. *Original surplus price:* vicinity of $60.00.



Circuitry: Dynamotor-powered (BC-312) or transformer-powered (BC-342) superhet. Two r.f stages; two i.f. stages; crystal filter (some models); BFO; speaker separate. *Tube complement*: 6K7 (2) 1st and 2nd r.f. amplifiers; 6L7 mixer; 6C5 oscillator; 6K7 (2)1st and 2nd i.f. amplifiers; 6C5 BFO; 6R7 detector/1st audio; 6F6 (audio output).

NATIONAL NC-46

General: This early postwar National set appeared in 1946 and was sold against Hallicrafters' more sleek Loewy-restyled S-40 (see Part 1). The photo is from a National ad. Priced slightly higher than the S-40, it had an appealing no-nonsense traditional appearance but wasn't quite competitive electronically. It had no r.f. stage where the S-40 had one and was an a.c.-d.c. design where the S-40 was transformer powered. However, audio enthusiasts might have been drawn to the '46's push-pull output. While the S-40 had a built-in speaker, the NC-46 had a separate speaker sold as an accessory. *Tuning range*: 540 kHz - 30 MHz in four bands. *Dimensions*: 17 3/8"w X 9 7/16"h X 12 3/8"d. Two-tone grey crackle cabinet with grey front panel. *Original price:* $98.00.

Circuitry: A.c.-d.c. superhet (no power transformer). No r.f. stage; two i.f. stages; push-pull audio output; bandspread; BFO; noise limiter; speaker separate. Tube complement: 6K8 oscillator/mixer; 6SG7 (2) 1st and 2nd i.f. amplifiers; 6H6 detector/limiter; 6SF7 AVC amplifier; 6SJ7 BFO; 6SC7 phase inverter; 25L6 (2) audio output; 25Z5 rectifier.

NATIONAL NC-57

General: Released in 1947, just a year after the NC46, this set was a potent competitor for the Hallicrafters S-40. While hardly in the Loewy cosmetic design class, the NC-57 has a postwar styling that breaks with tradition. It's also transformer-powered and has an r.f. stage, a voltage-regulated oscillator, and an extra band extending its tuning range to cover six meters. Speaker is built-in. *Tuning range*: 540 kHz - 54 MHz in five bands. *Dimensions*: 16 1/2"w X 11 3/4"h X 8 3/4"d. Grey hammertone finish. *Original price:* $90.00.

Circuitry: Transformer-powered superhet. One r.f. stage; two i.f. stages; voltage-regulated oscillator; bandspread; BFO; noise-limiter; built-in speaker. *Tube complement:* 6SG7 r.f. amplifier; 6SBY7 oscillator/mixer; 6SG7 (2) 1st and 2nd i.f. amplifiers; 6H6 detector/AVC/limiter; 6SN7 1st audio/BFO; 6V6 audio output; VR150 voltage regulator; 5Y3 rectifier.

HAMMARLUND HQ-129X

This is one of the two receivers introduced by Hammarlund just after the war. (The other was the SPC-400-X, an update of the justifiably famous "ultimate" radio, the "Super Pro".) Released in 1946, the HQ-129X was a redo of the pre-war HQ-120. Of all the well-known radio manufacturers, this company seems to have been least interested in giving its products an exuberant postwar look. Except for some nominal changes such as a two-tone grey paint job to replace the original black and the addition of a one-piece bezel for the dials and s-meter, the '129X is virtually a twin, cosmetically, of the '120. The HQ-129X was very well received by the amateur community, where it was known as a "hot" performer. Very many were sold, as evidenced by the frequent appearance of this set at hamfests and antique radio swap meets. *Tuning range*: 540 kHz - 31 MHz in six bands. *Dimensions*: 20"w X 11"h X 13 1/2"d. Two-tone grey finish. *Original price:* $129.00 (This initial promotional price was quite a bargain; the radio eventually sold for over $180.00).

Circuitry: Transformer-powered superhet. One r.f. stage; three i.f. stages; voltage-regulated oscillator; bandspread; "s"-meter; crystal filter; BFO; noise-limiter; speaker separate. *Tube complement:* 6SS7 r.f. amplifier; 6K8 oscillator/mixer; 6SS7 (3) 1st, 2nd and 3rd i.f. amplifiers; 6H6 detector/noise limiter; 6SN7 1st audio/S-meter amplifier; 6SJ7 BFO; 6V6 audio output; OC3 voltage regulator; 5U4 rectifier.

COLLINS 75-A

General: Once again I'm resorting to an advertising photo to show you a radio I couldn't easily get my hands on. The 75-A was definitely too important not to be included in this listing. When introduced in 1947, this ham-bands-only receiver was greeted with tremendous excitement. Its permeability-tuned vfo provided remarkable stability. With the associated slide-rule dial mechanism, frequency readout could be made with unprecedented accuracy. Thanks to the double-conversion front end, image response was negligible, even on the highest frequency bands. *Tuning Ranges:* 3.2 - 4.2 MHz; 6.8 - 7.8 MHz; 14 - 15 MHz; 20.8 - 21.8 MHz; 26 - 28 MHz; 28 - 30 MHz. *Dimensions:* 21"w X 12 1/4"h X 14"d. Grey crackle finish. *Original Price*: $375.00.

Circuitry: Transformer-powered superhet, ham bands only. Double conversion. One r.f. stage; two mixers; three i.f. stages; bandspread; "S" meter; crystal filter; BFO; noise-limiter; speaker separate. *Tube complement:* 6AK5 r.f. amplifier; 6SA7 1st mixer; 6SK7 1st i.f. amplifier; 6L7 2nd mixer; 6AK5 crystal oscillator; 6SG7 (2) 2nd and 3rd i.f. amplifiers; 6H6 detector/limiter; 6SJ7 BFO; 6SJ7 1st audio; 6V6 audio output; 6SJ7 VFO, 5Y3 rectifier.

NATIONAL HRO-60

General: This 1952 release is the last of the tube-type HROs and embodies the final refinements on the original HRO design. (Please see notes for the HRO-5TH for more information.) Though the transistorized HRO-500 and HRO-600 sets followed, these were bandswitching receivers (no plug-in coil drawers) and represented entirely new design concepts. Although I'm pleased to say that I do have a '60 in my personal collection, I chickened out on dragging the 80-pound behemoth from its storage spot so I could photograph it. Instead, I'm showing this excellent National Co. advertising photo. Like the pioneering Collins 75-A, the HRO-60 has permeability tuned circuits and double conversion (in this case for band above 7MHz only). *Tuning Ranges:* see notes on HRO-5TH. Dimensions: 19 3/4"w X 10 1/8"h X 16"d. Grey enamel finish. Original Price: $483.50. Became $745.00 by 1961.

Circuitry: Transformer-powered superhet. Double conversion above 7 MHz. One r.f. stage; three i.f. stages; bandspread; "S" meter; crystal filter; crystal calibrator; BFO; noise-limiter; push-pull audio output; speaker separate. Tube complement: 6BA6 (2) 1st and 2nd r.f. amplifiers; 6BE6 (2) 1st and 2nd freq. converters; 6C4 hf oscillator; 6SG7 (3) 1st, 2nd and 3rd i.f. amplifiers; 6H6 detector/AVC; 6H6 noise limiter; 6SN7 S-meter amp/phase inverter; 6SJ7 first audio; 6V6 (2) audio output; 6SJ7 BFO osc.; OB-2 voltage regulator; 4H-4C current regulator; 5V4 rectifier.

HAMMARLUND HQ-110

General: Introduced in 1957, this is one of those Hammarlund sets with a front-panel clock/timer. By now, miniature tubes had all but taken over and many amateur communication receivers were equipped for single sideband reception. The HQ-110 also has a built-in Q-multiplier to provide variable selectivity. This is a ham-bands only rig like the Collins 75-A and has double conversion above 7 MHz. *Tuning Ranges:* 1.8 - 2 MHz; 3.5 - 4 MHz; 7 - 7.3 MHz; 14 - 14.4 MHz; 21 - 21.6 MHz; 28 - 30 MHz; 50 - 54 MHz. *Dimensions:* 16"w X 9.5"h X 9"d. Two-tone grey finish. *Original Price:* $229.00.

Circuitry: Transformer-powered superhet, ham bands only, SSB reception. One r.f. stage; double conversion above 7 MHz with i.f.s at 3045 and 455 kHz; bandspread; s-meter; Q-multiplier filter; crystal calibrator; BFO; noise limiter; speaker separate. *Tube complement:* 6BZ6 r.f. amplifier; 6BE6 1st mixer; 6C4 hf oscillator; 6BE6 2nd mixer; 12AX7 Q-multiplier 1st audio; 6BA6 1st i.f.; 6AZ8 2nd i.f./bfo; 6BJ7 detector/limiter/avc; 6BZ6 Xtal cal osc; 6AQ5 audio output; 0B2 voltage regulator; 5U4 rectifier.

LAFAYETTE KT200

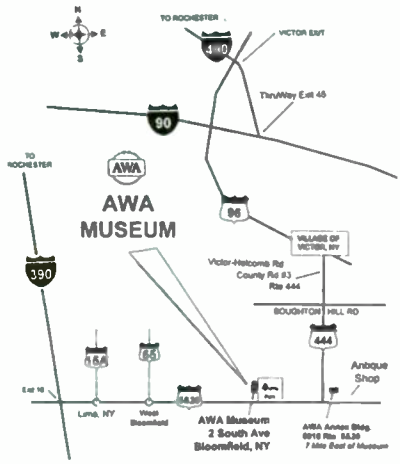
General: For no good reason except that it fits here in the chronology, we'll close with this interesting little Lafayette kit-built set of 1959. Looks like a Hallicrafters S-38 on steroids, doesn't it? The radio was also sold assembled as the HE-10. AM and CW reception only (no SSB). Made in Japan. *Tuning Range:* 550 kHz - 31 MHz in four bands. *Dimensions:* 15 1/2"w X 8 1/4"h X 12"d. Grey finish. *Original Price:* $65.00 kit form. $80.00 assembled (as the HE-10).

Circuitry: Transformer-powered superhet. One r.f. stage; two i.f. stages; bandspread; S-meter; BFO; noise-limiter; speaker separate. *Tube complement:* 6BD6 r.f. amplifier; 6BE6 oscillator/mixer; 6BD6 (2) 1st and 2nd i.f. amplifiers; 6AV6 detector/AVC/1st audio; 6AV6 BFO/limiter; 6AR5 audio output; 5Y3 rectifier.

History Face-to-Face

If you're interested in vintage communications receivers or almost any other aspect of the history of wireless, radio and television, you'll enjoy a visit to the A.W.A. Electronic Communication museum in Bloomfield, N.Y. The free museum, located in the beautiful Finger Lakes region, was founded by the Antique Wireless Association, Inc. It contains one of the largest collections of early communications apparatus assembled at one location.

The museum is open Sundays from 2 - 5 p.m. during May through September and also Saturdays from 2 to 4 p.m. during June through August. To arrange group tours or for more information, contact Ed Gable, Curator, at (585) 392-3088; k2mp@eznet.net; or 187 Lighthouse Rd., Hilton, NY 14468. You can also pay an electronic visit to the museum at the Antique Wireless Association web site: **http://www.antiquewireless.org**



References for Part 1 and Part 2

Shortwave Receivers Past and Present—Communication Receivers 1942-1997 by Fred Osterman, third edition. Published 1998 by Universal Radio Research, Reynoldsburg, Ohio

Communications Receivers—The Vacuum Tube Era 1932-1981 by Raymond S. Moore, fourth edition. Published 1997 by RSM Communications, La Belle, Florida.

The Hallicrafters Story 1933-1975 by Max De Henseler. Published 1991 by Antique Radio Club of America.

"A Brief History of The National Company, Inc." by John J. Nagle, *AWA Review*, Volume 1. Published 1986 by Antique Wireless Association, Holcomb, NY.

The Incident Command System

By John Mayson

"Engine 14 on scene establishing IC at 14:32."

Many scanner listeners have heard something similar to the above response. Some have investigated the acronym "IC" and learned it stands for "incident command." The name sounds very straightforward and intuitive. In our case, engine 14 is establishing an incident command at 2:32 PM. What else is there to know?

Federal, state, and local agencies define the Incident Command System (ICS) as the model tool for command, control, and coordination of a response. It provides a means to coordinate the efforts of individual agencies as they work toward the common goal of stabilizing the incident and protecting life, property, and the environment.

Okay. What does this mean in the real world?

History

During the late 1960s and early 1970s, California experienced several very large wildfires. These fires brought together fire departments large and small from across the state and even other states. Emergency managers faced a number of problems. Too many people were reporting to a single person. Different organizations had different command structures. There was inadequate communication between agencies.

Photo credit Gorry W. Watts

Lines of authority were unclear. There was no common terminology and objectives were unclear or unspecified.

The California Department of Forestry cooperated with local, state, and federal agencies and formed FIRESCOPE (Firefighting Resources of California Organized for Potential Emergencies). Early in the processes four essential requirements became clear:

- The system must be organizationally flexible to meet the needs of any incident regardless of size.
- Agencies must be able to use the system on a day-to-day basis for routine situations as well as for major emergencies.
- The system must standardize to allow various agencies from diverse geographies to integrate into a common management structure.
- The system must be cost effective.

The years of planning and testing finally paid off for California and the rest of the nation when the Incident Command System structure was finally established. Every local, state, and national emergency response organization in the United States and Canada – whether it's law enforcement, fire response, HAZMAT, or medical – follows ICS.

Why use ICS?

It prevents chaos. It's not hard to imagine the confusion that would erupt if ICS did not exist. Picture a large-scale event such as a wildfire. One would expect at a minimum the US Forest Service, state forestry department, various city and county fire departments, EMS departments, and local, state, and federal law enforcement to be present. What if their respective battalion chiefs, supervisors, medical directors, and officers all decided to do their own thing?

This brings us to reason number two for using ICS: it prevents individualism. Egos get checked at the door. One person, the incident commander (IC), is in charge. The entire incident is managed from the command post (CP) located a safe distance from the incident. ICS also prevents injury and further damage by assuring responders are not needlessly exposed to danger and that the situation is resolved as quickly as possible.

Don't think for a minute that ICS is only for large-scale events. Literally every emergency situation involves ICS. This accomplishes several things. Responders get used to working in the ICS structure when they have to use it even for the most routine calls. Since ICS is scalable, it should be more or less transparent to the responder whether he's part of a minor call or major disaster.

Secondly, small incidents have a nasty habit of becoming large incidents. It would be too difficult to decide on the spot when an incident has gotten out of hand and when it's time to switch to ICS. Also, by using ICS at all times, when small incidents become big ones the structure is already in place.

An easy way to think of ICS is thinking of children's building blocks. A block can stand alone, but, when the time comes, it can be connected to a larger block. It becomes part of the larger structure while still retaining its fit, form and function.

The Incident Commander

The person in charge of everything is the incident commander. Typically, the IC is the first person to respond to a call. When multiple people show up, the most senior crew member usually assumes the role of IC. As the incident grows or as more experienced people arrive on

Photo credit Garry W. Watts

the scene the actual person in charge could continue to change, but the roles and responsibilities of the IC never change.

The first thing the IC does is assume command. Ideally, the command post (CP) will be located at a safe distance from, but with an unobstructed view of the incident. Other factors in placing a CP are wind, flow, and slope. The CP must be upwind, upriver, and uphill from an incident. There's no point in setting up a command post if the fire, chlorine gas cloud, or acid spill are going to move in.

The most important responsibility of an IC is ensuring responder safety. Safety of emergency workers has always been the number one priority. But it's sometimes hard to reign in responders, since they enter the emergency services to satisfy their desire to help people. At no time has this been more apparent than in lower Manhattan on September 11, 2001. FDNY lost 343 firefighters that day. This does not include the number of NYPD, PANYNJPD, and other personnel who responded to the call.

The IC has to make sure that personnel don't just rush into a scene to rescue people. They will take the time to size up the situation, don appropriate personal-protective equipment (PPE), refer to their guidebooks, and plan their response. Managers will tell their people that if a victim is screaming at least they have an airway. Protect the responder first.

The second responsibility is assessing incident priorities. The four priorities in order of importance are: protect human life and health, protect the environment, minimize property damage, and promote prompt recovery. When these priorities conflict the higher priority always wins.

The third responsibility is determining the operational objectives. What is the ultimate objective of the responders? Put out the fire? Clean up the oil spill? In small incidents the answer is simple. In larger ones it's not so clear nor so easy to make. Remember the above priorities. If an IC has a choice during a raging wildfire to save an upscale neighborhood that's been evacuated or save the habitat of an endangered bird, guess what will win? The objective becomes saving the habitat.

Finally, the IC must activate the plan and assure it's executed as efficiently as possible.

Photo credit Garry W. Watts

The ICS Structure

An incident commander cannot act alone. Never will you see a single fire fighter drive up, rescue the people, bandage them up, connect the hoses, put out the fire, clean everything up, then drive the wounded to the hospital. It takes a team to respond successfully to an incident and the IC is only one part of that team. ICS has five major components and they are: Command, Operations, Logistics, Planning, and Finance. Before we move on, let's briefly describe each function.

Command we covered above: It's the incident commander. Reporting in to the IC are the remaining four functions.

Operations. This is the largest group and is the one actually doing the physical work. Operations people fight the fires, revive the victims, and clean up the spills.

Planning. This group looks at the big picture. They balance the size of the incident with the available resources and determine the best way to contain and control the incident.

Logistics. This important group assures that the tools required by operations are where they need to be when they need to be there. This means adequate water to fight the fires, food and drink for the responders, bulldozers, airdrops, or whatever is needed.

Finance. Only the largest of incidents will have a finance team. Fire fighters and paramedics do not need special permission to use the equipment in their trucks. The water, bandages, and saline bags have all been paid for. If an IC suddenly decides he needs fifty more bulldozers to cut a fire line or a 727 to bring in more people from out-of-state, he'll have to work with his finance team. Generally the head of finance will have unlimited access to a high level person such as a governor and can get approval very quickly.

During small routine events these roles will not be as clearly defined. Generally the IC will have command responsibilities. Another person may act as head of operations and planning, for example, leading the firefighters (operations) while making decisions as to how to attack the structure fire (planning).

Span of Control

The IC will have only one person from each function reporting directly to her. One human being can only do so much. One person can only take input and give leadership to so many people. ICS states that a person may only have between one and five subordinates. Sometimes this is called the "one-hand rule." Never directly supervise more people than you have fingers on one hand.

Photo credit Adam Alberti

The Big Picture

There is a small exception to the "one-hand rule" organizational chart. In extremely large incidents the IC might also have safety, information, and liaison personnel. The safety officer is responsible for assuring that operations, planning, and logistics are operating safely. During a real incident the safety officer acts as a buffer between the IC and the other functions, helping maintain some semblance of the "one-hand rule." An information officer will keep the media informed and get the word out to the public about warnings, evacuations, and such. The liaison officer helps manage the wide array of agencies that must work as one team.

In Closing

Hopefully we have demystified the Incident Command System. This system is used for every emergency call, large or small. Over thirty years ago California saw the need for ICS and developed a system used by all agencies across the United States and Canada. I applaud our nation's emergency services workers who make this system work and keep us all safe.

Table: Web resources

New York State Emergency Management Office
http://www.nysemo.state.ny.us/ICS/explain.htm

ICS for Amateur Radio ARES and RACES teams
http://www.w0ipl.com/ECom/ics.htm

ICS Information
http://www.911dispatch.com/ics/ics_main.html

California's Firescope
http://firescope.oes.ca.gov/

Mobile Satellite Service in the Gulf

By Dan Veeneman

The recent conflicts in Afghanistan and Iraq made extensive use of satellite technology for a variety of mobile users. Modern, portable transceivers allowed journalists to provide live, on-the-spot television coverage of military activity as it happened. The same satellites used by the media were also pressed into service by the armed forces of the United States, and have radically altered the way modern war is waged.

Satellites 101

Much of the data used by civilians and military forces in the Persian Gulf region travels over satellite. Almost all of these "radio relays in the sky" are parked in geostationary orbit, their orbital speed equal to the earth's rotation. The effect is that the satellite appears to remain stationary above a fixed spot on the earth. These geostationary satellites, or "Geos," are assigned to an orbital slot high above the equator. These slots are referenced by their distance in degrees from the prime meridian that runs through Greenwich Observatory in England. This standard of measurement may also be familiar to you as *longitude*.

For instance, the digital television broadcast service DirecTV has several satellites in geostationary orbit over the United States. Its primary orbital slot is at 101 degrees West, which is a line of longitude that runs through West Texas, Oklahoma, Kansas, Nebraska and the Dakotas. This central location allows the satellite good coverage of the continental United States.

XM Radio, the new satellite-based radio music service, has two satellites in orbit. One, nicknamed "Rock," is at 85 degrees West longitude, placing it on a line that runs from Florida up through Michigan. The other satellite, "Roll," is at 115 degrees West, which is a line running through southeast California, Nevada, Idaho and Montana. These two positions provide good eastern and western U.S. coverage, with some overlap in the Great Plains.

Knowing the orbital location of a satellite and the latitude and longitude of your own location will allow you to compute a *look angle* – the direction (*azimuth*) and height above the horizon (*elevation*) your antenna will need to look to "see" the satellite.

Satellite service can be broadly divided into two types: fixed and mobile. Fixed satellite service uses large directional antennas at permanent installations to provide relatively high capacity voice and data services. Look angles do not change during operation and interruptions in service are infrequent.

Mobile satellite service, on the other hand, uses compact antennas to achieve portability but sacrifices capacity. These units must operate in a variety of environmental circumstances, varying look angles, and potential blockage. Interrupts in service can be frequent and often unpredictable. Despite these challenges, the need for satellite connectivity by mobile users has created a specialized market for such service.

Persian Gulf Satellites

In the Persian Gulf region there are three major commercial satellite systems providing voice and data services to mobile civilian and military customers.

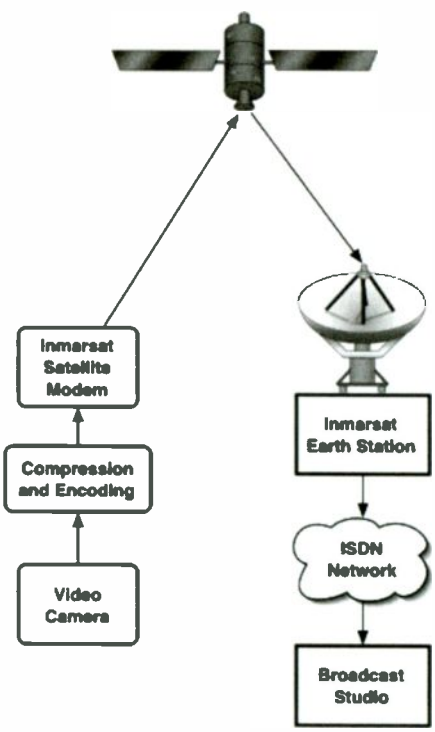
Inmarsat

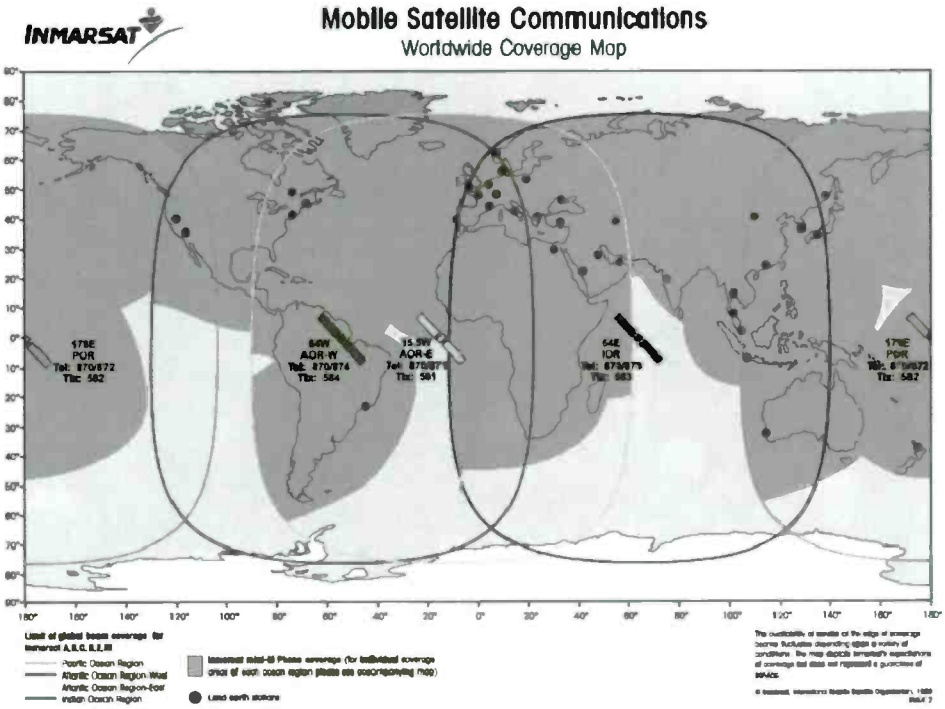
Inmarsat was formed more than 20 years ago as the International Maritime Satellite Organization to provide communications services to ships at sea. This London-based company currently operates five geostationary Inmarsat-3 satellites, along with four older Inmarsat-2 spacecraft used as backup. Being a maritime organization, Inmarsat satellites are in orbital slots designed to provide overlapping coverage for the world's oceans. The coverage area (called the "footprint") of the main ("global") beams from these satellites are wide enough to reach a significant amount of land area as well.

A call originated from an Inmarsat phone (they refer to them as "terminals") goes up to the satellite overhead and then back down to a land earth station (LES). The earth station, also known as a *gateway*, connects the call to the public telephone network.

Two satellites cover the Atlantic Ocean, one at 54 degrees West and another closer to Europe at 15.5 degrees West. These satellites are referred to as AOR-West and AOR-East, respectively, where AOR means Atlantic Ocean Region. A Pacific Ocean Region (POR) spacecraft sits at 178 degrees East, very close to the International Date Line, providing transpacific service.

Of interest for activities in the Persian Gulf is the Indian Ocean Region (IOR) satellite at 64.5 degrees East. This spacecraft covers most of the Asian, African and European continents. In addition, in March of this year Inmarsat pressed one of their backup satellites into service as IOR-West to provide additional capac-





ity in the Middle East.

The primary service utilized by journalists "embedded" with military units is Inmarsat's Global Area Network (GAN) Mobile ISDN service.[1] ISDN stands for Integrated Services Digital Network, which is an international standard for telephony services. The Mobile ISDN service provides a 64-kilobit per second data circuit between a portable, battery-powered satellite terminal and a ground-based network. This is enough to transmit live video from any location that has a unobstructed look angle to the satellite.

However, the link isn't exactly broadcast quality, as television viewers can attest. The video often appears "jerky" because of a slow camera frame rate and side effects of the compression mechanism. Conversations are a bit awkward as well because of the delay from *time-of-flight* – the time it takes for a radio signal to travel up to the satellite and back down. There are also processing delays, especially from the compression and decompression mechanisms used to maximize the link.

Journalists these days travel with 15-pound satellite videophones the size of a briefcase that cost in the ballpark of $20,000. By comparison, during the first Gulf War in 1991 these video setups were "luggable" units that weighed sixty pounds, required commercial electric power or a generator and cost $100,000. Future generations of equipment will be even lighter than today and cost a tenth as much.

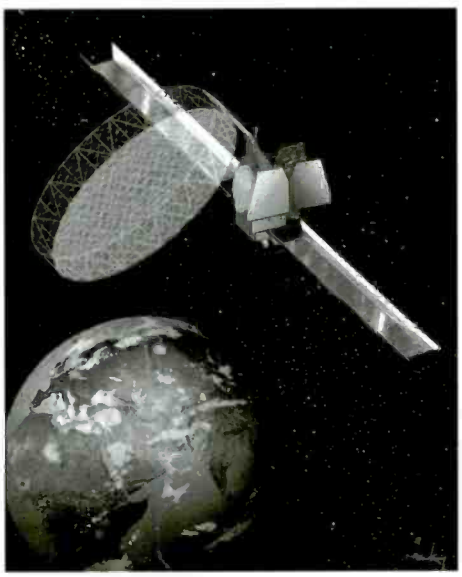
From a service perspective, video delivery runs about $5 a minute and a less-demanding voice call is under $2 a minute.

Inmarsat is already familiar to hobbyists that monitor satellite transmissions. Besides digital traffic, the satellites carry analog telephone and fax calls under a service called "Inmarsat A." Using a receiver that covers 1535 to 1543.5 MHz and the appropriate antenna and preamplifier, hobbyists are able to hear traffic on the 339 voice channels.[2]

Thuraya

One of the newest satellites in the Persian Gulf is Thuraya, a high power spacecraft designed to process more than 12,000 simultaneous telephone calls from small, handheld terminals. Designed, built and launched by Boeing, Thuraya's footprint covers most of Europe, much of Africa and Asia, and the entire Middle East from its geostationary orbital slot at 44 degrees east. Thuraya is owned by a consortium of Arab companies and is headquartered in the United Arab Emirates, with the primary earth station gateway in the city of Sharjah.

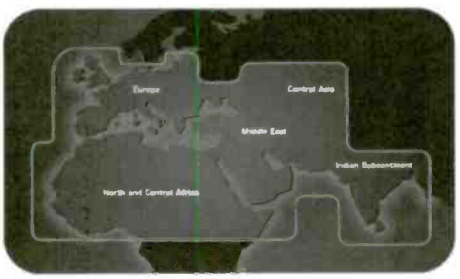
In contrast to the large footprint of Inmarsat beams, Thuraya has more than 200 small "spot" beams that cover a relatively small area. These individual beams allow the spacecraft to reuse its assigned L-band frequencies in much the same way a terrestrial cellular telephone system reuses 800 MHz and 1.9 GHz frequencies.



Thuraya phones transmit up to the satellite between 1626.5 and 1660.5 MHz and receive from the satellite between 1525.0 to 1559.0 MHz.

Some journalists used their Thuraya phone with a data jack to deliver video back to the home office. Although the data rate is lower over Thuraya than Inmarsat, a connection can be maintained while moving. This allows large files to be sent as a "drip feed," where a minute of video might take half an hour to be transferred.

Thuraya phones are dual-mode, meaning they can be used in terrestrial GSM systems as well as through the Thuraya satellite. When in satellite mode the phones also use and transmit position and timing information to the gateway from a built-in GPS (Global Positioning System) receiver. During the height of the war in Iraq the U.S. military banned the use of Thuraya phones in areas where combat was possible, citing the risk of transmitting sensitive location information. The concern related to the fact that all calls, and all position information, are processed through the Thuraya gateway where non-U.S. personnel could see it. Interestingly, an announcement made on Iraqi television at the beginning of the war appealed to the population to turn in their satellite phones so it would be easier for Iraqi officials to identify "infiltrating" transmissions.



In the month of March Thuraya signed up more than 100,000 new customers and reported that each day they were serving, on average, 17,000 minutes from callers in Iraq and another 12,000 minutes from Kuwait.

Iridium

The third major mobile satellite service provider during the war was Virginia-based Iridium. Rather than operating large, powerful satellites 22,300 miles up in geostationary orbit, the original designers of the Iridium satellite network chose a constellation of 66 satellites flying in low earth orbit (LEO), at an altitude of only 420 nautical miles. Since the satellites are much closer to the earth, the handsets can operate at lower power levels and users experience less of a delay due to a much shorter signal path. However, because the satellites are moving rapidly across the sky, the look angle is constantly changing and calls must be "handed off" from one satellite to another as they move out of view.

Originally backed by Motorola, the company spent about $5 billion building and launching the satellites and establishing a network of ground stations. After bankruptcy three years ago, the assets of the company were purchased

for $25 million by an investment group that planned to focus on military and government customers. They soon won a $72 million, two-year contract to provide service for 20,000 Department of Defense employees. In January of this year that contract was renewed for another year of service.

The military likes Iridium in large measure because the satellites communicate directly with each other. In nearly all other satellite operations, the satellite relays transmissions from the ground back down into the same geographic area. This makes it possible for an eavesdropper located in the same coverage area as the user to listen to the downlink in real-time.

Iridium, on the other hand, relays a transmission from one satellite to another until the signals reach a satellite that is over the desired ground station. Since there is an Iridium earth station in Hawaii dedicated to government users, calls can go up to an Iridium satellite anywhere on earth and come down only in Hawaii. This makes it much more difficult for eavesdroppers to coordinate a real-time response.

Despite a technologically advanced system, user reports from the Gulf indicated that Thuraya phones connected more reliably than Iridium and had a much lower rate of dropped calls.

Targeting Satellite Phones

Although the digital voice signals can be encrypted, the satellite phone transmissions themselves are not covert. The emissions from a transmitting phone can be detected and triangulated using standard direction-finding techniques. From a security perspective this makes them a poor choice for a battlefield communications device. Early on in the war journalists were warned that their satellite phones might be mistaken for enemy transmissions and become the target of a military strike.

The U.S. military uses specially equipped satellites and aircraft, as well as ground-based units, to detect and locate such signals. Enemy forces presumably keep their calls as short as possible and change phones on a regular basis, but unclassified after-action reports indicate that the U.S. had a fair amount of success locating enemy forces through this kind of signal interception.

One of many US government earth stations in Hawaii (Photo by Harry Baughn)

Military Satellite Communications

The United States armed forces rely heavily on satellite-based communication systems for a variety of purposes. A constellation of satellites operating the UHF (Ultra-high frequency) band provides tactical links for ground, air and naval forces. A separate network of SHF (super-high frequency) satellites, called the Defense Satellite Communications System (DSCS, pronounced "disc-us"), carries high data rate traffic including video and audio feeds. Another program, dubbed Milstar, is intended to provide worldwide command and control (C2) capability. In addition, the military makes heavy use of commercial satellites.

Digital Command and Control

One of the primary tactical command and control (C2) products used by front-line troops is called Force-XXI Battle Command Brigade-and-Below, or FBCB2 for short. FBCB2 is a mapping and messaging software application developed by Northrup-Grumman (formerly TRW) that runs on a rugged computer inside a military vehicle or aircraft.

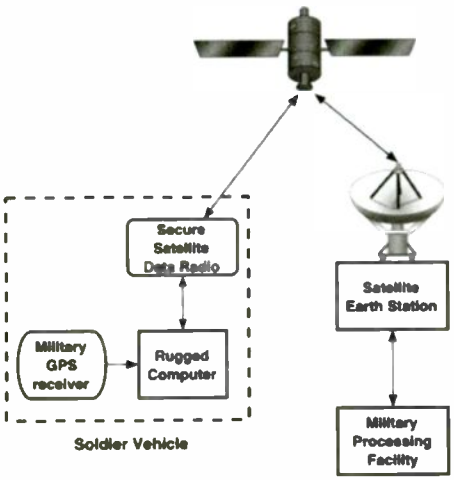
The FBCB2 software displays the location of friendly and enemy forces on a digital map of the battlefield. Landmarks, waypoints, minefields and other items of interest are also shown on the screen. This information is collectively called situational awareness (SA) and has become indispensable for soldiers and field commanders alike. Having a common view of the battlefield in real-time helps reduce fratricide (so-called "friendly fire") and can give troops the information they need to stay out of harm's way.

Friendly vehicles are shown on the screen as blue icons, giving FBCB2 the nickname "blue force tracker." Enemy force locations, gathered from spotters and other intelligence reports, are displayed in red. Using the touch screen, the operator can call up unit identification and other detailed information about each icon.

Military GPS

Each FBCB2 installation is connected to a military GPS receiver, typically a separate device known as a "plugger" (PLGR, standing for Precision Lightweight GPS Receiver). Despite having been designed a decade ago, the PLGR provides more accurate position information than modern commercial GPS units.

GPS receivers sold to civilians monitor a



single frequency coming from GPS satellites called L_1 at 1575.42 MHz. This provides what is known as Standard Positioning Service (SPS) and gives position "fixes" that are accurate to perhaps 60 feet. Military GPS receivers access L_1 and a second frequency called L_2 at 1227.6 MHz. L_2 carries more accurate information in encrypted form, and with the proper decryption key can provide Precise Positioning Service (PPS) with accuracies of better than 30 feet. PPS also provides some protection against jamming and other attacks against GPS.

With accurate GPS data from the PLGR, FBCB2 automatically transmits the vehicle's location over a radio link to a central computer. This computer aggregates all of the incoming location reports from all FBCB2 units into a summary report and broadcasts it back out to the field. In this way each FBCB2 installation knows where all the other FBCB2 units are located. This Common Operating Picture (COP) is also fed to commanders in theater and Pentagon analysts in the United States.

FBCB2 also provides the ability to send and receive short messages, somewhat like an Instant Messenger chat service. These command and control (C2) messages allow soldiers to send in reports and commanders to issue orders and instructions. Prior to the introduction of this technology, solders would have to report in their position via voice radio, which was a lengthy and error-prone process. Now the position reports are done automatically without requiring the soldier's attention, allowing him or her to focus on the task at hand. It also reduces voice radio traffic, reserving it for more critical or detailed reports.

Each FBCB2 computer is connected to a communications device. Prior military operations had all FBCB2 traffic operating over terrestrial-based line-of-sight radios, either SINCGARS (Single Channel Ground and Airborne Radio System) or EPLRS (Enhanced Position Location Reporting System). In Operation Iraqi Freedom the FBCB2 application was connected to a two-way satellite data radio, which provided over-the-horizon connectivity for SA and C2 messages.

The satellite radio is capable of operating over commercial satellites, including Thuraya and Inmarsat. It provides an encrypted two-way data link using direct sequence spread spectrum (DSSS) bursts, making it difficult for adversaries to detect and identify the transmissions. These bursts are sent through Thuraya and Inmarsat satellites and processed at ground stations in the Middle East and Europe. The encrypted data is then sent to military processing facilities for decryption and delivery to SA and C2 computers.

Total Asset Visibility

It is a maxim that an army moves on its stomach. The job of moving supplies to the front lines falls to transport vehicles of the U.S. Army's Combined Arms Support Command (CASCOM). Many of these vehicles are equipped with another satellite-based messaging and geolocation application known as Movement Tracking System (MTS).

As with FBCB2, a ruggedized computer inside the vehicle's cab displays the location of friendly forces overlaid on a digital map. The operator can also send and receive text mes-

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Ken Reitz, KS4ZR
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Inquiring Minds Ask Interesting Questions

T readers are great communicators and it's always a treat to hear from you. This month's column will deal with a number of totally unrelated topics brought up by readers over the last six months.

❖ Unlicensed Freeband Ops

Longtime *MT* reader Judy May refers to the January issue of the *Beginner's Corner* where I mentioned the existence of "outband" operators. She asks, "...Are you saying that there are a bunch of non-hams that purchase 10 meter ham radios and use them to talk among themselves in their own made-up band...? Who would do this, and why? Is there no enforcement action? I am very interested in this because I once saw a truck stop selling nice CB radios alongside some similar looking radios...that were labeled as being 10 meters. It made no sense to me and I have always wondered about what I saw."

For decades unlicensed operators have proliferated the frequencies between 25-28 MHz, the so-called "Freeband," around the world. In our hemisphere the bulk of unlicensed traffic originates in Latin America where easily modified amateur gear is used mostly as a "telephone" system for communications between friends and family members in an area of the world where the infrastructure of a power grid or wired phone service are many years away.

U.S. outband operators typically use self-assigned "handles," linear amplifiers, "echo" effects on their audio, "courtesy beep" tones to indicate letting up on the mic, and they transmit against convention, i.e., using Lower Side Band on high frequencies instead of the conventional Upper Side Band. On the actual CB channels they can be heard using either side band or AM mode.

The Freeband is actually allocated to a host of Federal agencies from the FAA to the Coast Guard to NASA, and, for the most part, the Freebanders try to keep a low profile. About the only time the FCC pays any attention to them is when they encroach on a Fed Frequency or when a licensed ham decides to join the fun. It's hard to imagine why a licensed ham would be caught operating 11 meters but they do.*

The real problem is Freebanders operating on ham frequencies. Anyone who has operated on the 10 meter band has run across them. Usually they operate side band in the CW portion, but, occasionally they wander into the voice portion and are chased away.

As to enforcement, there's really not much the FCC can do. They are chronically understaffed with a huge enforcement portfolio. Sniffing out radio culprits and bringing them to justice is a Herculean task through a tortuously long process which inevitably ends with slaps on the wrist all around.

❖ MPEGII Satellite TV Questions

J. J. Owens found a like-new digital DBS satellite TV system complete with cables and dual LNBs for $20. His question is "...can I use the [DBS] receiver to receive C-band MPEGII FTA signals like DW TV from Berlin...What do I need to change on my C-band system...?"

Unfortunately, DISH Network and DirecTV receivers are not compatible with C or Ku-band Free-To-Air (FTA) MPEGII reception. The reason is that both of those receivers are specifically built for the proprietary data streams each is designed to receive. And, on top of that, the LNBs used for DBS reception can't be used for broadcast Ku-band reception because they are designed to receive a slightly different set of Ku-band frequencies and they are circularly polarized, not linear.

However, FTA MPEGII receivers have been on the market long enough so that the earlier models should be showing up used fairly cheap. Even new MPEGII receivers, warranty and all, can be found starting at under $200.

If you have an existing C-band system and you want to add MPEGII FTA to it, installation couldn't be simpler. You don't need to change anything on your system. New MPEGII receivers have a loop-through circuit which allows you to take the LNB from your dish into and out of the MPEGII receiver and then into your C-band receiver, whatever its make. Now, to view programming just switch the channel 3 output of the C-band receiver to the channel 3 output of the MPEGII receiver. See the June *Beginner's Corner* for more information on MPEGII reception.

Ranger Communications' RCI 2950DX 10/12 meter all mode 25 watt transceiver is typical of rigs which could be modified for illegal "Freeband" use. (Courtesy: Ranger Communications)

❖ ST9900 FTA MPEGII Review

Speaking of which, Dick Milligan, K5RCG, enjoyed the review of the ST9900 FTA MPEGII satellite receiver in the June issue so much he bought one. That led to a few questions after going to Satcom C3.

"After the search on the satellite, and I go to a channel that has been saved...I notice that all the sites have a "$"...What happens if you click 'Factory Reset'...?" He also wants to know how to use the USB socket on the back for updates and how to add Panamsat 9 to the satellites list. He points out in his e-mail that the manual leaves a lot unsaid.

One thing to understand about FTA MPEGII receivers is that they are truly generic receivers and have some features on them which may or may not be functional or applicable to U.S. For instance, the SCART connection is there for the European market. Some MPEGII

receivers have security card slots even though there's no reader or other circuitry attached.

The RS-232 connection in the back can be used in the event that a new software update from the manufacturer is needed. I've found, after five years of using MPEGII receivers, that updates haven't been necessary.

The "$" icon indicates an encrypted channel, but with FTA receivers, there is no way subscribe to encrypted channels you may come across. So, you just have to forget about them. Sometimes encrypted channels are in the clear, in which case you just enjoy them as long as they are.

Adding new satellites is simply a matter of navigating the help screens. The key is that the more you perform the functions on the receiver the more routine it becomes.

And, finally, the factory reset button simply restores the receiver to the original factory presets. MPEGII channels are changing constantly and you'll find the best place to keep up with the changes is **http://www.lyngsat.com**.

❖ Profiting from the Hobby

Ray Chevalier wrote recently, "...Your article on Sat radio in the Feb issue of *Monitoring Times* really moved me. I understand your feeling. You caused me to go out and buy stock (in XMSAT and SIRI), something I have never done before. Thank you. I like waking each morning and checking the prices. Thanks again."

The numbers are looking good for XM, having crested the all-important half million subscriber barrier while Sirius continues to lag. I like that you've bought both stocks. How can you lose?

One thing to watch for in the next year will be the "churn rate," that's the number of subscribers who are not renewing. Typically satellite service providers trumpet their new subscriber numbers each month while making non-renewal figures unavailable. Right now both services are too new to have any significant churn.

Get rich quick, retire early or "just looking," monitor the big cable/satellite players on The Street. (Courtesy: Media Business Corp.)

The other thing to watch will be when the new "universal" systems are introduced at the end of this year or early next year. Those systems are supposed to be compatible and churn figures will really be important to follow. Ray, I hope you got in when Sirius was still under fifty cents a share! As of this writing XM Satellite Radio was selling for $10.99/share and Sirius Satellite Radio was trading at $1.85/share.

Want to make a killing in the market or at least put your money where your money already is (cable and satellite bills)? You can follow the daily trends in the satellite/cable industry with a full slate on related stocks e-mailed to you at the end of each market day from Media Business Corp. To subscribe send a blank email to: *subscribe.marketclose@mediabiz.com.*

MT ***reader Dick Milligan, K4RCG, is an all around monitoring enthusiast. A ham since 1958, Dick's shack is well equipped and laid out. He says, "...the console was started from a $125 computer desk/hutch/printer side table. I had the plywood [and] purchased a few yards of black vinyl and 1/4-inch foam." He also did a great job finishing it. Among the gear is an Icom 706 ham transceiver and general coverage receiver, AL811a linear amp, AOR 3000a, IC-R3, Universal M-7000 and a host of antennas. Dick has just added MPEGII (see text) satellite monitoring to completely round out his interests. (Courtesy: Dick Milligan)***

❖ Baseball On Internet Radio

Doug Chandler from Utah read my recent piece about listening to Major League Baseball via Internet radio through MLB's Game Day Audio. He asks, "...have you listened to international radio stations with music on the internet? I'm trying to find out if they too have that 'distorted cell phone' audio or dropouts."

Well, Doug, it really depends on the rate at which the station is being downloaded from the Internet. Since I have a "slow speed" connection, typically 26.4 to 32 kbps, anything I receive over that rate gets constant dropouts. Luckily, all the baseball feeds are sent much lower than my receiving rate so I don't get any dropouts from them and the audio is about as good as listening to DX on the AM band.

On your suggestion I listened to RCI, which was sent at 32 kbps which is the speed at which I was receiving and the audio was great but the dropout rate made it impossible to continue listening. I also tuned in BBC World Service and the audio was sent at 14 kbps and it came in quite well, but was definitely not live as I was monitoring the BBCWS feed on C-band satellite at the same time and the programming was not the same. So, the upshot is that it really depends on what you're using for a computer, what your dial-up connection rate is, and at what rate the program is being sent.

❖ One Last Baseball Comment

And finally, we hear from Michael, an *MT* reader who lives in England and is also a baseball fan. He writes, "...I am a Yankee fan, and from time to time I log onto their web site and 'watch' the game on the MLB, Play by Play. Now that the Iraq crises is over, AFN [Armed Forces Network], who broadcast on AM from Frankfurt, Germany, are airing major sports events once again. These were suspended during the crises.

Since March of this year a new satellite channel in Europe has transmitted American sports 24/7....In the case of baseball, we are seeing at least five live games a week, many of them day games. This means we do have to stay up half the night. We have seen a number of Yankee games from YES Network, Fox Sports Net for many of the teams, ESPN and Fox Sports Saturday. All in all, great coverage. In addition, our own channel 5 shows the ESPN Sunday night game." He adds that he hopes to be Stateside in September to "fit in a couple of games during my stay." Now, that's a fan!

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*An article on the ARRL web site "Hams on 11 Meters, an Enforcement Issue." **http://www2.arrl.org/news/stories/2000/10/30/1/** answers some of these questions.

Ask Bob

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

Q. *What are the unstable shortwave carriers that slowly drift upward in frequency consistent spacings? I have heard them on various receivers and at several locations. (Frank Tangel, email)*

A. Without a doubt, these gurgling frequency drifts are generated locally by harmonic-rich switching power supplies and other free-running oscillators found in modern electronic appliances, telephones, and even utilities like telephone company accessories, and radiated from power lines, telephone lines, and your own appliances.

One way to determine whether or not they are in your house is to turn off the circuit breakers, one at a time, as you are listening to the interference; if one of the breakers kills the interference (but not your receiver!), you're getting closer!

I had such a problem several years ago with our telephone system. The provider had installed a device called a "Circuit Maker" which multiplexed several lines together; their power supply produced harmonics all over the shortwave spectrum. I finally had to file a complaint with our public utility commission to force them to remove the devices.

You can sometimes home in on them walking around with a portable radio tuned to one of the offending signals to see where it gets loudest.

Q. *I often see the term "from DC to daylight" used to describe the continuum of the electromagnetic spectrum. Obviously, daylight refers to the wavelength of sunlight, but what does DC refer to? A low frequency like the Dawn Chorus? (David Chambers, email)*

A. Like so many popular expressions, this is a hyperbole (gross exaggeration) like claiming "They piled the ice cream a mile high on my banana split!" Yes, "daylight" refers to the highest frequency ranges (not nearly as high as light), and DC refers to direct current (as from a battery), where there is no frequency at all (the direction of the current doesn't alternate). In actual practice, the highest frequency allocated by the Federal Communications Commission (FCC) is 300 GHz, and the lowest is 9 kHz.

Q. *What is the difference between a harmonic and a spurious ("spur") in shortwave reception? (Joe Wood, Gray, TN)*

A. A harmonic is always a whole-number multiple of some fundamental frequency; for example, harmonics of a 4 MHz signal might be heard at 8, 12, (etc.) MHz. Harmonics are produced by the oscillator in the transmitter, and must be suppressed by successive tuned stages before the antenna. But not all transmitters do this well, and any transmitter and/or antenna can be mistuned.

Depending upon the antenna, the third harmonic frequency is often a good impedance match, while the second is not. When propagation is better on the band on which the third harmonic is present, it is often received when the original fundamental-frequency signal is not.

A spurious signal ("spur") is a generic reference to any unintentional emission from a transmitter, and may be produced by the oscillator, frequency synthesizer, mixer or amplifier stages under certain conditions like improper tuning, inadequate shielding, or over-driving with power. It is usually not a multiple of the fundamental frequency.

Q. *I would like to install a good antenna indoors for AM broadcast-band DXing. Can I suspend a PVC pipe from the attic rafters and wind a very long wire around it like a giant version of the ferrite-rod antenna in a portable radio? (Rick Ericksberg, email)*

A. The reason ferrite-rod antennas work so well is that the ferrite is a signal "concentrator." Simply making a long spiral of wire won't have the same effect, and probably won't work that much better than a straight wire. A long wire at those frequencies may make signals louder, but the noise will be louder, too; you might as well just turn the volume control up and use the shorter wire!

A wire antenna has a specific pattern of signal reception, virtually unaffected by where you attach the lead-in; thus, the spiral-wound length of wire will have the same directivity as a center-fed dipole.

Your best bet would be a large-diameter loop antenna; that is the choice of most serious medium-wave DXers. You could wind it over the ends of an "X" frame of wood or PVC pipe, and pivot it suspended from a rafter so it could be rotated to favor a particular direction. Better yet, put pegs on the four inside corners of a closet door and wind the wire around those, moving the door for directivity.

An excellent discussion of this may be found on line at **http://www.hard-core-dx.com/nordicdx/antenna/loop/loop5.html**.

Q. *I connected one wire from a 120VAC light bulb to the "hot" wire of the wall receptacle, and the other to a ground rod; the bulb lit. Would the same thing happen if I connected ten 12-volt car batteries in series and grounded the negative lead? (Mark Bums, Terre Haute, IN)*

A. Yes, provided you assured the same circumstances. In the case of commercial AC power, the reason the bulb lit is that the ground rod had a return path to the AC ground wire via the moist soil, a soggy resistor at best.

So the analogy with the 120 VDC string of car batteries would be to connect the negative terminal to the same ground rod used by the electric utility, and the positive terminal through the bulb to your experimental ground rod. The bulb should light then as well.

Q. *How do cellular telephone signals get out of a metal airplane? (James Haire, Rancho Palos Verde, CA)*

A. The fuselage is not entirely RF-tight due to the window ports. The wavelength of a cell phone frequency is a short 14 inches, allowing considerable interior reflection and emission through those ports.

But a more puzzling question is, why aren't cell phones currently allowed on planes? They don't pose a danger to navigational systems, and it isn't to protect the airline's profit from air-to-ground pay phones.

The prohibition is by the FCC. Cell sites are designed and licensed for short-range, terrestrial applications. A conventional cell phone at high altitudes can access dozens of cell sites simultaneously, confounding the system, creating busy circuits, and even causing lockup. Multiply this by the number of overhead cell phones that could be on simultaneously, and you can visualize the problem!

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 bobgrove@monitoringtimes.com. (Please include your name and address.) The current Ask Bob is now online at our website:
http://www.monitoringtimes.com

Getting Started

Bright Ideas

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63 Here is a freebie: Just send an email to **ScannerDigest@usa.com** to get on their mailing list. This email newsletter is a great source for frequencies and related monitoring information. Best of all, it is free! I will be submitting some frequencies for Washington State. You can do the same for your area. Here is your chance to be a "contributing editor." While you're at it, also send your list to **editor@monitoringtimes.com** for posting in the online Frequency Exchange.

64 Fire season is in full swing. Here are yet more sites for accurate fire information in the western US: **http://www.smokereports.com**, and **http://www.nifc.gov/**. I am already revising my master frequency guide for 2003 fire season. If you have any information on frequencies for Oregon, Washington, Idaho, or Western Montana, for BLM, USFS, NPS, BIA, etc., please email me.

65 I recently played host to some visiting relatives. They go to bed a little earlier than I do. I wanted to watch some late night TV, but I didn't want to disturb their sleep. I used the old trick of listing to the TV audio frequency on my Icom T-90. I used an earpiece, and everyone slept soundly. (Alternatively, I could have used a pillow speaker.) You gotta love what these new wide receive radios can do!

66 I picked up a used (cheap), rapid, drop-in charger for my Alinco 196 HT. But when I tried it at home, the radio battery would not fit into the holding cup. I know better than to force it. (Yeah, I been there, and broke that.) Something was misaligned. Was it the battery or the charging cup? Correct answer is C: both of the above. The solution was a small, flat, hobbyist's file. First, I reamed out the battery grooves. Then I filed down the alignment posts in the charger. Eureka, problem solved.

67 Just when I thought my radio addiction under control, the devil awoke me one night, and forced me to buy a Kenwood TH-D7G and a Garmin GPS. I find myself once again deep in the dark side of radio using APRS™. (I'll bet you did not know that "APRS"– automatic position reporting system – was trademark protected.) I will be sharing my experiences with APRS in the future. For those of you already bitten by the bug, perhaps you can send me some bright ideas for APRS.

68 I found a website with some nifty quick reference cards for specific radios, as well as frequency allocation charts. In fact, that is the name of their website: **http://niftyaccessories.com/**. I ordered some of their reference cards. Very Cool. While you are logged on to the net, and have your credit card handy, here are two more interesting sites: **http://www.rabq.com/home2.htm** and **http://www.artscipub.com/**. No manual with the your used radio? Try the Lost User Manual from Artsci.

69 Last week I had a sudden burst of energy, and decided to reorganize my battery charging station. With more than 30 radios, this is quite a farm. I picked up most of these used, as the new ones can be in the $40-80 dollar range. My collection seems to grow every time I go to a ham swap. If you observe the photo, you will see the finished project. There is a master on/off switch so the units are not usually energized.

70 I also decided to relabel my batteries, drop-in chargers, and radios. It was getting difficult to remember what battery went with what radio and what was the voltage. If you are a long time reader of the column, you probably recall that previously I used the small round Avery™ labels to mark my radios and accessories. I hand printed the information on the label, and then applied clear scotch tape over the label to "seal the deal."

I needed a more professional look. This time I made up a sheet of labels using the table feature in my word processor. I used seven columns across, and thirty rows. I then made the first two columns for 12 volt, etc. I used bright colored fonts of red, blue and white for the print in bold, and a shaded background. I used a full size paper cutter to cut out all the tiny labels. Since these did not have adhesive backing, I had to be careful to place them, and then apply clear scotch tape to complete the labeling process. You could use Avery's mailing labels. These have adhesive on the back, but you must plan on spending extra time and effort on tweaking the size of the label to get the desired effect.

Sample of mini labels

AB7NI 12 volt	AB7NI 9.6 volt	AB7NI 7.2 volt
AB7NI 12 volt	AB7NI 9.6 volt	AB7NI 7.2 volt

For my radios and accessories, I use just my callsign, name, and phone number. It is easy to select any color, font, shading, or other style to customize your creations. Even if you have only a couple of radios, this might help get your radio back if it is lost, or stolen. In fact, I usually hide a label in the bottom of the battery or radio bottom cavity. Only a couple of radios? Geesh, who has only a couple?

71 Internet sites for pocket partner booklets include:
http://www.LooseleafLaw.com
http://www.emsguides.com/
http://www.firebooks.com/
http://www.pocketmobility.com/

If you are a subscriber to the electronic version of *MT*, when you see a web link, you can just double click on it to go there directly. Cool huh? As always, *MT* leads the way.

72 Does your workplace use radios? Is there a use for them? Can you think of any new uses, i.e. your emergency/disaster plan? Suggest it to the boss. Assuming you actually know your radio stuff, perhaps you can become the in-house radio coordinator/troubleshooter. I am amazed how many times the technically/radio challenged folks don't even know how to turn the radio on or the full limits or capabilities of the radios. Or even the source for buying speaker microphones or replacement batteries. C'mon, you love radio, so improve your status in the workplace. Step up to the plate. Make the radio hobby work for you.

73 The new Yaesu VX-2R is getting mixed reviews. The price and specs (1000 memory channels) are impressive. But there might be some bugs. Wait awhile and let someone else do the beta test. You can check out the hardware mods at **http://www.icongrp.com/~sllewd/vx7rmain.htm**, and the downloadable software at **http://www.qsl.net/kc8unj/**. If you like and use the software, a small contribution to the author helps guarantee updates and future software. Thanks to all the software programmers, Don Star, Bob Parnass, and Jim Mitchell.

Robert Wyman
robertwyman@monitoringtimes.com

On-Scene Commander: Arizona Update

From Robert at **http://www.azrepeaters.net**, "Thank you for featuring 'Robert's Favorite Frequencies' in your July 2003 *MT* column. It always seems to happen, but I noted some corrections that needed to be made." The following updates are provided by Robert and an anonymous local government radio operator, primarily concerning local traffic control devices and roadway maintenance operations in Phoenix:

154.570 Main Channel, Wildlife World Zoo, near Glendale, Arizona

151.955 Out of Africa Wildlife Park (not 155.955 as previously reported)

453.500 is primarily used by street construction inspectors (Design and Construction Management). The Traffic Signal Shop switches to this freq on nights and weekends because it is monitored by the City of Phoenix Switchboard Operator.

453.625 is used by Traffic 3. Traffic 3 is the dispatch desk for the sign shop and striping crews. They're the guys who install/maintain the signs (stop signs, etc.) and paint the lane lines on the streets.

453.875 is used by Street Maintenance...their dispatch is 'Dispatch 19' (from Municipal channel 19). They use designations like Streets 31 to Streets 35 for their different yards/shops.

The Traffic Signal Shop uses 453.950 as their primary freq Mon-Fri, 7 AM to 5 PM. The Traffic Signal Shop dispatch designation is actually Signals Three. Signals One is the Traffic Engineering/Ops center in City Hall. While they do use this freq, they are not the primary user or the dispatcher.

460.350 The HOTEL net allows Scottsdale PD to communicate with Phoenix PD helicopters, and the MCSO, and also private security agencies at various Scottsdale and Paradise Valley hotels and resorts.

460.375 UHF Intersystem, used during DUI enforcement activities. Can hear Phoenix, Tempe, Mesa PD, as well as Maricopa County SO here.

❖ NASCAR and Nextel

In a recently announced sponsorship change, Nextel will replace Winston as the sponsor of NASCAR's top racing circuit. Racing events will be called the NASCAR Nextel Cup Series. As of this announcement, it is unclear if Nextel will also provide a new communication system for race tracks and teams. If this is part of the deal, individual racing team channels may be replaced with a Nextel digital system...one that is inaccessible to racing fans and monitoring hobbyists.

As NASCAR fans know all too well, quite an industry has sprung up in recent years concerning the trackside sale and rental of scanners, plus the publishing of racing team frequency lists and manufacture of specialized noise-canceling scanner headphones, audio splitters, intercoms and related scanner accessories suitable for the track environment. Some racing analysts even said, some years ago, that scanners saved NASCAR. At that time, track attendance was down and the few hobbyists who listened-in were scorned by NASCAR officials for intercepting their "private" communications.

Eventually, track officials and teams saw the light. Crowds are drawn by complete "multimedia" experiences, and the audio element provided by scanners actively complements the visual element provided by the race itself. By listening to "behind the scenes" communications, fans feel closer to the event and they have a much more enjoyable spectator experience.

If current radios and channels are replaced by Nextel, fans will once again be forced to watch a race with only the roar of engines in their ears. We'll "monitor" this story and report on any new developments as they are announced. So far, Nextel has only hinted toward an upcoming ad campaign geared toward teenagers and young adults...the same age group that R.J. Reynolds (Winston) was prohibited from addressing due to tobacco marketing restrictions. NASCAR-related wireless news and NASCAR-themed phones may also be offered to fans as part of the campaign.

If you want to voice your opinion on scanners and spectators, please address your comments to NASCAR at **http://www.nascar.com** (go to Message Boards section). If you have an interesting race-monitoring story, please send it to *Monitoring Times* for use in a future column.

❖ Taylorsville, North Carolina

An anonymous reader forwards these channels for Alexander County. Note the Coast Guard listing which is in a military radio band:

149.050 Coast Guard (Lakes)
152.405 Sheriff Dept (Detectives)
153.155 Sheriff Dept (TACTICAL 4)
154.235 Fire Channel 2
154.325 unid.
155.115 Sheriff
155.160 EMS
155.280 Rescue Squad
155.370 Taylorsville Police
155.430 Sheriff Dept.
155.475 Taylorsville Police
155.490 Sheriff Ch. 1
155.685 Sheriff Ch. 2
163.100 FBI Field Office (Alexander, Catawba & Iredell Counties)

❖ Gulfport, Mississippi

Jason C. Burnside contributes this update: "I just wanted to inform you that the Gulfport, Mississippi Police, Fire, and other City radio users have gone digital (APCO 25 possibly)...so, as I track down the frequencies, I will pass them along. One question: I can hear some transmissions in the 900 MHz range that seem to be from Gulfport PD. Is it possible that they have gone into the 900 MHz range? Some transmissions (simulcast, it seems) are analog. Hmmm. Interesting."

Jason, check the FCC website and *Police Call* for radio licensing information in Gulfport. Since a 900 MHz allocation is non-standard for public safety use, you may be getting some type of scanner overload or interference from nearby transmitter. Please let us know what you find in terms of licensed channels and actual monitoring hits.

❖ Bank Number One: Emergency Response Exercises

"Hearing some traffic related to the TOPOFF Homeland Security Exercise in Seattle on the FPS repeater in Portland, Oregon...Reports from the Seattle area indicate exercise traffic on the Seattle and King County trunked Systems...," reports Chris Parris regarding one of the recent nationwide anti-terrorism and mass-casualty response exercises.

The first TOPOFF (formally known as Exercise Top Officials) was conducted in May of 2000, involving a simulated chemical attack on the East Coast followed by a biological attack in the Midwest. TOPOFF 2 was a weeklong exercise that commenced on May 12th, 2003, and involved a simulated "dirty bomb" nuclear explosion in Seattle, Washington, plus a biological attack in Chicago, Illinois. The Government of Canada, Province of British Columbia, and City of Vancouver also participated in the exercise.

While many facets of these exercises remain secret, exercise locations, dates and times

are decided months in advance and usually covered extensively by local news outlets.

Urban as well as rural municipalities, military bases, and government contractor factories are prime candidates for future exercises. When you hear of a planned exercise or disaster simulation, program up all of your local channels and also search for new frequencies...even in odd portions of the spectrum not normally allocated for public safety use. You may come up with some very interesting hits!

Information concerning the TOPOFF exercise series and other emergency management topics is readily available from FEMA's website at **http://www.fema.gov**.

❖ Homeland Security: Radio Spectrum Management

Another announcement has been made regarding the Federal Government's radio spectrum management study. This is a subject we've covered several times this year as the story has unfolded. In June, the White House announced a new effort to "better manage" the radio spectrum. A new White House Interagency Task Force will be composed of the Departments of Defense, Transportation and Homeland Security, plus the FAA and NASA.

Wireless Week Magazine reports the Task Force will conduct "the first comprehensive study of federal government radio spectrum policy in the modern era and will build on previous administration efforts to improve spectrum management."

Public meetings with industry representatives and local government officials will help steer the Task Force toward their final recommendations, to be released in about a year.

Almost daily news about this ongoing story can be found at *Wireless Week Magazine*, **http://www.wirelessweek.com**, National Telecommunications and Information Administration, **http://www.ntia.doc.gov**, and at **http://www.fcc.gov**.

❖ "And...They're Off!"

Also from Chris, while on another of his recent and enviable cross-country trips:

"Hi, Robert! I'm in beautiful Long Island, NY, for the Belmont Stakes on NBC...I can give you the ever-popular Goodyear Blimp frequency update. The ground ops are as follows..."

151.6250 Goodyear tech channel
450.9625 Goodyear "Director" to blimp
464.5000 Goodyear "PR" to blimp

Thanks, Chris. Looks like we may have to start a new section just for your monthly, nationwide posts. Keep 'em coming!

❖ Quick Research for Needed Frequencies

Steve A. writes, "Hi...I was searching the net for the [Fort Lauderdale] Air and Sea Show freqs and came across your list from a Google hit. THANKS and great work...I know this is current as I was able to hear the Air Boss on 132.9. Thanks again for the post."

Need some hot frequencies in a hurry? The information may be as close as your computer and Internet connection. Many personal webpages, as well as some Yahoo! Groups data, are cataloged on various search engines such as the aforementioned Google service (**http://www.google.com**). The frequency that you must have immediately may have been found by someone else and may be posted to an Internet site or message board.

In fact, individual message boards usually have a search feature that quickly locates "historic" information. Need a MilCom freq for an airbase? Just check the search engine at **http://www.qth.net** for historic files on dozens of QTH.NET radio-related boards.

How about the frequencies and Logical Channel Numbers for a local police trunked system? The information is probably posted on a Yahoo! Groups board for the city you're looking for. Go to **http://www.groups.yahoo.com** and search for the police agency name or jurisdiction of interest.

Keep your search broad at first...the specific agency and jurisdiction you want may be on a message board with a more generic title. Examples include "TexasScan," "HoustonScan," "ScanAtlanta," "DenverScannerBuffs," "FLACOM," and "Central-PA-Scanner-Club."

Yahoo! Groups include countries around the world, states, regions, counties, cities, specific agencies and even specific radio models. In fact, 70 Yahoo! Groups contain the words "radio monitoring" in their titles, 184 Groups contain the words "scanner radio," 335 Groups have the word "frequencies," 372 Groups include the word "scanning," and 661 Groups contain the word "scanner."

After joining the group(s) you're interested in, you can search for specific frequencies and agency names from the group's home page. All historic matches will be displayed to satisfy your research. For an individual frequency, just type the numbers into the "Search Archive" window. As a test, I searched for 155.37 on FLACOM and immediately found three messages dating from 2001 to 2003. Each message contained "155.37" somewhere in the post.

This method makes it easy to see what's been found in a particular area. It also helps the "newbies" who want to ask questions but are afraid to do so...you can answer your own questions with a quick search of the archives.

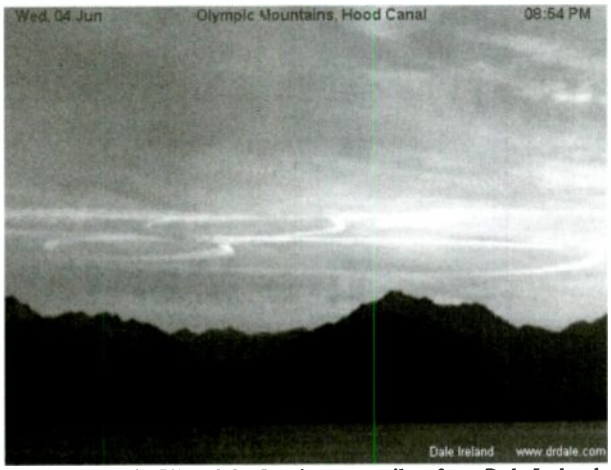
❖ On the Keyboard

On the horizon is a tour of the National Hurricane Center, a look at a brand new, high-tech Mobile Communications Command Post Vehicle, a Homeland Security update discussing "Patient Tracking Systems" for disaster victims, and another example of emerging wireless technologies, the Intelligent Transportation System (ITS) initiative. This program involves wireless highway message signs, cameras, roadway sensors, Highway Advisory Radio, toll facilities and other systems.

Do you have any ITS components in your area? Please send your frequencies, information, websites and photos to me for possible inclusion in a future column.

Dale's trails

Dale Ireland operates a variety of weather satellite and web camera equipment from his home in Silverdale, Seattle. On June 4, Dale noticed a recorded picture showing aircraft condensation (con) trails in the webcam sequence. He wrote: ".. caught a series of looping contrails I have never seen before. Not sure what they are, maybe military refueling or commercial parking orbits. The time stamp is Pacific daylight time (and) corresponds to 0354UT. The contrails are about 75-100 miles west of Seattle."



Webcam view in Silverdale showing contrails – from Dale Ireland

Dale's brother works for an airline company and explained that they are probably airport holding patterns which usually consist of three minute laps with one minute straights and 30-second turns.

http://www.drdale.com/cam/

Scanning Canada

John David Corby, VA3KOT
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The Maritimes Scanning Site

T reader Bill White (amateur radio callsign VA1WW) wrote to *Scanning Canada* recently politely offering information about his website. Always keen to follow-up on reader contributions I visited the site (called "The Maritimes Scanning Site" or "Marscan" for short) and I was sufficiently impressed to devote a column to it. You can check the site yourself by going to **http://www.accesswave.ca/~scan**.

For readers from outside Canada I should explain that the "Maritimes" refers to the three provinces in eastern Canada bordering on the Atlantic Ocean. Sometimes referred to as the "Atlantic Provinces," they are Nova Scotia, New Brunswick and Prince Edward Island. A fourth province (Newfoundland and Labrador) sometimes included in the same group, is not covered by this site (*Scanning Canada* will cover the big island in another column).

Bill spent his childhood days in British Columbia, thousands of kilometers away on the other side of Canada. It was while in BC that he developed his interest in radio. Starting in the scanning hobby in 1968, Bill then went on to become an amateur radio operator in 1978. Over the years Bill's interests have moved back and forth across the radio spectrum from marine frequencies to air band, from broadcast band DXing to trunked 800MHz band emergency services. Somewhere along the way Bill's QTH moved from the Pacific Ocean to the Atlantic Ocean and he now calls the Halifax area in Nova Scotia his home.

A modest man, Bill claims not to be an expert, nor to have very sophisticated equipment, but reading the extensive list of scanners in his shack would make many *MT* readers green with envy. He also claims to put a greater emphasis on frequency research than content. That is clearly evident on a website rich with information that Bill has either uncovered himself or has received from a long list of contributors that he gratefully acknowledges on his main page.

The "Marscan" site is neatly laid out to allow easy access to specifics for the three Maritime provinces. The nearby State of Maine in the United States is also covered. There are sections for railroad, weather, aeronautical, marine and amateur radio frequencies as well as general sections detailing 800 MHz bandplans and helpful tips for American visitors to the site.

❖ Nova Scotia

Let's take a tour of the site, starting with Bill's home province of Nova Scotia. The biggest city in Nova Scotia, and perhaps in the whole region, is Halifax. Scanner listeners whose primary interests lie in monitoring the emergency services will certainly need an 800 MHz trunk tracking scanner in this part of the world. Signals come primarily from a transmitter site on a prominent hill overlooking the city, but there are also other sites around town. Most emergency services are now on the provincial Trunked Mobile Radio System (TMRS – a Motorola Type II system operated by the local telephone company in partnership with government and other users).

Halifax is the home of the Canadian navy's Atlantic fleet. Halifax harbour has a storied past. It played a key role in the rescue of survivors of the *Titanic* disaster. It was also the site of a devastating, fatal explosion following a fire on board a munitions ship during the first world war. Traffic in the harbour and the naval dockyards can be found on VHF. I will refer readers to the Marscan website for exact frequencies.

Although almost everything of interest to the majority of scanner owners is on TMRS, there are simplex, non-trunked frequencies in the 800 MHz band that conventional scanner owners can listen to. In keeping with *Scanning Canada*'s quest to find continuing employment for those old, non trunk-tracking conventional scanners that most of us still have lying around, another few beans for the pot can be found in the Halifax area fire services backup systems and mobile to mobile, repeatered systems for various other users (see table below, courtesy Marscan).

Bill at his Marscan monitoring station

There are several official and unofficial police services in Nova Scotia. The biggest, best known and least monitorable is the RCMP (Royal Canadian Mounted Police) who have gone digital. Halifax Region Police can be found on the regular 800 MHz trunked system and several smaller forces outside of the big city areas can still be found on frequencies in the 150 MHz range.

Halifax fire services receive great coverage on the Marscan site. The talkgroups are identified according to station and equipment (engine, boat, command bus, etc). If you are in Halifax and you pick up traffic on a talkgroup, you will be able to identify the approximate location and equipment attending the scene. Monitoring the traffic on the group should give you the rest of the information needed to link the event to broadcast announcements. Similar information is also given for ambulance services. As always, of course, do not allow your hobby to interfere with the job of the emergency services.

Halifax area non-trunked 800 MHz frequencies

866.0125 866.2125 866.3125 866.5125 866.5625 866.6125 866.6250 866.7125 866.8125 867.0125 867.0625 867.1125 867.3125 867.5125 867.6125 867.8125 868.0125 868.0625 868.1125 868.3125 868.5875 868.6125

Visit the Marscan website for a complete description of frequency usage.

❖ New Brunswick

The Marscan website is similarly informative in its treatment of New Brunswick. Your humble Canadian columnist has to admit that his travels in New Brunswick have been limited to the city of Fredericton. However, the other major cities of the province (Moncton and Saint John) are also covered very well.

❖ Prince Edward Island

Canada's smallest province is the home of "*Anne of Green Gables*" and now enjoys a road link to the mainland over the Confederation Bridge.

Space in this column will not allow further detail, but I urge readers from all over Canada and the United States to take a look at the Marscan website and read the content firsthand. A lot of the general content is very informative and highly readable. Good work, Bill, and thanks for the tip!

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Bearcat 278CLT 100 ch. AM/FM/SAME WX alert scanner	$139.95
Bearcat 250D 1,000 ch. Trunktracker III handheld scanner	$339.95
Bearcat 245XLT 300 ch. Trunktracker II handheld scanner	$189.95
Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner	$84.95
Bearcat Sportcat 200 alpha handheld sports scanner	$159.95
Bearcat Sportcat 180B handheld sports scanner	$139.95
Bearcat 80XLT 50 channel handheld scanner	$99.95
Bearcat 60XLT 30 channel handheld scanner	$74.95
Bearcat BCT7 information mobile scanner	$139.95
AOR AR16BQ Wide Band scanner with quick charger	$199.95
Sangean ATS909 306 memory shortwave receiver	$209.95
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Hilda Global: All the World Is One

In late May, the US Air Force Air Mobility Command (AMC) opened its ultramodern new control facility at Scott Air Force Base in Illinois. On the radio, the major audible effect is the combining of Hilda East and Hilda West, into one big Hilda Global.

Hilda, though, isn't a radio station. It's the code name for the TACC, which stands for Tanker Airlift Control Center, a very busy room where AMC's worldwide airlift, refueling, and medical evacuation assets are coordinated.

This is a monumental job. There can be hundreds of missions being flown simultaneously, many of them needing to contact Hilda by phone patch. This is why AMC was the lead installer on the Air Force's recent radio upgrade, and also why it has Automatic Link Establishment (ALE) capability. Many phone patches are now being direct dialed, using the ALE to pass the number to the interconnect equipment.

It's always seemed a bit dizzy, though, with its split of the entire planet and its skies into east and west. According to the Air Force, the dividing line went right down the Mississippi River, putting the other side in Russia, China, India, and the Indian Ocean. The status of New Orleans, where the Mississippi flows northward and the sun rises over the West Bank, was never known to this editor.

According to AMC, it made much more sense to manage the facility by function rather than geography. The east had been a lot busier than the west, leading to inefficiency. Now, though, the new center's flexible software makes a different organization possible. Now our planet is united.

The new TACC, which replaces a more cramped facility, resembles a state-of-the-art, big-city, police dispatch room. Each of the many workstations has multiple, flat-panel, touch-screen displays, completely configurable for any task.

One function of the touch screen is to manage communication. There are a lot of phone lines. Listeners will continue to hear Hilda in AMC phone patches. It's still a very busy place.

❖ Don't Kick Your Receiver

If you had trouble hearing for most of April and May, it was due to an extended siege of solar-terrestrial events which pretty much wiped out the whole season for some marginal paths on high frequency (HF, shortwave). At press time in June, there is still a problem from a persistent coronal hole.

Coronal holes are well named, being basically holes in the sun's glowing corona. The really persistent ones can last a number of months. They're maddening, as the sun rotates them back into position every 28 days or so, and HF propagation deteriorates right on schedule.

Coronal holes increase the solar wind, which is basically a flow of massive particles such as protons. While incredibly thin, it actually has enough mass and electromagnetic potential to distort our planet's magnetic field, making it teardrop shaped with the tail pointing away from the sun. Enhanced solar wind is bad for HF, and extreme events will even shorten the lives of geosynchronous satellites. For this and other reasons, satellites are not as sunspot-proof as originally hoped.

Coronal holes can also increase the effect of mass ejections from energetic events on the solar surface. This mass is also mostly protons, and it causes the really spectacular auroras by turning solar wind into a hurricane, relatively speaking. These phenomena are more prevalent during the declining years of solar cycles, which we are in. Also, they have a somewhat greater effect in the spring and fall months.

Every cloud, even one made of high-speed particles, has a silver lining. In this case, people living in sufficiently high latitudes have had a great series of northern and southern light displays in the sky. These auroras have also created extraordinary skip on the bands just above HF, such as 6 meter amateur, which has been red-hot in the favorable places.

Hopefully, things will have improved with the coming of summer. Summer propagation is at least consistent, if consistently rather insipid on the high bands and noisy on the low ones. The radio has its dog days, too.

❖ Latest For Geoalert Junkies

By now everyone knows about this editor's incurable addiction to the data in the Geoalert messages. This arcane bulletin of observations and forecasts is issued by several agencies worldwide. The US one is broadcast on time station WWV at 18 minutes after the hour, and WWVH at 45 minutes.

Achieving a basic understanding of the Geoalert's solar flux, A index, and K index is one big step of initiation into the radio hobby's circle of elders. The simple answer is that higher solar fluxes are better, but lower A and K indices are much better, and a declining K means a lower A the next day.

On the ham radio side, there's been a whole sub-hobby in obtaining and massaging these numbers by computer. WWV's Internet mailing list always seemed like the ultimate Geoalert fix, with eight bulletins every day, every month, every year. However, there is a new ultimate.

This is Geoalert Wizard, a US $20 Windows shareware which automatically contacts government file servers at the Space Environment Center. It rapidly downloads a number of data files, updating them every few hours and plotting everything in attractive charts.

As with so many programs these days, the writer seems to assume that the user has a continuous Internet connection. I found a problem using a dialup account. The computer would hang on startup, as the tray icon waited forever for an internet connection that was not going to happen. Simply turning off the tray icon and connecting by hand solved this.

The result is a very slick display of a lot of arcane data, using a color code for severity. Also extremely good is the help file, which is essentially a basic course in what these numbers all mean and why they matter in the first place.

The shareware can be downloaded at **http://www.taborsoft.com/**. See you next month.

Utility World

Utility Logs

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ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
ARQ-E	French ARQ teleprinting (ARQ-E3 is variant)
AWACS	Airborne Warning And Control System
CAMSLANT	Communication Area Master Station, Atlantic
CAMSPAC	Communication Area Master Station, Pacific
CROSS	Regional Surveillance & Rescue Center (French)
CW	Morse code telegraphy ("Continuous Wave")
DEA	Drug Enforcement Administration
DSC	Digital Selective Calling
E10	Israeli phonetic English female numbers
E10a	Israeli phonetic numbers, callup-only or abnormal
EAM	Emergency Action Message
FAX	Radiofacsimile
FBI	Federal Bureau of Investigation
FEC	Forward Error Correction teleprinting system
HFDL	High-Frequency Data Link
HF-GCS	High-Frequency Global Communications System
JSTARS	Joint Surveillance Target Attack Radar System
LSB	Lower Sideband
M22	Israeli CW "numbers," identifies 4XZ
MARS	Military Affiliate Radio System
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
MXC	Russian CW "cluster beacon" markers
NATO	North Atlantic Treaty Organization
Navtex	Navigational Telex (automated SITOR-B)
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	Simplex Teleprinting Over Radio, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United States

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.

518.0 "R"-Italian Coast Guard, Rome, with SITOR-B Navtex at 2250. "U"-Italian CG, Trieste, Navtex at 2320. "V"-Italian CG, Augusta, Navtex at 2330. (Ary Boender-Netherlands)

1650.0 CROSS Corsen-French rescue center, with weather in French and English, interference from Dutch pirate Zender Barcelona, at 2210. (Boender-Netherlands)

3016.0 Gander Radio-North Atlantic air route net, working Uzbek 102, Uzbekistan Airlines, at 0135. (Ron Perron-MD)

4560.0 TAH-Istanbul Radio, Turkey, with a SITOR-B weather forecast broadcast in Turkish, at 2007. (Day Watson-UK)

4777.5 Roma Meteo-Italy, with European FAX weather chart at 2010. (Patrice Privat-France)

4954.3 43C-UK Cadet Force, with SITOR-A traffic at 1440. 97A, working 43A, in SITOR-A and the cadet mailbox system, at 1533. (Watson-UK)

4961.5 ASF1IL-US Army National Guard Aviation Support, IL, sounding in ALE at 0315. (Perron-MD)

4996.0 RWM-Russian standard time station, Moscow, CW time pips at 2050. (Watson-UK)

5192.0 WPFJ625-New Hampshire Emergency Management, Concord, sounding in ALE at 0211. Also 5135 at 0241, and 7805 at 0242. (Jack Metcalfe-KY)

5423.9 CGD9-US Coast Guard District 9, Cleveland, OH, working NRKP (Cutter *Mackinaw*), ALE and secure voice, at 0023. CGD9 working NRUR in ALE at 0025, also 7530 at 1148, and 8126.4 at 1149. (Perron-MD)

5446.5 FDC-French Air Force, Metz, testing in RTTY at 1400. (Watson-UK)

5598.0 Virgin 52-Virgin Airlines, giving position at 0354. Delta 126, position at 0357. (Privat-France)

5616.0 Delta 129-Flight giving position at 0350. American 50, position at 0352. (Privat-France)

5696.0 CAMSLANT-US Coast Guard, VA, working 52A in search of a distressed fishing boat in the Bahamas, at 0235. (Mark Cleary-SC)

5708.0 "Tango Uniform"-Unknown helicopter, probably French customs surveillance, working "Armor" at 1605. (Privat-France)

5711.0 AAT3BFMARS-US Army MARS gateway for SHARES (SHAred RESources) net, ALE sounding at 1404. (Perron-MD)

6697.0 Griswald-US military, with an EAM simulcast on 13155, at 0607. (Jeff Haverlah-TX)

6715.0 Halifax Military-Canadian Forces, working 050M, a possible fisheries aircraft, at 0213. (Perron-MD)

6912.0 SYN2-Israeli intelligence, AM numbers callup only (E10a), for 5-minute periods at 0046, 0146, and 0246, plus once (no repeat) at 0244. (Edward G. Walsh-AL)

7508.0 ZSJ-South African Navy, Silvermine, with text FAX to announce temporary suspension of weather faxes due to budget cuts and office move, at 1550. (Bob Hall-RSA)

7535.0 VMW-Australian Bureau Of Meteorology, Wiluna, with FAX charts being stepped on by other stations using wideband data modems, at 1908. (Watson-UK)

7611.0 FAAZNY-US Federal Aviation Administration, NY, ALE sounding at 1502, also 13457 at 1822. (Perron-MD)

7633.5 AFA1EN-US Air Force MARS, IN, patching weather WC-130H Teal X1 to Teal Ops (Keesler AFB?) at 1945. (Allan Stern-FL)

7777.0 Station 5-Probable Mexican Army, dressing down poor Station 8 in Spanish, at 0059. (Perron-MD)

7778.6 CO1-US FBI, Columbia, SC, working Q01 (Quantico?) and SJ1 (Puerto Rico), ALE at 0345. SE1-FBI, Seattle, WA, calling AN1 (FBI, Anchorage, AK), ALE at 0504. (Perron-MD)

8103.0 4XZ-Israeli Navy, Haifa (M22), with the usual "vvv de 4XZ" marker, at 1615. (Watson-UK)

8297.7 VTP13-Indian Navy, Vishakhapatnam, RTTY test loop at 1600. (Hall-RSA)

8337.6 Shark 02-US Coast Guard, clear and secure modes, at 2344. (Cleary-SC)

8424.0 SVO-Olympia Radio, with Greek news in Latin-alphabet SITOR-B, at 0640. (Privat-France)

8431.0 TAH-Istanbul Radio, Turkey, SITOR-B weather forecasts in Turkish and English, at 2005. (Watson-UK)

8834.0 "8"-Johannesburg, RSA, taking HFDL position from SA0317, South African Airways, at 0653. (Hall-RSA)

8912.0 Omaha 551-US Customs Service, working Panther (DEA, Bahamas). getting a frequency for Coast Guard Cutter *Diligence*, at 0021. (Cleary-SC)

8930.0 ZD952-Brize Norton flight, radio check with Stockholm at 0745. (Privat-France)

8971.0 Cardfile 02-US Navy P-3C, working Bluestar (Roosevelt Roads, PR), at 0147. Pelican 712-US Navy, working Fiddle (Jacksonville, FL), at 2033. (Cleary-SC)

8983.0 Coast Guard 1790-US Coast Guard HC-130, diverted by CAMSLANT to the Bahamas, to help search for Haitian refugees with a Santa Claus on their sail, at 0114. CAMSLANT, diverting "I-0-P" to help Shark 05 and Coast Guard 6013 work a go-fast boat gone dead in water, at 0137. CAMSLANT, working Coast Guard 2109, with traffic for Coast Guard 6593 regarding a medical evacuation, at 2210. (Cleary-SC)

8992.0 Razor 93-US Air Force E-8 JSTARS, in patch via Andrews HF-GCS to Peachtree (Robins AFB, GA), at 2322. (Cleary-SC)

9007.0 NATO 12-NATO aircraft getting weather from Trenton Military, at 0124. (Cleary-SC)

9016.0 Net Gain-US military, with an EAM "For Melba," simulcast on 8992 and 11244, at 1515. (Haverlah-TX)

9025.0 Reach 214-US Air Force, patch via Andrews HF-GCS to Charleston AFB Meteo, for weather at Ben Gurion Airport, Israel, at 2120. (Cleary-SC)

9040.7 5YE-Nairobi Meteo, Kenya, with RTTY weather observation codes at 1547. (Hall-RSA)

9057.0 Man Groom-US military, with a 28-character EAM simulcast on 8992 and 11244, at 1632. (Haverlah-TX)
9104.0 V5G-Romanian MFA, Bucharest, CW no-traffic markers at 1800. (Watson-UK)
10242.0 UCG-ALE address of US Coast Guard CAMSPAC, Pt. Reyes, CA, working helicopter J27, voice call "Coast Guard 6027," in ALE and voice, at 0256. UCG, CAMSPAC, working J38 (Coast Guard 6038), in ALE and voice at 0259. (Perron-MD)
10404.6 WPC-SeaWave, NJ, on a frequency formerly used by HEC96 in Switzerland, data with CW identifier every 3 minutes, at 0920. (Watson-UK)
10610.9 Unid-Moscow Meteo, Russia, with an indistinct FAX chart for Japan, at 1503. (Watson-UK)
10626.0 RFFXL-French Forces, Naquora (Beirut), Lebanon, with offline encrypted ARQ-E traffic, at 2057. (Watson-UK)
10871.7 "D"-Russian Navy, Odessa, single-letter CW cluster beacon (MXC), at 1439. (Watson-UK)
10872.0 "C"-Russian Navy, Moscow, single-letter CW cluster beacon (MXC), at 1437. (Watson-UK)
10913.5 ME1-FBI, Memphis, TN, calling AT1, FBI, Atlanta, GA, ALE at 1916. (Perron-MD)
10945.0 CFH-Canadian Forces, Halifax, NS, with CW marker, listening on 2822, 3394, 4170, 6251, 8321, 12389, 16576, and 22182 kHz, at 2000. (Watson-UK)
11000.0 RIW-Russian Navy, Moscow, working RFK76 and RGZ58 in CW, at 0813. (Watson-UK)
11175.0 Reach 333Y-US Air Force, patch via Puerto Rico HF-GCS to Hilda, at 0011. *[The Air Mobility Command Tanker/Airlift Command Centers, formerly Hilda East and Hilda West, have been combined into Hilda Global. -Hugh]* Tuff 31-US Air Force B-52H, patch to Barksdale via Andrews, at 0030. Navy JT 918-US Navy C-9B, patch via Offutt HF-GCS to Duty Office, diverting for bad weather, at 0048. (Cleary-SC)
11202.0 "O-8-T"-Possible US Coast Guard, working CAMSLANT at 2339. (Cleary-SC)
11232.0 Vampire 3-Canadian Forces CC-138 Twin Otter, giving an ice and flood report via Trenton Military, at 0016. (Cleary-SC)
11244.0 Offutt-US Air Force, Offutt AFB, NE, with a 6-character EAM "For Melba," at 1505. Man Groom-US military, with a 28-character EAM simulcast on 8992, at 1828. (Haverlah-TX)
11494.0 Hammer-US Customs Service, March Air Reserve Base, CA, working aircraft Omaha 63L, in voice and ALE, at 0245. (Perron-MD)
12185.0 CLC-Venezuelan Army, calling SCLC432 in ALE at 2206. (Perron-MD)
12191.0 SCLC512-Venezuelan Army, calling CLC51 in ALE, at 2200. (Perron-MD)
12504.5 234736000-British bulk carrier *Riruccia*, testing in DSC, at 0605. 230117000-Finnish oil tanker *Tavi*, in DSC at 0615. 353156000-Panamanian vehicle carrier *Atlantic Highway*, DSC at 0900. (Privat-France)
12654.0 TAH-Istanbul Radio, SITOR-B weather in English, at 2000. (Watson-UK)
12790.0 NMG-US Coast Guard, New Orleans, LA, with extremely clear FAX charts at 0740. (Hall-RSA)
13155.0 Griswald-US military, with a 28-character EAM simulcast on 8992, at 0507. (Haverlah-TX)
13200.0 JW 310-US Navy C-130T, patch to Brunswick, ME, via Puerto Rico HF-GCS, at 1955. (Cleary-SC)
13215.0 Reach 43J-US Air Force, with an ALE-initiated voice phone patch at 0248. (Cleary-SC)
13357.0 Recife-Air route control station, Brazil, working an unknown aircraft in Portuguese, at 2124. (Perron-MD)
13510.0 CFH-Canadian Forces, Halifax, NS, with RTTY weather at 1430. (Watson-UK)
13528.0 "C"-Russian Navy, Moscow, CW, single-letter CW beacon (probably MXC), at 1434. (Watson-UK)
13907.0 Coast Guard J13-US Coast Guard helicopter, working CS9 in ALE, at 0030. CAMSPAC Point Reyes:-US Coast Guard, working helicopter J11 at 0106, followed by ALE on 18594 at 0053. (Perron-MD)
13927.0 Steel 81-Pennsylvania Air National Guard KC-135, in o morale patch via AFA1EN (US Air Force MARS, IN) at 0043. Sentry 51-US Air Force E-3 AWACS, patch via MARS AGA2PA (Patrick AFB, FL) to Raymond 24 (Tinker AFB, OK), at 1808. Pitt 18-US Air Force, morale patch via AFA1EN, at 2339. (Cleary-SC) King 33-US Air Force HC-130, patch via AGA2PA to Randolph AFB, at 1705, again at 1729. AFA2CU (MARS, FL) making several patches for Reach 93J, US Air Force, at 2254. (Stern-FL)
14467.3 DDH8-Hamburg Meteo, Germany, with ship and synoptic weather observations in RTTY, at 1406. (Watson-UK)
14493.5 MO1-FBI, Mobile, AL, calling QT1, Quantico, VA, in ALE at 1749. (Perron-MD)
14556.0 RIW-Russian Navy, Moscow, working an unheard station in CW, at 1011. (Watson-UK)
14569.0 SCLC513-Venezuelan Army, calling CLC51 in ALE, at 2025. (Perron-MD)
14653.0 LITNGB-US National Guard, Little Rock, AR, calling HQ3NGB (Crystal City, VA), at 1329 and 1339. BNANGB-US National Guard, ALE sounding at 2041. (Perron-MD)
14669.0 RFFXL-French Forces, Naquora (Beirut), Lebanon, with ARQ-E markers, at 1449. (Watson-UK)
14670.0 CHU-Standard time station, Ottawa, Canada, with USB time beeps *[actually USB with carrier -Hugh]*, at 1435. (Watson-UK)
14867.7 Unid-Possible Egyptian MFA, Cairo, passing detailed English and Arabic data on bank accounts, in ARQ at 1619. (Hall-RSA)
14982.4 Unid-Tashkent Meteo, Russia, with FAX synoptic charts at 60 and 90 lines/minute, at 1117. (Watson-UK)
14996.0 RWM-Russian Standard time station, Moscow, with CW time beeps at 0957. (Watson-UK)
15851.0 FAAZJX-Federal Aviation Administration, FL, ALE sounding at 1730. (Perron-MD)
16080.0 MAE-Algerian MFA, Algiers, sounding in ALE at 0835. (Watson-UK)
16331.7 "D"- Russian Navy, Odessa, single-letter CW cluster beacon (MXC), at 1935. (Watson-UK)
16332.0 "C"- C-Russian Navy, Moscow, CW, single-letter CW beacon (MXC), at 1935. (Watson-UK)
16710.5 UHFD-Russian vessel *Molemenskoe*, working Kaliningrad in 3rd-shift Cyrillic SITOR-A, at 1403. (Watson-UK) UHJU-Russian vessel *Kapitan Kouzmin*, calling UIW, Kaliningrad, at 1800. (Privat-France)
16822.5 UDK2-Murmansk Radio, Russia, working a vessel in 3rd-shift Cyrillic SITOR-A, at 0850. (Watson-UK)
16904.9 RFQPME-French Navy, Djibouti, testing in RTTY at 150 baud (usually 75), at 1543. (Watson-UK)
16915.0 RFVIE-French Navy, Le Port, testing in RTTY at 1553. (Watson-UK)
16926.0 LFI-Rogaland Radio, Norway, CW navigation warnings at 1318. (Hall-RSA)
16951.5 6WW-French Navy, Dakar, Senegal, testing in RTTY at 1605. (Watson-UK)
16961.5 FUF-French Navy, Fort de France, Martinique, testing in normal-polarity RTTY (usually reverse), at 1815. (Watson-UK)
17069.6 JJC-Tokyo Radio, with a Kyodo newspaper FAX and then navigation warnings in Japanese, 60 lines/minute, at 1617. (Watson-UK)
17180.0 FUG-French Navy, La Regine, testing in RTTY at 0943. (Watson-UK)
18666.0 BS1-FBI, Boston, MA, calling QT2, Quantico, VA, ALE at 2055, also 7903.5 at 2056. (Perron-MD)
19724.5 UIW-Kaliningrad Radio, RTTY navigational warnings in Russian, at 1635. (Hall-RSA)
21859.7 Unid-Unknown Egyptian diplomatic, with SITOR-A chatter in Arabic, at 1754. (Watson-UK)
21982.0 TZ4081-American Trans Air, working Thailand in HFDL, at 1414. (Privat-France)
25186.0 ASI-British Military, Ascension, sounding in ALE at same time as KUW. Kuwait, at 1506. (Hall-RSA)
27870.0 JDG-US Air Force, Diego Garcia, ALE sounding at 1246. JDGSPR, Diego Garcia secure data network gateway, sounding in ALE at 1317. CRO, Croughton, sounding at 1344. (Hall-RSA)

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Venezuelan Army / Swedish Navy

This month, with the help of fellow digital listener Ron Peron, we take a detailed look at the extensive Venezuelan Army network audible throughout the HF spectrum. We also profile this year's expedition by the Swedish Navy's traveling training ship, the *HMS Carlskrona*.

❖ Venezuelan Army

As most regular *DD* readers will know, most parts of the Venezuelan Forces are well-equipped radio-wise and have been using ALE for linking military networks across their large country for some time. The Army is no different and we were very pleased when Ron passed on a very useful breakdown of the likely networks and the meaning behind the ALE identifiers.

Let's begin by looking at the structure of the Venezuelan Army, which is broken down into six zones or regions. According to a profile available via web search engine Google's cache of defunct web pages the structure of the Army is as follows:

Area Militar 1 (HQ San Cristóbal) covers Táchira, Mérida, Barinas and Apure
Area Militar 2 (HQ Maracaibo) covers Falcón, Zulia and western Trujillo
Area Militar 3 (HQ Barquisimeto) covers Lara, Yaracuy, Portuguesa, Cojedes, Guárico and eastern Trujillo
Area Militar 4 (HQ Maracay) covers Caracas, Carabobo, Aragua, Miranda, Sucre, Nueva Esparta and northern Anzoátegui
Area Militar 5 (HQ Maturin) covers Monagas, southern Anzoátegui and the Delta Amacuro Territory
Area Militar 6 (HQ Ciudad Bolivar) covers Bolívar and the Amazonas Territory

Prior to the country's "Plan Ejercito 2000," each military zone had its own Infantry Division, each of which was further sub-divided into one or two brigades. Under the new plan, the Army combined the 1st and 2nd Infantry Divisions into a new 1st Infantry Division, with its HQ at Maracaibo. With their HQ at Maracay, the 3rd and 4th Infantry Divisions merged to become the new 4th Infantry Division. Lastly, a new 5th Jungle Infantry Division, headquartered at Ciudad Bolívar was formed to cover the old regions 5 and 6 in the south of the country.

So let's look at ALE identifiers which have been collected thus far:

CGE
CLC
CLC13, 22, 32, 321, 41, 43, 44, 51, 52
CLM
CLM21, 31, 32, 41, 42, 46, 52
CRC
CRC1, 2, 3, 4, 5
CRM
CRM2, 4, 5
PCRC5
PCRM5
SCLC211, 222, 224, 431, 432, 442, 50, 501, 51, 511, 513, 514, 521
SCLM34, 340, 341, 342, 344, 347, 349
SCM02, 04

As we might expect from the Army's five division organization, we never see ALE identifiers having numeric portions with a starting digit higher than 5.

Using a number of Spanish translation guides, Ron was also able to piece together the following possible meanings for each identifier prefix:

CLC= Communications Logistics Center (Centro Logistico Comunicaciones)
SCLC= Communications Logistics Service Center (Servicio Centro Logisitico de Comunicacicnes)
CRC= Regional Communications Center (Centro Regional de Comunicaciones)
PCRC= Rear Command Post (Communications) (Puesto de Commanda Retrasado Communicaciones)
CLM= Maintenance Logistics Center (Centro Logistico Mantenimiento)
SCLM= Maintenance Logistics Service Center (Servicio Centro Logistico Mantenimiento)
CGE= Army HQ (Cuartel General de Ejercito), Caracas

The digits themselves appear to correspond closely to the various unit numbers of the battalions into which the lower hierarchies of each division are structured. For example, SCLC512 is likely to be the communications facilities of the 512th (Jungle) Infantry Battalion based at Fort Tarabay. Identifiers with a single digit are most probably the central (HQ) facilities of each division.

When Ron checked the frequencies used by each identifier, he was able to determine the following net structure, too:

2nd Infantry Division: 5760, 9232, 10156, and 11610kHz USB
3rd Infantry Division: 7597, 8050, 9232, 9259, 12192, 13464, 13506kHz USB
5th Infantry Division: 9233, 12191, 14569kHz USB

There are likely to be many more frequencies that we have yet to find in this large and interesting network. Perhaps you will come across them some day...?

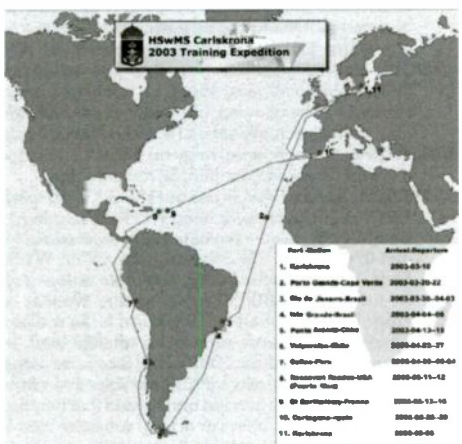
❖ HMS Carlskrona

We were lucky to hear the Swedish Navy's training ship towards the end of this year's annual expedition, sending email back to home using a 1200bd MIL-188-110a high-speed modem. When we heard her on 13511kHz she was nearing the end of her trip and close to her last port of call in Cartagena, Spain.

The *Carlskrona* (shown in Figure 1) makes the annual trip in order to provide a more extended training environment for her compliment of 72 cadets undergoing basic training. During this time the servicemen will learn about all aspects of their new jobs from the galley to the bridge to the engine room.

The trips also serve an important function as "goodwill" missions to the various countries that the ship visits. The ship and its crew are, in effect, ambassadors of their country while abroad and show the Swedish flag. Apart from furthering Swedish general interests, they also support Swedish the export industry in ports visited and the *Carlskrona* carries exhibitions on Sweden, Swedish industry, and their home port of Karlskrona.

The 2003 expedition covered the following ports of call and countries, following the route shown in Figure 2.



Karlskrona, Sweden
Porto Grande, Cape Verde
Rio de Janeiro, Brazil
Isla Grande, Brazil
Punta Arenas, Chile
Valparaiso, Chile
Callao, Peru
Roosevelt Roads, Puerto Rico
St Barthelémy Islands, France
Cartagena, Spain

Maybe you will be able to hear her on her 2004 voyage?

Our thanks again to Ron Peron for his assistance with this month's column. Until next time, enjoy your digital listening.

Resources

Venezuelan Army - http://www.ejercito.mil.ve
Spanish Military Glossary - http://carlisle-www.army.mil/usamhi/usarsa/main.htm
HMS Carlskrona - http://www.4minkriflj.mil.se/ue/index.php?lang=eng

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www.worldofradio.com

Web Resources

LISTEN TO THE WORLD - ENGLISH LANGUAGE TRANSMISSIONS with convenient links to station websites, well-updated: **http://www.swl.nu/listen/#bottom** (via Alexandre Deves Sailer, radioescutas)

ALBERT BELLE ISLE's 3-page list of selected English broadcasts by time: **http://www.cerberussystems.com/%7Ebelleisl/swl2003a.txt**

MARK FINE's comprehensive list of SW broadcasts: **http://www.fineware-swl.com/**

DANIEL SAMPSON's PRIMETIME SHORTWAVE in several formats: **http://www.primetimeshortwave.com/** (via Ulis Fleming, swl @ qth.net)

DOMESTIC BROADCASTING SURVEY #5. Danish Shortwave Club International has updated its DBS and the fifth edition is now on sale by e-mail as pdf-files. Contains about 1725 entries of domestic shortwave stations including the tropical bands, and clandestines. **http://www.dswci.org** and click Domestic Broadcasting Survey for more details (Anker Petersen, DSWCI) It's a really exhaustive publication, by frequency from tropical bands to 29 MHz, excluding external services; also a listing by frequency of such stations which have been deleted in the last few years (gh)

NEW WEB RECEIVER CLUB for anyone interested in listening to live SW receivers over the internet. There are now over 40 web radios around the world; most are Javaradios. **http://groups.yahoo.com/group/webreceivers/** (Bradford Wall, CA, EDXP)

AFGHANISTAN [non] R. Afghanistan via Kvitsøy, Norway, 18940, *1430-1545 June 7, Dari IDs, talks (Anker Petersen, Denmark, *@tividade DX*) Same date, changed to Pushtu at 1452 (Dmitry Mezin, Kazan, Russia, *Signal*) Still on despite new 400 kW MW 1107 in Kobul, but maybe not for long (gh)

ALASKA Construction continues at KNLS. One major problem has been this year's warm winter left the ground outside not frozen hard enough for the equipment to complete placing the earth anchors for the new tower and antenna. This will have to be accomplished now by using a drill mounted on a tracked vehicle. It is planned that the tower be installed during July and the antenna be erected in September for the second 100 kW transmitter (**http://www.knls.org**)

ANGOLA Under legislation currently prepared, government will lose monopoly on SWBC. Media Minister Hendrick Vaal Neto announced that privately-run SW stations will be allowed, but financial considerations might limit the number of new stations actually set up (© Radio Netherlands *Media Network*)

ARGENTINA R. Continental relay on 5339.91-LSB opening night program at 0519 (Flávio Archangelo, Jundiaí, SP, *radioescutas*)

AUSTRALIA Severe QRM wipes out HCJB 11770 totally at times (Don Rhodes, Vic., *EDXP*) HCJB has approached WYFR concerning 11770 for Portuguese to Brazil 0800-1045, causing havoc to HCJB-Australia in New Zealand. Kununurra operates 0700-1200, 106 degrees, to EAu/SPac. WYFR uses 100 kW, 142 degrees, to SAm, widely heard in Pacific. The other antenna at Kununurra is at 307 degrees, for India on 15480; 30-meter towers. Neither can be operated on all bands. Program distribution to Kununurra is via a dial-up wideband ISDN link from Kilsyth, a Melbourne suburb, no satellite feed. Transmitter was constructed in Ecuador (Bob Padula, EDXP *World Broadcast Magazine*)

Both organizations [HCJB and Voice International] are phenomenally wealthy. Both are so well organized and funded that they are understood to be prepared to provide digital receivers or at least subsidize their $100 cost (Deborah Cameron, *Sydney Morning Herald* via Robert Williams, Jilly Dybka) So why all the cutbacks from Ecuador? (gh) See also ECUADOR

BELARUS' On 4982 around 0335, in Russian, ads, morning exercises by radio. ID at 0340 "Radio Stalitsa." Carrier partially suppressed; had to use BFO (Yaroslav Derevyagin, Odessa, Ukraine, *open_dx via Signal*)

BENIN ORTB, 7210.25, 2210-2300* French, vernacular talk, variety of US and French pops, ballads, Afro pops. Sign-off with NA. Weak but in the clear (Brian Alexander, PA, DX Listening Digest)

BOLIVIA 6585.41, unID at 0100, religious station with Indian language brass *banda del pueblo*, mentioning *"La Esperanza,"* very stable in frequency to 0200* (Björn Malm, Quito, Ecuador, *SW Bulletin*)

New at 1205 on 6586.1v, is Radio Nueva Esperanza, El Alto, Depto. La Paz, already on MW 1520 (Rogildo Fontenelle Aragão, Cochabamba a.k.a. Quillacollo, Bolivia, *DXLD*) 6585.4, at 1010+ Sponish and Aymara, religious (Arnaldo Slaen, Cascomus DX camp, Argentina, *hard-core-dx*) Got it here in Moscow and even recorded more than one hour of it starting from 0036 up till 0143, mostly talk, only one music fragment, choral singing (Artyom Prokhorov, Russia, *Cumbre DX*)

BRAZIL 12575, R. Globo, Rio de Janeiro, 1200+, A3H feeder, ID mentioned 1220 kHz (Adán Mur, Paraguay, *Conexión Digital*) unID Brazilian on 6370.00! Seems not harmonic, at 1010, typical Brazilian-Portuguese talk, someone playing around, or relay by a utility station? (Björn Malm, Ecuador, *SW Bulletin*) both on maritime bands Rádio Canção Nova, Cachoeira Paulista, now relayed by Rádio Gazeta, São Paulo, which means that their letterbox program *Além fronteiras*, Sats 2200-2300, can be heard on 5955, 9685 and 15325 in addition to 4825, 6105 and 9675 (Henrik Klemetz, Sweden, *DXLD*)

CANADA On June 11, the House of Commons Standing Committee on Canadian Heritage came out with a massive report on Canadian broadcasting and among its 97 recommendations, one that RCI be strengthened. Details at: **http://www.geocities.com/rciaction/HeritageCttee20030611.html**

Neither CBC, nor our own management had informed staff by one week later when they got the news from the RCI Action Committee. The recommendations come at a time when RCI is increasingly losing control, as it is integrated into the domestic service, CBC/Radio-Canada. Offices are being given away to personnel from the domestic service. There are even days were RCI conference rooms are so booked, that RCI personnel has to meet elsewhere. Master control room that coordinated all broadcasts in and out of RCI has been dismantled, now routed through the central control of the domestic service. Technical, administrative and support are now all part of the domestic service. Production staff is still working with reduced resources, and a number of permanent positions have not been filled (Wojtek Gwiazda, RCI Action Committee)

RCI frequency change for 2200-0000 (World at Six, As It Happens): 6140 replacing 13670, to benefit New England, NY, NJ – 9590, which was expected to do well, was skipping over that region (Bill Westenhaver, RCI, CKUT *International Radio Report*)

CHILE R. Santa María, 6029.7v is off SW for budgetary reasons, remaining on MW only, a friend in Coyhaique confirms (Gabriel Iván Barrera, Argentina, *Conexión Digital*)

CHINA CH8S, China Huayi Broadcasting Station: I am QSL manager, and will reply with full-data card if report sent to me at: Qiao Xiaoli, Fen Jin Xing Cun 3-4-304, Changshu, JiangSu 215500, P. R. China or just email me at 2883752@163.com Return postage, 1 IRC or 1 Euro or $1 appreciated but not necessary. Chinese DX program *"Sky of BCL"* on CH8S added English IDs and a midnight airing, so now: Sat 0730-0830 and Sun 1600-1700 both on 6185. In winter also on 4830. CHBS also wants official monitors all over the world. Contact chrisyuanjia@sohu.com (Qiao Xiaoli, *dxing.info*)

[non] Fang Guang Ming (Falun Gong) on TDP's website: 2100-2200 on 6035 and 9625 (ex-9945) (Silvain Domen, Belgium, *DXLD*) Both via Samara, Russia, 200 kW, 297 degrees; 9625 excellent here (Observer, Bulgaria) On Falun Gong persecution in China: **http://www.faluninfo.net** and **http://www.clearwisdom.net** as well as **http://www.falundafa.org** (Gary Pansey, FL, *DXLD*)

COLOMBIA 2879.98, R. Reloj, Tuluá, popped up with good strength at 1058, which is 10 minutes before sunrise. Harmonic 2 x 1439.99. My recordings of these and others at **http://homepage.sverige.net/~a-0901/** (Björn Malm, Quito, Ecuador, *SW Bulletin*)

CONGO 5985, R. Congo 2059-2301* French, 15 minute music and talk blocks alternating. No formal ID but several mentions of "Radio Congo" and "Brazzaville" during phone-in (Scott Barbour, NH, NASWA *Flashsheet*) Best time is in the 0430-0455 window from sign-on until WYFR opens; later, surprisingly good and in the clear at 2155-2300* (Brian Alexander, PA, *DXLD*)

CONGO DR R. Okapi, Kinshasa, 6030-USB, at 2210 Afropop/US soul instrumental non-stop music; only two female ID jingles in 30 minutes; SWR [Germany] absent that night; jamming to R. Martí not until 2305; SIO 353 (Luca Botto Fiora, Rapallo, Italy, BDXC-UK *Communication*) 6030 at 2218, lovely Congolese songs and western soul. Only once heard DJ (tho very clearly) say "Okapi," peaked here at 2240 (Finn Krone, Denmark, *hard-core-dx*) Certainly a rare one, especially on this frequency. Why go to all the trouble to set up station and network, to play so much music? (gh)

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; A-03=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

CROATIA [non] HRT via 100 kW DTK T-systems Germany as revised 23 May, shows overlap on 9925, two targets at once: 2300-0400 230 degrees SAm, 2300-0300 300 degrees ENAm, 0300-0700 325 degrees WNAm; 9470 0400-0700 230 degrees for NZ rather than SAm, 13820 0600-1000 Au (via Alokesh Gupta, India, *DXLD*)

CUBA On two dates in May, RHC English on 9550 was at 2300-2400 instead of 2230-2330; *DXers Unlimited* Tue 2341 (John H. Carver Jr., Mid-North Indiana, *DXLD*) English at 2030 heard on 9550 (Chuck Bolland, FL, *DXLD*) Message from RHC to Gilles Garnier says they broadcast to Europe only episodically due to transmitter problems (**http://perso.wanadoo.fr/jm.aubier**) 2030 English hour heard on bath 11760 and better 9505, not announced long-defunct 13660 and 13750 (gh)

R. Rebelde on new 11655 with *Haciendo Radio* program around 1100-1300 (José Elias Diaz Gómez, Venezuela, *Conexión Digital*) Also around 1600-1730 on 11655; and on new unlisted 15074.97 at 0847, and at 0130 with *Música Beat*, mentioning FM 96.7 (Adán González, Venezuela)

[non] R. Martí program schedule: **http://www.martinoticias.com/schedule.asp** (Oscar de Céspedes, *Conexión Digital*) Still broadcasting only Catholic mass Sun 1100-1200. Why aren't all the others breaking down the doors of R. Martí demanding equal free time? Does the NRB know about this? (gh)

DENMARK A collection of Danish QSL cards through the years can be seen at: **http://www1.dr.dk/pubs/nyheder/html/programmer/kortboelge/qsl.html** (Erik Køie, Copenhagen, *DXLD*)

ECUADOR [and non] Contrary to the June issue *Closing Comments*, acceding to a barrage of listener protest, HCJB decided to allow Allen Graham to keep producing *DX Partyline* after the termination of English to Europe and North America. It remained broadcast via Australia, Sat 0930 on 11770, 1430 on 15480, but schedules expected to change in July; and to NAm at a new time on the one remaining English broadcast from Ecuador, Sat 1230 on 15115, 21455; and then supposedly via WINB, UT Sun 0000+ on 12160, which just happens to be the same time as previously on HCJB 9745 (gh) 9745 remained on the air with Spanish at 0100-0500, moved from 9525 (*Observer*, Bulgaria) English at 1100-1300 actually off-frequency, 15114.2. Now includes for-right shows besides religious teaching. Just as well the founders of HCJB can no longer hear it (John Figliozzi, NY) *Morning in the Mountains* not part of the current schedule. Once some of the staff return from Home Ministry Assignment (i.e. furlough), early Aug, *MIM* to start up again (Allen Graham, via Figliozzi, *swprograms*) Graham says they have four new quarterly QSLs for 2003 featuring volcanoes (Ben Loveless, WB9FJO, MI, *DXLD*) Cards were delivered after pressure from Allen *et al.* to continue QSLing contrary to previous cost-cutting plans (*DX Partyline*) See also AUSTRALIA

R. Nacional Espejo, Quito, is looking into possibility of resuming SW on 4879. Radio Saquisili y Libertador, Saquisili was active again in June early evenings and late mornings on 4899.77 (Björn Malm, Quito, *SW Bulletin*)

EGYPT R. Cairo tested 17675 to replace 17775 for English 1215-1330, then Bengali to SAs (Swopon Chakroborty, Kolkata, India, *DXLD*) Unable to copy much due to foding and massive splatter from Finland (Scott R Barbaur Jr, NH, *DXLD*) Cairo in English on new 9755 at +1703-1715+ (Robertas Pogorelis, Belgium, *DXLD*) Terribly bad modulation 1710-1830, then African language, ex-15255?. With this horrible audio, what a waste of time, money, program producers' efforts (Jari Savolainen, Finland, *DXLD*) Not so bad the day I heard it (Pogorelis)

FINLAND YLE, R. Finland A-03 includes Special Finnish: at 1555 on 17670, 1945 on 6140, 2055 and 0245 on 6120, 0845 on 17615, except on Sun/UT Mon when there is Latin news. Also complicated schedule in Finnish including relays of many local stations, a different one each day of week, at 0700-1100, 1200-1300, 1315-1400 on 11755, 6120; 1315-1400 Swedish on 9630 (via Sergey Kolesov, via Alan Roe, World DX Club Contact) I can see it now: hard-core DXers trying to QSL each individual station via SW to run up their station totals, even tho they don't understand a word of Special Finnish (gh)

GERMANY New address: Deutsche Welle, D-53111 Bonn (Wolfgang Büschel, Germany, *DXLD*)

GREECE Unidentified on 17340-USB at 1207-1218* in Greek with news, weather, rather strong (Robertas Pogorelis, Belgium, *DXLD*) Probably coastal station SVO, Olympia Radio, Athens on 17341 SSB relaying some broadcast (Glenn Hauser, *DXLD*) see also TAJIKISTAN

GUYANA GBC on 3291.2, at 0010 news in English, 0100 lottery numbers? 0800-0920, ID, 0830 choral music, 0837 subcontinental music in usual eclectic mix, 0850 birthday greetings, 0916 pop music (Bob Wilkner, FL, *DXLD*)

HUNGARY New SW site for IBB is Jaszbereny, now on schedule with RFE/RL: 0300-0400 9760 Tajik; 0400-0500 11710 & 0500-0600 11885 Russian; 1600-1700 9505 Armenian (Wolfgang Bueschel, Germany)

ICELAND Trish Huizinga confirms the AFN 13855-USB site as Grindavik, attached to the base in Keflavik, also the site for previous mistaken 3903 kHz transmission; no plans for additional frequencies (Jerry Berg, MA, NASWA *Flashsheet*)

INDIA Temporary relay of AIR Patna lasted about two weeks on 11620 while MW 621 transmitter was down, then resumed external service, heard at 1515 (Jose Jacob, *dx_india*)

INDONESIA About once a month, VOI at 2000 on 15150 suddenly becomes a great signal with perfect clarity. What do you suppose is the reason for this? Beaming to USA by accident? Higher power? Shows what they could do if they really tried (Zeke Russell, AZ, *DXLD*) Suspect both propagation and transmission variations involved (gh)

IRAN Voice of David via IRIB, 9910, *0228-0245, sign-on with haunting flute Interval signal, 0230 chimes, sign-on in Hebrew. ID is Kol Dah-veed, gives web site as **http://www.iribworld.com** then news and commentary (Edward Kusalik, Coaldale AB, *Cumbre DX*)

[non] Iran Democracy Act, S. 1082, appropriates $50 million to establish an Iran Democracy Foundation that will provide grants to private pro-democratic Iranian-American radio programs and other pro-democratic activities; introduced in the Senate Moy 19. Requires R. Farda to ensure that a significant percentage of programming is devoted to discussing democratic change in Iran including an internationally-monitored democratic referendum. Not less than 10 percent of the funds appropriated to the International Broadcasting Operations account for fiscal year 2004 shall be made available to carry out the provisions of this Act (via Nick Grace, *CRW*)

V. of Southern Azerbaijan, clandestine for Iran on 9375, may actually transmit from Azerbaijan, as in March a request was made to the government there to change from SW to MW, according to an article in the Swedish-based, Azerbaijan-related website **http://www.cehreganli.com/xeberler/radiok-english.txt** The station's webpoge **http://www.cehreganli.com/media/radio.html** provides audio files of the broadcasts in Azeri, not Farsi. Maybe produced in Sweden, as Stockholm occasionally mentioned (Bernd Trutenau, Lithuania, *DXLD*)

IRAQ Had a chance to interview via satellite for CNN Jalal Talabani, Founder and Secretary General of the Patriotic Union of Kurdistan (PUK). He confirmed that Voice of Iraqi Liberation, the clandestine radio operation first monitored by and reported on *DXing.info* was a U.S.-sponsored operation in which the CIA was involved, and that it was broadcasting from the PUK-controlled part of Iraqi Kurdistan (Mike Mäkeläinen, Finland, *dxing.info*)

ISRAEL IBA meetings didn't specifically discuss SW. The official stance is that they will stop shortwave BY the end of the year – not AT the end of the year. A good address to send letters to protest the closure would be to: Chairman of the IBA, Avraham Natan, IBA House, 161 Jaffa Road, Jerusalem 91280 (Doni Rosenzweig, *DXLD*)

Director General of IBA, Yosef Barel, presented his restructuring plan to the IBA managing committee. Under the plan, the Foreign Service of Israel Radio will close. The plan has been necessitated by the government's planned budget cut of about $52 million through 2006; will see 200 employees taking early retirement (© Radio Netherlands *Media Network*)

ITALY While some stations cut back QSLs to save money, I continue to receive correspondence from stations who seem eager to keep their listener base. Some even send me presents – for example Rai, who I do some monitoring work for, has managed to outfit me with a nice little alarm clock, lapel pins, a pewter keychain, a very neat little radio and a fine shirt. It's almost enough to make one feel guilty (Sue Hickey, Grand Falls-Windsor, NF, *CIDX*)

IRRS schedule: daily 1900-2030 on 5780; Sat & Sun only 0800-1200 on 13840. All programs are in parallel 24/7 at **http://mp3.nexus.org** (Ron Norton, IBA, via *Cumbredx*)

KASHMIR [non] 5100, Voice of Jammu & Kashmir Freedom Movement, QSL in 97 days. Got a pack of six "SOS from Indian occupied Kashmir" magazines, two grand leaflets, Kashmir viewcards and letter from Islam ud Din But. Address: Islam ud Din But, Voice of Jammu & Kashmir Freedom Movement, P. O. Box 102, Muzaffarabad, Azad Kashmir, via Pakistan. For one IRC (Shukrat Rakhmatullayev, Tashkent, Uzbekistasn, *Signal*)

KOREA NORTH [non] The House International Relations Committee has approved a proposal authored by California Republican Rep. Ed Royce to increase U.S. broadcasts into North Korea. Royce's amendment expresses the sense of Congress that Radio Free Asia's broadcasts to the Communist stronghald should be increased to 24 hours each day (UPI *Capital Comment* May 13 via Jilly Dybka)

KURDISTAN [non] A Kurdish group on the US list of terrorist organizations has been allowed to broadcast from a SW transmitter in Rogaland, Norway. A growing number of opposition groups wish to use the transmitter to send messages to their home countries. It is owned by Norkring, which does not check its customers against the list of terrorist organizations. One of those is the Kurdish group PKK, which is both on the US list and the EU list of terrorist organizations (Hanne Dankertsen, *Nettavisen*, Norway via Kim Elliott)

What station? TDP's listing of clandestine stations shows V. of Independent Kurdistan, links to **http://www.pkk.org/** which is entirely in Turkish! – not Kurdish. Not a TDP client and used 4 MHz band, not via Norway (gh) Voice Of Mesopatamia in Kurdish on 15675 from 0400-0800 allegedly comes from Norway. According to clandestineradio.com this one is backed by the PKK (Silvain Domen, Belgium, *DXLD*) Heard on 15675 before and after 0500 (César Pérez Dioses, Chimbote, Perú, *hard-core-dx*) Denge Mezopotamya, HQ in Brussels, Belgium, transmits in four Kurdish dialects: Kurmanji, Sorani, Dimilki [Zazaki], and Hewremani. Broadcasts also via website **http://www.denge-mezopotamya.com** (*Azadiya Welat* weekly newspaper, By Sevda Eldemir, March, via KurdishMedia.com via Bernd Trutenau, Lithuania) Kurdish 0400-0800 Daily on 15675 via Kvitsøy, Norway, 200 kW, 110 degrees. 0800-1600 Daily on 11530 via Moldova, 500 kW, 116 degrees (*Observer*, Bulgaria)

LEBANON A 1969 Radio Liban QSL card fetched US$787 at an eBay auction. QSL cards are well established as collectibles now, and recent price levels (over US$50 each for AM/SW cards) would indicate that prices are taking off. An average collection of, say 1000 cards from the 1960s to date, may well be worth over $50,000 depending on which stations are included. I encourage all DXers to insure their QSL card collections, to make bequest provisions to lodge them with club collections and preservation groups or museums, or if they choose to put them on the market, to be aware of their potential value (David Ricquish, Radio Heritage Collection **http://www.radiodx.com** Wellington, New Zealand, *DXLD*) A second R. Lebanon QSL on eBoy closed at [only] $32.00 (Steve Lare, MI, *DXLD*)

LIBERIA On 13 May at 1645 on 11514.4 a station with several transmitter cut-offs and weak modulation, continuous gospel music with one announcement in (African) accented English, lost after 1800; possibly V. of Liberty from Monrovia testing (Jari Savolainen, Kuusankoski, Finland, *DXLD*) 11512.0, Voice of Liberty, Monrovia (tentative), 1715-1735, May 20, English, gospel songs (Anker Petersen, Denmark, DSWCI *DX Window*) WJIE advised May 30 that it was off the air waiting for a spore port; sent me photos of station which are posted in the Africa forum at *dxing.info* (Jari Savolainen, Finland) Due to fighting in Monrovia and paperwork problems it was decided to ship the 100 kW FEBA transmitter from Seychelles to Uganda, where we also have a mission, instead of Liberia (WJIE)

LIBYA [non] Trying to pick up Bahrain on 9745 at 2130 but station mentioning Iraq a lot, program "To our brothers in Iraq," Baghdad times; mentioned 9745, 11660, 7245, address in Libya; next day missing from 9, uncovering Bahrain again, but heard on 7 and 11. Address: The General Center for Overseas Stations, P. O. Box 4677,

Tripoli, The Great Jomohirya (=Libya). Fax: ++ 218 21 44 46 875. Times: 1800-1900, 2100-2200, maybe 1200-1300. Nothing at site of Libyan Radio & TV; claims they have only 3 networks: Great Jamahirya Radio, V. of Africa Radio, Holy Qur'on Rodio (Torek Zeidon, Egypt, *DXLD*) No more specific ID; vio Fronce like the rest from Libyo? (gh) V. of Africo, 15315, 1923-1929 ID, English ond French news, address, fox ond phone \\ 15025. Also 11635, May 25 *2000-2130* including English news 2041-2045, 2123-2127 (Brian Alexander, PA, *DXLD*)

LITHUANIA Sitkunai SW relays of R. Barabari, Avaye Ashena and FBN hove been cancelled; still carries R. Vilnius, R. Santec (Bernd Trutenau, Lithuania, *DXLD*)

MÉXICO XEYU, Radio UNAM, carrier between NSB 9595 and Rebelde 9600 around 9598 at 1245 (gh, OK) 9597.6, very poor at 1413, nice at 0103 in the clear, and at 0300 actually pretty good, steady S9 (Hans Johnson, *Cumbre DX*)

It is perhaps telling that the signals and modulation of R. México Internacional are both so poor, even in the neighboring country, that it did not even occur to me to include XERMX when I remarked on page 92 of the June ***MT*** that the departure of HCJB left us with nothing but Cuba and Argentino for Latin American external services in English. Strictly speaking, Mexico should be included, tho that hordly lightens the loss of HCJB. Strangely enough, no one has corrected me on this except myself (gh)

NETHERLANDS RN odded live streaming in 32 kpbs Windows Medio format as well as 16 kbps Real Audio, via **http://www.rnw.nl/distrib/realaudio/html/english.html** (Andy Sennitt, *Medio Network*)

NEW ZEALAND RNZI noted closing 9885 at 1310 but then they shift to 6095 for 5 minutes or so, before closing, just to check out the 6095 transmitter/antenna? (Steve Lare, Holland, MI, *DXLD*) After we close on 9885 the transmitter moves to 6095, tunes up ond then goes to bed (Adrian Sainsbury, RNZI via Mark Nichalls) In preparatian for next morning's first broadcast fram 1650 (gh)

NIGERIA [non] We welcome R. Abeokuta as a new member of NEXUS-IBA, from June 6, Fri, repeated Wed at 2000-2030 on 5780 via IRRS-SW, Italy, aiming at reaching the large community of Nigerians living in Europe: plenty of African music and info. See **http://www.abeokuta.org** (Ron Norton, IBA, via *Cumbredx*)

NORWAY see KURDISTAN

PAPUA NEW GUINEA A new SWBC station is planned for Sandaun Province in the near future, nothing to with NBC, to cover oll of PNG (Ian Baxter, Australia, ARDXC)

PARAGUAY Rdif. América moved 7371 test to 9983, in mid-June, as well as 15185, bath 200 watts, 24 hours; 9983 directional E/W; 15185 S. Reports for printed QSLs very welcome at: radioamerica@lycos.com or ramerica@rieder.net.py (Adán Mur, Radiodifusión América, Asunción, Paraguay, *DXLD*)

PERÚ 5009.65, R. Altura, Cerro de Pasco, Pasco, Pasco heard at 1110. Occasionally reactivated due to the death of a well-known person. Listen ta the recording from this occasion ond others at **http://homepage.sverige.net/~a-0901/**

6520.31, Ondas del Rio Marañón, Aramango, Bagua, Amazonas was active in May at 2300, also recorded (Björn Malm, Quito, Ecuador, *SW Bulletin*)

4890, R. Macedonia, 0430-0600 with organ and romantic instrumental music, only one ID "Macedonia." Outgunned by RFI Gaban from fode in 0445 to 0500* (David Norrie, Whitford Forest near Auckland, New Zealand using "fence post antenna" *Cumbre DX*)

R. Melodia, Arequipa, 5996, jumped to 6106 briefly, and then to 6042.55 (Björn Malm, Quito, Ecuador, *hard-core-dx*) And widely heard varying around there in late May, early June: 6042.5, at 0335 IDs, news of local violence (Rogildo Fontenelle Aragão, Cochabamba, Bolivia) 6044, Radio Melodia, Arequipa, YL in Spanish, 0023 past 0215, folk-like songs, phone-ins, sports (Artyom Prokhorov, near Moscow, Russia, *Cumbredx*) 6041.85v, 1049-1100 local news (Arnaldo Slaen, Argentina, *hard-core-dx*) 6042.56, 0459-0510, musical program, ID; another night on 6042.59 at 0546-0552 *"a través de la Onda Corta internacional desde la programación de Radio Melodia"* (Nicolás Eramo, Argentina, *DXLD*)

New station, 6536.06, Radio San Miguel, Sóndor, Huancabamba, Piura at 0200; formerly heard on 6536 was Rodiodifusora Huancabamba; recording at site above. Thord Knutsson says Rdif. Huancabamba is licensed on 3370 (Björn Malm, Quito, Ecuador, *SW Bulletin*)

PHILIPPPINES R. Pilipinas, Tinang, 0200-0330* in English on 11885 replacing 11775 but the old ID-tape still announced 12015! Heard also 15120, 15270 (Roland Schulze, Philippines, DSWCI *DX Window*)

RUSSIA V. of Russia told me on May 15: "I guess that you are missing *Moscow Mailbag*. Joe Adamov, the host of his program, has just returned home from the hospital, and we do not know when he'll be able to resume work." (Erik Køie, Copenhagen, *DXLD*)

SA'UDI ARABIA [non] Voice of Reform, in Arabic: 1800-2000 Daily on 15705 via Norway 500 kW, 125 degrees (*Observer*, Bulgaria)

SICILY RAI decided that SW transmitters at Caltanissetta on 6060/7175/9515 shall no longer be used for domestic broadcasts and closed down May 14 (Luigi Cobisi, Peninsular Italy, DSWCI *DX Window*)

6060 remains on air but from Roma (Prato Smeraldo) with *Notturno Italiano* 2200-0400, 100 kW (Roberto Scaglione, Dario Monferini, *DXLD*)

SINGAPORE RSI English: 1100-1400 on 6150 9600 (via Patrick Travers, *World DX Club*)

SLOVAKIA On RSI's mailbag program, Marcela Gregorcova asked listeners to the two-month old Spanish service who had inundated the station with requests for all kinds of goodies – calendars, maps, stickers, stamps, pennants – to be potient, as the staff was entirely occupied with their primary job of producing programs (via Rubén Guillermo Margenet, *DXLD*)

SOLOMON ISLANDS One mystery: for a few years now, I'm hearing BBCWS on 5020 from at least 1200 to 1500. The reference books show SIBC off the air at this time. Could they be relaying BBC? It's obviously coming from the Pacific Rim. Only ID at top of hour is "BBCWS." I've never seen the frequency listed anywhere. I have reported it to *Monitoring Times*, but they never list it, perhaps because they can't verify it (Zeke Russell, AZ) We have had numerous reports of SIBC relaying BBCWS overnight on 5020 (gh)

SOMALILAND 7530.6, R. Hargeisa at 1922 tune in with news and current affairs in English. "Voice of the Republic of Somaliland". Mode is USB plus carrier, a bit difficult "battle-sound" audio. Around 1939 switched to Somali until 1957* (Jari Sovaloinen, Finlond, *DXLD*) Must hove reploced transmitter over the post few months. Earlier this yeor it wos more-or-less on channel (7530), USB with o corrier, so OK to listen to in AM mode. Naw it is on 7530.6 ond the corrier is so heavily suppressed that listening in AM mode is impassible. Even in USB mode the oudio sounds very rough. A pity, os the signol strength is reasonable (Chris Greenway, Kenya, *DXLD*)

SRI LANKA SLBC swapped 9 and 11 MHz channels again putting English back on 9770 ot 0030-0430, 1230-1530, as well as 6005, 15745 (Jose Jacob, VU2JOS, ATOJ, *DXLD*)

TAIWAN [and non] RTI Spanish service staff are indignant with the postal services of Argentina and Spain, which mailbag presenter Bonnie Cheng says returned letters to listeners from the station on the pretext that they might spread SARS, rather than close personal contact (Célia Romois, Panorama, *@tividode DX*)

From July 1, Radio Taipei International changed its name to Radio Taiwan International (César Pérez Dioses, Perú; Adán González, Venezuela, *DXLD*) Affects all 12 language services; in French it was explained that some listeners were confused about haw Taipei related to Taiwan! (via Daniel Say, BC, *DXLD*)

TAJIKISTAN [and non] Not only was V. of Greece, 9420, putting a spur on 9270, at 2100-2300 but also on 9270 is the 2nd harmonic af 4635 heard at 1830; also puts out 3rd harmonic on 13905 heard at 1720. Tojik Radio transmitter in Yongiyul on 4635 seems ta be in rather bad shape. The carrier is wobbling and modulation is weakish (Jari Savoloinen, Finland, *DXLD*)

TOGO [non] In early June found an addition to TDP clandestine clients, Radio Togo Libre at **http://www.airtime.be/whose.html** – Schedule ot **http://www.airtime.be/schedule.html** shows: Rodio Togo Libre in French M-F 1300-1400 21760, Sun 2000-2100 12125. Website is **http://www.diastode.org/** which is Diaspora Togolaise pour la Democrotie = Togolese Diasporo for Democracy (gh, *DXLD*) Heard on 21760 at 1300-1400, African) French with many IDs as "RTL - R. Togo Libre." Schedule often repeated with patriotic diologue interspersed with Afro-Cuban rumba style songs. On Sat and Sun at same time 21760 is Channel Africa from Meyerton (Alan Pennington, BDXC-UK, Mike Barraclough, WDXC) Same audiafile at **http://www.diastode.org/Nouvelles/nouvelle1391.html** but 21760 had some other French program before 1300. RFI is scheduled 1230-1300 in French via Meyerton on 21760. So, R. Togo Libre starts at 1300 just after RFI time pips. RTL must be from Meyerton, too, as there was no gap in carrier/program. Clockwork (Jari Savolainen, Finland; Silvain Domen, Belgium) Website says service established because of the June 1 elections in Togo; program produced at great risk in Togo and sent to transmitter site with difficulty. Contact: rtl@diastode.org Listened to audio file, and like website it partly gave frequency wrong as 27760. In the sixth minute, switched from French ta Ewe (gh) Received an answer from Alexis Ayavon. Diastode is in Montréal, Canada; asked for money (Christian Ghibaudo, France, DSWCI *DX Window*)

RTL is a joint initiative of the National Dialogue of Civil Society (CNSC) and the Togolaise Diaspora for Democracy and Development (DIASTODE). A second website emerged, **http://www.togodebout.com/rtl.html** saying RTL sought correspondents in the main town of each Togo prefecture (© Radio Netherlands *Media Network*) Whether the Sunday frequency 12125 was also via South Africo has been a matter of dispute; could be Russia, or ?? (gh)

UGANDA One of the ex-FEBA-Seychelles 100 kW SW transmitters may wind up here for a new missionary outlet; see LIBERIA

U K [and non] BFBS SW relays left the air from Sunday morning 18 May. Presumably they now have enaugh coverage from local FM transmitters (Olle Alm, Sweden, *DXLD*)

U S A At the annual meeting of the National Association of SW Broadcasters in May, Tom Lucey of FCC's International Bureau reported that frequency coordination fees are being cut in half as of the B03 season, since the FCC will only be charging for two seasons per year instead af four. This will save stations thousands of dollars a year.

Dr. Kim Elliott of IBB Audience Research revealed results of o very recent worldwide VOA listener survey. 59% of respondents indicated they listen to VOA on SW, 16% to rebroadcasts of VOA on local AM and FM stations, 15% to VOA MW outlets, 9% to VOA Internet audio, 0.4% to direct-to-home VOA satellite transmissions, ond 0.2% to VOA on cable radio (NASB) So nearly 75% of VOA listeners tune in to VOA's own transmitters (bath MW ond SW), and those highly-touted local-station rebroadcasts are pretty negligible in their reach by comparison – ditto internet/satellite/cable radio, only more so (Randy Stewart, MO, *DXLD*)

Heavy interference to WWCR 5070 appeared here in Atlanta; sounds like a battle banging against something concrete, strongest after 0500 (Lou Johnson, KF4EON, *DXLD*) That would be the "banker" with data bursts, also bathering in Chicago per George Thurman but barely audible here in huge WWCR sideband, around 5072 (gh, OK) Disappeared a few hours after calling the FCC about it (Johnson) *World of Radio* on WWCR: New time replacing Sat 0600: Sat 1030 on 5070.

WINB decided to add DX programs to its schedule, thanks to sales manager Hans Johnson. After initiol daytime hours on 13570, three were to be grouped into a block, UT Sun 0000-0030 on 12160: HCJB *DX Partyline*, then *World of Radio* at 0030, AWR *Wavescan*. The first attempt resulted in none of the programs airing as scheduled (gh)

WWRB at 0613 with spur on 5034.22, instead of usual 5015v, //5050 and 5085 though much weaker (Paul Ormandy, ZL4TFX, New Zealand, *DXLD*)

Steve H. Anderson, who once broadcast o hate-filled, extremist SW radio program [Kentucky State Militia Radio, later United Patriot Radio], pleaded guilty May 30 to federal weapons charges filed after his attack on a sheriff's deputy. (So the trial scheduled for July 28 will not be necessary.) Anderson foces 10-15 years in prison; to be sentenced before U.S. District Judge Danny C. Reeves on Sept. 12 (Bill Estep, Lexington KY *Herald-Leader*)

VANUATU 7260, Port Vila, good signal at 0737 with news in presumed Bislama with English words, 0738 ID, 0740 really nice local music (Patrick Martin, OR, *hard-core-dx*)

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

Global Forum

Broadcast Logs

Gayle Van Horn
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0000 UTC on 12040
UKRAINE: Radio Ukraine Intl. English news to station ID and freq schedule. (Lou Rossetti N1PUX, Arlington, MA)

0030 UTC on 11800
ITALY: RAI. Italian comedy program // 9675. (Bob Fraser, Cohasset, MA) Domestic service **RTV Italiana-Caltanissetta** 6060, 2340 Italian. (Matthew Stanley, New York, NY)

0030 UTC on 9580
IRAN: VOIRI. English news followed by Koran recitations. Comments and news item on oil industry in Iraq, // 6120 poor. (Rossetti, MA) 11610, at 0230. (Stanley, NY)

0050 UTC on 9985
NORWAY: Radio Denmark relay. Danish. Sports news roundup with focus on Tiger Woods. Interval signal to 0055*. (David W. Weronka, Benson, NC) 11615 // 7465 Danish. (Jill Dybka KF4ZEO, Kingston Springs, TN), **Radio Norway** 15705, 1600 Norwegian. (William McGuire, Cheveryl, MD)

0100 UTC on 9665
RUSSIA: Voice of. Sign-on's national anthem to ID and newscast, // 11825; 11675, 1930 // 9775. (Froser, MA) **VOR-Armavir** 9830, 0120 Spanish // **VOR-Armenia** 9965; **VOR-Armavir** 11675, 1712.**VOR-Tajikistan** 11510, 0130 Spanish. **Radio France Intl-Irkutsk**, Russian 15535, 0023 French.. (Stanley, NY) **VOR-Irkutsk** 9800 // 9485, 1542 Russian. (Patrick Martin, Seaside, OR) **VOR-Moldova** 9665, 0433-0500* English. (Joe Talbot, Red Deer, Alberta, Canada/*Cumbre DX*)

0150 UTC on 11815
USA. Voice of America-Delano, CA. Music from Sheryl Crow and N'Sync. Station ID at 0155. (Stanley, NY) **VOA-Delano** 9770, 1145 (Fraser, MA) **Radio Marti-Delano** 15330, 0105 Spanish. (Stanley, NY) **VOA-Sao Tome** 11975, 1932.(Dybka, TN) **VOA-Botswana** 9885, 0410.(Stewart MacKenzie, Huntington Beach, CA) **VOA-Thailand** 7125, 1530. (Martin, OR) **WBCQ** 7415, 2157-2200; **WHRA** 17650, 1637.(Joe Wood, Gray, TN)

0230 UTC on 6230
GERMANY: Sudwestrundfunk. German service of techno-pop tunes, fair quality. **Deutsche Welle-Nauen** 9735, 0503 German. (Talbot, CAN) **Democratic Voice of Burma-Julich, Germany** 9435, 2340 Burmese. (Stanley, NY)

0235 UTC on 9925
GERMANY: Voice of Croatia. Spanish newscast read by announcer duo. (MacKenzie, CA) **Croatian Radio** 13830, 0459-0520. English news to music bridges, // 6165. (Talbot, CAN)

0415 UTC on 5890
VATICAN CITY: Vatican Radio. German text to interval signal and English at 0500. Fair signal, slight fading during onset of aurora display, eliminating all tropical band DX signals from 0700-1300. (Talbot, CAN)

0441 UTC on 12060
MADAGASCAR: Radio Voice of Hope. First log for English service of interviews on activities in Sudan. Afro pop musical interludes between interview segments. Vernacular language commencing at 0450 including several IDs as "Radio Voice of Hope," including mentions of Sudan, Uganda and Nairobi. Strong signal with minimal fading and static. Overall poor to good signal quality. (Wood, TN)

0830 UTC on 7260
VANUATU: Radio Vanuatu. French service's fair signal quality for island music with static crashes. (Martin, OR)

0950 UTC on 3234.93
PERU: Radio Luz y Sonido. Andean music to local ads and ID. Additional Peruvians in Spanish; **Radio El Sol de los Andes** 3230.81, 0956-1000; **Radio Atlantida** 4790, 1003-1009; **Radio San Antonio** 3375, 1018+; **Radio del Pacifico** 4975, 1040-1101; **Radio Cusco** 6193.94, 1111-1116. Arnaldo Slaen, Buenos Aires, Argentina).

1001 UTC on 3300
GUATEMALA: Radio Cultural. Religious choir music to Spanish preview of tomorrow's programming. (Dybka, TN) Guatemala's **Buenas Nuevas** 4799.92, 1040+ Spanish. (Slaen, ARG)

1018 UTC on 4919.20
ECUADOR: Radio Quito. Local folklorica music to Spanish ID as "Radio Quito, la voz de la capital," SINPO 24432. Ecuador's **Radio Federacion** 4960, 1032-1037 Vernacular; **La Voz del Upano** 5040, tentative 1038+ Spanish; **HCJB** 3220, 0938+ Spanish; **La Voz del Napo** 3279.93, 0945 Spanish. (Slaen, ARG) **HCJB** 9745, 0420. (MacKenzie, CA)

1230 UTC on 7185
BANGLADESH: Radio Bangladesh. Fair signal for English service news targeted to India and Pakistan. First time heard on shortwave. (Martin, OR)

1746 UTC on 11690
RWANDA: FEBA Radio relay. Tigray service for male/female duo's talks and Horn of Africa style music. Talks over music at 1755 with solid "FEBA Radio" identification and address. Unmistakable interval signal at sign-off . Fair signal amid constant RTTY interference. (Rich D'Angelo, PA/NASWA *Flash Sheet*)

1930 UTC on 21590
NETHERLANDS ANTILLES. Radio Netherlands relay. Portions of *Aural Tapestry* to *Dutch Horizon*. IDs with fading. **Radio Vlaanderen Intl -Netherlands Antilles** 15565, 2248-2259. Museum curator interview to Elvis music. ID and address to Dutch tune and 2259*. (Wood, TN)

1955 UTC on 15345
MOROCCO: RTV Marocaine. Arabic service of regional music to time tips, identification and newscast. (McGuire, MD) ; **RTV** 7135, 2344-0000*Arabic. (D'Angelo, PA) **Radio Liberty- Morocco** 9595, 0210 Armenian. (Stanley, NY) **RL/RFE** 9865, 0245 Arabic. (MacKenzie, CA) **VOA-Morocco** 17785, 1945-1957 French. (Wood, TN)

2040 UTC on 11785
INDONESIA: Voice of. Announcer's program of music from Blondie and Phil Collins, followed by Middle Eastern music. Language service Indo or Asian dialect for partial identification at 2028. English news to barely readable address and schedule. Signal fair to poor. (Wood, TN) Indonesian services for; **RRI-Wamena** 4869.96, 1205-1240; (John Wilkins, Wheat Ridge, CO/*Cumbre DX*) **RRI-Makasssar** 4753, 1100-1115; **RRI-Pontianak** 3976, 1105-1115; **RRI-Serui** 4606, 1105-1115.**Voice of Indonesia** 9525, 1115-1120. (Jim Evans, TN/*Cumbre DX*)

2156 UTC on 11935
CHINA: CPBS. Taiwan service with Chinese instrumental music until 2200, followed by male/female announcer's Chinese newscast. Abruptly left the air at 2203, so either technical problem or antenna change? Weak signal for clear channel. (D'Angelo, PA)

2230 UTC on 7572
PAKISTAN: Radio Pakistan. Tentative log including Asian style music to announcers low modulation of text. Time tips signal at 2240. (Dybka, TN)

2310 UTC on 9570
ROMANIA: Radio Romania Intl. News on Democratic Union of Acting Hungarians. (Weronka, NC)

2315 UTC on 9550
CUBA: Radio Havana. Discussion on terrorism. (Weronka, NC) 6270, 0430 (Dybka, TN)

2325 UTC on 11725
EGYPT: Radio Cairo. Fair signal's coverage on President Bush and USA. (Weronka, NC) 12050 Arabic at 2225. (MacKenzie, CA)

2345 UTC on 11905
FRENCH GUIANA: Swiss Radio Intl relay. Swiss Info segment discussing mathematics. (Weronka, NC) **China Radio Intl -French Guiana** 9720, 0310 English. **Radio Japan/NHK- French Guiana** 9660, 0315 English, // 17835, 17685, 17560, 15325, 15195. (MacKenzie, CA)

2350 UTC on 7205
SAO TOME: Radio Sawa. Arabic vocals to "Radio Sawa" identification. English pop vocals for good signal. (D'Angelo, PA) 7205, 0200. (Stanley, NY; Dybka, TN)

2351 UTC on 13610
SYRIA: Radio Damascus. Spanish news on Powell's visit to Saudi Arabia to regional music. ID as, "aqui Damascus, la radio emisora dela republica arabe Sirian", 0032*. (Stanley, NY)

Thanks to our contributors – Have you sent in YOUR logs? Send to Gayle Van Horn, c/o Monitoring Times (or e-mail gaylevanhorn@monitoringtimes.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

Getting the ball rolling ... 15 years later!

Every so often, it's nice to take a break. It gives you a chance to reflect and consider your accomplishments, as well as ponder the future. Fifteen years ago this month was the debut of *QSL Report*, and the continued popularity of the column is due to you, our readers and contributors.

In 1988, verifications were reported from now inactive stations, WSZO Marshall Islands and Radio Tahiti. DXers fifteen years ago, as today, still lamented the sluggish responses from Albania, Bangladesh and Egypt. Some things do remain the same in 2003.

Whether your interest lies in medium wave, utility, amateur or the broadcast bands, there remains an abundance to monitor and verify, and I would urge you to enjoy both. One hundred and eighty columns later, it remains you readers to whom I owe my thanks and appreciation. Now, let's keep this ball rolling!

AMATEUR RADIO

Kyrgzstan-EX8MDA, 10 meters SSB. Full data card. Received in one-and-a half years for a report sent to ARRL QSL Bureau on second submission, plus personal amateur card enclosure. DXCC Country # 160. (Larry Van Horn N5FPW, Brasstown, NC)

Morocco-CN2R, 20 meters SSB. Full data picture (line art) card. Received in 60 days for a self-addressed-envelope to; QSL Manager-James P. Sullivan, 21060 Turner Lane, Hillsboro, OR 97123 USA. 20 meter country # 63. (Van Horn, NC)

BURKINA FASO

Radio Burkina, 5030 kHz. No data French letter, stamped and signed by Tahere Ouedraogo. Received in 52 days for a registered French report, CD recording of broadcast and souvenir postcard of New York. Station address: Boite Postal 7029, Ouagadougou, Burkina Faso. (Marcelo Toniolo, Greenvale, NY/ *HCDX*)

BULGARIA

Radio Bulgaria, 9400 kHz. Partial data card unsigned. Received in four months. Station address: 4, Dragan Tsankow Blvd., 1040 Sofia, Bulgaria. (Joe Wood, Gray, TN)

CANADA

Voice of Vietnam relay, 6175 kHz. Full data logo QSL card, unsigned, plus program schedule. Received in 68 days for an English report and two IRCs. Station address: 58 Quan Su Street, Hanoi, Vietnam. (Frank Hillton, Charleston, SC)

CHINA

Voice of Jinling, 5860 kHz. Full data *Three Headed General* card unsigned, plus Chinese schedule and personal English letter. Received in one month for an English report, cassette tape, and return postage. Station address: P.O. Box 268, Nanjing, Jiangsu 210002, China. (Joe Talbot, Red Deer, Alberta, Canada/ HCDX) - *Station counts as Manchuria for country-counters. - ed.*

COLOMBIA

La Voz de tu Conciencia, 6010 kHz. Full data card signed by Martin Stendal-Administrador. Received in 88 days for a Spanish report. Station address: Colombia para Cristo, Calle 44 No. 13-69, Local 1, Bogota DF, Colombia. (Hans Dieter Buschau, Hildesheim, Germany/ *HCDX*)

MEDIUM WAVE

CJGX, 940 kHz AM. Full data GX94 verification card, signed by Bryan Mierau-Engineer, plus thank you card from verie signer. Received in 18 days for an AM report and one US dollar (returned). Station address: 120 Smith Street East, Yorkton, SK S3N 3V3 Canada. (Patrick Griffith, Westminster, CO)

CKWX, 1130 kHz AM. No data letter signed by Jacquie Donaldson-News Director, plus business card and two key chains. Received in 41 days for an AM report. Station address: 2440 Ash Street, Vancouver, BC Canada V57 4J6. (Griffith, CO)

KFNN, 1510 kHz AM. Partial data letter unsigned, plus stickers and program guides. Received in nine days for an AM report and one US dollar. Station address: 4800 North Central Ave., Phoenix, AZ 85012-1722. (Griffith, CO)

KHBC, 1060 kHz AM. Friendly handwritten personal letter from Buddy Gordon-Owner/General Manager. Received in eight days for an AM report. Station address: P.O. Box 515, Hilo, HI 96721. (Patrick Martin, Seaside, OR)

KINF, 1020 kHz AM. Partial data letter signed by Tracye Nelsom-Promo Manager, plus station souvenirs and T-shirt. Received in 10 days for an AM report and mint postage (returned). Station address: P.O. Box 670, Roswell, NM 88202. (Griffith, CO)

KZRK, 1550 kHz AM. Partial data handwritten card signed by Chris Knight-Market Manager, plus business card. Received in 106 days for an AM report. Station address: 301 South Polk, Suite 100, Amarillo, TX 79101. (Griffith, CO)

KTFH, 1680 kHz AM. Verification letter signed by Richard B. Harris-Corp. Projects Engineer. Received in 18 days for an AM report. At time of report, station was still in the testing mode. Station address: 2815 Second Avenue # 550, Seattle, WA 98121. (Martin, OR)

KTNS, 1060 kHz AM. Full data verification letter of DX Test, signed by Larry Gamble-General Manager. Mentioned station runs 5,000 watts day and 23 watts at night. Received in 70 days for an AM report. Station address: P.O. Box 2020, Oakhurst, CA 93644. (Martin, OR)

Vietnam-675 kHz AM. Email QSL from Anh Van-VoV News, Received in five days for follow up report from 1998 reception to **btdn.vov@hn.vnn.vn**. Pleased with this verification, as I also have Vietnam verified on 1010 AM. (Martin, OR)

WTNI, 1640 kHz AM. Friendly letter from Joel Robertson-Chief Engineer. Verie signer mentioned the station is 10/1 kW non-directional running a Harris DX10 transmitter. Received in ten days for a taped report. Station address: Mississippi Media WTNI, 1909 East Pass Road, Suite D11, Gulfport, MS 39507. (Martin, OR)

SLOVAKIA

Radio Slovakia International, 9440 kHz. Full data QSL card of an old Talizan 308 U receiver, unsigned. Received in 35 days for a Spanish report. Station address: Mytna 1, P.O. Box 55, 81755 Bratislava 15, Slovakia. (Arnaldo Slaen, Buenos Aires, Argentina)

SOUTH AFRICA

Radio Sonder Grense, 3320 kHz. Full data card signed by Kathy Otto, plus broadcast schedule. Received in 87 days for an English report. Station address: Sentech Pty Ltd., Private Bag X06, Honeydew 2040, South Africa. (Wood, TN)

SWEDEN

Radio Canada International relay, 5850 kHz. Full data logo QSL card stamped verified, unsigned. Received in 26 days for an English report and one IRC. Station address: P.O. Box 60000, Montreal H3C 3A8 Canada. (Sam Wright, Biloxi, MS)

UNITED ARAB EMIRATES

Gospel for Asia, 15170 kHz. Full data card signed by Rhonda Penland, plus business card and handwritten letter. Received in 134 days for an English report of an Urdu broadcast. QSL address: P.O. Box 1210, Somis, CA 93066 USA. Email: **gfaradio@mygfa.org.** Station headquarters 1800 Golden Trail Court, Carrollton, TX 75010 USA. (Slaen, ARG)

John Figliozzi
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Appointment Listening and Other Tips

"Appointment listening"? It seems such a quaint term, doesn't it? It goes almost hand-in-hand with the instructions one used to hear from some station announcers to "make a note in your listening diary."

Listening diary? Are you kidding? Maintaining a listening diary bespeaks a far higher level of personal organization that I've ever been able to achieve.

But enough of my shortcomings. I've brought up the subject to make a much wider point.

In an earlier time, the only way one could try to prevent missing a favorite program was by noting the scheduled day and time of broadcast somewhere. A dedicated listener likely would have several regular favorites, along with special "one off" programs on topics of interest, about which stations would give notice and reminders.

Relying on one's memory might work; but this might just as easily be a recipe for disappointment when the program was missed due to an almost inevitable spell of forgetfulness. Writing down the particulars might be a better idea and, depending on one's aptitude for organization, this could be anything from a list on a sheet of paper to an appointment book kept specifically for this purpose. Hence the instruction to "make a note in your listening diary."

◆ Audio On-Demand

A little forward planning and organization is never a bad idea. However, it's far better to have things available at one's individual command and convenience than to be confined to a time specific window of availability determined by another. In this regard, perhaps the biggest revolution in radio (and maybe in mass media broadcasting in general) initiated by the new emerging delivery technologies is the ability they offer to consumers to become "emancipated from the tyranny of broadcast schedules." (Alright, that's a little too strong, but you get the point.)

Today, many international broadcasters, through their internet web sites, offer an archive of programs that are available to the listener at the click of a mouse. In order to protect the rights of the program owners and producers, most are available "on demand" only via real time audio streaming. But a few even permit the listener to download a program and transfer it to a PDA (personal digital assistant), a portable player (MP3 or other format) like Apple's iPod, or just keep it on a personal hard drive for playback at a later time.

Some broadcasters offer only the most recent edition of a particular program. For example, the **BBC** does this, limiting access to a seven day window. Other broadcasters maintain an archive for some programs that stretch as far back as several weeks or months. The **Radio Australia** web site, along with a sister **ABC** web site maintained for **ABC Radio National** from which **Radio Australia** draws much of its schedule, is an example of a station with wider access.

In the *Monitoring Times* creative lab, we are working on a method that will provide you with at least a partial guide to on-demand programming on a regular basis within the monthly program listings. Look for this new feature in the coming months.

◆ Czech(o)Slovakia

Even back in the bad old days of the Cold War, the one station that stood out from the mostly drab and mechanical sound of Soviet and Soviet-influenced international radio was **Radio Prague**. Its presenters had personality, something largely absent from most other Warsaw Pact stations. Its programs dealt more with the rich history and culture of the country, than with tractor production figures and rigid ideological tracts. And there was that marvelous daily selection of Czechoslovak folk music.

These characteristics were underscored and enhanced during the all too brief period that has come to be known as the Prague Spring. Even after that short spell of freedom and experimentation was dramatically and brutally truncated by the 1968 Soviet and Warsaw Pact invasion, **Radio Prague** – though clearly subdued and obviously shaken – still managed to retain as much of its unique character as was possible given the circumstances.

Today, a few years after Czechoslovakia peacefully agreed to split into its two constituent parts (itself a unique event in our all too contentious world), we are left with two international broadcasters where once there was one – **Radio Prague** and **Radio Slovakia**, the latter broadcasting from studios in its capital, Bratislava.

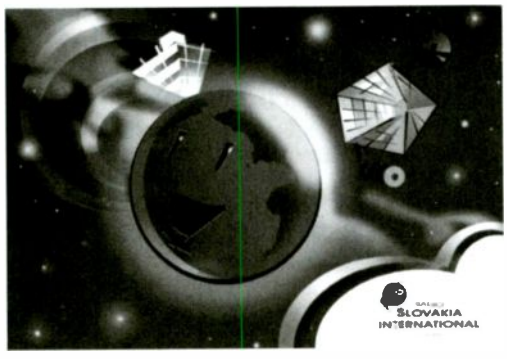
Having recovered from an earlier "near death" experience, Radio Prague has emerged as a strong presence on the international airwaves. It utilizes a standard daily half-hour magazine format to cover a wide range of topics and interests. Czech culture and history are given prominence, along with coverage of Czech society, politics and people.

One strongly recommended feature (among many) is the weekly Saturday music block (heard Sunday UT in North America beginning around 0010, 0110 and 0310) that ranges from folk to classical, rock to jazz – all always Czech in origin.

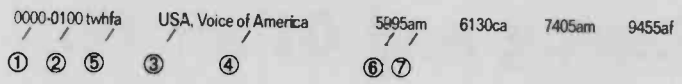
Radio Slovakia, the relative newcomer, also uses the tried and true magazine format for its half hour broadcast. The station seems intent on raising Slovakia's profile internationally by emphasizing local business and scientific achievements, and this may account for the station's style seeming somewhat drier in comparison to the longer established Czech broadcaster.

To my ears, **Radio Slovakia**'s best feature offering is its Friday quarter-hour segment after the news (heard Saturday UT beginning around 0110, in North America) that is hosted and produced by Pete Miller. It could be titled "Pete Miller at Large," as the brief for the program appears to give its presenter wide latitude in coming up with perennially interesting observations and interviews. Miller, who many (including me) had the distinct pleasure of meeting personally at this year's SWL Winterfest, has a unique understated style – correct, but friendly; a bit formal, but reassuring and good humored. In a recent program, he had sought out university students from abroad who were studying in Slovakia to get their impressions of the country. He clearly knows how to bring out the best in his subjects.

That's all for now. Until September, good listening!



How to Use the Shortwave Guide



Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight 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
occ:	occasional
DRM:	Digital Radio Mondiale

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

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

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

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

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

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

Program Notes

HCJB: ***DX Partyline*** lives! It now airs on HCJB's sole remaining English service mornings to Latin America—A 1230 (15115 kHz.), as well as on **WINB** (12160 kHz.)—S 0000.

R. Netherlands: ***Amsterdam Forum*** is taking a summer break. In its place are two quarter hour programs back-to-back. ***Sketches of the Low Lands*** paints portraits of interesting Dutch places. ***Second Chance*** replays excerpts from some superb RN interviews over the years. Check the *SWG* for details. ***Amsterdam Forum*** returns in September.

R. Australia: ***Australia Now***, a 13-part series that began in mid-June, is an interesting, leisurely and expansive profile of the island continent that features the stories and views of students, farmers, writers, academics and Aboriginal Australians. It airs twice a week W 2130 and S 0830. Transcripts and audio files for all at **http://www.abc.net.au/ra.**

R. for Peace Int.: In June, **RFPI** was conducting a daily reading of George Orwell's novel *1984*. Air times were M-F 2100 and T-A at 0300, 0900 and 1500; with an omnibus reading of each week's installments A 2030 and S at 0230, 0830 and 1430. The series may be reprised in August.

DRM Info!

Digital Radio Mondiale has launched officially with a growing schedule of daily transmissions from broadcasters like *Deutsche Welle*, *Radio Netherlands*, *BBC World Service*, *Radio Sweden*, *RCI* and others. The introduction of consumer grade receivers is eagerly anticipated; but for the present only certain analog receivers properly modified and used in conjuction with PC-based computers and available **DRM** software can read and decode **DRM** signals. Details on these broadcasts and on how to receive them are available at **http://www.drm.org** and **http://www.rnw.nl/realradio/html/drm.html**.

MT has added **DRM** broadcasts to its *SWG* frequency listings, but until they have been on air long enough to confirm the format, the frequencies listed as DRM have not been removed from analog listings. Regular selected programming won't be added to *MT* listings until OEM "all in one box" receivers are offered for sale to the general public.

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

0000	0007		Sierra Leone, SLBS 3316do		
0000	0015		Cambodia, National Radio Of	11940as	
0000	0015		Japan, Radio 6145na	13650as	17810as
0000	0027		Czech Rep, Radio Prague Intl	7345na	9440na
0000	0030		Egypt, Radio Cairo 11725na		
0000	0030	DRM	Netherlands, Radio 15525na		
0000	0030	mtwhfa	Serbia & Montenegro, R Yugo	9580va	
0000	0030		Thailand, Radio 9570af		
0000	0030		UK, BBC World Service	3915as	11945as
			17615as		
0000	0030		USA, Voice of America 7215as	9770as	11760as
			15185as 15290as 17740as	17820as	
0000	0045		India, All India Radio 9705as	9950as	11620as
			13605as		
0000	0059		South Korea, R Korea Intl	15385am	
0000	0100		Anguilla, Caribbean Beacon	6090am	
0000	0100		Australia, ABC NT Alice Springs	2310irr	4835do
0000	0100		Australia, ABC NT Katherine	5025do	
0000	0100		Australia, ABC NT Tennant Crk	4910do	
0000	0100		Australia, Radio 9660pa	12080va	15240pa
			15415as 17580pa 17750as	17775as	17795va
			21725as		
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	15205as
0000	0100		Costa Rica, R for Peace Intl	7445am	15038va
0000	0100		Costa Rica, University Network	5030am	6150am
			7375am 9725sa 11870am	13750na	
0000	0100		Germany, Deutsche Welle	7130as	9505as
			9825as		
0000	0100		Guyana, Voice of 3291do	5950do	
0000	0100		Malaysia, Radio 7295do		
0000	0100		Namibia, NBC 3270af	3290af	6060af
0000	0100		Netherlands, Radio 6165na	9845na	
0000	0100		New Zealand, Radio NZ Intl	17675pa	
0000	0100		Russia, University Network	9940as	
0000	0100		Sierra Leone, Radio UNAMSIL	6139af	
0000	0100		Singapore, SBC Radio One	6150do	
0000	0100	vl	Solomon Islands, SIBC 5020do	9545do	
0000	0100		UK, BBC World Service	5970as	5975am
			6195as 9410as 9740as	9825sa	11835am
			11955as 12095sa 15280as	15310as	15360as
			17790as		
0000	0100		Ukraine, R Ukraine Intl 12040na		
0000	0100		USA, Armed Forces Network	3903usb	4278usb
			4319usb 4993usb 6350usb	6458usb	10320usb
			12579usb 12689usb	13362usb	13855usb
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 6130am	7405am	9455am
			9775am 11695am 13790am		
0000	0100		USA, WBCQ Kennebunk, ME	7415na	9329na
0000	0100		USA, WBOH Newport NC	5920am	
0000	0100		USA, WEWN Birmingham AL	5825na	
0000	0100		USA, WHRA Greenbush ME	7580va	
0000	0100		USA, WHRI Noblesville IN	5745va	7315am
0000	0100		USA, WINB Red Lion PA	12159am	
0000	0100		USA, WJIE Louisville KY	7490am	13595am
0000	0100	sm	USA, WRMI Miami FL 9955am		
0000	0100	twhfa	USA, WRMI Miami FL 7385na		
0000	0100		USA, WRNO New Orleans LA	7355am	
0000	0100		USA, WSHB Cypress Creek SC	7535am	9430sa
0000	0100		USA, WTJC Newport NC	9370na	
0000	0100	sm	USA, WWBS Macon GA	11910na	
0000	0100		USA, WWCR Nashville TN	3210na	5070na
			7465na 13845na		
0000	0100		USA, WWRB Manchester TN	5050na	5085no
			6890na		
0000	0100		USA, WYFR Okeechobee FL	6065na	9505no
			15130sa		
0000	0100	vl	Vanuatu, Radio 3945al	7260do	
0000	0100		Zambia, Christian Voice	4965do	
0000	0130		UAE, Gospel For Asia 6145as		
0015	0100		Japan, Radio 6145na		
0030	0100		Iran, VOIR19530na 11920na		
0030	0100		Lithuania, R Vilnius 9855al	11690na	
0030	0100	mtwhfa	Russia, Bible Voice BC 11975as		
0030	0100		Sri Lanka, SLBC 6005as	9770as	15745as
0030	0100		Thailand, Radio 15395na		
0030	0100		UAE, AWR Africa 9720as	9810as	
0030	0100		UAE, Bible Voice 7180as		
0030	0100		UK, BBC World Service	9580as	17615as
0030	0100		USA, Voice of America 7215as	9770as	11760as
			15185as 15290as 17740as	17820as	
0038	0050		Croatia, Croatian Radio	9925sa	
0045	0100		Pakistan, Radio 11650as	15625as	
0055	0100		Italy, RAI Intl 9675am	11800am	

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

0100	0115		Italy, RAI Intl 9675na	11800am	
0100	0115		Pakistan, Radio 11650as	15625as	
0100	0120		Kyrghyz, Kyrghyz Radio	4010as	4795as
0100	0125		Netherlands, Radio 6165na	9845na	
0100	0127		Czech Rep, Radio Prague Intl	6200na	7345na
0100	0127		Slovakia, R Slovakia Intl	5930na	6190ca
			9440sa		
0100	0127		Vietnam, Voice of 6175na		
0100	0128		Hungary, Radio Budapest	9590na	
0100	0130	s	Germany, R Africa Intl 9435as		
0100	0130		UAE, Gospel For Asia 6145as		
0100	0130		Uzbekistan, R Tashkent Intl	7190as	9715as
0100	0156		China, China Radio Intl	9580na	9790na
0100	0156		North Korea, Voice of 3560as	6195as	6520am
			7140as 7580am 9345as	11735am	
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	12080va	15240pa
			15415as 17580pa 17750as	17775va	17795va
			21725as		
0100	0200		Canada, CBC Northern Service	9625do	
0100	0200		Canada, CFRX Toronto ON	6070do	
0100	0200		Canada, CFVP Calgary AB	6030do	
0100	0200		Canada, CKZN St John's NF	6160do	
0100	0200		Canada, CKZU Vancouver BC	6160do	
0100	0200		Canada, Racio Canada Intl	9755am	15170am
			15305am		
0100	0200		Costa Rica, R for Peace Intl	7445am	15038va
0100	0200		Costa Rica, University Network	5030am	6150am
			7375am 9725sa 11870am	13750na	
0100	0200		Cuba, Radio Havana 6000na	9820na	11705usb
0100	0200		Guyana, Voice of 3291do	5950do	
0100	0200		Indonesia, Voice of 9525va	11785as	
0100	0200		Iran, VOIR19530na 11920na		
0100	0200		Japan, Radio 11860as	11880me	15325as
			17560me 17685pa 17810as	17835sa	17845as
0100	0200		Malaysia, Radio 7295do		
0100	0200		Namibia, NBC 3270af	3290af	6060af
0100	0200		New Zealand, Radio NZ Intl	17675pa	
0100	0200		Russia, University Network	9940as	
0100	0200		Russia, Voice of 9665na	9725na	11825na
			12000na 17595na		
0100	0200		Sierra Leone, Radio UNAMSIL	6139af	
0100	0200		Singapore, SBC Radio One	6150do	
0100	0200	vl	Solomon Islands, SIBC 5020do	9545do	
0100	0200		Sri Lanka, SLBC 6005as	9770as	15745as
0100	0200		UK, BBC World Service	5975am	6195as
			9410as 9525sa 9825sa	11835am	11955as
			12095sa 15280as 15310as	15360as	17790as
0100	0200		USA, Armed Forces Network	3903usb	4278usb
			4319usb 4993usb 6350usb	6458usb	10320usb
			12579usb 12689usb	13362usb	13855usb
0100	0200		USA, KAIJ Dallas TX 5755va		
0100	0200		USA, KJES Vado NM 7555na		
0100	0200		USA, KTBN Salt Lk City UT	7505na	
0100	0200		USA, KWHR Naalehu HI	17510as	
0100	0200		USA, Voice of America 7115as	9635as	11705as
			11725as 11820as 13650as	17740as	17820as
0100	0200	twhfa	USA, Voice of America 5995af	6130af	7405am
			9455am 9775am 13790am		
0100	0200		USA, WBCQ Kennebunk, ME	7415na	9329na
0100	0200		USA, WBOH Newport NC	5920am	
0100	0200		USA, WEWN Birmingham AL	5825na	
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	sm	USA, WRMI Miami FL 9955am		
0100	0200	twhfa	USA, WRMI Miami FL 7385na		
0100	0200		USA, WRNO New Orleans LA	7355am	
0100	0200		USA, WSHB Cypress Creek SC	7535no	9430sa
0100	0200		USA, WTJC Newport NC	9370na	
0100	0200		USA, WWCR Nashville TN	3210na	5070na
			5935na 7465na		
0100	0200		USA, WWRB Manchester TN	5050na	5085na
			6890na		
0100	0200		USA, WYFR Okeechobee FL	6065na	9505no
			15060as		
0100	0200	vl	Vanuatu, Radio 3945al	7260do	
0100	0200		Zambia, Christian Voice	4965do	
0105	0112		Croatia, Croatian Radio	9925na	
0130	0140		Libya, Voice of Africa 15435af	21695af	
0130	0200		Australia, Voice International	17775as	
0130	0200		Iraq, Radio Iraq Intl 6175irr	9687irr	11787irr
0130	0200		Sweden, Radio 9435va	9495na	

SELECTED PROGRAMMING BEGINS ON PAGE 55

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0130	0200		UK, RTE Radio	6155ca		
0130	0200		USA, Voice of America	7115as	9635as	11705as
			11725as 11820as	13650as	17740as	17820as
0130	0200	twhfa	USA, Voice of America	7405am	9775am	13740am
0140	0200		Vatican City, Vatican Radio		9650as	12055as
0145	0200	twhfa	Albania, Radio Tirana Intl		6115na	7160eu

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

0200	0210		Bangladesh, Bangla Betar		4882as	
0200	0230	sm w fa	Belarus, Radio Belarus Intl		5970eu	7210eu
0200	0230		Iran, VOIRI9530na	11920na		
0200	0230		UAE, Bible Voice	9610as		
0200	0230	o	UK, Wales Radio Intl	9795na		
0200	0230		USA, KJES Vado NM	7555na		
0200	0256		North Korea, Voice of	4405as	9325as	11335as
0200	0256		Romania, R Romanio Intl		9510na	11940na
			15105as 17720as			
0200	0256		South Korea, R Korea Intl		9560as	11810as
			15575na			
0200	0257		Canada, Radio Canada Intl		15510as	17860as
0200	0300		Anguilla, Caribbean Beacon		6090am	
0200	0300	twhfa	Argentina, RAE	11710am		
0200	0300		Australia, ABC NT Alice Springs		2310irr	4835do
0200	0300		Australia, ABC NT Katherine		5025do	
0200	0300		Australia, ABC NT Tennant Crk		4910do	
0200	0300		Australia, Radio	9660pa	12080va	15240pa
			15415as 15515va	17580pa	17750as	21725as
0200	0300		Austria, AWR Europe	9820as		
0200	0300		Bulgaria, Radio	9400na	11900na	
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		7445am	15038va
0200	0300		Costa Rica, University Network		5030am	6150am
			7375am 9725sa	11870am	13750na	
0200	0300		Cuba, Radio Havana	6000na	9820na	11705usb
0200	0300		Egypt, Radio Cairo	11780na		
0200	0300		Guyana, Voice of	3291do	5950do	
0200	0300		Malaysia, Radio	7295da		
0200	0300		Myanmar, Radio	7185do		
0200	0300		Namibia, NBC	3270af	3290af	6090af
0200	0300		New Zealand, Radio NZ Intl		17675pa	
0200	0300	as	Philippines, Radio Pilipinas		11885me	15120me
			15270me			
0200	0300	as	Russia, Bible Voice 8C	17540as		
0200	0300		Russia, University Network		9940as	
0200	0300		Russia, Voice of	9665na	9725na	12000na
			17595na			
0200	0300		Sierra Leone, Radio UNAMSIL		6139af	
0200	0300		Singapore, SBC Radio One		6150do	
0200	0300	vl	Solomon Islands, SIBC	5020do	9545do	
0200	0300		Sri Lanka, SLBC	6005as	9770as	15745as
0200	0300		Taiwan, R Taiwan Intl	5950na	9680na	11875as
			15320as 15465as			
0200	0300		UK, BBC World Service		5975am	6195eu
			9410eu 9750af	9825am	11835om	11760me
			11955as 12095so	15280as	15310as	15360as
			17790os			
0200	0300		USA, Armed Forces Network		3903usb	4278usb
			4319usb 4993usb	6350usb	6458usb	10320usb
			12579usb	12689usb	13362usb	13855usb
0200	0300		USA, KAIJ Dallas TX	5755va		
0200	0300		USA, KTBN Salt Lk City UT		7505no	
0200	0300		USA, KWHR Naalehu HI		17510as	
0200	0300		USA, Voice of America	7115as	9635as	11705as
			11725as 11820as	13650as	17740as	17820as
0200	0300		USA, WBCQ Kennebunk, ME		7415na	9329no
0200	0300		USA, WBOH Newport NC		5920am	
0200	0300		USA, WEWN Birmingham AL		5825na	
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	7385na		
0200	0300		USA, WRNO New Orleans LA		7355am	
0200	0300		USA, WSHB Cypress Creek SC		7535na	9430na
0200	0300		USA, WTJC Newport NC		9370na	
0200	0300		USA, WWCR Nashville TN		3210na	5070na
			5935no 7465na			
0200	0300		USA, WWRB Manchester TN		5050na	5085na
			6890na			
0200	0300		USA, WYFR Okeechobee FL		5985sa	6065na
			9505na 11855sa	15255so		
0200	0300		Zambia, Christian Voice		4965do	
0200	1215		Cambodia, National Radio Of		11940os	
0205	0220		Croatia, Croatian Radio		9925na	
0215	0220		Nepal, Radio	3230as	5005as	6100as
			7164as			
0230	0257		Vietnam, Voice of	6175na		
0230	0258		Hungary, Radio Budapest		9570na	
0230	0300	twhfa	Albania, Radio Tirana Intl		6115na	7160eu
0230	0300		Sweden, Radio	9495na		
0245	0300		UK, BBC World Service		9610af	
0250	0300		Vatican City, Vatican Radio		7305am	9605am

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

0300	0310		Vatican City, Vatican Radio		7305am	9605am
			9660af			
0300	0327		Czech Rep, Radio Prague Intl		7345na	7385na
			9870na			
0300	0329		Belgium, Radio Vlaanderen Intl		15565om	
0300	0330		Egypt, Radio Cairo	11780na		
0300	0330	s twhfa	Mexico, Radio Mexico Intl		9705am	11770am
0300	0330	as	Philippines, Radio Pilipinas		11885me	15120me
			15270me			
0300	0330		South Africa, Channel Africa		6035af	
0300	0330		Thailand, Radio	15395na		
0300	0330		USA, Voice of America	6080af	7105af	7290af
			7340af 9575af	9885af	11835af	12080af
			17895af			
0300	0356		China, China Radio Intl		9690na	9790na
0300	0356		North Korea, Voice of	3560as	6195as	7140as
			9345as			
0300	0400		Anguilla, Caribbean Beacon		6090am	
0300	0400		Australia, ABC NT Alice Springs		2310irr	4835do
0300	0400		Australia, ABC NT Katherine		5025do	
0300	0400		Australia, ABC NT Tennant Creek		4910do	
0300	0400		Australia, Radio	9660pa	12080va	15240pa
			15415as 15515va	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 Rico, R far Peace Intl		7445am	15038va
0300	0400		Costa Rica, University Network		5030am	6150am
			7375am 9725sa	11870am	13750na	17645as
0300	0400		Cuba, Radio Havana	6000na	9820na	11705usb
0300	0400	vl	Guatemala, Radio Cultural		5955do	
0300	0400		Guyana, Voice of	3291do	5950do	
0300	0400		Japan, Radio	17825ca	21610pa	
0300	0400		Malaysia, Radio	7295do		
0300	0400		Malaysia, Voice of	6175as	9665as	9750as
			15295au			
0300	0400		Namibia, NBC	3270af	3290af	6090af
0300	0400		New Zealand, Radio NZ Intl		17675pa	
0300	0400		Oman, Radio	15355af		
0300	0400		Russia, University Network		17765as	
0300	0400		Russia, Voice of	9665na	11720no	11750na
			12000na 17565na	17650na	17660na	17690na
0300	0400		Sierra Leone, Radio UNAMSIL		6139af	
0300	0400		Singapore, SBC Radio One		6150do	
0300	0400	vl	Solomon Islands, SIBC	5020do	9545do	
0300	0400		Sri Lanka, SLBC	6005as	9770as	15745as
0300	0400		Taiwan, R Taiwan Intl	5950no	9680na	15215sa
			15320as			
0300	0400		Turkey, Voice of	7270va	9650eu	11655va
0300	0400		Uganda, Radio	4976do	5026do	7196do
0300	0400		UK, BBC World Service		3255af	5975am
			6005af 6190af	6195eu	7120af	7160af
			9410eu 9750af	9825am	11760as	11835am
			12035af 12095eu	15280as	15310as	15360os
			15575me 17760as	17790as	21660as	21830as
0300	0400	DRM	UK, BBC World Service		11955na	
0300	0400		UK, British Forces BCS	7260me	15795me	
0300	0400		Ukraine, R Ukraine Intl	12040na		
0300	0400		USA, Armed Forces Network		3903usb	4278usb
			4319usb 4993usb	6350usb	6458usb	10320usb
			12579usb	12689usb	13362usb	13855usb
0300	0400		USA, KAIJ Dallas TX	5755va		
0300	0400		USA, KTBN Salt Lk City UT		7505na	
0300	0400		USA, KWHR Naalehu HI		17510os	
0300	0400		USA, WBCQ Kennebunk, ME		7415na	9329na
0300	0400		USA, WBOH Newport NC		5920am	
0300	0400		USA, WEWN Birmingham AL		5825na	
0300	0400		USA, WHRA Greenbush ME		7580va	
0300	0400		USA, WHRI Noblesville IN		5745va	7315am
0300	0400		USA, WJIE Louisville KY		7490am	13595am
0300	0400	smtwhf	USA, WMLK Bethel PA	9465eu		
0300	0400		USA, WRMI Miami FL	7385na		
0300	0400		USA, WRNO New Orleans LA		7395am	
0300	0400		USA, WSHB Cypress Creek SC		7535am	9450eu
0300	0400		USA, WTJC Newport NC		9370na	
0300	0400		USA, WWCR Nashville TN		3210na	5070no
			5935no 7465na			
0300	0400		USA, WWRB Manchester TN		5050na	5085na
			6890na			
0300	0400		USA, WYFR Okeechobee FL		6065na	9505na
			11740sa			
0300	0400		Zambia, Christian Voice		4965do	
0305	0312		Croatia, Croatian Radio		9925na	
0310	0330		Vatican City, Vatican Radio		9660af	
0330	0340		Libya, Voice of Africa	15435af	21695af	
0330	0350		UAE, Radio Dubai	12005na	13675na	15400na
			17890na			

Shortwave Guide

0330	0357		Czech Rep, Radio Prague Intl	11600va	15620va	
0330	0357		Vietnam, Voice of 6175na			
0330	0400		Malaysia, RTM Kota Kinabalu	5979do		
0330	0400		UAE, AWR Africa 15160as			
0330	0400		UK, BBC World Service	15420af		
0330	0400		USA, Voice of America 6080af	7105af	7290af	
			9575af 9885af	11835af	12080af	17895af
0345	0400		Tajikistan, Radio 7245as			

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

0400	0415		Israel, Kol Israel 9435va	15640va	17600va	
0400	0415		South Africa, TWR 11640af			
0400	0430		France Radia France Intl	9550af	11700af	
			11910af 13610af			
0400	0430	vl	Guatemala, Radia Culturol	5955do		
0400	0430	s twhfa	Mexico, Radio Mexico Intl	9705am	11770am	
0400	0430		South Africa, Channel Africa	5955af		
0400	0430		Sri Lanka, SLBC 6005as	9770as	15745as	
0400	0430		UK, Project Airwaves 21510as			
0400	0456		China, China Radia Intl	9560na	9755na	
0400	0456		Romania, R Romania Intl	9510na	11940na	
			15335as 17735as			
0400	0500		Anguilla, Caribbean Beacon	6090am		
0400	0500		Australia, ABC NT Alice Springs	2310irr	4835do	
0400	0500		Australia, ABC NT Katherine	5025da		
0400	0500		Australia, ABC NT Tennant Crk	4910do		
0400	0500		Australia, Radio 9660pa	12080va	15240pa	
			15415as 15515va 17580pa	17750as	21725as	
0400	0500	vl	Botswana, Radio 3356do	4820do	7255do	
0400	0500		Canada, CBC Northern Service	9625do		
0400	0500		Canada, CFRX Toronto ON	6070da		
0400	0500		Canada, CKZN St John's NF	6160do		
0400	0500		Canada, CKZU Vancouver BC	6160do		
0400	0500		Costa Rica, R for Peace Intl	7445am	15038va	
0400	0500		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa 11870am	13750na	17645as	
0400	0500		Cuba, Radio Havana 6000na	9820na	11705usb	
0400	0500		Germany, Deutsche Welle	7225af	11945af	
			15410af			
0400	0500		Guyana, Voice of 3291do	5950do		
0400	0500		Malaysia, Radio 7295do			
0400	0500		Malaysia, RTM Kota Kinabalu	5979do		
0400	0500		Malaysia, Voice of 6175as	9665as	9750as	
			15295as			
0400	0500		Namibia, NBC 3270af	3290af	6090af	
0400	0500		New Zealand, Radio NZ Intl	17675pa		
0400	0500		Russia, University Network	17765as		
0400	0500		Russia, Voice of 9665na	11720na	11750na	
			12000na 17565na 17660na	17660na	17690na	
0400	0500		Sierra Leone, Radio UNAMSIL	6139af		
0400	0500		Singapore, SBC Radio One	6150do		
0400	0500	vl	Solomon Islands, SIBC 5020do	9545do		
0400	0500		Uganda, Radio 4976do	5026do	7196do	
0400	0500		UK, BBC World Service	3255af	5975va	
			6005af 6190af 6195eu	7120af	7160af	
			9410eu 11835am 11760as	12095eu	15280as	
			15310as 15360as 15420af	15575me	17640af	
			17760as 17790as 21660as	21830as		
0400	0500		UK, British Forces BCS 11975me	15795me		
0400	0500		USA, Armed Forces Network	3903usb	4278usb	
			4319usb 4993usb 6350usb	6458usb	10320usb	
			12579usb 12689usb	13362usb	13855usb	
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	6080af	7290af	
			9530eu 9575af 9885af	11835af	11965eu	
			12080af 15205eu 17895af			
0400	0500		USA, WBCQ Kennebunk, ME	7415na		
0400	0500	twhfa	USA, WBCQ Kennebunk, ME	9329na		
0400	0500		USA, WBOH Newport NC	5920am		
0400	0500		USA, WEWN Birmingham AL	5825na		
0400	0500		USA, WHRA Greenbush ME	7580va		
0400	0500		USA, WHRI Noblesville IN	5745va	7315am	
0400	0500		USA, WJIE Louisville KY	7490am	13595am	
0400	0500	smtwhf	USA, WMLK Bethel PA 9465eu			
0400	0500		USA, WRMI Miami FL 7385na			
0400	0500		USA, WRNO New Orleans LA	7395am		
0400	0500		USA, WSHB Cypress Creek SC	9450eu	13720af	
0400	0500		USA, WTJC Newport NC	9370na		
0400	0500		USA, WWCR Nashville TN	3210na	5070na	
			5935na 7560na			
0400	0500		USA, WWRB Manchester TN	5050na	5085na	
			6890na			
0400	0500		USA, WYFR Okeechobee FL	6065na	7355eu	
			9355eu 9505na 9715na	11580eu		
0400	0500		Zambia, Christian Voice	6065do		
0427	0500	smt a	Madagascar, Radio VO Hope	12060af	15320af	
0430	0445		UK, BBC World Service	6010eu	9815eu	
0430	0500		Netherlands, Radio 6165na	9590na		
0430	0500	DRM/ as	Nethrelands, Rodio 15400pa			
0430	0500		Nigeria, Radio/Abuja 7275do			
0430	0500		Nigeria, Radio/Enugu 6025do			
0430	0500		Nigeria, Radio/Ibadan	6050do		
0430	0500		Nigeria, Radio/Kaduna	4770do	6090do	
0430	0500		Nigeria, Radio/Lagos 3326do	4990do		
0430	0500		Serbia & Montenegro, R Yugo	9580va		
0430	0500		Swaziland, TWR 3200af	4775af		
0438	0450		Croatia, Croatian Radio	9925na		
0445	0500		Italy, RAI Intl 6110af	7235af	9875af	

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

0500	0505		New Zealand, Radio NZ Intl	17675pa		
0500	0520		Vatican City, Vatican Radio	4005eu	5890eu	
			7250eu 9660af 11625af	15570af		
0500	0530		France Radio France Intl	11685af	15155af	
			17800af			
0500	0530		Netherlands, Radio 6165na	9590na		
0500	0530	DRM/ as	Netherlands, Radio 15400pa			
0500	0530		South Africa, AWR Africa	3215af	3345af	
0500	0530		South Africa, Channel Africa	11710af		
0500	0530		UK, BBC World Service	15280as		
0500	0556		China, China Radio Intl	9560na		
0500	0600		Anguilla, Caribbean Beacon	6090am		
0500	0600		Australia, ABC NT Alice Springs	2310irr	4835do	
0500	0600		Australia, ABC NT Katherine	5025do		
0500	0600		Australia, ABC NT Tennant Crk	4910do		
0500	0600		Australia, Radio 9660pa	12080va	15240pa	
			15415as 15515va 17580pa	17750as	21725as	
0500	0600	mtwhf	Bhutan, Bhutan BC Service	5030ol	6035do	
0500	0600	vl	Botswana, Radia 3356do	4820do	7255do	
0500	0600		Canada, CFRX Taronto ON	6070do		
0500	0600		Canada, CKZN St John's NF	6160do		
0500	0600		Canada, CKZU Vancouver BC	6160do		
0500	0600		Costa Rica, R for Peace Intl	7445am	15038va	
0500	0600		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa 11870am	13750na	17645as	
0500	0600		Cuba, Radio Havana 9665usb	9820na	11760am	
0500	0600	a	Finland, Scandinovian Weekend R	6170va	11690va	
0500	0600		Germany, Deutsche Welle	9700af	11925af	
			12045af 13755af 15410af			
0500	0600		Guyana, Voice of 3291do	5950do		
0500	0600		Japan, Radio 5975eu	6110na	7230eu	
			11715as 11760as 15195as	17810as	21755pa	
0500	0600		Kuwait, Radio 15110as			
0500	0600		Malaysia, Radio 7295do			
0500	0600		Malaysia, RTM Kota Kinabalu	5979do		
0500	0600		Malaysia, Voice of 6175as	9665as	9750as	
			15295as			
0500	0600		Namibia, NBC 6060af	6175af		
0500	0600		Nigeria, Radio/Abuja 7275do			
0500	0600		Nigeria, Radio/Enugu 6025do			
0500	0600		Nigeria, Radio/Ibadan	6050da		
0500	0600		Nigeria, Radio/Kaduna	4770do	6090da	
0500	0600		Nigeria, Radio/Lagos 3326do	4990do		
0500	0600		Nigeria, Voice of 7255af	9690af	11770af	
			15120af			
0500	0600		Russia, University Network	17765as		
0500	0600		Russia, Voice of 17635au	21790au		
0500	0600		Sierra Leone, Radia UNAMSIL	6139af		
0500	0600		Singapore, SBC Radio One	6150do		
0500	0600	vl	Solomon Islands, SIBC 5020do	9545do		
0500	0600		Swaziland, TWR 4775af	6120af	9500af	
0500	0600		Uganda, Radio 4976do	5026do	7196do	
0500	0600		UK, BBC World Service	6190af	6005af	
			6195eu 7120af 7160af	9410eu	11760me	
			11765af 11940af 11955as	15310as	15360as	
			15420af 15565eu 15575as	17640af	17760as	
			17790as 17885af 21660as			
0500	0600		UK, British Forces BCS 11975me	15795me		
0500	0600		USA, Armed Forces Network	3903usb	4278usb	
			4319usb 4993usb 6350usb	6458usb	10320usb	
			12579usb 12689usb	13362usb	13855usb	
0500	0600		USA, KAIJ Dallas TX 5755va			
0500	0600		USA, KTBN Salt Lk City UT	7505na		
0500	0600		USA, KWHR Naalehu HI	17780as		
0500	0600		USA, Voice of America 6035af	6080af	7290af	
			9530eu 11835af 11965eu	12080af	15205eu	
0500	0600	mtwhf	USA, Voice of America 7195af			
0500	0600		USA, WBCQ Kennebunk, ME	7415na		
0500	0600		USA, WBCQ Kennebunk, ME	7415na		
0500	0600		USA, WBOH Newport NC	5920am		
0500	0600		USA, WEWN Birmingham AL	5825na		
0500	0600		USA, WHRA Greenbush ME	11730af		
0500	0600		USA, WHRI Noblesville IN	5745va	7315am	
0500	0600		USA, WJIE Louisville KY	7490am	13595am	
0500	0600	smtwhf	USA, WMLK Bethel PA 9465eu			
0500	0600		USA, WRMI Miami FL 7385na			
0500	0600		USA, WRNO New Orleans LA	7395am		
0500	0600		USA, WSHB Cypress Creek SC	9450eu	9840af	
0500	0600		USA, WTJC Newport NC	9370na		
0500	0600		USA, WWCR Nashville TN	3210na	5070na	
			5935na 7560na			
0500	0600		USA, WWRB Manchester TN	5050na	5085na	
			6890na			
0500	0600		USA, WYFR Okeechobee FL	9355eu		
0500	0600		Zambia, Christian Voice	6065do		
0505	0512		Croatia, Croatian Radio	9470pa		

0506	0600		New Zealand, Radio NZ Intl	11820pa	
0515	0525		Rwanda, Radio 6005do		
0520	0530		Vatican City, Vatican Radio 15570af	9660af	11625af
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915do
0530	0545	as	UK, BBC World Service	9875eu	
0530	0550		UAE, Radio Dubai 13675au 21700au	15435au	17830au
0530	0600		Georgia, Georgian Radio	11805eu	
0530	0600		South Africa, AWR Africa	15105af	
0530	0600		Thailand, Radio 21795eu		

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

0600	0630		France Radio France Intl 21620af	11665af	17800af
0600	0630		South Africa, Channel Africa	15215af	
0600	0630		Swaziland, TWR 4775af	6120af	9500af
0600	0630	mtwhf	USA, Voice of America 7195af	7290af	
0600	0630		USA, Voice of America 6035af 9760eu 11805eu 11835af 12080af 15205eu	6080af	9530eu 11965eu 11995af
0600	0637		Romania, R Romania Intl	9530no	11830na
0600	0700		Anguilla, Caribbean Beacon	6090am	
0600	0700		Australia, ABC NT Alice Springs	2310irr	4835do
0600	0700		Australia, ABC NT Katherine	5025do	
0600	0700		Australia, ABC NT Tennant Crk	4910do	
0600	0700		Australia, Radio 9660pa 15415as 15515va	12080va 17580pa	15240pa 17750as 21725as
0600	0700	vl	Botswana, Radio 3356do	4820do	7255do
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	7445am	15038va
0600	0700		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am 13750na 17645as
0600	0700		Cuba, Radio Havana 9665usb	9820na	11760am
0600	0700		Germany, Deutsche Welle 15275af 17860af	6140eu	9780af
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do
0600	0700		Guyana, Voice of 3291do	5950do	
0600	0700		Japan, Radio 7230eu 13630na 15195as	11740as 17870pa	13630na 21755pa
0600	0700		Kuwait, Radio 15110as		
0600	0700		Liberia, ELWA 4760da		
0600	0700		Liberia, R Liberia Intl 6100do		
0600	0700		Liberia, Radio Veritas 5470af		
0600	0700		Malaysia, Radio 7295do		
0600	0700		Malaysia, Voice of 6175as 15295au	9665as	9750as
0600	0700		Namibia, NBC 6060af	6175af	
0600	0700		New Zealand, Radio NZ Intl	11820pa	
0600	0700		Nigeria, Radio/Abuja 7275do		
0600	0700		Nigeria, Radio/Enugu 6025do		
0600	0700		Nigeria, Radio/Ibadan	6050do	
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do
0600	0700		Nigeria, Radio/Lagos 3326do	4990da	
0600	0700		Nigeria, Voice of 7255af 15120af	9690af	11770af
0600	0700		Russia, University Network	17765as	
0600	0700		Russia, Voice of 15490au 21790au	17635au	17670au
0600	0700		Sierra Leone, Radio UNAMSIL	6139af	
0600	0700		Singapore, SBC Radio One	6150do	
0600	0700	vl	Solomon Islands, SIBC 5020do	9545do	
0600	0700		Uganda, Radio 4976do	5026do	7196do
0600	0700		UK, BBC World Service 7120af 7160af 9410eu 11955as 12095eu 15310as 15565eu 15575as 17640af 21660as	6055af 11765af 15360as 17760as	6190af 11940af 15485eu 17790as
0600	0700	as	UK, BBC World Service	17885af	
0600	0700		UK, British Forces BCS 15425me	15795me	
0600	0700		USA, Armed Forces Network 4319usb 4993usb 6350usb 12579usb 12689usb	3903usb 6458usb 13362usb	4278usb 10320usb 13855usb
0600	0700		USA, KAIJ Dallas TX 5755va		
0600	0700		USA, KTBN Salt Lk City UT	7505na	
0600	0700		USA, KWHR Naalehu HI	17780as	
0600	0700		USA, WBCQ Kennebunk, ME	7415na	
0600	0700		USA, WBOH Newport NC	5920am	
0600	0700		USA, WEWN Birmingham AL	5825na	9385eu
0600	0700		USA, WHRA Greenbush ME	11730af	
0600	0700		USA, WHRI Noblesville IN	5745va	7315am
0600	0700		USA, WJIE Louisville KY	7490am	13595am
0600	0700	smtwhf	USA, WMLK Bethel PA 9465eu		
0600	0700		USA, WRMI Miami FL 7385na		
0600	0700		USA, WRNO New Orleans LA	7395am	
0600	0700		USA, WSHB Cypress Creek SC	9450af	
0600	0700		USA, WTJC Newport NC	9370na	
0600	0700		USA, WWCR Nashville TN 5935na 7560na	3210na	5070na
0600	0700		USA, WYFR Okeechobee FL	7355eu	11580eu
0600	0700	vl	Vanuatu, Radio 3945al	4960do	
0600	0700		Yemen, Rep of Yemen Radio	9780me	
0600	0700		Zambia, Christian Voice	9865do	
0630	0645	mtwhf	Vatican City, Vatican Radio 6185eu 7250eu 9645eu	4005eu 11740eu	5890eu 15595eu
0630	0700		Bulgaria, Radio 11600eu	13600eu	
0630	0700		Swaziland, TWR 6120af	9500af	
0630	0700		UK, BBC World Service	15400af	
0630	0700		USA, Voice of America 9530eu 11965eu 15205eu	9760eu	11805eu
0630	0700	as	USA, Voice of America 6035af 11835af 11995af 12080af	6080af	7195af
0630	0700		Vatican City, Vatican Radio	11625af	15570af
0637	0700		Romania, R Romania Intl 11830na 11840eu	9530na 11940eu	9690eu 15270eu
0638	0650		Croatia, Croatian Radio	9470pa	
0645	0700	as	Germany, TWR 6045eu		
0645	0700	as	Monaco, TWR 9870eu		
0655	0700		Germany, TWR 6045eu		
0655	0700		Monaco, TWR 9870eu		

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

0700	0705		New Zealand, Radio NZ Intl	11820po	
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu
0700	0727		Slovakia, R Slovakia Intl 17550au	9440au	15460au
0700	0729		Belgium, Radio Vlaanderen Intl	5985eu	
0700	0745		Germany, Voice of Hope	5975eu	
0700	0750		Germany, TWR 6045eu		
0700	0750		Monaco, TWR 9870eu		
0700	0756		Romania, R Romania Intl	17720af	21480af
0700	0800		Anguilla, Caribbean Beacon	6090am	
0700	0800		Australia, ABC NT Alice Springs	2310irr	4835do
0700	0800		Australia, ABC NT Katherine	5025do	
0700	0800		Australia, ABC NT Tennant Crk	4910do	
0700	0800		Australia, Radio 9660pa 15415as 17580pa	12080va 17750as	15240va 21725as
0700	0800	vl	Botswana, Radio 3356do	4820do	7255do
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	7445am	15038va
0700	0800		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am 13750na 17645as
0700	0800		Ecuador, HCJB 11770pa		
0700	0800		Eqt Guinea, Radio Africa	15184af	
0700	0800		France Radio France Intl	15605af	
0700	0800		Germany, Deutsche Welle	6140eu	
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do
0700	0800		Guyana, Voice of 3291do	5950do	
0700	0800		Kuwait, Radio 15110as		
0700	0800		Liberia, ELWA 4760da		
0700	0800		Liberia, R Liberia Intl 6100do		
0700	0800		Liberia, Radio Veritas 5470af		
0700	0800		Malaysia, Radio 7295do		
0700	0800		Malaysia, RTM Kota Kinabalu	5979do	
0700	0800		Malaysia, Voice of 6175as 15295au	9665as	9750as
0700	0800		Myanmar, Radio 9730do		
0700	0800		Papua New Guinea, NBC	9675do	11880irr
0700	0800		Russia, University Network	17765as	
0700	0800		Russia, Voice of 15490au 17635au 17670au	17495au	17525au
0700	0800		Sierra Leone, Radio UNAMSIL	6139af	
0700	0800		Singapore, SBC Radio One	6150do	
0700	0800	vl	Solomon Islands, SIBC 5020do	9545do	
0700	0800		Taiwan, R Taiwan Intl 5950na		
0700	0800	as	UK, BBC World Service	17885af	
0700	0800		UK, BBC World Service 11760me 11765af 15310as 15360as 15575eu 17640eu	6190af 11940af 15400af 17760as	7120af 11955as 12095eu 15485eu 15565eu 17790as 21660as
0700	0800		USA, Armed Forces Network 4319usb 4993usb 6350usb 12579usb 12689usb	3903usb 6458usb 13362usb	4278usb 10320usb 13855usb
0700	0800		USA, KAIJ Dallas TX 5755va		
0700	0800		USA, KTBN Salt Lk City UT	7505na	
0700	0800		USA, KWHR Naalehu HI	11565pa	17780as
0700	0800		USA, Voice of America 13760as		
0700	0800		USA, WBCQ Kennebunk, ME	7415na	
0700	0800		USA, WBOH Newport NC	5920am	
0700	0800		USA, WEWN Birmingham AL	5825na	9385eu
0700	0800		USA, WHRA Greenbush ME	11730af	
0700	0800		USA, WHRI Noblesville IN	5745va	7315am
0700	0800		USA, WJIE Louisville KY	7490am	13595am
0700	0800	smtwhf	USA, WMLK Bethel PA 9465eu		
0700	0800		USA, WRMI Miami FL 7385na		
0700	0800		USA, WRNO New Orleans LA	7395am	
0700	0800		USA, WSHB Cypress Creek SC	9450af	
0700	0800		USA, WTJC Newport NC	9370na	
0700	0800		USA, WWCR Nashville TN 5935na 7560na	3210na	5070na
0700	0800		USA, WYFR Okeechabee FL 13695af	7355eu	11530af

0700	0800	vl	Vanuatu, Radio 3945al	4960da	
0705	0712		Croatia, Croatian Radio	13820au	
0706	0800		New Zealand, Radio NZ Intl	9885pa	
0725	0730	mtwhf	Guam, TWR/KTWR 15205as		
0730	0800		Austria, AWR Europe 9775eu		
0730	0800		Georgia, Georgian Radio	11910eu	
0730	0800		Guam, TWR/KTWR 15205as		
0730	0800		Switzerland, Swiss R Intl 21750va	13650va	15445va
0745	0800	mtwhf	Guam, TWR/KTWR 15330as		
0750	0800	smtwhf	Germany, TWR 6045eu		
0750	0800	smtwhf	Monaco, TWR 9870eu		

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

0800	0804		Pakistan, Radio 17825eu	21465eu	
0800	0815		Guam, TWR/KTWR 15205as		
0800	0815	mtwhf	Guam, TWR/KTWR 15330as		
0800	0820	smtwhf	Germany, TWR 6045eu		
0800	0820	smtwhf	Monaco, TWR 9870eu		
0800	0825		Malaysia, Voice of 6175as 15295au	9665as	9750as
0800	0830		Australia, ABC NT Alice Springs	2310irr	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		Myanmar, Radio 9730do		
0800	0900		Anguilla, Caribbean Beacon	6090am	
0800	0900		Australia, Radio 5995pa 11880as 12080va 15240va 15415as 17750as 21725as	9580va	9710pa 15415as 15240va
0800	0900	as	Australia, Radio 17750cs		
0800	0900	mtwhf	Bhutan, Bhutan BC Service	5030al	6035do
0800	0900	vl	Botswana, Radio 3356do	4820do	7255do
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, R for Peace Intl	7445am	15038va
0800	0900		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am 13750na 17645as
0800	0900		Ecuador, HCJB 11770pa		
0800	0900		Eqt Guinea, Radio Africa	15184af	
0800	0900		Germany, Deutsche Welle	6140eu	
0800	0900	vl	Ghana Ghana BC Corp	3366do	4915do
0800	0900		Guyana, Voice of 3291do	5950do	
0800	0900		Indonesia, Voice of 9525va	11785as	
0800	0900	as/vl	Italy, IRRS 13840va		
0800	0900		Liberia, ELWA 4760do		
0800	0900		Liberia, R Liberia Intl 6100do		
0800	0900		Liberia, Radio Veritas 5470af		
0800	0900		Malaysia, Radio 7295do		
0800	0900	s	Malta, VO Mediterranean	9605eu	
0800	0900		New Zealand, Radio NZ Intl	9885pa	
0800	0900		Papua New Guinea, NBC	9675do	11880irr
0800	0900		Russia, University Network	17765as	
0800	0900		Sierra Leone, Radio UNAMSIL	6139af	
0800	0900		Singapore, SBC Radio One	6150do	
0800	0900	vl	Solomon Islands, SIBC 5020do	9545do	
0800	0900	a	South Africa, Radio League	9750af	21560at
0800	0900		South Korea, R Korea Intl	9570am	13670eu
0800	0900		Swaziland, TWR 6120af	9500af	
0800	0900		UK, BBC World Service 11760me 11940af 11955as 15360as 15400af 15485eu 17830af 17885as 21470af	6190af 12095eu 15565eu 21660as	7120af 15310as 17640eu 21830as
0800	0900		USA, Armed Forces Network 4319usb 4993usb 6350usb 12579usb 12689usb	3903usb 6458usb 13362usb	4278usb 10320usb 13855usb
0800	0900		USA, KAIJ Dallas TX 5755va		
0800	0900		USA, KNLS Anchor Point AK	11765as	
0800	0900		USA, KTBN Salt Lk City UT	7505na	
0800	0900		USA, KWHR Naalehu HI	11565pa	17780as
0800	0900		USA, Voice of America 11930as 15150as	13620as	13760as
0800	0900		USA, WBCQ Kennebunk, ME	7415na	
0800	0900		USA, WBOH Newport NC	5920am	
0800	0900		USA, WEWN Birmingham AL	5825na	9385eu
0800	0900		USA, WHRI Noblesville IN	5745va	7315am
0800	0900		USA, WJIE Louisville KY	7490am	13595am
0800	0900	smtwhf	USA, WMLK Bethel PA 9465eu		
0800	0900		USA, WRMI Miami FL 7385na		
0800	0900		USA, WRNO New Orleans LA	7395am	
0800	0900		USA, WSHB Cypress Creek SC	9845au	9860eu
0800	0900		USA, WTJC Newport NC	9370na	
0800	0900		USA, WWCR Nashville TN 5935na 7560na	3210na	5070na
0800	0900		USA, WYFR Okeechobee FL	13570af	
0800	0900	vl	Vanuatu, Radio 3945al	4960do	
0810	0830	s	Armenia, Voice of 4810eu	15270as	
0815	0900		Guam, TWR/KTWR 15205as	15330as	
0830	0900		Australia, ABC NT Alice Springs	2310do	4835irr
0830	0900		Australia, ABC NT Katherine	2485do	
0830	0900		Australia, ABC NT Tennant Crk	2325do	
0830	0900		Austria, AWR Europe 17780af		
0830	0900		Georgia, Georgian Radio	11910me	
0830	0900		Lithuania, R Vilnius 9710eu		
0830	0900		Switzerland, Swiss R Intl	21770at	
0838	0850		Croatia, Croatian Radio	13820au	
0840	0850		Turkmenistan, Turkmen Radio	4930as	
0845	0900	as	Russia, Bible Voice BC 5975eu		

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

0900	0915	as	Russia, Bible Voice BC 5975eu		
0900	0927		Czech Rep, Radio Prague Intl	21745vo	
0900	0930	as	Australia, Radio 17750as		
0900	0930		Austria, AWR Europe 17780af		
0900	0930		Guam, TWR/KTWR 15330as		
0900	0956		China, China Radio Intl	11730pa	15210pa
0900	1000		Anguilla, Caribbean Beacon	6090am	
0900	1000		Australia, ABC NT Alice Springs	2310do	4835irr
0900	1000		Australia, ABC NT Katherine	2485do	
0900	1000		Australia, ABC NT Tennant Crk	2325do	
0900	1000		Australia, Radio 9580va 17750as 21820as	11880as	15240as
0900	1000		Australia, Voice International	13685as	
0900	1000	vl	Botswana, Radio 3356do	4820do	7255do
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		Costa Rica, R for Peace Intl	7445am	15038va
0900	1000		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am 13750na 17645as
0900	1000		Eqt Guinea, Radio Africa	15184af	
0900	1000		Germany, Deutsche Welle	6140eu	15440eu
0900	1000		Guyana, Voice of 3291da	5950do	
0900	1000	as/vl	Italy, IRRS 13840va		
0900	1000		Liberia, R Liberia Intl 6100do		
0900	1000		Liberia, Radio Veritas 5470af		
0900	1000		Malaysia, Radio 7295do		
0900	1000		New Zealand, Radio NZ Intl	9885pa	
0900	1000		Nigeria, Voice of 7255af	9690af	11770af
0900	1000		Palau, KHBN/VO Hope	15725as	
0900	1000		Papua New Guinea, NBC	4890do	9675irr
0900	1000		Russia, University Network	17765as	
0900	1000		Singapore, SBC Radio One	6150do	
0900	1000	vl	Solomon Islands, SIBC 5020do	9545do	
0900	1000	s	UAE, Radio UNMEE 21715af		
0900	1000		UK, BBC World Service 7120af 9605as 12095eu 15190sa 15485eu 15565eu 17790as 17830af	6190af 9740as 15310as 15575as 17885af	6195as 11760me 11940af 15360as 15400af 17640eu 17760as 21470af 21660as
0900	1000	DRM	UK, BBC World Service	7370eu	
0900	1000		USA, Armed Forces Network 4319usb 4993usb 6350usb 12579usb 12689usb	3903usb 6458usb 13362usb	4278usb 10320usb 13855usb
0900	1000		USA, KAIJ Dallas TX 5755va		
0900	1000		USA, KTBN Salt Lk City UT	7505na	
0900	1000		USA, KWHR Naalehu HI	11565pa	17780as
0900	1000		USA, Voice of America 11930as 15150as	13620as	13760as
0900	1000		USA, WBCQ Kennebunk, ME	7415na	
0900	1000		USA, WBOH Newport NC	5920am	
0900	1000		USA, WEWN Birmingham AL	5825na	
0900	1000		USA, WHRA Greenbush ME	11730af	
0900	1000		USA, WJIE Louisville KY	7490am	13595am
0900	1000		USA, WRMI Miami FL 9955am		
0900	1000		USA, WSHB Cypress Creek SC	9455sa	9860eu
0900	1000		USA, WTJC Newport NC	9370na	
0900	1000		USA, WWCR Nashville TN 7560na 9475na	5070na	5935na
0900	1000	vl	Vanuatu, Radio 3945al	4960do	
0900	1000	mt hfa	Vatican City, Vatican Radio	5890eu	
0930	1000	DRM	Germany, Deutsche Welle	15440eu	
0930	1000	asmwhf	Greece, Voice of 12105eu	15630eu	17900eu
0930	1000		Netherlands, Radio 9785pa	12065as	13710as
0930	1000	DRM	Netherlands,Radio 9590eu		

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

1000	1027		Vietnam, Voice of 9840au	12020au	
1000	1030		Germany, Deutsche Welle	17615as	17715as
1000	1030		Guam, AWR/KSDA 11560as	11930as	
1000	1030		Mongolia, Voice of 12085as		
1000	1030		Netherlands, Radio 9785pa	12065pa	13710as
1000	1030		UK, BBC World Service	9605as	21660as
1000	1030		UK, RTE Radio 15280au		
1000	1045		USA, KWHR Naalehu HI	9930as	11565pa
1000	1056		China, China Radio Intl	11730pa	15210pa
1000	1056		North Korea, Voice of 3560as 11710am 11735as	9335am	9849as
1000	1100		Anguilla, Caribbean Beacon	11775am	
1000	1100		Australia, ABC NT Alice Springs	2310do	4835irr
1000	1100		Australia, ABC NT Katherine	2485do	
1000	1100		Australia, ABC NT Tennant Crk	2325do	

1000	1100		Australia, Radio 17750as 21820as	9580va	11880as	15240as
1000	1100		Australia, Voice International		13685as	
1000	1100	as	Bhutan, Bhutan BC Service		5030ol	6035do
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		Costa Rica, R for Peace Intl		7445am	15038vo
1000	1100		Costa Rica, University Network 7375am 9725sa	11870am	5030am 13750na	6150am 17645as
1000	1100		Eqt Guinea, Radio Africa		15184af	
1000	1100	a	Finland, Scandinavian Weekend R		11720va	
1000	1100		Germany, Deutsche Welle		6140eu	15440eu
1000	1100	DRM	Germany, Deutsche Welle		6140eu	15440eu
1000	1100		Guyana, Voice of	3291do	5949do	
1000	1100		India, All Indio Radio 15410as 17510au	13695as 17800as	15020as 17895au	15260as
1000	1100	as/vl	Italy, IRRS 13840va			
1000	1100		Japon, Radio 21755pa	9695as	15590as	17585eu
1000	1100		Liberia, R Liberia Intl	6100do		
1000	1100		Malaysia, Radio	7295do		
1000	1100	s	Malta, VO Mediterranean		9605eu	
1000	1100	DRM	Netherlands, Radio	9590eu		
1000	1100		New Zealand, Radio NZ Intl		9885pa	
1000	1100		Palau, KHBN/VO Hope		15725as	
1000	1100		Papua New Guinea, NBC		4890do	9675irr
1000	1100		Russia, University Network		17765as	
1000	1100		Singapore, SBC Radio One		6150do	
1000	1100	vl	Solomon Islands, SIBC 5020do		9545do	
1000	1100		South Africa, Radio Veritas		7240af	
1000	1100	DRM	UK, BBC World Service		7320eu	
1000	1100		UK, BBC World Service 7120af 9740as 15190va 15310as 17640eu 17760as	11760me 15360as 17790as	6190af 11940af 15485eu 17885af	6195va 12095eu 15565eu 21470af 15575as
1000	1100	as	UK, BBC World Service		15400af	17830af
1000	1100		USA, Armed Forces Network 4319usb 4993usb 12579usb	6350usb 12689usb	6458usb 13362usb	10320usb 13855usb
1000	1100		USA, KAIJ Dallas TX	5755va		
1000	1100		USA, KTBN Salt Lk City UT		7505na	
1000	1100		USA, Voice of America 9770as 13620as	5745am 15240as	7370am 15425as	9590am
1000	1100		USA, WBOH Newport NC		5920am	
1000	1100		USA, WEWN Birmingham AL		7520na	
1000	1100		USA, WHRI Noblesville IN		9495am	9850na
1000	1100		USA, WINB Red Lion PA		9320am	
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 11780as		6095am	9455sa
1000	1100		USA, WTJC Newport NC		9370na	
1000	1100		USA, WWCR Nashville TN 7560na 15825na		5070na	5935na
1000	1100		USA, WYFR Okeechobee FL		5950na	
1015	1030		Israel, Kol Israel	15640va	17525va	17545va
1015	1030		UK, BBC World Service 17695eu		11680eu	15325eu
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9704do
1030	1057		Czech Rep, Radio Prague Intl		9880eu	11615eu
1030	1100		Guam, AWR/KSDA	11560as		
1030	1100		Iran, VOIRI 15450as 21730as	15550as	15600as	21470as
1030	1100		Netherlands, Radio 9860eu 12065as	5965na 13710as	6045eu	9785au
1030	1100		UAE, Radio Dubai 21605eu	13675eu	15395eu	17865eu
1030	1100	t	UAE, Radio UNMEE	21550af		
1030	1100		UK, BBC World Service 15285as 21660as		9605as	11945as
1045	1100		USA, KWHR Naalehu HI		9930as	
1045	1100	as	USA, KWHR Naalehu HI		11565pa	

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

1100	1104		Pakistan, Radio	17825eu	21465eu	
1100	1105		New Zealand, Radio NZ Intl		9885pa	
1100	1125		Netherlands, Radio 9860eu 12065as	5965na 13710as	6045eu	9785au
1100	1127		Vietnam, Voice of	11630as		
1100	1130	as	Bhutan, Bhutan BC Service		5030al	6035do
1100	1130		Iran, VOIRI 15450as 21730as	15550as	15600as	21470as
1100	1130	t	UAE, Radio UNMEE	21550af		
1100	1130		UK, BBC World Service		15400af	17790sa
1100	1130	mtwhf	UK, BBC World Service		6195ca	15190ca
1100	1200		Anguilla, Caribbean Beacon		11775am	
1100	1200		Australia, ABC NT Alice Springs		2310do	4835irr
1100	1200		Australia, ABC NT Katherine		2485do	
1100	1200		Australia, ABC NT Tennant Crk		2325do	
1100	1200		Australia, Radio 9580va 11650va	5995pa 11880as	6020pa 12080va	9475as 15240va
1100	1200		Australia, Voice International		13685as	
1100	1200		Canada, CBC Northern Service		9625do	
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, R for Peace Intl		7445am	15038va
1100	1200		Costa Rica, University Network 7375am 9725sa	11870am	5030am 13750na	6150am 17645as
1100	1200		Ecuador, HCJB	11770pa	15115am	21455usb
1100	1200	DRM	Germany, Deutsche Welle		15440eu	
1100	1200		Germany, Deutsche Welle 17820eu		6140eu	15110as
1100	1200	as/vl	Italy, IRRS 13840va			
1100	1200		Japan, Radio	6120na	9695as	15590as
1100	1200		Malaysia, Radio	7295do		
1100	1200	DRM	Netherlands, Radio	9590eu		
1100	1200		Papua New Guinea, NBC		4890do	9675irr
1100	1200		Russia, University Network		17765as	
1100	1200		Singapore, R Singapore Intl		6150as	9600as
1100	1200		Taiwan, R Taiwan Intl	7445as	11985as	
1100	1200		UK, BBC World Service 7120af 9740as 15190va 15310as 17640eu 17760as 21470af	11760me 15485eu 17790as	6190af 11940af 15565eu 17830af	6195va 12095eu 15575eu 17885af
1100	1200	DRM	UK, BBC World Service		7320eu	
1100	1200		Ukraine, R Ukraine Intl	15415eu		
1100	1200		USA, Armed Forces Network 4319usb 4993usb 12579usb	6350usb 12689usb	6458usb 13362usb	10320usb 13855usb
1100	1200		USA, KAIJ Dallas TX	5755va		
1100	1200		USA, KTBN Salt Lk City UT		7505na	
1100	1200	as	USA, KWHR Naalehu HI		11565pa	
1100	1200		USA, Voice of America 9770as 13610as	6160as 15240as	9645as 15425as	9760as
1100	1200		USA, WBOH Newport NC		5920am	
1100	1200		USA, WEWN Birmingham AL		7520na	
1100	1200		USA, WHRI Noblesville IN		9495am	9850na
1100	1200		USA, WINB Red Lion PA		9320am	
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
1100	1200		USA, WTJC Newport NC		9370na	
1100	1200		USA, WWCR Nashville TN 7560na 15825na		5070na	5935na
1100	1200		USA, WYFR Okeechobee FL 7335sa 11855sa		5850na	5950na
1106	1200		New Zealand, Radio NZ Intl		9885pa	
1115	1145		Nepal, Radio 7164as	3230as	5005as	6100as
1125	1200		Netherlands, Radio	5965na	6045eu	9860eu
1130	1140		Libya, Voice of Africa	15435af	21695af	
1130	1145		UK, BBC World Service		7135as	11920as
1130	1159		Belgium, Radio Vlaanderen Intl		9865as	
1130	1200		Bulgaria, Radio	11700eu	15700eu	
1130	1200	s hfa	Russia, Bible Voice BC	13590as		
1130	1200		South Korea, R Koreo Intl		9650na	
1130	1200		Sweden, Radio	17505va	17840na	
1130	1200	f	Vatican City, Vatican Radio		15595va	17515va

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

1200	1225		Netherlands, Radio	5965na	6045eu	9860eu
1200	1230		Ecuador, HCJB	15115am	21455as	
1200	1230		France Radio France Intl 25820af		17815af	21620af
1200	1230	DRM	Netherlands, Radio	9590eu		
1200	1230		South Korea, R Korea Intl		9650na	
1200	1230		Uzbekistan, R Tashkent Intl 15295as 17775as		7285as	9715as
1200	1256		China, China Radio Intl 11760pa 11980as	15415pa	9730as	9760po
1200	1259		Poland, Radio Polonia		9525eu	11820eu
1200	1300		Anguilla, Caribbean Beacon		11775am	
1200	1300		Australia, ABC NT Alice Springs		2310do	4835irr
1200	1300		Australia, ABC NT Katherine		2485do	
1200	1300		Australia, ABC NT Tennant Crk		2325do	
1200	1300		Australia, Radio 9580va 11650va	5995pa 11880as	6020pa 12080as	9475as 21820as
1200	1300		Australia, Voice International		13685as	
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 17800na		9515na	13655na
1200	1300		China, Voice of Hope	13590as		
1200	1300		Costa Rica, R for Peace Intl		7445am	15038va
1200	1300		Costa Rica, University Network 7375am 9725sa	11870am	5030am 13750na	6150am 17645as

1200	1300	DRM	Germany, Deutsche Welle	6140eu		
1200	1300		Germany, Deutsche Welle	6140eu	15440eu	
1200	1300		Jordan, Radio 11690eu			
1200	1300		Malaysia, Radio 7295do			
1200	1300		New Zealand, Radio NZ Intl	9885pa		
1200	1300		Papua New Guinea, NBC	4890do	9675irr	
1200	1300		Russia, University Network	17765as		
1200	1300		Singapore, R Singapore Intl	6150as	9600as	
1200	1300		Taiwan, R Taiwan Intl 7130as	9610au		
1200	1300		UK, BBC World Service	6190af	6195va	
			7120af 9740as 11760me	11940af	12095eu	
			15190as 15310as 15485eu	15565eu	15575me	
			17640eu 17760as 17790as	17830af	17885af	
			21470af			
1200	1300	DRM	UK, BBC World Service	7320eu		
1200	1300		USA, Armed Forces Network	3903usb	4278usb	
			4319usb 4993usb 6350usb	6458usb	10320usb	
			12579usb 12689usb	13362usb	13855usb	
1200	1300		USA, KAIJ Dallas TX 5755va			
1200	1300		USA, KTBN Salt Lk City UT	7505na		
1200	1300		USA, KWHR Naalehu HI	9930as		
1200	1300	as	USA, KWHR Naalehu HI	11565pa		
1200	1300		USA, Voice of America 6160as	9645as	9760as	
			13610as 15160as 15240as	15425as		
1200	1300	mtwhf	USA, WBCQ Kennebunk, ME	17494na		
1200	1300		USA, WBOH Newport NC	5920am		
1200	1300		USA, WEWN Birmingham AL	7520na		
1200	1300		USA, WHRI Noblesville IN	9495am	9850na	
1200	1300		USA, WINB Red Lion PA	9320am		
1200	1300		USA, WJIE Louisville KY	7490am	13595am	
1200	1300		USA, WRMI Miami FL 15725na			
1200	1300		USA, WRNO New Orleans LA	7395am		
1200	1300		USA, WSHB Cypress Creek SC	9430am	9880as	
			11670am			
1200	1300		USA, WSHB Cypress Creek SC	9455am	9880as	
			11670am			
1200	1300		USA, WTJC Newport NC	9370na		
1200	1300		USA, WWCR Nashville TN	7560na	12160na	
			13845na 15825na			
1200	1300		USA, WYFR Okeechobee FL	5850na	5950na	
			13695na 17750na			
1215	1300		Egypt, Radio Cairo 17775as			
1230	1245		UK, BBC World Service	15105af	17780af	
			21640af			
1230	1257		Vietnam, Voice of 9840as	12019as		
1230	1300		Bangladesh, Bangla Betar	7185as	9550as	
1230	1300		Ecuador, HCJB 15115am	15480as	21455usb	
1230	1300		Sri Lanka, SLBC 6005as	9770as	15745as	
1230	1300		Sweden, Radio 15750as	17505as	17840na	
1230	1300		Thailand, Radio 9860as			
1230	1300		Turkey, Voice of 17595va	17830eu		
1230	1300		UAE, Gospel For Asia 15590as			
1230	1300	a	UK, Wales Radio Intl 17845au			
1240	1255	f	Greece, Voice of 11730na	12110eu	15630eu	
			15650au			

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

1300	1305		New Zealand, Radio NZ Intl	9885pa		
1300	1310	mtwhfa	Turkmenistan, Turkmen Radio	5015as		
1300	1327		Czech Rep, Radio Prague Intl	13580eu	21745as	
1300	1330		Egypt, Radio Cairo 17775as			
1300	1330		Turkey, Voice of 17595as	17830eu		
1300	1330		UAE, AWR Africa 17740as			
1300	1330		UAE, Gospel For Asia 15590as			
1300	1356		China, China Radio Intl	7405na	9570na	
			11760pa 11900pa 11980as	15180as	17720na	
1300	1356		North Korea, Voice of 4405as	7505eu	9335na	
			11335eu 11710am			
1300	1400		Anguilla, Caribbean Beacon	11775am		
1300	1400		Australia, Radio 5995pa	6020po	9580va	
			11650va 11660as 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		Canada, Radio Canada Intl	17800na		
1300	1400		China, Voice of Hope 13590as			
1300	1400		Costa Rica, R for Peace Intl	7445am	15038va	
1300	1400		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa 11870am	13750na	17645as	
1300	1400		Ecuador, HCJB 15115am	15480as	21455usb	
1300	1400		Germany, Deutsche Welle	6140eu		
1300	1400		Germany, Overcomer Ministries	6110me		
1300	1400		Jordan, Radio 11690eu			
1300	1400		Malaysia, Radio 7295do			
1300	1400		Papua New Guinea, NBC	4890do	9675irr	
1300	1400		Russia, University Network	17765as		
1300	1400		Singapore, R Singapore Intl	6150as	9600as	
1300	1400	os	South Africa, Channel Africa	11780af	21620af	
			21760af			
1300	1400		South Korea, R Korea Intl	9570am	13670am	
1300	1400		Sri Lanka, SLBC 6005as	9770as	15745as	
1300	1400		UK, BBC World Service	6190af	6195va	
			7120af 9740as 11760me	11940af	12095eu	
			15190va 15310as 15420af	15485eu	15575me	
			17640eu 17760as 17790as	17830af	17885as	
			21470af			
1300	1400	DRM	UK, BBC World Service	7320eu		
1300	1400		USA, Armed Forces Network	3903usb	4278usb	
			4319usb 4993usb 6350usb	6458usb	10320usb	
			12579usb 12689usb	13362usb	13855usb	
1300	1400		USA, KAIJ Dallas TX 5755va			
1300	1400		USA, KJES Vado NM 11715na			
1300	1400		USA, KNLS Anchor Point AK	11870as		
1300	1400		USA, KTBN Salt Lk City UT	7505na		
1300	1400		USA, KWHR Naalehu HI	9930as		
1300	1400		USA, Voice of America 6160as	9645as	9760as	
			15160as 15425as			
1300	1400		USA, WBCQ Kennebunk, ME	17494na		
1300	1400		USA, WBOH Newport NC	5920am		
1300	1400		USA, WEWN Birmingham AL	7520na		
1300	1400		USA, WHRA Greenbush ME	17560af		
1300	1400		USA, WHRI Noblesville IN	9850na	15105am	
1300	1400		USA, WINB Red Lion PA	13570am		
1300	1400		USA, WJIE Louisville KY	7490am	13595am	
1300	1400		USA, WRMI Miami FL 15725na			
1300	1400		USA, WRNO New Orleans LA	7395am		
1300	1400		USA, WSHB Cypress Creek SC	7460as	9430na	
			11670na			
1300	1400		USA, WTJC Newport NC	9370na		
1300	1400		USA, WWCR Nashville TN	9475na	12160na	
			13845na 15825na			
1300	1400		USA, WYFR Okeechobee FL	11560as	11830na	
			11970na 17750na			
1306	1400	occ	New Zealand, Radio NZ Intl	6095pa		
1330	1350		UAE, Radio Dubai 13630eu	13675eu	15395eu	
			17865eu 21605eu			
1330	1357		Vietnam, Voice of 11630eu	13740eu		
1330	1400		Germany, Voice of Hope	15775as		
1330	1400		Guam, AWR/KSDA 11980as	15275as		
1330	1400		India, All India Radio 9690as	13710as		
1330	1400		Laos, Lao National Radio	7145do		
1330	1400		Serbia & Montenegro, R Yugo	11835au		
1330	1400		Sweden, Radio 17505va	17840na		
1330	1400		UAE, AWR Africa 15320as			
1330	1400		UK, BBC World Service	15105af	21640af	
1330	1400		Uzbekistan, R Tashkent Intl	7285as	9715as	
			15295as 17775as			

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

1400	1415	mtw	UK, BBC World Service	11860af	15420af	
			21490af			
1400	1430		Ecuador, HCJB 15115am	15480as	21455usb	
1400	1430		Egypt, Radio Cairo 17775as			
1400	1430		Germany, IBRA Radio 15715as			
1400	1430		Mexico, Radio Mexico Intl	9705am	11770am	
1400	1430		Thailand, Radio 9830as			
1400	1455	as	South Africa, Channel Africa	11780af	21620af	
			21760af			
1400	1456		China, China Radio Intl	7405na	9700as	
			11675as 11765as 13685af	15125af	17720na	
1400	1456		Romania, R Romania Intl	15270eu	15365eu	
			17790eu 17805eu			
1400	1500		Anguilla, Caribbean Beacon	11775am		
1400	1500		Australia, Radio 5995va	6080pa	9580va	
			11650va 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	9515na	13655na	
1400	1500		Canada, Radio Canada Intl	17800na		
1400	1500		China, Voice of Hope 13590as			
1400	1500		Costa Rica, R for Peace Intl	7445am	15038va	
1400	1500		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa 11870am	13750na	17645as	
1400	1500	a	Finland, Scandinavian Weekend R	5980va		
1400	1500		France Radio France Intl	11610as	17515as	
1400	1500		Germany, Deutsche Welle	6140eu		
1400	1500		Germany, Overcomer Ministries	6110me		
1400	1500		Germany, Voice of Hope	15775as		
1400	1500		India, All India Radio 9690as	13710as		
1400	1500		Japan, Radio 7200as	9505na	11730as	
			11840pa 11755me			
1400	1500		Jordan, Radio 11690eu			
1400	1500	occ	New Zealand, Radio NZ Intl	6095pa		
1400	1500		Oman, Radio 15140eu			
1400	1500		Russia, University Network	17765as		
1400	1500		Russia, Voice of 7340as	9745as	12055as	
			17645as			
1400	1500		Singapore, SBC Radio One	6150do		
1400	1500		Sri Lanka, SLBC 6005as	9770as	15745as	
1400	1500		Taiwan, R Taiwan Intl 15265as			

1400	1500		UK, BBC World Service	6135as	6190af	
			6195as 7120af 9740as	11940af	12095eu	
			15190va 15310as 15485eu	15565eu	15575me	
			17640eu 17790as 17830af	21470af	21660af	
1400	1500		UK, British Forces BCS 13860me	17895me		
1400	1500		USA, Armed Forces Network	3903usb	4278usb	
			4319usb 4993usb 6350usb	6458usb	10320usb	
			12579usb 12689usb	13362usb	13855usb	
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		
1400	1500		USA, Voice of America 6160as	7125as	9760as	
			15160as 15255eu 15425as			
1400	1500		USA, WBCQ Kennebunk, ME	17494na		
1400	1500		USA, WBOH Newport NC	5920am		
1400	1500		USA, WEWN Birmingham AL	9955na		
1400	1500		USA, WHRA Greenbush ME	17560af		
1400	1500		USA, WHRI Noblesville IN	9850am	15105am	
1400	1500		USA, WINB Red Lion PA	13570am		
1400	1500		USA, WJIE Louisville KY	7490am	13595am	
1400	1500		USA, WRMI Miami FL 15725na			
1400	1500		USA, WRNO New Orleans LA	7395am		
1400	1500		USA, WTJC Newport NC	9370na		
1400	1500		USA, WWCR Nashville TN	9475na	12160na	
			13845na 15825na			
1400	1500		USA, WYFR Okeechobee FL	11560as	11830na	
			11970na 17750na			
1415	1420		Nepal, Radio 3230as	5005as	6100as	
			7164as			
1430	1500		Ecuador, HCJB 15480as			
1430	1500		Myanmar, Radio 5040da	5985do		
1430	1500		Netherlands, Radio 9860as	11835as	12075as	
			15220na			
1430	1500	a	Russia, Bible Voice BC 5945as			
1445	1500		Guam, TWR/KTWR 15330as			
1445	1500		UK, BBC World Service	6140as	7205as	

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

1500	1500	as	Canada, Radio Canada Intl	9515na	13655na	
			17800na			
1500	1528	s	Hungary, Radio Budapest	6025eu	9715eu	
1500	1530		Germany, Voice of Hope	15775as		
1500	1530	as	Germany, Voice of Hope	15680me		
1500	1530		Mexico, Radio Mexico Intl	9705am	11770am	
1500	1530		Mongolia, Voice of 12015eu			
1500	1530		South Africa, Channel Africa	17770af		
1500	1530		Sri Lanka, SLBC 6005as	9770as	15745as	
1500	1545		Guam, TWR/KTWR 15330as			
1500	1556		China, China Radio Intl	7160as	9785as	
			13685af 15125af			
1500	1556		North Korea, Voice of 4405as	7505eu	9335am	
			11335eu 11710am			
1500	1600		Anguilla, Caribbean Beacon	11775am		
1500	1600		Australia, Radio 5995va	6080pa	9475as	
			9580va 11650va 11660as			
1500	1600		Australia, Voice International	13665as		
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		Canada, Radio Canada Intl	15455as	17720as	
1500	1600		Costa Rica, R for Peace Intl	7445am	15038va	
1500	1600		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa 11870am	13750na	17645as	
1500	1600		Germany, Deutsche Welle	6140eu		
1500	1600	smtwhf	Germany, Overcomer Ministries	6110me		
1500	1600	s	Ireland, Reflections Europe	3910eu	6295eu	
			12255eu			
1500	1600		Japan, Radio 7200as	9750as	11705na	
			11730as			
1500	1600		Jordan, Radio 11690na			
1500	1600	s	Latvia, Laser Radio 5935eu			
1500	1600		Myanmar, Radio 5040do	5985do		
1500	1600		Netherlands, Radio 9890as	11835as	12075as	
			15220na			
1500	1600	occ	New Zealand, Radio NZ Intl	6095pa		
1500	1600		Russia, University Network	17765as		
1500	1600		Russia, Voice of 4940me	4965me	4975me	
			7315as 7325me 7340as	11500as	11985me	
1500	1600		Singapore, SBC Radio One	6150do		
1500	1600		UK, BBC World Service	5975as	6135as	
			6190af 6195as 7120af	9740as	11940af	
			12095eu 15190va 15310as	15400af	15485eu	
			15565eu 17790as 17830af	21470af	21660af	
1500	1600		UK, British Forces BCS 13860me	17895me		
1500	1600		USA, Armed Forces Network	3903usb	4278usb	
			4319usb 4993usb 6350usb	6458usb	10320usb	
			12579usb 12689usb	13362usb	13855usb	
1500	1600		USA, KAIJ Dallas TX 13815va			
1500	1600		USA, KTBN Salt Lk City UT	7505na		
1500	1600		USA, KWHR Naalehu HI	9930as		
1500	1600		USA, Voice of America 6160as	7125as	9590as	
			9700eu 9760as 9845as	12040as	15205as	
			15255eu 15550as			
1500	1600		USA, WBCQ Kennebunk, ME	17494na		
1500	1600		USA, WBOH Newport NC	5920am		
1500	1600		USA, WEWN Birmingham AL	9955na		
1500	1600		USA, WHRA Greenbush ME	17650af		
1500	1600		USA, WHRI Noblesville IN	13760va	15105am	
1500	1600		USA, WINB Red Lion PA	13570am		
1500	1600		USA, WJIE Louisville KY	7490am	13595am	
1500	1600	smtwhf	USA, WMLK Bethel PA 9465eu			
1500	1600		USA, WRMI Miami FL 15725na			
1500	1600		USA, WRNO New Orleans LA	7395am	15420al	
1500	1600		USA, WTJC Newport NC	9370na		
1500	1600		USA, WWCR Nashville TN	9475na	12160na	
			13845na 15825na			
1500	1600		USA, WYFR Okeechobee FL	6280as	11830na	
			15520as 17750na			
1515	1530	a	Germany, Voice of Hope	15680me		
1515	1530	mtw	Russia, Bible Voice BC 9540as	15680me		
1515	1600	a	Vatican City, Vatican Radio	13765as	15235as	
1530	1545		Bangladesh, Bangla Betar	4882as		
1530	1545		UK, BBC World Service	11685as	15540as	
1530	1600		Georgia, Georgian Radio	6180me		
1530	1600		Germany, IBRA Radio 15715me			
1530	1600		Germany, Voice of Hope	15680me	17655me	
1530	1600		Iran, VOIRI7245eu 9635as	11775as		
1530	1600	hfa	Russia, Bible Voice BC 17655as			
1540	1550		Turkmenistan, Turkmen Radio	4930da		
1545	1600	s h	Bangladesh, Bangla Betar	4882as		

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

1600	1615		Pakistan, Radio 11570va	15065va	15725va	
			17720va			
1600	1625		Netherlands, Radio 9890as	11835as	12075as	
			15220na			
1600	1627		Czech Rep, Radio Prague Intl	5930eu	21745af	
1600	1627		Vietnam, Voice of 11630eu	13740eu		
1600	1630		Germany, Voice of Hope	15680me		
1600	1630		Guam, AWR/KSDA 11560as	15215as	15235as	
1600	1630		Iran, VOIRI7245eu 9635as	11775as		
1600	1630		Jordan, Radio 11690na			
1600	1630	w	Moldova, Radio Pridnestrovye	5960eu		
1600	1630		South Africa, Channel Africa	9525af		
1600	1630		UAE, Gospel For Asia 11695as			
1600	1630		USA, KWHR Naalehu HI	9930as		
1600	1635		UAE, Radio Dubai 13630eu	13675eu	15395eu	
			17865eu 21605eu			
1600	1650	occ	New Zealand, Radio NZ Intl	6095pa		
1600	1656		North Korea, Voice of 3560as	9975af	11735af	
1600	1700		Algeria, Radio Algiers Intl	11715eu	15160eu	
1600	1700		Anguilla, Caribbean Beacon	11775am		
1600	1700		Australia, Radio 5995va	6080pa	9475as	
			9580va 11650va 11660as			
1600	1700		Australia, Voice Internationat	13665as		
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		Costa Rica, R for Peace Intl	7445am	15038va	
1600	1700		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa 11870am	13750na	17645as	
1600	1700		Ecuador, HCJB 15480as			
1600	1700		Ethiopia, Radio 5990af	7110af	7165af	
			9560af 9704af 11800af			
1600	1700	a	Finland, Scandinavian Weekend R	6170va		
1600	1700		France Radio France Intl	9730af	11615af	
			11995af 12015af 15160af	15605af	17605af	
			17850af			
1600	1700	DRM	Germany, Deutsche Welle	6140eu		
1600	1700		Germany, Deutsche Welle	6140eu	6170as	
			7225as 17595as			
1600	1700	a	Germany, Overcomer Ministries	6110eu		
1600	1700	a	Greece, Voice of 9420eu	15630eu	17705na	
1600	1700	s	Ireland, Reflections Europe	3910eu	6295eu	
			12255eu			
1600	1700	s	Latvia, Laser Radio 5935eu			
1600	1700	mtwhf	Russia, Bible Voice BC 15680as	17655as		
1600	1700		Russia, Voice of 7315as	7350as	11720as	
			11985me 12055as 15540me			
1600	1700		South Africa, Radio Veritas	3230af		
1600	1700		South Korea, R Korea Intl	5975am	9515af	
			9870af			
1600	1700		Taiwan, R Taiwan Intl 11550as			
1600	1700		UK, BBC World Service	3915as	5975as	
			6190eu 6195as 7120af	7160as	9410eu	
			9510as 11940af 12095eu	15190va	15310as	
			15400af 15475eu 15565eu	17790as	17830af	
			21470af			
1600	1700		UK, British Forces BCS 13860me	17635me		
1600	1700		USA, Armed Forces Network	3903usb	4278usb	
			4319usb 4993usb 6350usb	6458usb	10320usb	
			12579usb 12689usb	13362usb	13855usb	
1600	1700		USA, KAIJ Dallas TX 13815va			

1600	1700		USA, KTBN Salt Lk City UT	15590na	
1600	1700		USA, Voice of America 12080af	13600as	17895af
1600	1700		USA, WBCQ Kennebunk, ME	17494na	
1600	1700		USA, WBOH Newport NC	5920am	
1600	1700		USA, WEWN Birmingham AL	13615na	
1600	1700		USA, WHRA Greenbush ME	17650af	
1600	1700		USA, WHRI Noblesville IN	13760va	15105am
1600	1700		USA, WINB Red Lion PA	13570am	
1600	1700		USA, WJIE Louisville KY	7490am	13595am
1600	1700	smtwhf	USA, WMLK Bethel PA 9465eu		
1600	1700		USA, WRMI Miami FL 15725na		
1600	1700		USA, WRNO New Orleans LA	7395am	15420al
1600	1700		USA, WSHB Cypress Creek SC	18910af	
1600	1700		USA, WTJC Newport NC	9370na	
1600	1700		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na
1600	1700		USA, WWRB Manchester TN	9320no	12172na
1600	1700		USA, WYFR Okeechobee FL 17750na 18980eu 21455eu	11830na	15520as 21525af
1600	1700		Zimbabwe, SWR Africa 6145af		
1615	1630		UK, BBC World Service	15420af	
1615	1630		Vatican City, Vatican Radio 7250eu 9645eu 15595eu	4005eu	5890eu
1615	1700	as	UK, BBC World Service	21490af	
1630	1645		Israel, Kol Israel 15640va	17545va	
1630	1657		Slovakia, R Slovakia Intl 7345eu	5920eu	6055eu
1630	1700		Egypt, Radio Cairo 15255af		
1630	1700		Guam, AWR/KSDA 11560as 15235as	11975as	15215as
1630	1700		UAE, AWR Africa 17630me		
1630	1700		UK, BBC World Service 13645eu 15420af	9530eu	11735eu
1645	1700		Tajikistan, Radio 7245as		
1650	1700	mtwhf	New Zealand, Radio NZ Intl	6095pa	

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

1700	1715	vl	Somalia, Radio Galkayo	6985va	
1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485af
1700	1727		Vietnam, Voice of 9725eu		
1700	1730		Azerbaijan, Voice of 6110eu	9155eu	
1700	1730		Ecuador, HCJB 15185eu		
1700	1730		France Radio France Intl	15605af	17605af
1700	1730	twfa	Russia, Bible Voice BC 7430af	13810af	
1700	1730		South Africa, Channel Africa	15265af	
1700	1746		UK, BBC World Service	6005af	9630a
1700	1750	mtwhf	New Zealand, Radio NZ Intl	6095po	
1700	1756		China, China Radio Intl 11910af 11920af	9570af	9695at
1700	1756		Romania, R Romania Intl 11940eu 15380eu	9510eu	11820eu
1700	1759		Poland, Radio Polonia	5995eu	7285eu
1700	1800		Anguilla, Caribbean Beacon	11775am	
1700	1800		Australia, Radio 5995va 9580va 9815pa 11880va	6080pa	9475as
1700	1800		Australia, Voice International	11680as	
1700	1800		Canada, CBC Northern Service	9625da	
1700	1800		Canada, CFRX Toronto ON	6070da	
1700	1800		Canada, CFVP Calgary AB	6030da	
1700	1800		Canada, CKZN St John's NF	6160da	
1700	1800		Canada, CKZU Vancouver BC	6160da	
1700	1800		Costa Rica, R for Peace Intl	7445am	15038va
1700	1800		Costa Rica, University Network 7375am 9725so 11870am	5030am	6150am 13750na 17645as
1700	1800		Egypt, Radio Cairo 15255af		
1700	1800		Eqt Guinea, Radio Africa	7189af	15184al
1700	1800		Germany, Deutsche Welle	6140eu	
1700	1800		Germany, R Africa Intl 13820af	11735af	
1700	1800		Japan, Radio 9505na	11970eu	15355af
1700	1800		Russia, University Network	9940as	
1700	1800		Russia, Voice of 7315as 11510af 11985af	9775eu	9890eu
1700	1800	as	Russia, Voice of 9480eu		
1700	1800		Russia, Voice of Hope 9495eu		
1700	1800		South Africa, Radio Veritas	3230af	
1700	1800		Taiwan, R Taiwan Intl 11550as		
1700	1800		UK, BBC World Service 5975as 6190af 6195eu 9410eu 9510as 12095eu 15420af 15485eu 15565eu	3255af 7120af 15310as 17830af	3915as 7160as 15400af 21470af
1700	1800		UK, British Forces BCS 13860me	15150me	
1700	1800		USA, Armed Forces Network 4319usb 4993usb 6350usb 12579usb 12689usb	3903usb 6458usb 13362usb	4276usb 10320usb 13855usb
1700	1800		USA, KAIJ Dallas TX 13815va		
1700	1800		USA, KTBN Salt Lk City UT	15590na	
1700	1800		USA, WBCQ Kennebunk, ME	17494na	
1700	1800		USA, WBOH Newport NC	5920am	
1700	1800		USA, WEWN Birmingham AL	13615na	17595eu
1700	1800		USA, WHRA Greenbush ME	17650af	
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	smtwhf	USA, WMLK Bethel PA 9465eu		
1700	1800		USA, WRMI Miami FL 15725na		
1700	1800		USA, WRNO New Orleans LA	7395am	15420al
1700	1800		USA, WSHB Cypress Creek SC	18910af	
1700	1800		USA, WTJC Newport NC	9370nc	
1700	1800		USA, WWCR Nashville TN 13845na 15825na	9475nc	12160na
1700	1800		USA, WWRB Manchester TN	9320na	12172na
1700	1800		USA, WYFR Okeechobee FL 21680af	18980eu	21455eu
1700	1800		Zimbabwe, SWR Africa 6145af		
1715	1730		Swaziland, TWR 3200af		
1730	1740		Libya, Voice of Africa 15435af	21695af	
1730	1745	mtwhf	Germany, Voice of Hope	15680me	
1730	1745		UK, BBC World Service 9525va	3390va	7230va
1730	1745	mw	UK, BBC World Service 15585eu	6050eu	11955eu
1730	1745	mtwhf	UK, United Nations Radio 17810af	7150af	15495me
1730	1759		Belgium, Radio Vloonderen Intl 13710me	9925eu	13690eu
1730	1800		Bulgaria, Radio 9400eu	11900eu	
1730	1800		Georgia, Georgian Radio	11910eu	
1730	1800		Guam, AWR/KSDA 9385me	12015me	
1730	1800		Liberia, ELWA 4760do		
1730	1800	mtwhffa	Malta, VO Mediterranean	9605eu	
1730	1800		Netherlands, Radio 6020af	7120af	11655af
1730	1800		Philippines, Radio Pilipinas 17720me	11720me	15190me
1730	1800		Swaziland, TWR 3200af	9500af	
1730	1800	mtwhfa	Sweden, Radio 6065va		
1730	1800	s	Sweden, Radio 13580va		
1730	1800		Switzerland, Swiss R Intl 17870va	13750va	15515va
1730	1800		Vatican City, Vatican Radio 17515af	13765af	15570af
1735	1745	vl/th	Paraguay, Radio Nacional	9739sa	
1745	1800		Bangladesh, Bangla Betar 15520eu	7185eu	9550eu
1745	1800		India, All India Radio 7410eu 11620eu 11935af 13605af 17670af	9445af	9950eu 15075al 15155af
1751	1800		New Zealand, Radio NZ Intl	11725pa	

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

1800	1827		Slovakia, R Slovakia Intl 7345eu	5920eu	6055eu
1800	1827		Vietnam, Voice of 11630eu	13740eu	
1800	1830		Egypt, Radio Cairo 15255af		
1800	1830	s	Germany, R Africa Intl 15750af		
1800	1830		Netherlands, Radio 6020af	7120af	11655af
1800	1830		South Africa, AWR Africa 9520af	3215af	3345af
1800	1830		South Africa, Channel Africa	15265af	
1800	1830		UK, BBC World Service	5975as	9510as
1800	1830		UK, RTE Radio 15585me		
1800	1850		New Zealand Radio NZ Intl	11725pa	
1800	1900		Anguilla, Caribbean Beacon	11775am	
1800	1900	mtwhf	Argentina, RAE 9690eu	15345eu	
1800	1900		Australia, Radio 6080pa 9580va 9815pa 11880va	7240va	9475as
1800	1900		Australia, Voice International	11680as	
1800	1900		Bangladesh, Bangla Betar 15520eu	7185eu	9550eu
1800	1900		Canada, CBC Northern Service	9625da	
1800	1900		Canada, CFRX Toronto ON	6070da	
1800	1900		Canada, CFVP Calgary AB	6030da	
1800	1900		Canada, CKZN St John's NF	6160da	
1800	1900		Canada, CKZU Vancouver BC	6160da	
1800	1900		Costa Rica, R for Peace Intl	7445am	15038va
1800	1900		Costa Rica, University Network 7375am 9725so 11870am	5030am	6150am 13750na 17645as
1800	1900		Eqt Guinea, Radio Africa	7189af	15184al
1800	1900	DRM	Germany, Deutsche Welle	6140eu	
1800	1900		Germany, Deutsche Welle	6140eu	
1800	1900		Germany, R Africa Intl 13820va	11735va	
1800	1900	a	Germany, Voice of Hope	13845me	
1800	1900	s	Greece, Voice of 9420eu	15630eu	17705na
1800	1900		India, All India Radio 7410eu 11620eu 11935af 13605af 17670af	9445af	9950eu 15075af 15155af
1800	1900	s	Ireland, Reflections Europe 12255eu	3910eu	6295eu
1800	1900		Kuwait, Radio 11990va		
1800	1900	s	Latvia, Laser Radio 5935eu		
1800	1900		Liberia, ELWA 4760do		
1800	1900		Liberia, R Liberia Intl 5100do		
1800	1900		Liberia, Radio Veritas 5470af		
1800	1900		Philippines, Radio Pilipinas 17720me	11720me	15190me
1800	1900		Russia, Bible Voice BC 5970eu	7430me	
1800	1900		Russia, University Network	9940as	
1800	1900		Russia, Voice of 9480eu 11510af 11630eu 11675eu	9775eu	9890eu 11870af

1800	1900		Sierra Leone, Radio UNAMSIL	6139af		
1800	1900	s	South Africa, Radio League	3215af		
1800	1900	as	South Africa, Radio Lusofonia	3345af		
1800	1900		South Africa, Radio Veritas	3230af		
1800	1900		Swaziland, TWR 3200af	9500af		
1800	1900		Taiwan, R Taiwan Intl 6045eu			
1800	1900		UK, BBC World Service	3255af	6190af	
			6195eu 7120af 9410eu	12095eu	15310me	
			15400af 15420af 17830af	21470af		
1800	1900		UK, British Forces BCS 6015me	13760me		
1800	1900		USA, Armed Forces Network	3903usb	4278usb	
			4319usb 4993usb 6350usb	6458usb	10320usb	
			12579usb 12689usb	13362usb	13855usb	
1800	1900		USA, KAIJ Dallas TX 13815va			
1800	1900		USA, KJES Vado NM 15385na			
1800	1900		USA, KTBN Salt Lk City UT	15590na		
1800	1900		USA, WBCQ Kennebunk, ME	17494na		
1800	1900	s	USA, WBCQ Kennebunk, ME	7415na		
1800	1900		USA, WBOH Newport NC	5920am		
1800	1900		USA, WEWN Birmingham AL	13615na	17595eu	
1800	1900		USA, WHRA Greenbush ME	17650af		
1800	1900		USA, WHRI Noblesville IN	9495am	13760va	
1800	1900		USA, WINB Red Lion PA	13570am		
1800	1900		USA, WJIE Louisville KY	7490am	13595am	
1800	1900	smtwhf	USA, WMLK Bethel PA 9465eu			
1800	1900		USA, WRMI Miami FL 15725na			
1800	1900		USA, WRNO New Orleans LA	7395am	15420al	
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 15825na			
1800	1900		USA, WWRB Manchester TN	9320na	12172na	
1800	1900		USA, WYFR Okeechobee FL	18980eu		
1800	1900		Yemen, Rep of Yemen Radio	9780me		
1800	1900		Zimbabwe, SWR Africa 6145af			
1830	1845		Germany, IBRA Radio 15695af			
1830	1855		Greece, Voice of 12110eu			
1830	1900		Georgia, Georgian Radio	11760eu		
1830	1900		Netherlands, Radio 6020af	7120af	9895af	
			11655af 13700af 17605af	21590af		
1830	1900		Serbia & Montenegro, R Yugo	6100eu		
1830	1900		South Africa, AWR Africa	9520af		
1830	1900		Turkey, Voice of 9785eu			
1830	1900		UK, BBC World Service	6005af	9630af	
1830	1900		UK, RTE Radio 13640na	21630af		
1845	1900	mtwhfa	Albania, Radio Tirana Intl	7210eu	9520eu	
1845	1900		Congo, RTVC 4765af	5985af		
1851	1900		New Zealand, Radio NZ Intl	15160pa		

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

1900	1925		Israel, Kol Israel 11605va	15615va	15640af	
			17545va			
1900	1927		Vietnam, Voice of 9725eu	11630eu	13740eu	
1900	1928		Hungary, Radio Budapest	3975eu	6025eu	
			11720eu			
1900	1930	s	Germany, R Africa Intl 15565me			
1900	1930	mtwhf	Nigeria, Radio Jakada Intl	15170af		
1900	1930		Philippines, Radio Pilipinas	11720me	15190me	
			17720me			
1900	1930		Turkey, Voice of 9785eu			
1900	1945		India, All India Radio 7410eu	9445af	9950eu	
			11620eu 11935af 13605af	15075af	15155af	
			17670af			
1900	1945		Iraq, Radio Iraq Intl 6175irr	9687irr	11787irr	
1900	1956		China, China Radio Intl	9440af	13790af	
1900	1956		North Korea, Voice of 4405as	7505eu	11335eu	
1900	2000		Anguilla, Caribbean Beacon	11775am		
1900	2000		Australia, Radio 6080pa	7240va	9500as	
			9580va 9815pa 11880va			
1900	2000		Australia, Voice International	11680as		
1900	2000	vl	Botswana, Radio 3356do	4820do	7255do	
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		Costa Rica, R for Peace Intl	7445am	15038va	
1900	2000		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa 11870am	13750na	17645as	
1900	2000		Eqt Guinea, Radio Africa	7189af	15184al	
1900	2000	a	Finland, Scandinovian Weekend R	5990va	11690va	
1900	2000		Germany, Deutsche Welle	6180af	7225af	
			11965af 13590af			
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do	
1900	2000		Italy, IRRS 5775va			
1900	2000		Kuwait, Radio 11990va			
1900	2000	s	Latvia, Laser Radio 5935eu			
1900	2000		Liberia, ELWA 4760do			
1900	2000		Liberia, R Liberia Intl 5100do			
1900	2000		Liberia, Radio Veritas 5470af			
1900	2000		Malaysia, Rodio 7295do			
1900	2000	smtwh a	Malta, VO Mediterranean	12060eu		
1900	2000		Namibia, NBC 3270af	3290af	6060af	
1900	2000		Netherlands, Radio 6020af	7120af	9895af	
			11655af 13700af 17605af	21590af		
1900	2000		New Zealand, Radio NZ Intl	15160pa		
1900	2000		Nigeria, Radio/Abuja 7275do			
1900	2000		Nigeria, Radio/Enugu 6025do			
1900	2000		Nigeria, Radio/Ibadan	6050do		
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do	
1900	2000		Nigeria, Radio/Lagos 3326do	4990do		
1900	2000		Nigeria, Voice of 7255af	9690af	11770af	
			15120af			
1900	2000	fa	Russia, Bible Voice BC 13710me			
1900	2000	s	Russia, Bible Voice BC 7430me	13725af		
1900	2000		Russia, University Network	9940as		
1900	2000		Russia, Voice of 7440eu	9775eu	9890eu	
			11675eu 12070eu 15735am			
1900	2000		Sierra Leone, Radio UNAMSIL	6139af		
1900	2000		Sierra Leone, SLBS 3316do			
1900	2000	vl	Solomon Islands, SIBC 5020do	9545do		
1900	2000		South Korea, R Korea Intl	5975am	7275eu	
1900	2000		Swaziland, TWR 3200af			
1900	2000		Thailand, Radio 7155eu			
1900	2000		Uganda, Radio 4976do	5026do	7196do	
1900	2000		UK, BBC World Service	3255af	6005af	
			6190af 6195eu 7120af	9410eu	9630af	
			12095af 15310me 15400af	17830af		
1900	2000		UK, British Forces BCS 6015me	13760me		
1900	2000		UK, Christain Radio Africa	15590af		
1900	2000		UK, Gospel Far Asia 15590af			
1900	2000		USA, Armed Forces Network	3903usb	4278usb	
			4319usb 4993usb 6350usb	6458usb	10320usb	
			12579usb 12689usb	13362usb	13855usb	
1900	2000		USA, KAIJ Dallas TX 13815va			
1900	2000		USA, KTBN Salt Lk City UT	15590na		
1900	2000		USA, Voice of America 7260me	9680me	11925as	
			13635me			
1900	2000		USA, WBCQ Kennebunk, ME	17494na		
1900	2000	s	USA, WBCQ Kennebunk, ME	7415na		
1900	2000		USA, WBOH Newport NC	5920am		
1900	2000		USA, WEWN Birmingham AL	13615na	17595eu	
1900	2000		USA, WHRA Greenbush ME	17650af		
1900	2000		USA, WHRI Noblesville IN	9495am	13760va	
1900	2000		USA, WINB Red Lion PA	13570am		
1900	2000		USA, WJIE Louisville KY	7490am	13595am	
1900	2000	smtwhf	USA, WMLK Bethel PA 9465eu			
1900	2000		USA, WRMI Miami FL 15725na			
1900	2000		USA, WRNO New Orleans LA	7395am	15420al	
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 15825na			
1900	2000		USA, WWRB Manchester TN	9320na	12172na	
1900	2000		USA, WYFR Okeechobee FL	3230af	17750eu	
			18980eu			
1900	2000	vl	Vanuatu, Radio 3945al	7260do		
1900	2000		Zambia, Christian Voice	4965do		
1915	1925		Rwanda, Radio 6005do			
1915	1930		UK, BBC World Service	17885af		
1930	1959		Belgium, Radio Vlaanderen Intl	9925eu	13690eu	
1930	2000	t h	Belarus, Radio Belorus Intl	7105eu	7210eu	
1930	2000		Iran, VOIRI9800eu 11670eu	11750eu	11860eu	
1930	2000		Papua New Guinea, NBC	4890do	9675irr	
1930	2000		Slavakia, AWR Europe 7130eu			
1930	2000		Sweden, Radio 6065va			
1930	2000		Switzerland, Swiss R Intl	11815va	13645va	
			13795va 15220af			
1935	1955		Italy, RAI Intl 5970eu	9745eu		
1940	1945		Turkmenistan, Turkmen Radio	4930as		
1940	2000	mtwhfa	Armenia, Voice of 4810eu	9960eu		
1950	2000		Vatican City, Vatican Radio	4005eu	5890eu	
			7350eu			

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

2000	2010		Vatican City, Vatican Radio	4005eu	5890eu
			7250eu 9660af	11625af	13765af
2000	2025		Netherlands, Radio 6020af	7120af	9895af
			11655af 13700af 17605af	21590af	
2000	2027		Czech Rep, Radio Prague Intl	5930eu	11600as
2000	2030		Iran, VOIRI9800eu 11670eu	11750eu	11860eu
2000	2030		Italy, IRRS 5775va		
2000	2030		Mongolia, Voice of 12015eu		
2000	2030	as	Russia, Bible Voice BC 13725af		
2000	2030		Swaziland, TWR 3200af		
2000	2056		China, China Radio Intl	9440af	11640af
			13630af 15110eu 17790eu		
2000	2059	mtwhf	Spain, R Exterior Espana	9570af	15290eu
2000	2100		Algeria, Radio Algiers Intl	11715eu	15160eu
2000	2100		Anguilla, Caribbean Beacon	11775am	
2000	2100		Australia, Radio 9500as	9580va	9815po
			11880va 12080va		
2000	2100	as	Australia, Radio 6080pa	7240va	
2000	2100		Australia, Voice International	11680as	
2000	2100	vl	Botswana, Radio 3356do	4820do	7255do
2000	2100		Canada, CBC Northern Service	9625do	
2000	2100		Canada, CFRX Toronto ON	6070do	
2000	2100		Canada, CFVP Calgary AB	6030do	

Shortwave Guide

2000	2100		Canada, CKZN St John's NF	6160do		
2000	2100		Canada, CKZU Vancouver BC	6160do		
2000	2100		Canada, Radio Canada Intl	5850va	5995va	
			11690va 11965va 12015va	15325va	15470va	
			17870va			
2000	2100		Costa Rica, R for Peace Intl	7445am	15038va	
2000	2100		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa 11870am	13750na	17645as	
2000	2100		Ecuador, HCJB 15185eu			
2000	2100		Eqt Guinea, Radio Africa	7189af	15184al	
2000	2100		Germany, Deutsche Welle	9780af	15205af	
			17810af			
2000	2100		Germany, Overcomer Ministries	3965eu		
2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do	
2000	2100		Guam, AWR/KSDA 11750as	11980as		
2000	2100		Indonesia, Voice of 11785eu	15150eu		
2000	2100	s	Ireland, Reflections Europe	3910eu	6295eu	
			12255eu			
2000	2100		Kuwait, Radio 11990va			
2000	2100	s	Latvia, Laser Radio 5935eu			
2000	2100		Liberia, ELWA 4760do			
2000	2100		Liberia, R Liberia Intl 5100do			
2000	2100		Liberia, Radio Veritas 5470af			
2000	2100		Libya, Voice of Africa 11635af	15205af		
2000	2100		Malaysia, Radio 7295do			
2000	2100		Namibia, NBC 3270af	3290af	6060af	
2000	2100		New Zealand, Radio NZ Intl	15160pa		
2000	2100		Nigeria, Radio/Abuja 7275do			
2000	2100		Nigeria, Radio/Enugu 6025do			
2000	2100		Nigeria, Radio/Ibadan	6050do		
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do	
2000	2100		Nigeria, Radio/Lagos 3326do	4990do		
2000	2100		Nigeria, Voice of 7255af	9690af	11770af	
			15120af			
2000	2100		Papua New Guinea, NBC	4890do	9675irr	
2000	2100		Russia, University Network	9940as		
2000	2100		Russia, Voice of 9775eu	11675eu	12070eu	
			15455eu 15735am			
2000	2100		Sierra Leone, Radio UNAMSIL	6139af		
2000	2100		Sierra Leone, SLBS 3316do			
2000	2100	vl	Solomon Islands, SIBC 5020do	9545do		
2000	2100		Syria, Radio Damascus	12085eu	13610eu	
2000	2100		Uganda, Radio 4976da	5026do	7196do	
2000	2100		UK, AWR Europe 15385af			
2000	2100		UK, BBC World Service	3255af	6005af	
			6190af 6195eu 7120af	9410eu	9630af	
			12095af 15400af 17830af			
2000	2100		USA, Armed Forces Network	3903usb	4278usb	
			4319usb 4993usb 6350usb	6458usb	10320usb	
			12579usb 12689usb	13362usb	13855usb	
2000	2100		USA, KAIJ Dallas TX 13815va			
2000	2100		USA, KTBN Salt Lk City UT	15590na		
2000	2100		USA, Voice of America 4950af	6095eu	9760eu	
			9770eu 9850af 11855af	11975af	13670af	
			15410af 15445af 15580af	17745af	17895af	
2000	2100		USA, WBCQ Kennebunk, ME	7415na	9329na	
			17494na			
2000	2100		USA, WBOH Newport NC	5920am		
2000	2100		USA, WEWN Birmingham AL	13615na	17595eu	
2000	2100		USA, WHRA Greenbush ME	17650as		
2000	2100		USA, WHR Nablesville IN	5745va	9495am	
2000	2100		USA, WINB Red Lion PA	13570am		
2000	2100		USA, WJIE Louisville KY	7490am	13595am	
2000	2100		USA, WRMI Miami FL 15725na			
2000	2100		USA, WRNO New Orleans LA	7395am	15420al	
2000	2100		USA, WTJC Newport NC	9370na		
2000	2100		USA, WWCR Nashville TN	9475na	12160na	
			13845na 15825na			
2000	2100		USA, WWRB Manchester TN	9320na	12172na	
2000	2100		USA, WYFR Okeechobee FL	3230af	15195af	
			17725sa 17845af 18930eu	18980eu		
2000	2100	vl	Vanuatu, Radio 3945al	7260do		
2000	2100		Zambia, Christian Voice	4965do		
2000	2100		USA, WSHB Cypress Creek SC	15665af	18910af	
2010	2030		Vatican City, Vatican Radio	9660af	11625af	
			13765af			
2025	2045		Italy, RAI Intl 6185va	9670va	11880af	
2030	2040		Libya, Voice of Africa 15435af	21695af		
2030	2045		Swaziland, TWR 3200af			
2030	2045		Thailand, Radio 9680eu			
2030	2057		Vietnam, Voice of 11630eu	13740eu		
2030	2100	t h	Belarus, Radio Belarus Intl	7105eu	7210eu	
2030	2100		Cuba, Radio Havana 11760eu	13660usb		
2030	2100		Egypt, Radio Cairo 15375af			
2030	2100		Turkey, Voice of 9525as			
2030	2100	f	UK, Wales Radio Intl 7325eu			
2030	2100	as	USA, Voice of America 4950af			
2030	2100		Uzbekistan, R Tashkent Intl	5025eu	9545eu	
			11905eu			
2045	2100		India, All India Radio 7410eu	9445eu	9575au	
			9910au 9950eu 11620va	11715au		

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

2100	2128		Hungary, Radio Budapest	6025eu	11890af
2100	2130		Canada, Radio Canada Intl	5850va	7235va
			13690va 15325va 17870va		
2100	2130		China, China Radio Intl	11640af	13630af
			15110eu 17790eu		
2100	2130		Cuba, Radio Havana 11670eu	13660usb	
2100	2130		Serbia & Montenegra, R Yugo	6100eu	
2100	2130		South Korea, R Korea Intl	3955eu	
2100	2130		Turkey, Voice of 9525as		
2100	2156		North Korea, Voice of 4405as	7505eu	11335eu
2100	2156		Romania, R Romania Intl	7185eu	9510eu
			9725eu 11775eu		
2100	2159	as	Spain, R Exterior Espana	9570af	9840eu
2100	2200		Anguilla, Caribbean Beacon	11775am	
2100	2200		Australia, Radio 7240va	9500as	9580va
			9660pa 11880va 12080va	17715va	21740va
2100	2200		Austria, AWR Europe 15130af		
2100	2200	vl	Botswana, Radia 3356do	4820do	7255do
2100	2200		Bulgaria, Radio 5800eu	7500eu	
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	6160da	
2100	2200		Costa Rica, R for Peace Intl	7445am	15038va
2100	2200		Costa Rica, University Network	5030am	6150am
			7375am 9725sa 11870am	13750na	17645as
2100	2200		Ecuador, HCJB 15185eu		
2100	2200		Egypt, Radio Cairo 15375af		
2100	2200		Eqt Guinea, Radio Africa	7189af	15184al
2100	2200	f	Finland, Scandinavian Weekend R	5990va	11720va
2100	2200		Germany, Deutsche Welle	9440af	11865af
			15205af		
2100	2200	vl	Ghana, Ghana BC Corp	3366do	4915do
2100	2200		Guyana, Voice of 5949do		
2100	2200		India, All India Radio 7410eu	9445eu	9575au
			9910au 9950eu 11620va	11715au	
2100	2200	s	Ireland, Reflections Europe	3910eu	6295eu
			12255eu		
2100	2200		Japan, Radio 6035pa	6055eu	6180eu
			11855af 17825na 21670pa		
2100	2200		Liberia, ELWA 4760do		
2100	2200		Liberia, R Liberia Intl 5100do		
2100	2200		Liberia, Radio Veritas 5470af		
2100	2200		Malaysia, Radio 7295da		
2100	2200	smth a	Malta, VO Mediterranean	12060eu	
2100	2200		Mexico, Radio Mexico Intl	9705am	11770am
2100	2200		Namibia, NBC 3270af	3290af	6060af
2100	2200		Nigeria, Radio/Abuja 7275do		
2100	2200		Nigeria, Radio/Enugu 6025do		
2100	2200		Nigeria, Radio/Ibadan	6050do	
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do
2100	2200		Nigeria, Radio/Lagos 3326do	4990do	
2100	2200		Nigeria, Voice of 15120irr		
2100	2200		Papua New Guinea, NBC	4890do	9675irr
2100	2200		Russia, University Network	9940as	
2100	2200		Sierra Leone, Radio UNAMSIL	6139af	
2100	2200		Sierra Leone, SLBS 3316do		
2100	2200		Syria, Radio Damascus	12085eu	13610eu
2100	2200		UK, BBC World Service	3255af	3915as
			5965as 5975am 6005af	6190af	6195va
			7120af 9410eu 11945as	12095sa	15400af
			17830af		
2100	2200		Ukraine, R Ukraine Intl	5905eu	
2100	2200		USA, Armed Forces Network	3903usb	4278usb
			4319usb 4993usb 6350usb	6458usb	10320usb
			12579usb 12689usb	13362usb	13855usb
2100	2200		USA, KAIJ Dallas TX 13815va		
2100	2200		USA, KTBN Salt Lk City UT	15590na	
2100	2200		USA, Voice of America 6040eu	6095eu	9530eu
			9705as 9760eu 9850af	11870as	11975af
			13670af 15185as 15410af	15445af	15580af
			17740as 17820as 17895af		
2100	2200		USA, WBCQ Kennebunk, ME	7415na	9329na
			17494na		
2100	2200		USA, WBOH Newport NC	5920am	
2100	2200		USA, WEWN Birmingham AL	13615na	17595eu
2100	2200		USA, WHRA Greenbush ME	17650af	
2100	2200		USA, WHRI Noblesville IN	5745va	9495am
2100	2200		USA, WINB Red Lion PA	13570am	
2100	2200		USA, WJIE Louisville KY	7490am	13595am
2100	2200		USA, WRMI Miami FL 15725na		
2100	2200		USA, WRNO New Orleans LA	7395am	15420al
2100	2200		USA, WSHB Cypress Creek SC	15665af	18910af
2100	2200		USA, WTJC Newport NC	9370na	
2100	2200		USA, WWCR Nashville TN	9475na	12160na
			13845na 15825na		
2100	2200		USA, WWRB Manchester TN	9320na	12172na
2100	2200		USA, WYFR Okeechobee FL	17725sa	17845af
			18930eu 18980eu		
2100	2200	vl	Vanuatu, Radio 3945al	7260da	
2100	2200		Zambia, Christian Voice	4965do	
2115	2130	mtwhf	UK, BBC World Service	11675am	15390am
2115	2200		Egypt, Radio Cairo 9990eu	15375af	
2130	2145	tf	UK, BBC World Service	11720sa	
2130	2156		China, China Radio Intl	15110eu	17790eu
2130	2157		Czech Rep, Radio Prague Intl	11600na	13580na
2130	2200	twhfa	Albania, Radio Tirana Intl	7130eu	9540eu

2130	2200		Australia, ABC NT Alice Springs	2310do	4835irr
2130	2200		Australia, ABC NT Katherine	5025do	
2130	2200		Australia, ABC NT Tennant Crk	4910do	
2130	2200		Guam, AWR/KSDA 11850as	11980as	
2130	2200		Iran, VOIRI9870au 13665ou		
2130	2200		Sweden, Radio 6065va	11650as	
2130	2200		Uzbekistan, R Tashkent Intl 11905eu	5025eu	9545eu

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

2200	2215		New Zealond, Radio NZ Intl	15160pa	
2200	2227		Iran, VOIRI9870au 13665ou		
2200	2230		Canada, Radio Canada Intl 11920am15170om 15455am	6140am	9590am 17880am
2200	2230		India, All Indio Rodio 9910au 9950eu 11620va	7410eu 11715au	9445eu 9575ou
2200	2230	s	Ireland, Reflections Europe 12255eu	3910eu	6295eu
2200	2230		Liberia, ELWA 4760do		
2200	2230	mtwhf	Mexico, Radio Mexico Intl	9705am	11770am
2200	2230		Papua New Guinea, NBC	4890do	9675irr
2200	2230	mtwhfs	Serbia & Montenegro, R Yugo	7230au	
2200	2230	mtwhf	USA, Voice of Americo 9B50af 15580af	11975af	13670af
2200	2245		Egypt, Radio Cairo 9990eu		
2200	2255		Turkey, Voice of 9830va	12000va	
2200	2256		China, China Radio Intl	9880eu	
2200	2300		Anguilla, Caribbean Beocon	6090am	
2200	2300		Australia, ABC NT Alice Springs	2310do	4835irr
2200	2300		Australia, ABC NT Katherine	5025do	
2200	2300		Australia, ABC NT Tennant Crk	4910do	
2200	2300		Australia, Radio 9660va 15230as 17715va 17795va	12080va 21740va	13620va
2200	2300		Conada, CBC Northern Service	9625do	
2200	2300		Conada, 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		Costa Rica, R for Peoce Intl	7445am	15038va
2200	2300		Costa Rica, University Network 7375am 9725sa 11870am	5030am 13750na	6150am 17645as
2200	2300		Eqt Guinea, Radio Africa	7189af	15184af
2200	2300		Germany, Deutsche Welle	9720as	15605as
2200	2300	vl	Ghana, Ghano BC Corp	3366do	4915do
2200	2300		Guyana, Voice of 3291do	5949do	
2200	2300		Liberia, R Liberia Intl 5100do		
2200	2300		Malaysia, Radio 7295do		
2200	2300		Namibia, NBC 3270af	3290af	6060af
2200	2300		Nigeria, Radio/Abuja 7275do		
2200	2300		Nigeria, Radio/Enugu 6025do		
2200	2300		Nigeria, Radio/Ibadan	6050do	
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do
2200	2300		Nigeria, Radio/Lagos 3326do	4990do	
2200	2300		Nigeria, Voice of 7255af 15120af	9690af	11770af
2200	2300		Russia, University Network	9940os	
2200	2300		Sierra Leone, Radio UNAMSIL	6139af	
2200	2300		Sierra Leone, SLBS 3316do		
2200	2300	vl	Solomon Islands, SIBC 5020do	9545do	
2200	2300		Taiwan, R Taiwan Intl 15600eu		
2200	2300		UK, BBC World Service 6195as 7105as 7120af 12095sa 15400af 17830af	5965as 9740as	5975am 11955os
2200	2300		USA, Armed Forces Network 4319usb 4993usb 6350usb 12579usb 12689usb	3903usb 6458usb	4278usb 10320usb 13362usb 13855usb
2200	2300		USA, KAIJ Dallas TX 13815va		
2200	2300		USA, KTBN Salt Lk City UT	15590na	
2200	2300		USA, KWHR Naalehu HI	17510as	
2200	2300		USA, Voice of America 7215as 11760as 15185as 15290as 17820as	9705as 15305as	9770as 17740as
2200	2300		USA, WBCQ Kennebunk, ME	7415na	9329na
2200	2300		USA, WBOH Newport NC	5920am	
2200	2300		USA, WEWN Birmingham AL	9975na	17595eu
2200	2300		USA, WHRA Greenbush ME	17650af	
2200	2300		USA, WHRI Noblesville IN	5745va	9495am
2200	2300		USA, WINB Red Lion PA	13570am	
2200	2300		USA, WJIE Louisville KY	7490am	13595am
2200	2300		USA, WRMI Miami FL 15725na		
2200	2300		USA, WRNO New Orleans LA	7395am	15420al
2200	2300		USA, WSHB Cypress Creek SC	13770eu	15285sa
2200	2300		USA, WTJC Newport NC	9370na	
2200	2300		USA, WWCR Nashville TN 12160na 13845na	7465na	9475na
2200	2300		USA, WWRB Manchester TN 6890na	5050na	5085na
2200	2300		USA, WYFR Okeechobee FL 15770af 17845af	11740na	15695eu
2200	2300	vl	Vanuatu, Radio 3945al	7260do	
2200	2300		Zambia, Christian Voice	4965do	
2205	2230		Italy, RAI Intl 11895va		
2216	2300		New Zealand, Radio NZ Intl	17675pa	
2230	2257		Czech Rep, Radio Prague Intl	11600na	13580na
2230	2259		Belgium, Radio Vlaanderen Intl	15565am	
2230	2300		Canada, Radio Conada Intl 15455na	9590no	13670na
2230	2300		Cuba, Radio Havana 6195am	9550na	
2230	2300		Popua New Guinea, NBC	4890do	11880irr
2245	2300		India, All India Radio 9705os 13605as	9950as	11620as

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

2300	0000		Anguillo, Caribbean Beacon	6090am	
2300	0000		Australia, ABC NT Alice Springs	2310do	4835irr
2300	0000		Australia, ABC NT Katherine	5025do	
2300	0000		Australia, ABC NT Tennont Crk	4910do	
2300	0000		Australia, Radio 9660pa 13620as 15230os 15415as 21740va	11695as	12080va 17715va 17795va
2300	0000		Bulgaria, Radio 9400na	11900na	
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		Canada, Radio Canada Intl 15455na	9590na	13670na
2300	0000		Costa Rica, R for Peace Intl	7445am	15038am
2300	0000		Costa Rica, University Network 7375am 9725sa 11870am	5030am 13750na	6150am 17645as
2300	0000		Egypt, Radio Cairo 11725na		
2300	0000		Germany, Deutsche Welle	9890as	17860as
2300	0000	vl	Ghana, Ghana BC Corp	3366do	4915do
2300	0000		Guyana, Voice of 3291do	5949do	
2300	0000		India, All India Radio 9705as 13605as	9950as	11620os
2300	0000		Maloysia, Radio 7295do		
2300	0000		Nomibia, NBC 3270af	3290af	6060af
2300	0000	DRM	Netherlands, Radio 15525na		
2300	0000		New Zealand, Radio NZ Intl	17675pa	
2300	0000		Papua New Guinea, NBC	4890do	11880irr
2300	0000		Russia, University Network	9940as	
2300	0000		Sierra Leone, Radio UNAMSIL	6139af	
2300	0000		Sierra Leone, SLBS 3316do		
2300	0000		Singapore, SBC Radio One	6150do	
2300	0000	vl	Solomon Islands, SIBC 5020do	9545do	
2300	0000		UAE, Gospel For Asio 6145as		
2300	0000		UK, BBC World Service 5975am 6195as 7120af 11955as 11955as 12095sa	3915as 9580as	5965as 9740as 15280as
2300	0000		USA, Armed Forces Network 4319usb 4993usb 6350usb 12579usb 12689usb	3903usb 6458usb	4278usb 10320usb 13362usb 13855usb
2300	0000		USA, KAIJ Dallas TX 13815va		
2300	0000		USA, KTBN Salt Lk City UT	15590na	
2300	0000		USA, KWHR Naalehu HI	17510as	
2300	0000		USA, Voice of America 7215os 7260os 9545os 11760os 13725os 13775as 15185as 15305as 17740as 17820as	7200os	7225as 11805as 11925os 15205as 15290as
2300	0000		USA, WBOH Newport NC	5920am	
2300	0000		USA, WEWN Birmingham AL	9975na	17595eu
2300	0000		USA, WHRA Greenbush ME	7580eu	
2300	0000		USA, WHRI Noblesville IN	5745va	9495am
2300	0000		USA, WINB Red Lion PA	12159am	
2300	0000		USA, WJIE Louisville KY	7490am	13595am
2300	0000	as	USA, WRMI Miami FL 9955am		
2300	0000	mtwhf	USA, WRMI Miami FL 7385na		
2300	0000		USA, WRNO New Orleans LA	7355va	
2300	0000		USA, WTJC Newport NC	9370na	
2300	0000	as	USA, WWBS Macon GA	11910na	
2300	0000		USA, WWCR Nashville TN 9475na 13845na	5070na	7465na
2300	0000		USA, WWRB Manchester TN 6890na	5050na	5085na
2300	0000		USA, WYFR Okeechobee FL 11855sa 15255sa 17750sa	5985sa	11740na
2300	0000	vl	Vanuatu, Radio 3945al	7260do	
2300	0000		Zambia, Christian Voice	4965do	
2300	2305		Nigeria, Radio/Abuja 7275do		
2300	2305		Nigeria, Radio/Enugu 6025do		
2300	2305		Nigeria, Radio/Ibadan	6050do	
2300	2305		Nigeria, Radio/Kaduna	4770do	6090do
2300	2305		Nigeria, Radio/Lagos 3326do	4990do	
2300	2330		China, China Radio Intl	5990na	13680na
2300	2330		Cuba, Radio Havana 6195am	9550na	
2300	2356		Romania, R Romania Intl 11775eu 15105na	9570eu	11740na
2305	2312		Croatia, Croatian Radio	9925sa	
2320	2330		Kyrghyz, Kyrghyz Radio	4010as	4795as
2330	0000		Lithuania, R Vilnius 9875na		
2330	0000		Netherlands, Radio 6165na	9845na	
2330	0000		Switzerland, Swiss R Intl	9885sa	11905sa
2330	2340		Libya, Voice of Africa 15435af	21695af	
2330	2345		Iraq, Radio Iraq Intl 11787irr		
2330	2356		China, China Radio Intl	5990na	13680na
2330	2357		Vietnam, Voice of 9840as	12019as	

Selected Shortwave Guide Programming

Notes:

1. BBCWS stream abbreviations: (am)=Americas; (eas)=East Asia. The East Asia (eas) stream is recommended to listeners in western North America. Be advised that regularly scheduled BBCWS programming is subject to preemption whenever the BBC determines that coverage of breaking news warrants it.
2. Deutsche Welle has ended direct shortwave service to North America and Australasia. Experience has demonstrated that DW's 0400 and 2100 transmissions to Africa provide acceptable reception for listeners in at least the eastern half of North America. *The editor requests reports on reception of DW's English Service from MT readers in western North America.*
3. At press time, Radio Sweden was polling listeners about the potential effects of the station eliminating its 1130 half-hour broadcast to North America. Even if this transmission is dropped, RS has four other transmissions to NA at 1230, 1330, 0230 and 0330.

0000 UTC/ 8pm E/5pm P - Page 43 Freqs

NEWSCASTS (*extended)

0000	BBCWS(am)	D	News
	R. Australia	D	News
	R. Japan	D	World News
	R. New Zealand Int.	S/A	News
	M-F		Midday Report*
	R. Prague	D	News
	R. Ukraine Int.	D	News
	Spanish Foreign R...	T-A	REE News Service*
	VOA News Now	T-A	News*

CURRENT AFFAIRS MAGAZINES/FEATURES

0006	BBCWS(am)	F	Assignment (in-depth report)
0010	R. Australia	H	Background Briefing (documentaries)
0015	R. Japan	T-A	44 Minutes
	VOA News Now	T-A	Focus (one story in depth)

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

0000	R. Netherlands	A	A Good Life (development issues)
0010	R. Prague	F	Economic Report
0030	R. Netherlands	W	A Good Life
0032	BBCWS(am)	F	The Music Biz

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0000	R. Netherlands	T	The Research File
0010	R. Australia	T	The Science Show
0030	R. Netherlands	F	The Research File

ARTS AND CULTURE

0000	Spanish Foreign R...	M	Window on Spain
0006	BBCWS(am)	S	The Ticket (arts/ performance)
	W		Masterpiece (cultural ideas)
0010	R. Australia	M	Awaye! (Aboriginal)
	R. Prague	A	The Arts
0015	Spanish Foreign R...	S/M	History or cultural series
0020	R. Prague	M	Readings from Czech Literature
	A		Away from Politics (poetry)
0030	R. Ukraine Int.	M	Roots
0035	Spanish Foreign R...	H	Entremeses (food & travel)

LOCAL LIVES & VIEWS

0000	R. Netherlands	M	Dutch Horizons
0005	R. Prague	S	Insight Central Europe
	M		Letter from Prague
	T-A		Newsview
	R. Ukraine Int.	T-A	Ukraine Today
0010	R. Australia	W	The National Interest
	F		Hindsight (social history)
	A		Australian Express
	R. Japan	M	Weekend Japonology
	R. Prague	T	One on One (interview)
	W		Witness (oral history)
0012	R. New Zealand Int.	S	The Week in Parliament
	A		Focus on Politics
0020	R. Prague	W	Talking Point
	H		Czechs in History [or] Spotlight (places)
0030	R. Netherlands	S	Sketches of the Lowlands (travelogue)
	T		EuroQuest (Europe in context)
	H		Dutch Horizons
0033	R. New Zealand Int.	S	Spectrum
	VOA News Now	T-A	Coast to Coast

INFORMATIONAL FEATURES

0000	R. for Peace Int.	W	RadioNation
	R. Netherlands	H	Documentary
	F		Sound Fountain (soundscapes)
0006	BBCWS(am)	M	Everywoman (magazine)
	T		Spinning to Win (political spin)
	H		Documentaries
0030	R. Netherlands	M	Sound Fountain
	A		Documentary
0047	Spanish Foreign R...	T-A	Spanish Language Course

MUSIC

0000	R. Netherlands	S/W	Music 52-15 (world/folk)
	WBCQ Maine	S	A Different Kind of Oldies Show
0110	R. Australia	S	Go Zone (pop)
	R. Ukraine Int.	M	Music from Ukraine
0032	BBCWS(am)	T	The Music Feature
	W		Top of the Pops (UK top 20)
	H		Charlie Gillett (world music)
	A		John Peel (eclectic)
0033	R. New Zealand Int.	A	The Sampler (new CDs)

ENTERTAINMENT

0000	WBCQ Maine	M	Radio New York International
	W		Good Morning Maine
	A		Allan Weiner Worldwide
0032	BBCWS(am)	M	Westway Omnibus (drama serial)
0045	R. Netherlands	S	Second Chance (best of RN)

SWL, MEDIA & COMMUNICATIONS

0000	R. for Peace Int.	W	Counterspin (media analysis)
	WINB	S	DX Partyline
0015	R. Ukraine Int.	S	Whole World on Radio Dial
0030	R. for Peace Int.	M	World of Radio
	W		Counterspin
0035	Spanish Foreign R...	S/T	Radio Waves
0045	R. Bulgaria	A	R. Bulgaria Calling

LISTENER CONTACT/INTERACTIVE

0000	R. for Peace Int.	S	Mailbag
0010	R. Japan	S	Hello from Tokya
	R. Prague	M	Mailbox
0030	R. Ukraine Int.	S	Hello from Kiev
0035	Spanish Foreign R...	A	Radio Club

SPORT

0006	BBCWS(am)	A	Sports International (magazine)
0023	VOA News Now	T-A	Sports

0100 UTC/ 9pm E/6pm P - Page 43 Freqs

NEWSCASTS (*extended)

0100	BBCWS(am)	D	News
	China R. Int.	D	News & Reports*
	R. Australia	D	News
	R. Budapest	D	News
	R. Canada Int.	D	News
	R. Habana Cuba	D	News
	R. Netherlands	S/M	News
	R. New Zealand Int.	D	News
	R. Prague	D	News
	VOA News Now	T-A	News & Reports*
	Voice of Russia	D	News
	Voice of Vietnam	D	News
0130	VOA Spec. Eng.	T-A	News

CURRENT AFFAIRS MAGAZINES/FEATURES

0100	R. Netherlands	T-A	Newsline
0105	R. Australia	S	Correspondents' Report
	A		Asia Pacific Weekend Edition
	R. Netherlands	M	Wide Angle (one topic focus)
0110	China R. Int.	S	Report on Developing Countries
	R. Australia	M-F	Asia Pacific
	R. Habana Cuba	M	Weekly Review
0111	Voice of Russia	S	News and Views
	M		Sunday Panorama
	T-A		Commonwealth Update
0115	R. Habana Cuba	T-S	Viewpoint
0130	R. for Peace Int.	S	Alternative Radio
0133	VOA News Now	A	VOA News Review
0135	R. Canada Int.	T	Media Zone
0140	R. Habana Cuba	A	Weekly Review
	VOA Spec. Eng.	A	In the News
0145	VOA News Now	T-F	Dateline

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)

0105	R. Budapest	M	Europe Unlimited (trade-monthly)
	R. Canada Int.	S	Business Sense
0110	R. Prague	F	Economic Report
0115	Voice of Vietnam	F	Vietnam Economy
0130	China R. Int.	T	Biz China
0133	VOA News Now	T-F	Business News
0135	R. Canada Int.	F	Business Sense
0140	VOA Spec. Eng.	T	Development Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0106	BBCWS(am)	T	Health Matters
	W		Go Digital
	H		Discovery (research)
	F		One Planet (ecology)
	A		Science in Action (magazine)
	R. New Zealand Int.	A	Digital Life
0115	China R. Int.	A	Cutting Edge
0130	R. Australia	M	The Health Report
0135	R. Canada Int.	S/A	Sci-Tech File
0140	VOA Spec. Eng.	W	Agriculture Today
	H		Health Report
	A		Environment Report
0145	VOA Spec. Eng.	W	Science in the News
	H		Explorations
0150	R. Habana Cuba	M	Breakthrough

ARTS AND CULTURE

0105	R. Budapest	M	Spotlight (monthly)
0106	R. New Zealand Int.	S	At the Movies
0110	R. Prague	A	The Arts
0115	Voice of Vietnam	W	Culture & Society
0120	China R. Int.	S	In the Spotlight
	R. Prague	M	Readings from Czech Literature
	A		Away from Politics (poetry)
	Voice of Vietnam	A	Literature & Arts
0130	R. New Zealand Int.	S	Bookmarks
0132	BBCWS(am)	F	The Word (books, writers & readers)
0135	R. Canada Int.	M/H	Spotlight
0145	VOA Spec. Eng.	A	American Stories
	H		The Making of a Nation

LOCAL LIVES & VIEWS

0105	R. Budapest	S	Insight Central Europe
	M		Heading for Hungary (monthly)
	T-A		Hungary Today
	R. Canada Int.	T-A	Canada Today
	R. Netherlands	S	Europe Unzipped
	R. Prague	S	Magazine (local color)
	M		Letter from Prague
	T-A		Newsview
	Voice of Vietnam	D	Current Affairs
0110	R. Prague	T	One on One (interview)
W	Witness (oral history)		
0115	Voice of Vietnam	T	Vietnam: Land and People
A	Rural Vietnam		
0120	R. Prague	W	Talking Point
	H		Czechs in History [or] Spotlight (places)
0124	Voice of Russia	M	Russia: People & Events
0130	China R. Int.	M	People in the Know
	W		China Horizons
	H		Voices from Other Lands
	F		Life in China
	RTE Ireland	S	Saturday View
	M		This Week with Gerald Barry
	T-A		5-7 Live
0132	Voice of Russia	S	Moscow Yesterday and Today
0135	R Austria Int.	M	Network Europe
0140	R. Habana Cuba	T/H/F	Caribbean Outlook
0145	VOA Spec. Eng.	T	This is America
	F		Making of a Nation
	A		American Mosaic
0154	Voice of Russia	H	Russia: People and Events

INFORMATIONAL FEATURES

0100	R. for Peace Int.	A	Disability Radio Worldwide
0130	R. Australia	T	The Law Report
	W		The Religion Report
	R. for Peace Int.	S	Alternative Radio
0132	Voice of Russia	A	Christian Message from Moscow
0140	VOA Spec. Eng.	F	Education Report
0145	BBCWS(am)	H	Heart and Soul (beliefs & values)
	A		What's the Problem? (advice)

MUSIC

Shortwave Guide

0106 BBCWS(am) ..... M Wright Round the World (variety)
R. New Zealand Int. M-F Cadenza (light classics)
0120 R. Prague ..... S Saturday Music (a mix)
Voice of Vietnam ..... S Vietnamese Music
0130 R. Australia ..... S Oz Sounds
A ..... Music Deli (international)
0132 BBCWS(am) ..... W Music Review (magozine)
Voice of Russio ..... T Folk Box
W ..... Jazz Show
H ..... Musical Tales of St. Petersburg
F ..... Music Around Us
0146 Voice of Russia ..... F Music At Your Request

ENTERTAINMENT
0100 WBCQ Moine ..... S Marion's Attic (vintoge recordings)
M ..... Radio New York International
A ..... Tosho Takes Control
0101 BBCWS(am) ..... S Play of the Week (radio theotre)
0110 Voice of Vietnam ..... M Sunday Show
0130 R. New Zealand Int. A Comedy Zone
0132 BBCWS(am) ..... T Panel game or Quiz
H/S ..... Westway (drama serial)
Voice of Russia ..... M Timelines

SWL, MEDIA & COMMUNICATIONS
0100 R. for Peace Int. ..... W World of Radio
0120 R. Budapest ..... A DX Corner
0130 R. Australia ..... H The Media Report
R. for Peace Int. ..... A World of Radio
0140 R. Habana Cuba .... S/W DXers Unlimited

LISTENER CONTACT/INTERACTIVE
0105 R. Budapest ..... M And the Gatepost (monthly)
R. Conada Int. ..... M Maple Leaf Mailbag
0110 R. Prague ..... M Mailbox
0115 Voice of Vietnam ..... H Letterbox
0130 China R. Int. ..... A Listeners' Garden
R. for Peace Int. ..... W RFPI Mailbag
0135 R. Conada Int. ..... W Maple Leaf Mailbag
0140 R. Habana Cubo .... M Mailbag Show
0150 R. Austria Int. ..... S Postbox

SPORT
0123 VOA News Now ..... T-A Sports Report
0130 R. Australio ..... F The Sports Factor
RTE Ireland ..... S Sportsnews
0135 R. Habana Cuba .... T-A Time Out
0135 R. New Zealand Int. D Live Sport (os available)

0200 UTC/ 10pm E/7pm P - Page 44 Freqs

NEWSCASTS (*extended)
0200 BBCWS(am) ..... D The World Today*
R. Australia ..... D News
R. Habana Cuba .... D News
R. Korea Int. ..... D News
R. New Zealand Int. D News
R. Taiwan Int. ..... D News
Voice of Russia ..... D News
0230 R. Budapest ..... D News
Voice of Vietnam ..... D News

CURRENT AFFAIRS MAGAZINES/FEATURES
0205 R. Australio ..... A Background Briefing (documentaries)
0210 R. Australio ..... M-F The World Today
0230 R. Sweden ..... T-A 60 Degrees North
0245 BBCWS(am) ..... T/W/F/A Analysis
H ..... From Our Own Correspondent
0255 R. Australia ..... A Perspective

BUSINESS/ECONOMICS (olso in NEWSCASTS & Current Affairs)
0211 Voice of Russia ..... W/A Newmarket
0232 BBCWS(am) ..... S Global Business (trends/ideas)
M ..... World Business Review
T-A ..... World Business Report
0235 R. Budapest ..... M Europe Unlimited (trade-monthly)
0245 Voice of Vietnam ..... F Vietnam Economy

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0204 R. New Zealand Int. A Eureka
0211 Voice of Russia ..... T/F Science & Engineering
0230 R. New Zealand Int. A Health [or] Environment Matters
0245 R. Sweden ..... F Greenscon (ecology-2nd wk.)
..... Heartbeat (health-3rd wk.)

ARTS AND CULTURE
0215 R. Taiwan Int. ..... T Culture Express
0230 R. Sweden ..... S Spectrum (3rd wk.)
0235 R. Budapest ..... M Spotlight (monthly)
0245 Voice of Vietnam ..... W Culture & Society
0250 Voice of Vietnam ..... A Literature and Arts

LOCAL LIVES & VIEWS
0215 R. Korea Int. ..... T-A Seoul Calling (magazine)
R. Taiwan Int. ..... S Great Wall Forum (mainland issues)
W ..... Taiwan Today
H ..... Discover Taiwan
F Taipei Magazine
0230 R. Sweden ..... S Weekend (Europe magazine-1st wk.)
Sweden Today (2nd wk)
Studio 49 (topical discussion-4th wk.)
Voice of Russia ..... M This is Russia
T ..... Kaleidoscope (events)
H ..... Moscow Yesterday and Today
0235 R. Budapest ..... S Insight Central Europe
M ..... Heading for Hungary (monthly)
T-A ..... Hungary Today
0245 R. Korea Int. ..... T Korea, Today & Tomorrow
W ..... Korean Kaleidoscope (society)
H ..... Wonderful Korea (travelogue)
F ..... Seoul Report (interviews)
R. Sweden ..... W Close Up (profiles-1st/3rd wk)
F ..... Nordic Report (1st wk.)
..... The S-Files (things Swedish-4th wk)
A ..... Review of the Newsweek
Voice of Vietnam ..... T Vietnam: Land & People
A ..... Rural Vietnam
0254 Voice of Russia ..... W Russio: People & Events

INFORMATIONAL FEATURES
0200 R. for Peace Int. ..... M New Dimensions ("progressive" ideas)
0232 Voice of Russio ..... F Russian by Radio
0235 R. Habana Cuba .... S The World of Stamps
0245 BBCWS(am) ..... M The Instant Guide (issue background)
R. Taiwan Int. ..... M-F Let's Learn Chinese

MUSIC
0206 R. New Zealand Int. M-F Wayne's Music (by decades)
0210 R. Habana Cubo .... M From Habana
R. Korea Int. ..... M Korean Pop Interactive
0215 R. Taiwan Int. ..... M Jade Bells and Bamboo Pipes (traditional)
0230 R. Habana Cubo .... M The Jazz Place [or] Top Tens
R. Sweden ..... M Sounds Nordic (exc. 1st wk.)
0332 Voice of Russia ..... S Songs from Russia
W ..... Musical Tales of St. Petersburg
0250 Voice of Vietnam ..... S Music (Vietnamese)

ENTERTAINMENT
0205 R. Australia ..... S Margoret Throsby Interview
0230 R. Taiwan Int. ..... W Instant Noodles (the weird news)
0232 Voice of Russia ..... A Audio Book Club
0240 Voice of Vietnam ..... M Sunday Show

SWL, MEDIA & COMMUNICATIONS
0200 R. for Peace Int. ..... F Continent of Meaio
WBCQ Maine ..... S Pocket Calculator
0230 WHRA Maine(7580) S DXing with Cumbre
WHRI Indiana(5745) M DXing with Cumbre
WWCR Tenn(5070) .. S World of Radio
0250 R. Budopest ..... A DX Corner

LISTENER CONTACT/INTERACTIVE
0200 R. for Peace Int. ..... A Mailbag
0210 R. Korea Int. ..... S Worldwide Friendship
0211 Voice of Russio ..... S/M/H Moscow Mailbag
0230 R. Sweden ..... M In Touch with Stockholm (1st wk.)
R. Taiwan Int. ..... S Mailbag Time
0235 R. Budapest ..... M And the Gatepost (monthly)
0245 Voice of Vietnam ..... H Letterbox
0246 Voice of Russio ..... S You Write to Moscow

SPORT
0200 R. New Zealand Int. D Live Sport (as available)
0205 BBCWS(am) ..... H Sports International (magozine)
R. Australia ..... S/A Grandstand (live sports action*)
0245 R. Sweden ..... T Sportscan
(*special on 9660, 12080, 17580, 21725 kHz. only.)

0300 UTC/ 11pm E/8pm P - Page 44 Freqs

NEWSCASTS (*extended)
0300 BBCWS(am) ..... D News
China R. Int. ..... D News & Reports
R. Australio ..... D News
R. Habana Cuba .... D News
R. New Zealand Int. S/A News
M-F ..... Pacific Regional News
R. Prague ..... D News
R. Taiwan Int. ..... D News
R. Ukraine Int. ..... D News
RVi Belgium ..... T-S News
Voice of Russio ..... D News
Voice of Turkey ..... D News
0330 Voice of Vietnam ..... D News
0345 R. for Peace Int. ..... T-A U.N. Today

CURRENT AFFAIRS MAGAZINES/FEATURES
0305 Voice of Turkey ..... D Press Review
0306 BBCWS(am) ..... S From Our Own Correspondent
T-A ..... Outlook (magazine)
0310 China R. Int. ..... S Report on Developing Countries
R. Habana Cuba .... M Weekly Review
R. New Zealand Int. W Pacific Report
F ..... Doteline Pacific
0311 Voice of Russio ..... M Sunday Panoroma
T-A ..... News & Views
0315 R. Habana Cuba .... T-S Viewpoint
0330 R. New Zealand Int. F Pacific Correspondent
R. Sweden ..... T-A 60 Degrees North
0340 R. Habana Cubo .... T/H/F Caribbean Outlook
A ..... Weekly Review
0345 R. Sweden ..... A Review of the Newsweek

BUSINESS/ECONOMICS (olso in NEWSCASTS & Current Affairs)
0310 R. Prague ..... F Economic Report
0315 R. Taiwan Int. ..... M Taiwan Economic Journal
0330 China R. Int. ..... T Biz China
R. New Zealand Int. W Tradewinds
0345 Voice of Vietnam ..... F Vietnam Economy

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0345 R. Sweden ..... F Greenscan (ecology-2nd wk.)
..... Heartbeat (health-3rd wk.)
0350 R. Habana Cuba .... M Breakthrough

ARTS AND CULTURE
0310 R. New Zealand Int. M Tagato o te Moana (Pacific culture)
R. Prague ..... A The Arts
0320 China R. Int. ..... S In the Spotlight
R. Prague ..... M Readings from Czech Literature
A ..... Away from Politics (poetry)
0330 R. Sweden ..... S Spectrum (3rd wk.)
R. Taiwan Int. ..... M Stage, Screen & Studio
F ..... Taiwan Gourmet
R. Ukraine Int. ..... M Roots
0332 Voice of Russia ..... W/F Russian history/culture program
0335 Voice of Turkey ..... S Turkish Arts
F ..... Culture Parade
0345 Voice of Vietnam ..... W Culture and Society
0350 Voice of Vietnam ..... A Literature & Arts

LOCAL LIVES & VIEWS
0304 RVi Belgium ..... T-A Flanders Today
0305 R. Australia ..... A Rural Reporter (outback)
R. Prague ..... S Magazine (local color)
M ..... Letter from Prague
T-A ..... Newsview
R. Ukraine Int. ..... T-A Ukraine Today
0308 RVi Belgium ..... M Tourism in Flanders
0310 R. Prague ..... T One on One (interview)
W ..... Witness (oral history)
Voice of Turkey ..... A Archaeological Settlements
0315 R. Taiwan Int. ..... S Great Wall Forum (mainland issues)
A ..... Kaleidoscope
0318 RVi Belgium ..... A Tourism in Flanders
0320 R. Australia ..... M-F Life Matters (social issues)
R. Prague ..... H Czechs in History or
..... Spotlight (places)

Shortwave Guide

0324 Voice of Russia ..... M Russia: People and Events
0330 China R. Int. ..... M People in the Know
W ..... China Horizons
H ..... Voices from Other Lands
F ..... Life in China
R. Sweden ..... S Network Europe (magazine-1st wk)
Sweden Today (2nd wk)
Studio 49 (topical discussion-4th wk)
0332 BBCWS(am) ..... S People & Politics (British Parliament)
Voice of Russia ..... S Kaleidoscope (Russian events)
0345 R. Sweden ..... F Nordic Report (1st wk.)
The S-Files (things Swedish-4tn wk)
A ..... Review of the Newsweek
Voice of Vietnam ..... T Vietnam: Land and People
A ..... Rural Vietnam
0354 R. Australia ..... S/A Heywire (Aussie rural youth views)

INFORMATIONAL FEATURES
0305 R. New Zealand Int. S RPM (international documentaries)
0332 Voice of Russia ..... T/H/A 20th Century
0345 R. Taiwan Int. ..... M-F Let's Learn Chinese

MUSIC
0300 RVi Belgium ..... S Music from Flanders
0305 R. New Zealand Int. A Home Grown (NZ artists)
0310 R. New Zealand Int. T Top 5 & New Releases (pop/rock)
R. Prague ..... S Saturday Music (a mix)
R. Ukraine Int. ..... M Music from Ukraine
Voice of Turkey ..... M Tunes Spanning Centuries
0315 R. Taiwan Int. ..... T Jade Bells & Bamboo Pipes (traditional)
0330 R. Australia ..... S Jazz Notes
A ..... Australian Country Style
R. New Zealand Int. A Musical Chairs (NZ artist profile)
R. Sweden ..... M Sounds Nordic (rock-exc. 1st wk.)
0350 Voice of Vietnam ..... S Music (Vietnamese)

ENTERTAINMENT
0300 WBCQ Maine ..... M Radio New York International
0305 WWCR Tenn(3215) .. A Golden Age of Radio Theatre
0332 Voice of Russia ..... M Audio Book Club
0340 Voice of Vietnam ..... M Sunday Show
0345 BBCWS(am) ..... T-A Off the Shelf (book readings)

SWL, MEDIA & COMMUNICATIONS
0300 KWHR Hawaii(17510) M DXing with Cumbre
RVi Belgium ..... M Radio World
WWCR Tenn(5070) .. S Spectrum
0310 R. New Zealand Int. H RNZI Talk (fortnightly)
0315 R. Ukraine Int. ..... S Whole World on Radio Dial
0320 Voice of Turkey ..... S DX Corner (fortnightly)
0330 WHRI Indiana(7315) M DXing with Cumbre
0340 R. Habana Cuba .... S/W DXers Unlimited
0345 R. Bulgaria ..... S R. Bulgaria Calling

LISTENER CONTACT/INTERACTIVE
0305 R. Australia ..... S Feedback
0306 BBCWS(am) ..... M Talking Point (current issues)
0310 R. New Zealand Int. H Mailbox (fortnightly)
R. Prague ..... M Mailbox
Voice of Turkey ..... W Live from Turkey
0314 RVi Belgium ..... M Brussels 1043
0315 Voice of Turkey ..... H Letterbox
0330 China R. Int. ..... A Listeners' Garden
R. Sweden ..... M In Touch with Stockholm (1st wk.)
R. Ukraine Int. ..... S Hello from Kiev
WRMI Florida ..... S Viva Miami
0340 R. Habana Cuba .... M Mailbag Show
0345 Voice of Vietnam ..... H Letterbox

SPORT
0300 R. Australia ..... S/A Grandstand (live action)*
R. New Zealand Int. D Live Sport (as available)
0310 R. Australia ..... M-F Regional Sports Report
0330 R. New Zealand Int. H The World in Sport
0335 R. Habana Cuba .... T-A Time Out
0345 R. Sweden ..... T Sportscan
(*special on 9660, 12080, 17580, 21725 kHz. only)

0400 UTC/ 12am E/9pm P - Page 45 Freqs

NEWSCASTS (*extended)
0400 BBCWS(am) ..... D World Brieting*
China R. Int. ..... D News & Reports
Deutsche Welle ..... D News
R. Australia ..... D News
R. Habana Cuba .... D News
R. New Zecland Int. D News
Voice of Russia ..... D News
0430 R. Netherlands ..... S/M News
0432 BBCWS(am) ..... M-F The World Today*

CURRENT AFFAIRS MAGAZINES/FEATURES
0400 R. for Peace Int. ..... T-A Democracy Now!
0405 Deutsche Welle ..... S Inside Europe
T-A ..... Newslink Africa
0410 China R. Int. ..... S Report on Developing Countr es
0430 Deutsche Welle ..... T Insight
R. Netherlands ..... T-A Newsline
0455 R. Australia ..... M-F Perspective
R. Netherlands ..... S Insight (commentary)

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)
0405 R. Australia ..... A Business Report
0411 Voice of Russia ..... H Newmarket
0430 BBCWS(am) ..... S World Business Review
China R. Int. ..... T Biz China
Deutsche Welle ..... W World in Progress (development
H ..... Money Talks
0445 Deutsche Welle ..... T Business German

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0405 R. Australia ..... S All in the Mind (the brain)
0411 Voice of Russia ..... W/A Science and Engineering
0415 China R. Int. ..... A Cutting Edge
0430 Deutsche Welle ..... F Man & Environment
A ..... Spectrum
R. Australia ..... S In Conversation

ARTS AND CULTURE
0420 China R. In'. ..... S In the Spotlight

LOCAL LIVES & VIEWS
0405 R. New Zealand Int. M-F In Touch w th NZ
0430 China R. Int. ..... M People in the Know
W ..... China Horizons
H ..... Voices from Other Lands
F ..... Life in China
0432 Voice of Russia ..... W Moscow Yesterday and Today
0435 R. Netherlands ..... S Europe Unzipped

INFORMATIONAL FEATURES
0435 R. Habana Cuba .... S The World of Stamps
0432 BBCWS(am) ..... A Reporting Religion
0445 BBCWS(am) ..... S The Instant Guide (queries answered)

MUSIC
0400 WRMI Florida ..... S Solid Rock Radio (unsigned/indie musicians)
0405 R. New Zealand Int. A Home Grown (from 0305)
0410 R. Habana Cuba .... M From Habana
0411 Voice of Russia ..... S/M Musical Tales of St. Petersburg
0430 R. Australia ..... A Aussie Music Show (rock)
R. Habana Cuba .... M The Jazz Place [or] Top Tens
0432 Voice of Russia ..... M Jazz Show
T ..... Music Around Us
H ..... Folk Box
0447 Voice of Russia ..... T Music At Your Request

ENTERTAINMENT
0400 WBCQ Maine ..... M-A Amos 'n Andy (classic comedy)
WRMI Florida ..... M Jupiter 400 (the paranormal)
0405 R. New Zealand Int. S Sunday Drama (a play for radio)
WWCR Tenn ..... A Golden Age of Radio Theatre (3215 kHz)
0410 R. Australia ..... M-F Margaret Throsby Interview
0432 Voice of Russia ..... F Audio Book Club
S/A ..... Timelines

SWL, MEDIA & COMMUNICATIONS
0400 R. for Peace Int. ..... S Counterspin
WBCQ Maine ..... S Tom & Darryl
WWCR Tenn(5070) .. S Cyber Line (digital)
0415 WBCQ Maine ..... M Worlc of Radio
0430 WHRA Maine(7580) A DXing with Cumbre

Listener Contact/Interactive
0405 Deutsche Welle ..... M Mailbag
0411 Voice of Russia ..... T/F Moscow Mailbag
0430 China R. Int. ..... A Listeners' Garden
0435 R. Netherlands ..... M Sincerely Yours

SPORT
0400 R. Australia ..... S/A Grandstand (live action)*
(*special on 9660, 12080, 17580, 21725 kHz. only.)

0500 UTC/ 1am E/10pm P - Page 45 Freqs

NEWSCASTS (*extended)
0500 China R. Int. ..... D News & Reports
R. Australia ..... D News
R. Habana Cuba .... D News
R. Japan ..... D News
R. New Zealand Int. D News
Voice of Nigeria ..... S/A News

CURRENT AFFAIRS MAGAZINES/FEATURES
0500 Voice of Nigeria ..... M-F VON Scope
0505 R. New Zealand Int. M-F Checkpoint
0510 China R. Int. ..... S Report on Developing Countries
R. Australia ..... M-F Pacific Beat
R. Habana Cuba .... M Weekly Review
0515 R. Habana Cuba .... T-S Viewpoint
R. Japan ..... M-F 44 Minutes
0540 R. Habana Cuba .... T/H/F Caribbean Outlook
A ..... Weekly Review

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)
0500 R. Netherlands ..... A A Good Life (development)
0530 China R. Int. ..... T Biz China

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0500 R. Netherlands ..... T Research File
0505 R. Australia ..... A Ockham's Razor (opinion)
0515 China R. Int. ..... A Cutting Edge
0550 R. Habana Cuba .... M Breakthrough

ARTS AND CULTURE
0520 China R. Int. ..... S In the Spotlight

LOCAL LIVES & VIEWS
0500 R. Netherlands ..... S Sketches of the Low Lands (travelogue)
M ..... Dutch Horizons
0510 R. New Zealand Int. A Tagata o te Moana (Pacific magazine)
0530 China R. Int. ..... M People in the Know
W ..... China Horizons
H ..... Voices from Other Lands
F ..... Life in China

INFORMATIONAL FEATURES
0500 R. Netherlands ..... H Documentary
F ..... The Sound Fountain (soundscapes)
R. for Peace Int. ..... H Alternative Radio
0505 R. Australia ..... S The Europeans
0510 R. New Zealand Int. S Religion feature
0520 R. Australia ..... A Lingua Franca (about language)
0530 R. Australia ..... S The Ark (religious history)

MUSIC
0500 R. Netherlands ..... W Music 52-15 (world/folk)
WRMI Florida ..... S Solid Rock Radio (from 0400)
0510 R. Japan ..... S Pop Joins the World
0535 R. Australia ..... A Fine Music Australia (classical)
0540 R. New Zealand Int. S Jazz Spotlight

ENTERTAINMENT
0500 WBCQ Maine ..... S Juliet's Wild Kingdom
WRMI Florida ..... M Jupiter 400 (from 0400)
0505 BBCWS(am) ..... M Wright Round the World (requests)
0515 R. Netherlands ..... S Second Chance (best of RN)
0530 Voice of Nigeria ..... D Moving On (lifestyles magazine)

Shortwave Guide

SWL, MEDIA & COMMUNICATIONS
0500 WHRI Indiana ..... A DXing with Cumbre
0530 R. far Peace Int. ..... S World of Radia
0540 R. Habana Cuba .... S/W DXers Unlimited

LISTENER CONTACT/INTERACTIVE
0510 R. Japan ..... A Hello from Tokyo
0530 China R. Int. ..... A Listeners' Garden
0540 R. Habana Cuba .... M Mailbag Show

SPORT
0500 R. Australia ..... S/A Grandstand (live action)*
0535 R. Habana Cuba .... T-A Time Out
R. New Zealand Int. D Live Sport (as available)
(*special on 9660, 12080, 17580, 21725 kHz. only.)

0600 UTC/ 2am E/11pm P - Page 46 Freqs

NEWSCASTS (*extended)
0600 R. Australia ..... D News
R. Habana Cuba .... D News
R. Japan ..... D News
R. New Zealand Int. D News
Voice of Nigeria ..... M-F News*

CURRENT AFFAIRS MAGAZINES/FEATURES
0615 R. Japan ..... M-F Asian Top News (region's radio)
0630 R. New Zealand Int. M-F Worldwatch
Voice of Nigeria ..... S In the News
A ..... Newsmoker

SCIENCE/TECHNOLOGY (incl. Health & Environment)
0620 R. Australia ..... M Ockham's Razor (opinion)
T ..... In Conversation

ARTS AND CULTURE
0605 R. Australia ..... S The Arts
0607 R. New Zealand Int. M-F What's Going On?
0620 R. Australia ..... F The Makers

LOCAL LIVES & VIEWS
0607 R. New Zealand Int. S Whenuo! (Maori program)
0610 R. Japan ..... S Weekend Japanology
0645 Voice of Nigeria ..... A Window on Abuja (regional report)
0654 R. Japan ..... S Sights & Sounds of Japan

INFORMATIONAL FEATURES
0620 R. Australia ..... W The Ark (religious issues)
H ..... Lingua Franca (language)
0625 R. Japan ..... T Basic Japanese for You
H ..... Brush Up Your Japanese
0635 R. Habana Cuba .... S World of Stamps

MUSIC
0600 WRMI Florida ..... S Solid Rock Radio (from 0400; to 0900)
0607 R. New Zealand Int. A The Mix
0610 R. Habana Cuba .... M From Havana (Cuban musicians)
R. Japan ..... A Pop Joins the World
0625 R. Japan ..... M Japan Music Treasure Box
W ..... Japan Musicscape
F ..... Music Beat (pop)
0630 R. Australia ..... S Blacktracker (modern Aboriginal)
A ..... Oz Sounds
R. Habana Cuba .... M The Jazz Place (or) Top Tens
0640 R. Australia ..... M Australian Music Show (modern rock)
T ..... Music Deli (international)
W ..... Blacktracker (Aboriginal)
H ..... Australia Country Style
F ..... Jazz Notes

ENTERTAINMENT
0600 WRMI Florida ..... M Jupiter 400 (from 0400; to 0900)
0645 R. New Zealand Int. M-F Storytime (for children)

SWL, MEDIA & COMMUNICATIONS
0600 KWHR Hawaii(17780) A DXing with Cumbre
R. for Peace Int. ..... W CounterSpin (media analysis)
0630 R. for Peace Int. ..... M World of Radio

LISTENER CONTACT/INTERACTIVE
0605 R. Australia ..... S Feedback
0630 R. for Peace Int. ..... S Mailbag

SPORT
0600 R. Australia ..... S/A Grandstand (live action)*
R. New Zealand Int. D Live Sport (as available)
0610 R. Australia ..... M-F Regional Sports Report
(*special on 9660, 12080, 17580, 21725 kHz. only.)

1000 UTC/6am E/3am P - Page 47 Freqs

NEWSCASTS (*extended)
1000 BBCWS(am) ..... S/A News
M-F ..... World Briefing*
R. Australia ..... D News
R. New Zealand Int. D News
VOA News Now ..... D News & Reports*
1030 R. Netherlands ..... S/A News

CURRENT AFFAIRS MAGAZINES/FEATURES
1000 R. for Peace Int. ..... T-A Democracy Now!
1005 R. Australia ..... M-F Asia Pacific
R. New Zealand Int. M-F Late Edition
1006 BBCWS(am) ..... S From Our Own Correspondent
A ..... Assignment (one topic in-depth)
1010 WWCR Tenn(5070) .. S A View from Europe
1030 R. Netherlands ..... M-F Newsline
1034 VOA News Now ..... F/A On the Line (US foreign policy)
1035 R. Netherlands ..... S Wide Angle (one topic examined)

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)
1032 BBCWS(am) ..... M-F World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)
1030 R. Australia ..... M Health Report

LOCAL LIVES & VIEWS
1005 R. Australia ..... A Australian Express
1034 VOA News Now ..... S-H Main Street
1035 R. Netherlands ..... A Europe Unzipped
R. New Zealand Int. S Sunday Supplement
1055 R. Netherlands ..... A Insight (commentary)

INFORMATIONAL FEATURES
1030 R. Australia ..... T Law Report
W ..... Religion Report
1032 BBCWS(am) ..... S Reporting Religion
A ..... The Interview

MUSIC
1005 R. Australia ..... S Go Zone (pop)
1012 R. New Zealand Int. A Deep Purple (relaxing)

SWL, MEDIA & COMMUNICATIONS
1000 KWHR Hawaii(11565) A DXing with Cumbre
R. for Peace Int. ..... S CounterSpin (media analysis)
1012 R. New Zealand Int. S Mediawatch
1030 R. Australia ..... H Media Report
1040 VOA News Now ..... S Kim Elliott (w/in Main St., time approx.)

LISTENER CONTACT/INTERACTIVE
1015 WWCR Tenn(15825) S Ask WWCR

SPORT
1030 R. Australia ..... F Sports Factor
1045 BBCWS(am) ..... M-H Sports Roundup
F ..... Football Extra

1100 UTC/ 7am E/4am P - Page 48 Freqs

NEWSCASTS (*extended)
1100 BBCWS(am) ..... D World Briefing*
BBCWS(eas) ..... S World Briefing*
M-A ..... News
R. Australia ..... D News
R. Japan ..... D News
R. New Zealand Int. D News
1120 BBCWS(eas) ..... S British News
1130 R. Korea Int. ..... D News

CURRENT AFFAIRS MAGAZINES/FEATURES
1105 BBCWS(am) ..... M-F Caribbean Morning Report
R. Australia ..... S Correspondents' Report
M-A ..... Asia Pacific
WWCR Tenn(15825) A A View from Europe
1106 BBCWS(eas) ..... M-F Outlook (magazine)
1115 R. Japan ..... M-F Asian Top News (region's radio)
1132 BBCWS(am) ..... S Letter from America (Alistair Cooke)
T/W/F ..... Analysis
H ..... From Our Own Correspondent

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)
1100 R. Netherlands ..... T A Good Life (development issues)
1130 R. Netherlands ..... F A Good Life (development issues)

SCIENCE/TECHNOLOGY (incl. Health & Environment)
1100 R. Netherlands ..... H Research File
1130 R. Netherlands ..... M Research File

ARTS AND CULTURE
1106 BBCWS(eas) ..... A The Ticket (arts/performance)
1130 R. Australia ..... S The Arts

LOCAL LIVES & VIEWS
1100 R. Netherlands ..... M EuroQuest
W ..... Dutch Horizons
A ..... Sketches of the Low Lands
1105 R. New Zealand Int. S/A NZ Forces Radio
M-H ..... Nine to Noon (current affairs)
1110 WWCR Tenn ..... S A View from Europe (5070 kHz)
1115 BBCWS(am) ..... M-F Caribbean Magazine
1120 BBCWS(am) ..... D British News
BBCWS(eas) ..... S British News
1130 R. Australia ..... M-F Bush Telegraph (rurol life)
R. Netherlands ..... S Dutch Horizons
1145 R. Korea Int. ..... M-F Seoul Calling

INFORMATIONAL FEATURES
1100 R. for Peace Int. ..... H Alternative Radio
R. Netherlands ..... S The Sound Fountain
F ..... Documentary
1125 R. Japan ..... T Basic Japanese for You
H ..... Brush Up Your Japanese
1130 R. Australia ..... A The Europeans
R. Netherlands ..... W Documentary
H ..... The Sound Fountain
1132 BBCWS(am) ..... M The Instant Guide (background)

MUSIC
1105 WWCR Tenn(5070) .. A Rock the Universe (Christian rock)
1110 R. Japan ..... A Pop Joins the World
1125 R. Japan ..... M Japan Music Treasure Box
W ..... Japan Musicscape
F ..... Music Beat (pop)
1130 R. Netherlands ..... T/A Music 52-15 (international)
R. New Zealand Int. F Top 5
1140 R. Korea Int. ..... S Korean Pop Interactive

ENTERTAINMENT
1115 R. Netherlands ..... A Second Chance (best of RN)
1132 BBCWS(eas) ..... S Play of the Week (radio theatre)
1145 BBCWS(eas) ..... M-F Off the Shelf (readings)

SWL, MEDIA & COMMUNICATIONS
1130 R. for Peace Int. ..... S World of Radio

LISTENER CONTACT/INTERACTIVE
1100 WRMI Florida ..... A Viva Miami
1110 R. Japan ..... S Hello From Tokyo
1130 WRMI Florida ..... M-F Viva Miami
1140 R. Korea Int. ..... A Worldwide Friendship

SPORT
1105 R. New Zealand Int. F Sports Story
1110 BBCWS(am) ..... M-F Caribbean Sport
1132 BBCWS(am) ..... A World Football (magazine)
1145 BBCWS(am) ..... S-F Sports Roundup

Shortwave Guide

1200 UTC/ 8am E/5am P - Page 48 Freqs

NEWSCASTS (*extended)

1200	BBCWS(am)	D	Newshour*
	BBCWS(eas)	M-A	News
	R. Australia	D	News
	R. Canada Int.	M-F	News
	R. Netherlands	S/A	News
	R. New Zealand Int.	D	News

CURRENT AFFAIRS MAGAZINES/FEATURES

1200	R. Netherlands	M-F	Newsline
1205	R. Canada Int.	M-F	The Current
	R. New Zealand Int.	M-F	Late Edition
1206	BBCWS(eas)	H	Assignment
1210	BBCWS(am)	M-F	Caribbean Morning Report
1230	R. Sweden	M-F	60 Degrees North

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

1205	BBCWS(am)	M-F	Caribbean Business
1232	BBCWS(eas)	H	The Music Biz (the music industry)

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1245	R. Sweden	H	Greenscan (ecology-2nd wk.)
			Heartbeat (3rd wk.)

ARTS AND CULTURE

1206	BBCWS(eas)	T	Masterpiece (cultural ideas)
1230	R. Sweden	A	Spectrum (3rd wk.)

LOCAL LIVES & VIEWS

1205	R. Australia	M-H	Late Night Live (discussion)
	R. Netherlands	A	Europe Unzipped
	R. New Zealand Int.	A	NZ Forces Radio
1215	R. Korea Int.	M	Korea, Today & Tomorrow
		T	Korean Kaleidoscope (society)
		W	Wonderful Korea (travelogue)
		H	Seoul Report (interviews)
1230	R.Sweden	A	Network Europe (Europe magazine-1st wk.)
			Sweden Today (2nd)
			Studio 49 (discussion-4th)
1245	R. Sweden	T	Close-Up (profiles-1st/ 3rd wk)
		H	Nordic Report (1st)
			The S-Files (things Swedish-4th)
		F	Review of the Newsweek

INFORMATIONAL FEATURES

1205	R. Australia	S	The Spirit of Things (spiritual matters)
1206	BBCWS(eas)	M	Spinning to Win (political spin)
		W	Documentaries
1232	BBCWS(eas)	S	Reporting Religion

MUSIC

1201	BBCWS(eas)	A	In Concert (by BBC ensembles)
1205	R. Australia	F	Sound Quality (innovative)
		A	The Music Show
	WWCR Tenn(5070)	A	Rock the Universe (from 1105)
1230	R. Sweden	S	Sounds Nordic (rock-exc. 1st wk.)
	WWCR Tenn(15825)	T	Music Memories
1232	BBCWS(eas)	M	The Music Feature
		T	Top of the Pops (UK top 20)
		W	Charlie Gillett (world music)
		F	John Peel (eclectic)

ENTERTAINMENT

1200	BBCWS(eas)	S	Play of the Week (from 1130)

SWL, MEDIA & COMMUNICATIONS

1200	R. for Peace Int.	W	Counterspin
	WHRI Indiana(9840)	A	DXing with Cumbre
1230	HCJB Ecuador	A	DX Partyline
	R. for Peace Int.	M	World of Radio
	WHRI Indiana(15105)	A	DXing with Cumbre

LISTENER CONTACT/INTERACTIVE

1200	R. for Peace Int.	S	Mailbag
	WRMI Florida	S	Vivo Miami
1205	R. Netherlands	S	Sincerely Yours
1230	R. Sweden (1st wk.)	S	In Touch with Stockholm

SPORT

1205	R. New Zealand Int.	S	Sportsworld (weekend review)
1206	BBCWS(eas) (magazine)	F	Sports International
1245	R. Sweden	M	Sportscan

1300 UTC/ 9am E/6am P - Page 49 Freqs

NEWSCASTS

1300	BBCWS(am)	D	News
	BBCWS(eas)	D	Newshour*
	China R. Int	D	News & Reports*
	R. Australia	D	News
	R. Canada Int.	D	News
	R. New Zealand Int.	D	News

CURRENT AFFAIRS MAGAZINES/FEATURES

1306	BBCWS(am)	M-F	Outlook
1310	China R. Int	S	Report on Developing Countries
1330	R. Sweden	M-F	60 Degrees North
1355	R. Australia	S	Perspective

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

1330	China R. Int	T	Biz China
	WRMI Florida	M-F	Stock Talk Live

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1305	R. Australia	S	The Science Show
1315	China R. Int.	A	Cutting Edge
1345	R. Sweden	H	Greenscan (ecology-2nd wk.)
			Heartbeat (health-3rd wk.)

ARTS AND CULTURE

1306	BBCWS(am)	S	The Ticket (arts performances)
1320	China R. Int.	S	In the Spotlight
1330	R. Sweden	A	Spectrum (3rd Sat.)

LOCAL LIVES & VIEWS

1305	R. Canada Int.	S	The Sunday Edition (interviews/documentaries)
		M-F	Sounds Like Canada
		A	The House (Parliament)
1330	China R. Int.	M	People in the Know
		W	China Horizons
		H	Voices from Other Lands
		F	Life in China
	R. Sweden	A	Network Europe (magazine-1st wk)
			Sweden Today (2nd wk.)
			Studio 49 (discussion-4th wk.)
1345	R. Sweden	T	Close Up (profiles - 3rd wk.)
		H	Nordic Report (1st wk.)
			The S-Files (things Swedish-4th wk.)
		F	Review of the Newsweek

INFORMATIONAL FEATURES

1300	R. for Peace Int. Worldwide	A	Disability Radio
1330	R. for Peace Int.	S	Alternative Radio

MUSIC

1305	R. Australia	M-F	The Planet (international)
		A	The Music Show (from 1205)
	VOA News Now	S/A	Jazz America
		M	American Gold (oldies)
		T	Roots & Branches (folk)
		W	Classic Rock
		H	Top 20
		F	Country Hits
	WWCR Tenn(15825)	M-F	World Wide Country Radio
1330	BBCWS(am)	S	The Music Feature
	R. Sweden	S	Sounds Nordic (rock/ pop-exc. 1st wk.)
	WWCR Tenn (15825 kHz)	T	Musical Memories

ENTERTAINMENT

1306	BBCWS(am)	A	Pick of the World (BBC's best)
1330	WWCR Tenn(15825)	S	The Old Record Shop
1345	BBCWS(am)	M-F	Off the Shelf (book readings)

SWL, MEDIA & COMMUNICATIONS

1300	R. for Peace Int.	W	World of Radio
		F	Far Right Radio Review
		A	Continent of Media
	WHRI Indiana (9840 kHz)	A	DXing with Cumbre
	WRMI Florida	S	Wovescan
1330	R. for Peace Int.	A	World of Radio
	WHRI Indiana (15105 kHz)	A	DXing with Cumbre

LISTENER CONTACT/INTERACTIVE

1300	R. for Peace Int. Forum	F	Global Community
1330	China R. Int.	A	Listeners' Garden
	R. for Peace Int.	W	Mailbag
	R. Sweden (1st wk.)	S	In Touch with Stockholm
1345	BBCWS(am)	A	Write On

SPORT

1345	R. Sweden	M	Sportscan

1400 UTC/ 10am E/7am P - Page 49 Freqs

NEWSCASTS (*extended)

1400	BBCWS(am)	D	News
	BBCWS(eas)	S/A	News
	China R. Int.	D	News & Reports*
	R. Australia	D	News
	R. Canada Int.	D	News
	R. Japan	D	News
1430	BBCWS(eas)	M-F	British News
	R. Netherlands	S/A	News

CURRENT AFFAIRS MAGAZINES/FEATURES

1400	BBCWS(eas)	M-F	East Asia Today
1406	BBCWS(am) (in-depth)	H	Assignment (one topic
1410	China R. Int. Countries	S	Report on Developing
1415	R. Japan	M-F	44 Minutes
1430	R. Netherlands	M-F	Newsline
	R. Sweden	M-F	60 Degrees North

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)

1400	WRMI Florida (from 1330)	M-F	Stock Talk Live
1410	China R. Int.	T	Biz China
1432	BBCWS(am)	H	The Music Biz

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1415	China R. Int.	A	Cutting Edge
1445	R. Sweden (ecology-2nd wk.)	H	Greenscan
			Heartbeat (health-3rd wk.)

ARTS AND CULTURE

1406	BBCWS(am) (cultural ideas)	T	Masterpiece
	R Australia	S	Books & Writing
1420	China R. Int.	S	In the Spotlight
1430	R Sweden	S	Spectrum (3rd wk.)

LOCAL LIVES & VIEWS

1405	R. Canada Int. (from 1305)	S	The Sunday Edition
		M-F	Sounds Like Canada (from 1305)
1410	R Japan	A	Weekend Japanology
1430	China R. Int.	M	People in the Know
		W	China Horizons
		H	Voices from Other Lands
		F	Life in China
	R Canada Int.	F	C'est la Vie (in French Canada)
	R Sweden (magazine-1st wk.)	A	Network Europe (Europe
			Sweden Today (2nd wk.)
			Studio 49 (discussion-4th wk.)
1432	BBCWS(eas)	M-F	British News
1435	R Netherlands	A	Europe Unzipped
1445	R Canada Int.	M-H	Out Front ("first person" radio)
	R. Sweden	T	Close Up (profiles-1st/ 3rd wk.)
		H	Nordic Report (1st wk.)
			The S-Files (things Swedish-4th wk.)
		F	Review of the Newsweek
1454	R. Japan	A	Sights & Sounds of Japan
1455	R. Netherlands	A	Insight (commentary)

INFORMATIONAL FEATURES

1400	R. for Peace Int.	S	Alternative Radio (from

1330)
M ..... New Dimensions
1405 R. Australia ..... A New Dimensions
1406 BBCWS(am) ..... M Spinning to Win (political spin)
W ..... Documentaries

MUSIC
1400 WRMI Florida ..... S Solid Rock Radio (unsigned/indie musicians)
1405 R. Japan ..... S Pop Joins the World
1430 R. Sweden ..... S Sounds Nordic (rock/pop-exc.1st wk.)
1432 BBCWS(am) ..... M The Music Feature
T ..... Top of the Pops (UK top 20)
W ..... Charlie Gillett (world)
F ..... John Peel (eclectic)

ENTERTAINMENT
1405 R. Australia ..... M-F Margaret Throsby (interview/music)
R. Canada Int. ..... A Vinyl Cafe (music/humor)

SWL, MEDIA & COMMUNICATIONS
1400 R. for Peace Int. ..... F Continent of Media

LISTENER CONTACT/INTERACTIVE
1400 R. for Peace Int. ..... A RFPI Mailbag
1406 BBCWS(am)(eas) ..... S Talking Point (current events call-in)
1430 China R. Int. ..... A Listeners' Garden
R. for Peace Int. ..... H Global Community Forum
R. Sweden ..... S In Touch with Stockholm (1st wk.)
1435 R. Netherlands ..... S Sincerely Yours

SPORT
1406 BBCWS(am) ..... F Sports International (magazine)
BBCWS(am)(eas) ..... A Sportsworld (live action)
1445 R. Sweden ..... M Sportscan
BBCWS(eas) ..... M-H Sports Roundup
F ..... Football Extra

1500 UTC/ 11am E/8am P - Page 50 Freqs

NEWSCASTS
1500 BBCWS(am)(eas) ..... D News
China R. Int. ..... D News
R. Australia ..... D News
R. Canada Int. ..... S/A News
R. Japan ..... D News
1545 R. for Peace Int. ..... T-A U.N. Daily News

CURRENT AFFAIRS MAGAZINES/FEATURES
1505 R. Australia ..... M-F Asia Pacific
1506 BBCWS(am) ..... S Assignment (one topic in-depth)
1510 China R. Int. ..... S Report on Developing Countries
1515 R. Japan ..... M-F Asian Top News

BUSINESS/FINANCE (also in NEWSCASTS & Current Affairs)
1500 R. Netherlands ..... F A Good Life (development issues)
1530 China R. Int. ..... T Biz China
R. Netherlands ..... T A Good Life
1555 R. Australia ..... A Business Weekend

SCIENCE/TECHNOLOGY (incl. Health & Environment)
1500 R. Netherlands ..... M Research File
1505 R. Canada Int. ..... A Quirks and Quarks
1506 BBCWS(am)(eas) ..... M Health Matters
T ..... Go Digital (infotech)
W ..... Discovery (research)
H ..... One Planet (ecology)
F ..... Science in Action (magazine)
1515 China R. Int. ..... A Cutting Edge
1530 R. Australia ..... M The Health Report
R. Netherlands ..... H Research File

ARTS AND CULTURE
1520 China R. Int. ..... S In the Spotlight

LOCAL LIVES & VIEWS
1500 R. Netherlands ..... S Dutch Horizons
1505 R. Canada Int. ..... S The Sunday Edition (from 1305)
1530 China R. Int. ..... M People in the Know
W ..... China Horizons
H ..... Voices from Other Lands
F ..... Life in China
R. Netherlands ..... M EuroQuest
W ..... Dutch Horizons
A ..... Sketches of the Low Lands (travelogue)
1532 BBCWS(am) ..... S People & Politics (British Parliament)

INFORMATIONAL FEATURES
1500 R. Netherlands ..... W Documentary
H ..... The Sound Fountain
1505 R. Australia ..... S Encounter (spiritual beliefs)
1525 R. Japan ..... T Basic Japanese for You
H ..... Brush Up Your Japanese
1530 R. Australia ..... T The Law Report
W ..... The Religion Report
R. Netherlands ..... S The Sound Fountain
F ..... Documentary
1532 BBCWS(am)(eas) ..... H The Word (books, writers & readers)
1545 BBCWS(am)(eas) ..... W Heart & Soul (beliefs & values)
F ..... What's the Problem? (advice)

MUSIC
1500 R. Netherlands ..... T/A Music 52-15 (international)
WRMI Florida ..... S Solid Rock Radio (from 1400)
1501 BBCWS(eas) ..... S In Concert (by BBC ensembles)
1505 R. Australia ..... A Nocturne (night music)
R. Japan ..... A Pop Joins the World
1525 R. Japan ..... M Japan Music Treasure Box
W ..... Japan Musicscape
F ..... Music Beat (pop)
1532 BBCWS(am)(eas) ..... T Music Review (magazine)

ENTERTAINMENT
1532 BBCWS(am)(eas) ..... M Panel game or Quiz
W/F ..... Westway (drama serial)
1545 R. Netherlands ..... A Second Chance (best of RN)

SWL, MEDIA & COMMUNICATIONS
1500 WHRI Indiana(13760) A DXing with Cumbre
1530 R. Australia ..... H The Media Report
R. for Peace Int. ..... S Continent of Media

LISTENER CONTACT/INTERACTIVE
1505 R. Japan ..... S Hello from Tokyo
1530 China R. Int. ..... A Listeners' Garden

SPORT
1505 BBCWS(am)(eas) ..... A Sportsworld (from 1405)
1530 R. Australia ..... F The Sports Factor

1600 UTC/ 12pm E/9am P - Page 50 Freqs

NEWSCASTS (*extended)
1600 BBCWS(am) ..... S/A News
R. Australia ..... D News
R. Netherlands ..... S/A News

CURRENT AFFAIRS MAGAZINES/FEATURES
1600 BBCWS(am) ..... M-F Europe Today
R. Netherlands ..... M-F Newsline
R. for Peace Int. ..... M-F Democracy Now!
1605 R. Netherlands ..... S Wide Angle (one topic focus)

LOCAL LIVES & VIEWS
1605 R. Australia ..... S The National Interest
M-F ..... Bush Telegraph (rural issues)
R. Netherlands ..... A Europe Unzipped

MUSIC
1600 WRMI Florida ..... S Solid Rock Radio (from 1400)
1605 R. Australia ..... A Nocturne (from 1505)
1630 WWCR Tenn(12160) A Ken's Country Classics

SWL, MEDIA & COMMUNICATIONS
1600 KWHR Hawaii(9930) A DXing with Cumbre
R. for Peace Int. ..... A CounterSpin (media analysis)

SPORT
1605 BBCWS(am) ..... S/A Sportsworld (live action)

1700 UTC/ 1pm E/10am P - Page 51 Freqs

NEWSCASTS (*extended)
1700 R. Australia ..... D News
R. Japan ..... D News

CURRENT AFFAIRS MAGAZINES/FEATURES
1700 R. Africa Int. ..... D Reports, features, music
1715 R. Japan ..... M-F 44 Minutes

LOCAL LIVES & VIEWS
1705 R. Australia ..... M-F Australia Talks Back (phone-in)

INFORMATIONAL FEATURES
1700 R. for Peace Int. ..... W Alternative Radio
1705 R. Australia ..... S New Dimensions ("progressive" ideas)
A ..... The Spirit of Things (spiritual matters)

MUSIC
1700 WRMI Florida ..... S Solid Rock Radio (from 1400; to 2000)
1710 R. Japan ..... S Pop Joins the World
1730 VOA Africa ..... S Music Time in Africa

SWL, MEDIA & COMMUNICATIONS
1730 R. for Peace Int. ..... A World of Radio

LISTENER CONTACT/INTERACTIVE
1706 VOA Africa ..... M-F Talk to America (listener phone-in)
1710 R. Japan ..... A Hello from Tokyo
1715 WWCR Tenn(12160) W Ask WWCR (exc. 2nd/3rd wk)
1730 WWCR Tenn(15825) S Ask WWCR

2100 UTC/ 5pm E/2pm P - Page 53 Freqs

NEWSCASTS (*extended)
2100 BBCWS(am) ..... D News
Deutsche Welle ..... D News
R. Australia ..... D News
R. Japan ..... D News
R. Prague ..... D News
2145 R. for Peace Int. ..... M-F U.N. Today

CURRENT AFFAIRS MAGAZINES/FEATURES
2105 Deutsche Welle ..... M-F Newslink Africa
2110 R. Australia ..... S-H AM (morning news magazine)
2115 R. Japan ..... M-F Asian Top News (region's radio)
2145 R. Australia ..... A Asia Sunday

BUSINESS/FINANCE (also in NEWSCASTS & Current Affairs)
2110 R. Prague ..... H Economic Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)
2106 BBCWS(am) ..... M Health Matters
T ..... Go Digital (infotech)
W ..... Discovery (research)
H ..... One Planet (ecology)
F ..... Science in Action (magazine)
2130 R. Australia ..... M Earthbeat (ecology)
T ..... Innovations
H ..... All in the Mind (the brain)

ARTS AND CULTURE
2110 R. Prague ..... F The Arts
2120 R. Prague ..... S Readings from Czech Literature
F ..... Away from Politics (poetry)
2130 Deutsche Welle ..... T Arts on the Air (magazine)
2145 Deutsche Welle ..... W Europe on Stage (theatre)

LOCAL LIVES & VIEWS
2105 R. Australia ..... A Australia All Over
R. Prague ..... S Letter from Prague
M-F ..... Newsview
A ..... Magazine (local color)
2110 R. Japan ..... A Weekend Japanology
R. Prague ..... M One on One (interview)
T ..... Witness (oral history)
2115 BBCWS(am) ..... M-F Caribbean Report*
2120 BBCWS(am) ..... M-F British News
R. Prague ..... T Talking Point
W ..... Czechs in History [or] Spotlight (places)

Shortwave Guide

2130 BBCWS(am) ..... T/F Calling the Falklands^
Deutsche Welle ..... W Living in Germany
A ..... Africa This Week
R. Australia ..... S Country Breakfast (rural issues)
W ..... Australia Now
2154 R. Japan ..... A Sights & Sounds of Japan
(*special service on 5975, 11675, 15390 kHz. only.)
(^special service on 11680 kHz.)

INFORMATIONAL FEATURES
2105 Deutsche Welle ..... A Religion & Society
2106 BBCWS(am) ..... S Documentaries
2115 Deutsche Welle ..... S Inspired Minds
A ..... German by Radio
R. Japan ..... T Basic Japanese for You
H ..... Brush Up Your Japanese
2130 Deutsche Welle ..... H Cool! (Euro youth culture)
2132 BBCWS(am) ..... H The Word (books, readers, writers)
2145 BBCWS(am) ..... W Heart & Soul (beliefs/values)
F ..... What's the Problem? (advice)

MUSIC
2105 R. Japan ..... S Pop Joins the World
VOA News Now ..... S/A Jazz America
M ..... American Gold (oldies)
T ..... Roots & Branches (folk)
W ..... Classic Rock
H ..... Top 20
F ..... Country Hits
2110 R. Prague ..... A Saturday Music (a mix)
2125 R. Japan ..... M Japan Music Treasure Box
W ..... Japan Musicscape
F ..... Music Beat (pop)
2130 Deutsche Welle ..... S Hits in Germany [or] ..... Melody Time
M ..... World Music Live
F ..... Focus on Folk
R. Australia ..... F Oz Sounds
2132 BBCWS(am) ..... T Music Review (magazine)

ENTERTAINMENT
2100 WBCQ Maine(7415) S Radio Free Euphoria
M ..... Jean Shepherd
F ..... Pan Global Wireless
A ..... HarvZower
2101 BBCWS(am) ..... A Play of the Week (radio theatre)
2130 WBCQ Maine(7415) F The Pab Sungenis Project
2132 BBCWS(am) ..... M Panel game or Quiz
W/F ..... Westway (drama serial)

SWL, MEDIA & COMMUNICATIONS
2100 WHRA Maine(17650)F DXing with Cumbre
WHRI Indiana(5745) S DXing with Cumbre
WRMI Florida ..... S Wavescan
2130 R. for Peace Int. ..... A Continent of Media
WHRA Maine(17650)A DXing with Cumbre

LISTENER CONTACT/INTERACTIVE
2105 R. Australia ..... F Feedback
2110 R. Prague ..... S Mailbox
2130 WRMI Florida ..... S Viva Miami

2200 UTC/ 6pm E/3pm P - Page 54 Freqs

NEWSCASTS (*extended)
2200 BBCWS(am) ..... D The World Today*
R. Australia ..... D News
R. Canada Int. ..... M-F The World at Six*
Voice of Turkey ..... D News
2230 R. Prague ..... D News
RVi Belgium ..... M-F News

CURRENT AFFAIRS MAGAZINES/FEATURES
2200 R. Canada Int. ..... S/A The World This Weekend
R. for Peace Int. ..... M-F Democracy Now!
2205 R. Australia ..... F Asia Pacific
A ..... Correspondents' Report
Voice of Turkey ..... D Press Review
2210 R. Australia ..... S-H AM (morning news magazine)
2230 R. Australia ..... F AM Saturday
R. Canada Int. ..... M-F As It Happens
2232 BBCWS(am) ..... A Agenda (trends)

BUSINESS/FINANCE (also in NEWSCASTS & Current Affairs)
2240 R. Prague ..... H Economic Report

ARTS AND CULTURE
2235 Voice of Turkey ..... H Culture Parade
A ..... Turkish Arts
2240 R. Prague ..... F The Arts
2250 R. Prague ..... S Readings from Czech Literature
F ..... Away from Politics (poetry)

LOCAL LIVES & VIEWS
2210 Voice of Turkey ..... F Archaeological Settlements
2234 RVi Belgium ..... M-F Flanders Today
2235 R. Prague ..... S Letter from Prague
M-F ..... Newsview
A ..... Insight Central Europe
2238 RVi Belgium ..... S Tourism in Flanders
2240 R. Australia ..... S-H Australia Wide (national report)
R. Prague ..... M One on One (interview)
T ..... Witness (oral history)
2250 R. Prague ..... T Talking Point (Czech issues)
W ..... Czechs in History [or] Spotlight (places)

INFORMATIONAL FEATURES
2232 BBCWS(am) ..... A The Interview

MUSIC
2210 Voice of Turkey ..... S Tunes Spanning Centuries
2230 R. Australia ..... A Fine Music Australia (classical)
RVi Belgium ..... A Music from Flanders

ENTERTAINMENT
2200 WBCQ Maine ..... A Radio Timtron Worldwide
2230 R. Canada Int. ..... A Madly Off n All Directions (comedy/satire)
WBCQ Maine ..... W Goddess Irina I Music Show
H ..... Uncle Ed's Musical Memories
F ..... WDCD

SWL, MEDIA & COMMUNICATIONS
2200 R. for Peace Int. ..... A CounterSpin (media analysis)
WBCQ Maine ..... W World of Radio
WHRI Indiana(5745) A DXing with Cumbre
2220 Voice of Turkey ..... F DX Corner (fortnightly)
2230 RVi Belgium ..... S Radio World
WRMI Florida ..... A Wavescan

LISTENER CONTACT/INTERACTIVE
2210 Voice of Turkey ..... T Live from Turkey
2240 R. Prague ..... S Mailbox
2215 Voice of Turkey ..... W Letterbox
2244 RVi Belgium ..... S Brussels 1043

SPORT
2230 R. Canada Int. ..... S The Inside Track

2300 UTC/7pm E/4pm P - Page 54 Freqs

NEWSCASTS (*extended)
2300 BBCWS(am) ..... D News
China R. Int. ..... D News & Reports*
R. Australia ..... D News
R. Canada Int. ..... D News
2330 R. Netherlands ..... S/A News

CURRENT AFFAIRS MAGAZINES/FEATURES
2305 R. Canada Int. ..... M-F As It Happens (from 2230)
2306 BBCWS(am) ..... M-F Outlook
2310 China R. Int. ..... A Report on Developing Countries
R. Australia ..... S-H Asia Pacific
2330 R. Canada Int. ..... W Dispatches (international)
R. Netherlands ..... M-F Newsline

BUSINESS/ECONOMICS (also in NEWSCASTS & Current Affairs)
2330 China R. Int. ..... M Biz China
R. Australia ..... S Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)
2305 R. Australia ..... A All in the Mind (the brain)
R. Canada Int. ..... A Quirks & Quarks
2315 China R. Int. ..... F Cutting Edge
2330 R. Australia ..... H The Buzz (infotech)
A ..... Innovations

ARTS AND CULTURE
2320 China R. Int. ..... A In the Spotlight
2330 R. Australia ..... W The Arts

LOCAL LIVES & VIEWS
2305 R. Australia ..... F Country Breakfast (rural issues)
2330 China R. Int. ..... S People in the Know
T ..... China Horizons
W ..... Voices from Other Lands
H ..... Life in China
R. Australia ..... T Rural Reporter
2335 R. Netherlands ..... A Europe Unzipped
2355 R. Netherlands ..... A Insight (commentary)

INFORMATIONAL FEATURES
2300 R. for Peace Int. ..... W Alternative Radio
2306 BBCWS(am) ..... S Spinning to Win (political spin)
2330 R. Australia ..... F Linguo Franco (about language)

MUSIC
2300 WBCQ Maine ..... F Lost Discs Radio Show
A ..... Fred Flintstone Music Show
2305 R. Canada Int. ..... S Global Village (world/folk)

ENTERTAINMENT
2300 WBCQ Maine ..... S Le Show
H ..... Uncle Ed's Musical Memories (from 2230)
2306 BBCWS(am) ..... A Pick of the World (BBC's best)
2332 BBCWS(am) ..... S Panel game or Quiz
2345 BBCWS(am) ..... M-F Off the Shelf (readings)

SWL, MEDIA & COMMUNICATIONS
2300 WBCQ Maine ..... W Off the Hook (public telecom issues)
A ..... Real Amateur Radio Show
2330 R. for Peace Int. ..... A World of Radio
WBCQ Maine ..... W World of Radio

LISTENER CONTACT/INTERACTIVE
2330 China R. Int. ..... F Listeners' Garden
2335 R. Netherlands ..... S Sincerely Yours
2345 BBCWS(am) ..... A Write On
WWCR Tenn(9475) .. A Ask WWCR

Thank You ...

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Aerial Refueling Tracks, Part III

The following is the conclusion to a comprehensive list of aerial refueling tracks and anchors, frequencies, and scheduling units set up in the continental United States, Puerto Rico, Bermuda, Alaska and Hawaii. The listing was started in June, which included the map showing the track locations.

Aerial Refueling Tracks, cont'd

Track	Refueling		ARTCC		Assigned	
	Primary	Secondary	ARCP	Exit	ARTCC	Scheduling Unit
AR-116E	366.30	260.20	269.40	343.70	Kansas City	2OSS Barksdale AFB
AR-116W	366.30	260.20	363.20	269.40	Kansas City	2OSS Barksdale AFB
AR-617	324.60	319.70	281.40	281.40	Miami	347OG Det 1 MacDill
AR-618	348.90	319.70	363.10	363.10	Miami	347OG Det 1 MacDill
AR-619	238.90	320.90	270.30	270.30	Minneapolis	West ADS McChord AFB
	Note: Callsign Big Foot AICC 364.20 or as assigned					
AR-620	238.90	319.70	349.0	349.0	Miami	347OG Det 1 MacDill
	Note: Used by MacDill tanker based aircraft only					
AR-621	344.70	319.50	335.60	335.60	Oakland	FACSFAC San Diego
	Note: Callsign Big Foot AICC 364.20 or as assigned					
AR-623	359.10	319.50				7OSS Dyess AFB
	West (North leg)		351.70	346.35	Albuquerque	
	East (South leg)		346.35	351.70	Albuquerque	
	Note: Intended for use by B-1 aircraft and support tankers					
AR-624	366.30	319.50	Los Angeles	57OSS Nellis AFB		
	Note: Contact Los Angeles ARTCC prior to exit on 343.60/124.20 primary, 319.20/124.85 secondory, 306.30/135.25 backup					
AR-625H/L	295.80	319.50	319.80	319.80	Oakland	57OSS Nellis AFB
AR-626	235.10	292.60	319.20	269.0	Seattle	FACSFAC Whidbey Is
	Note: Callsign Big Foot AICC 364.20 or as assigned by ATC					
AR-627	352.60	319.70	379.20	379.20	Jacksonville	347OSS Moody AFB
	Note: When Valdosta regional approach control frequencies used are 259.30/119.525					
AR-628	343.50	292.60	379.60	379.60	Seattle	West ADS McChord AFB
	Note: Callsign Long Rocks 337.40 primary/253.40 secondary					
AR-629	296.00	360.90	127.60/279.60	Minneapolis/5OSS RAPCON		23BS Minot AFB
AR-630	238.90	292.60	360.70	360.70	Seattle	West ADS McChord AFB
	Note: Callsign Big Foot 252.00 primary/364.20 secondary					
AR-631	295.80	282.70	348.70	348.70	Boston	NE ADS Rome NY
	Note: Callsign Footrope 301.60/314.20					
AR-632	238.90	282.70	As assigned		Minneapolis	Alpena CRTC Base Ops
	Note: Callsign Huntress 364.20 primary/secondary as assigned by Huntress. Contact callsign Steelgate (when operational) on 385.70, 381.10, 40.45 FM or 40.65 FM prior to entering/exiting Garland North/South (R-4201A).					
AR-633A/B	295.80	319.700	254.30			134ARW McGhee Tyson
			East	272.70	Atlanto	
			West	254.30	Atlanta	
	Note: Callsign Crisco 271.10 primary/322.70 secondary					
AR-634	235.10	319.50	343.80	290.50	Oakland	FACSFAC San Diego
	Note: Handoff to callsign Big Foot on 364.20					
AR-635	352.60	319.50	360.80	360.80	Salt Lake City	57FW Nellis AFB
AR-636	238.90	319.70	306.90	238.10	Washington	1FW Langley AFB
	Note: Callsign Pyramid/Giont Killer (FACSFAC Virginia Capes) 306.9 also exit, 238.10/118.125 check-in/out with Giant Killer.					
AR-637	291.90	319.70	317.50	317.50	Kansas City	131FW Lambert Field
AR-638	324.60	319.70	323.00	323.00	Miami	347OSS Moody AFB
AR-639	291.90	319.50				
		High	133.00	281.50	Albuquerque	355 Wing Davis Monthan
		Low	127.95	327.15	Albuquerque	355 Wing Davis Monthan
AR-639A	291.90	319.50	As assigned		Albuquerque	355 Wing Davis Monthon
AR-640A	305.50	320.90	As assigned		Chicago	ANG CRTC Volk Field
AR-640B	291.90	320.90	As assigned		Chicago	ANG CRTC Volk Field
	Note: For AR-640A/B callsign Brochure 298.775 primary/283.775 secondory. Callsign Phoenix 346.25					
AR-641A	295.40	319.50	343.60	343.60	Los Angeles	554RS Nellis AFB
AR-641B	295.40	319.50	385.80	385.80	Salt Lake City	554RS Nellis AFB
AR-642E/W	305.50	319.50	As assigned		Salt Lake City	388RANS Hill AFB
	Note: Callsign Clover 363.50 primary/134.10 secondary					
AR-643	279.80	260.20	335.50/317.50		Denver	140 Wing Buckely ANGB
	Note: Military radar unit 361.40 primary/395.10 secondary					
AR-644N	324.40	319.50	257.60	257.60	Albuquerque (Holloman Dep)	49OSS Holloman AFB
AR-644S	324.40	319.50	284.00	257.60	Albuquerque	49OSS Holloman AFB
AR-645	324.40	292.60	351.70	351.70	Seattle	142FW Kingsley Field
	Note: Callsign Big Foot 252.00 primary/364.20 secondary					
AR-646	238.90	260.20	As assigned		Houston	552OSS Tinker AFB

	Note: Restricted to 552ACW aircraft					
AR-647	283.90	319.50	As assigned		Albuquerque	56RMO Luke AFB
295.40	319.50		As assigned		Albuquerque	56RMO Luke AFB
	Note: O'Grady military radar unit (MRU) 254.50/120.55 and 264.70/120.55, Gila Bend AFAF Range Operations 272.100/120.55					
AR-647A	283.90	319.50	As assigned		Albuquerque	56RMO Luke AFB
	Note: O'Grady MRU 264.70/120.55, Gila Bend AFAF Range Operations 272.100/120.55					
AR-648A/B	238.90	319.50	269.0	363.15	Salt Lake City	151ARW Salt Lake City
AR-649	286.30	319.50	As assigned		Los Angeles	355Wing Davis-Monthan
AR-650	295.80	260.20	As assigned		Albuquerque	47OSS Laughlin AFB
AR-651	276.50	319.50	338.30	338.20	Los Angeles	FACSFAC San Diego
	Note: Callsign Beaver 289.90 primary/120.850 secondary or as assigned					
AR-652N/S	249.525	255.775	343.60	343.60	Albuquerque	49OSS Holloman AFB
AR-652A/B	249.525	255.775	343.60	343.60	Albuquerque	49OSS Holloman AFB
AR-653	324.40	260.20	363.20	363.20	Kansas City	184BW McConnell AFB
	Note: Callsign Jayhawk 228.95 primary/303.0 secondary					
AR-654	341.40	260.20	As assigned	Seattle	West ADS McChord AFB	
	Note: Restricted to aircraft deployed to WADS Det 1 Close Air Suppart Unit					
AR-655	276.50	319.70	307.30	307.30	Miami	347OG MacDill
	Note: Callsign Alleycat 364.10					
AR-657	No information provided		FACSFAC San Diego		FACSFAC San Diego	
	Note: Callsign Beaver Control (Navy FACSFAC San Diego) 289.90 primary/118.65 secondary					
AR-658	286.20	384.60	As assigned		Albuquerque	56OSS Luke AFB
	347.20	384.60	As assigned		Albuquerque	56OSS Luke AFB
	391.80	318.00	As assigned		Albuquerque	56OSS Luke AFB
AR-659	305.50	319.50	As assigned		Salt Lake City	388RANS Hill AFB
	Note: Callsign Clover 363.50 primary/134.10 secondary					
AR-667	318.00	264.90	286.00	286.00	NAS Lemoore RATCF	CSFWP NAS Lemoore
AR-669	394.90	384.60	263.10/133.30		Kansas City	71OSS Vance AFB
AR-672	249.50	310.425	351.7/127.85		Albuquerque	27OSS Cannon AFB
AR-674	341.40	260.20	307.20/128.80		Albuquerque	58OSS Kirtland AFB
AR-678	280.40	377.70	338.20	338.20	Denver	28OSS Ellsworth AFB
AR-716	283.90	319.70	363.10	363.10	Miami	347OG MacDill AFB
	Note: Callsign Barrie 325.8 or Alleycat 364.10					
AR-717A/B	283.90	292.60	291.60	291.60	Seattle	NAS Whidbey Island
	Note: Callsign Big Foot (Western Air Defense Sector) 271.00					
AR-719	270.20	263.90	284.70	284.70	Anchorage	354OSS Eielson AFB
AR-720NE	276.70	263.90	360.80	360.80	Anchorage	354OSS Eielson AFB
AR-720SW	276.70	263.90	360.80	269.00	Anchorage	354OSS Eielson AFB
AR-721NE/SW	270.20	263.90	354.00	354.00	Anchorage	3OSS Elmendorf AFB
AR-722NE	276.70	263.90	317.50	354.00	Anchorage	3OSS Elmendorf AFB
AR-722SW	276.70	263.90	317.50	317.50	Anchorage	3OSS Elmendorf AFB
AR-723	278.40	263.90	317.50	379.10	Anchorage	3OSS Elmendorf AFB
AR-724	278.40	263.90	317.50	379.10	Anchorage	3OSS Elmendorf AFB
AR-725NW	283.80	263.90	284.70	317.50	Anchorage	3OSS Elmendorf AFB
AR-725SE	283.80	263.90	317.50	284.70	Anchorage	3OSS Elmendorf AFB
AR-727NW/SE	270.20	263.90	317.50	317.50	Anchorage	3OSS Elmendorf AFB
	Note: For all Alaska AR listings above – callsign Top ROCC on 269.90 primary/364.20/126.20 secondary					

VFR Helicopter Refueling Tracks

AR-15V	363.90	252.80	As Assigned		Miami	45 RANS Patrick AFB
	Note: Restricted to 1FW and 301RQS assigned units only. Airspace delegated to Patrick AFB RAPCON					
AR-18V N/S	353.00	360.50	As assigned		Washington	MCAS Cherry Point
	Note: Airspace delegated to MCAS Cherry Point RATCF					
AR-40V	347 Wing Freqs		As assigned		Jacksonville	347OSS Moody AFB
	Note: Restricted to 347 Wing use only.					
AR-41V N/S	347 Wing Freqs		As assigned		Jacksonville	347 Wing Det MacDill AFB
	Note: Restricted to 347 Wing use only.					
AR-42V E/W	347 Wing Freqs		As assigned		Jacksonville	347OSS Moody AFB
	Note: Restricted to 347 Wing use only.					
AR-117V	58 SOW Freqs		307.20	307.20	Albuquerque	58OSS Kirtland AFB
			128.80	128.80	Albuquerque	58OSS Kirtland AFB
	Note: Restricted to 58SOW use only.					
AR-125V N/S	58 SOW Freqs		As assigned		Albuquerque	58OSS Kirtland AFB
	Note: Restricted to 58SOW use only.					
AR-126V N/S	49 FW Freqs		As assigned		Albuquerque	49OSS Holloman AFB
AR-127V N/S	49 FW Freqs		As assigned		Albuquerque	49OSS Holloman AFB
AR-225V N/S	129 RQW Freqs		As assigned		Oakland	129RQW Moffett Field
	Note: Restricted to H-60 and C-130 refueling operations. Monterey Approach 302.0/127.15					
AR-230V	66 ARS Freqs		As assigned		Los Angeles	66ARS Nellis AFB
	Note: Advise LAX ARTCC on 343.60/124.20 prior to entry.					
AR-231V	66 ARS Freqs		As assigned		Los Angeles	66ARS Nellis AFB
AR-242V N/S	129 RQW Freqs	120.95/294.50	Stockton Approach Control		129RQW Moffett Field	
AR-243V N/S	129 RQW Freqs		As assigned		Oakland	129RQW Moffett Field
	Note: Restricted to H-60 and C-130 refueling operations.					
AR-304AV/BV	125.8/291.70		As assigned		Seattle	939RQW Portland IAP
	Note: Limited to US Air Force Reserve use only. Restricted to H-60 and C-130 refueling operations.					
AR-305 AV/BV	128.15/288.10		As assigned		Seattle	939RQW Portland IAP
	Note: Limited to US Air Force Reserve use only. Restricted to H-60 and C-130 refueling operations.					
AR-306 AV/BV	128.15/288.10		As assigned		Seattle	939RQW Portland IAP
	Note: Limited to US Air Force Reserve use only. Restricted to H-60 and C-130 refueling operations.					

VFR Helicopter Refueling Anchor

AR-622V	129RQW Freqs	As assigned	NAS Lemoore RATCF	129RQW Moffett Field
	Note: NAS Lemoore Approach 318.80/124.10			

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Radio Shack Announces PRO-96

At the present time there are only two commercially available scanners capable of decoding APCO 25 digital transmissions: the BC250D handheld and the BC785D base/mobile, both made by Uniden. These units have been out for many months now and appear to be selling well.

However, Uniden is about to get some competition. In June Radio Shack submitted an application to the Federal Communications Commission (FCC) for a new scanner model, the PRO-96. Designed by GRE (General Research of Electronics), Inc. in Japan, the PRO-96 is a handheld scanner designed to follow both analog and digital transmissions, including APCO 25. This will be Radio Shack catalog number 20-526.

APCO 25 Trunking

Most notably, the PRO-96 will be able to follow the "pure" APCO 25 systems that use a 9600 baud control channel. The pre-release manual claims that the radio will automatically detect 3600 baud and APCO 9600 baud control channels and decode them accordingly. The PRO-96 will do all of this internally, without needing any external hardware or plug-in cards.

The PRO-96 will be capable of determining each of the voice ("traffic") channels for Motorola and APCO-25 systems using just the active control channel. What that means is that you will only need to program the control channels into the PRO-96, rather than every single voice frequency. Since some systems rotate the control channel on a daily basis between a handful of frequencies, each possible control channel frequency should be programmed.

A nice additional feature discussed in the manual is that when the scanner is tuned to a Motorola system control channel it will display the System Identification code and report a "decode success rate," which would give the user an indication of how well the digital signal is being received.

The manual also describes a feature called "Intelligent Adaptive Digital Tracking" which automatically tunes the sound quality settings, so the operator will not have to make any adjustments as the signal changes.

The PRO-96 will also track M/A-COM EDACS (Enhanced Digital Access Communications System) radio networks in VHF and UHF, but as with other trunking scanners, the EDACS frequencies must be entered in "Logical Channel Number" (LCN) order. The scanner does not appear to be able to follow E. F. Johnson LTR (Logic Trunked Radio) systems.

The manual claims that the scanner can track as many as 10 trunking systems at one time. Conventional and trunked systems can also be mixed in the same bank.

The PRO-96 also can be programmed with an adjustable trunking delay, anywhere from half a second to four seconds, in half-second intervals. This would allow the user to customize the amount of time the scanner would wait after the end of a transmission before resuming scanning.

Virtual Scanner

The PRO-96 introduces a new feature called "V-Scanner" (Virtual Scanner). The scanner has 11 separate configuration profiles stored in "folders," only one of which is active at a time. Each folder stores all of the operating settings, not only channels and talkgroups but lockout status, display contrast settings, and so on. Names up to 12 characters long can be assigned to each folder. Each folder has 500 channels.

The idea is that you can set up a different folder for, say, each geographic location you might travel to, and by loading the correct folder your scanner is immediately able to start scanning the appropriate frequencies.

Firmware Updates

Modern scanners are controlled by internal microprocessors, tiny computers that run a single program specifically written for the scanner. The program is referred to as *firmware*, which is supposed to imply something between software and hardware. You can think of it as the software instructions that tell the scanner hardware what to do and when to do it.

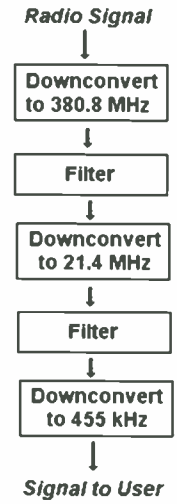
Anyway, the important part of this is that the PRO-96 allows part of that firmware to be upgraded pretty easily. This means that if GRE comes out with fixes or enhancements to the PRO-96 after you bought it, you should be able to take advantage of it by upgrading your firmware rather than trading in your radio or swapping circuit boards.

According to the manual there are three different sections of firmware inside the radio, only one of which is capable of being upgraded. The "CPU" and "DSP Voice" sections are apparently permanent. The "DSP Application," which presumably includes the digital decoding algorithms, can be updated in the future by downloading the latest version from Radio Shack's web site (**http://www.radioshack.com**) and transferring it into the scanner via a PC-to-scanner interface cable. This should be much easier than having to replace a circuit board or a chip, as with some older scanners, or even replacing the radio altogether.

That same interface cable can be used for "data cloning," where frequencies and talkgroups can be transferred to or from another PRO-96, or to and from a computer. According to the manual, you will not be able to clone directly from another radio unless it is also a PRO-96.

Hardware

The PRO-96 is a triple-conversion receiver, meaning the desired radio signal is downconverted (translated from a higher frequency to a lower frequency) and filtered three times before being delivered to the user. This minimizes the chances of unwanted signals getting through and limits the possibility of *image reception*, where the scanner is tuned to one frequency but receives signals at another frequency.



Triple Conversion in the PRO-96

On a practical level, the PRO-96 has the advantage of using regular AA batteries instead of a special battery pack like the BC250D. The PRO-96 comes with removable holders for both non-rechargeable and rechargeable batteries. The built-in charging circuit can handle nickel-cadmium (Ni-Cd) and high-capacity nickel-metal-hydride (Ni-MH) batteries.

Availability and Price

At this time the radio is expected to be available for purchase in the November timeframe with an estimated price of around $500.

Feature	Uniden BC250D	Radio Shack PRO-96
Channel Storage	1,000 channels 10 banks of 100	500 channels 10 banks 50 channels each (per folder)
Additional Storage	None	Total of 11 virtual scanner folders, each with 500 channels (5,500 total)
APCO 25 conventional	Yes	Yes
Mixed analog / APCO 25 digital trunked (3600 bd control chan)	Yes	Yes
"Pure" APCO 25 digital trunked (9600 baud control channel)	No	Yes
APCO 25 Decoder	Add-on card (BCi25D)	Built-in
Sound quality adjustment	Manual	Automatic
Freq loading/unloading via PC	Yes	Yes
Control via personal computer	Yes	No
Motorola Type I and II	Yes	Yes
EDACS	Yes	Yes
LTR	Yes	No
Scan speed	100 channels per second	60 channels per second
Search speed	150 steps per second	75 steps per second
Coverage (in MHz)	25 - 512	25 - 54, 108-174, 216-225, 406-512
	806 - 956 (less cellular)	806- 960 (less cellular)
	1240 - 1300	1240-1300
	Proprietary battery pack	4 standard or rechargeable AA batteries

So, to summarize the major differences from the chart above:

Pro:
Tracks 9600 baud control channel
Virtual Scanner capability
Automatic voice quality adjustment
Standard AA batteries
Firmware upgrades
Possible lower price than BC250D + BCi25D

Con:
Gaps in coverage
Fewer active channels (500) than BC250D (1000)
Doesn't track LTR systems
Possibly less sensitive than other radios in the 800 MHz band

I may be partial to GRE since my first shortwave receiver was a DX-150, but this handheld looks interesting. Most importantly, the fact that it can track 9600 baud systems will give residents of Colorado, Michigan, Minnesota, and other locations with "pure" APCO 25 systems the ability to monitor public safety and service activity where the BC250D and BC785D cannot.

◆ Interference

Public safety radio systems are continuing to suffer from interference. For digital radios, interference is often reported as "holes," or gaps in coverage where the radios simply do not work. Interference to analog radios can usually be heard directly, drowning out the desired voice messages. These problems are annoying at best, potentially life-threatening at worst.

Many of the reported cases of interference are related to cellular and specialized mobile radio (SMR) towers in a public safety area of coverage. As more cellular and SMR systems come on-line and their owners push for more capacity, interference problems have become more prevalent. The primary cause seems to be different design goals for each type of radio system.

Public safety radio systems are *noise-limited* systems, meaning their operational range and capacities are determined by the amount of radio frequency noise they can tolerate. Generally speaking, public safety radio networks need to cover a relatively large geographic area from a handful of radio tower repeater sites. The goal is to have as few sites as possible, since they're expensive to build and maintain, and have each one cover as much area as possible. In this case, broadly speaking, the more sensitive a receiver the better, since a more sensitive receiver will pick up a signal further away than a less sensitive one.

Cellular and Specialized Mobile Radio (SMR) systems, on the other hand, are *interference-limited*, meaning their range and capacities are determined mostly by how many other radios are operating nearby. These networks provide coverage through a large number of "cell sites" that each cover a relatively small area. The goal is to serve the greatest number of simultaneous users in the geographic region. Receivers designed for these systems, generally speaking, are better off if they have good *selectivity*, meaning they can exclude signals they don't want while still picking up the signals they do want

Now, what happens when a sensitive radio designed for a noise-limited system tries to operate near a cellular system that is geared for interference-limited operation? The sensitive radio becomes *desensitized*, meaning it requires a stronger signal when it's near the source of interference than it would otherwise.

Public safety and cellular systems operate on different but nearby frequencies. Radio receivers are designed to reject signals that are not on the desired frequency, but they're not perfect. When a nearby signal is too close and too strong, some of that signal may leak through the receiver's filters. You may have experienced something like this when listening to the radio in your car as you drove underneath electric power lines. The "hum" you heard was radio energy (unwanted, but there nonetheless) emanating from the power lines getting past the filters in your car's radio. In general, cellular and SMR receivers, with their focus on selectivity, are often better at rejecting adjacent, unwanted signals than the public safety radios that are geared toward sensitivity.

So, what to do? As reported in this column back in February 2002, the big SMR operator Nextel floated an ambitious plan that would relocate many public safety radio systems to frequency bands that are further away from cellular and SMR signals, thus reducing the interference problem. Nextel even offered to donate $850 million to help agencies make the transition. In return, Nextel wanted additional spectrum for its own operation.

In response to the interference problems and Nextel's unsolicited plan, the FCC opened a rulemaking proceeding, seeking comments and alternatives to the Nextel plan. Since then, a number of organizations joined Nextel and created a "Consensus Proposal," which subsequently underwent substantial modification. Many organizations question Nextel's motives and suspect that many cases of interference could be reduced or eliminated if Nextel did a better job filtering the transmissions from their towers.

Recently, Motorola submitted a response that included the possibility of manufacturing new public safety radios with better selectivity and other features that would help reduce the number of interference incidents. It's interesting to note that Motorola manufactures a significant amount of equipment for public safety agencies as well as SMR operators, including Nextel.

Without a clear solution in sight and lacking strong FCC action, debate over the causes and cures of public safety interference may be the only action for the foreseeable future.

That's all the space I have for this month. Look for more trunking-related information on my web site at **http://www.signalharbor.com**, and I welcome your e-mail to *danveeneman@monitoringtimes.com*. Until next month, happy monitoring!

PLANE TALK

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Visiting Texas

Welcome aboard, everyone! Even if you aren't visiting Texas, sooner or later you will be routed through Dallas/Ft Worth, so here are frequencies galore to entertain you.

◆ Fort Worth ARTCC Remote Transmitter Sites

Ft. Worth: 134.150, 134.400, 377.100, 380.300
Abelene: 127.450, 134.250, 282.200, 290.550, 317.700; 380.050
Ardmore: 128.100, 132.975; 270.000, 322.400
Big Spring: 133.700, 350.200
Blue Ridge: 124.875, 127.600, 254.300, 307.200
Brownwood: 127.450, 380.050
Clinton-Sherman:126.300, 128.400, 128.450, 290.200, 339.800, 363.100
Cumby: 126.575, 132.020, 132.850, 317.750, 322.450, 360.750
Dublin: 127.150, 128.325, 135.375, 290.550, 351.900, 381.650, 387.000
El Dorado: 128.200, 269.100
Frankston: 135.250, 265.100, 134.025, 227.400
Gainsville: 126.775, 134.150, 343.850, 377.100
Habbs: 133.100, 385.60
Keller: 133.250, 134.150, 135.275, 285.550, 377.100, 380.200
Lubbock; 120.775, 126.450, 127.700, 316.100, 327.100, 362.300
Marshall: 128.125, 135.100, 269.200, 281.550, 327.800
McAllester: 132.200, 135.450, 269.650, 338.350
Midland: (Site A) 132.075, 133.100, 291.650, 385.600
Midland: (Site B) 291.650
Mineral Wells: 127.000, 135.600, 307.350, 360.600l
Monroe: 133.775, 135.100, 346.250
Oklahoma City: 128.300, 132.450, 133.900, 291, 700, 298.900, 363.100
Paducah: 120.775, 126.450, 133.500, 133.350, 13.550, 231.100, 316.100, 327.100, 348.650, 350.350
Paris: 128.150, 133.950, 348.700
Plainview: 126.450, 316.100
San Angelo: 126.150, 322.550, 132.075, 291.650
Scurry: 126.725, 135.750, 298.850, 379.250
Shrevepart: 132.275, 133.875, 135.100, 285.650, 327.800, 346.250
Texarkana: 126.575, 133.950, 134.475, 263.050, 284.600, 322.450
Tyler: 134.025, 135.250, 251.150, 279.650
Waca: 133.300, 269.500
Wichita Falls: (Site 1) 132.925, 134.55, 278.500, 348.650
Wichita Falls: (Site 2) 127.950, 133.500, 350.350, 360.700

◆ Dallas/Fort Worth International Airport (KDFW)

ARTCC: Fort Worth Center
Flight Service Station (FSS): Fort Worth Flight Service Station
ATIS: 123.775 (Arrival), 135.925 (Departure)
Regianal Approach: 119.875, 284.650, 133.625 (West); 125.025, 319.250, 133.525 (East).
Clearance Delivery: 128.250
Regional Departure:
126.475, 363.150 (West)
124.825, 323.050 (North)
118.550, 290.350 (East)
125.125, 319.850, (South).
Ground Control:
121.650, 121.800 (East)
121.850 (West)
Tower:
124.15, 134.900 (West),
126.550, 128.500 (East)
UNICOM: 122.950
NAVIGATION AIDS: (By popular request, we are now including Navigation Aid frequencies for all airports!)

VOR Radial/ Distance	Name	Frequency	Variation
TTT: radial – 359; distance – 1.6; Maverick (VOR/DME); 113.100; 06E			
CVE: radial – 267; distance – 6.7; Cowboy (VOR/DME), 116.200; 06E			
FUZ :radial – 081; distonce – 7.2; Ranger (VORTAC); 115.700; 06E			

NDB name	Heading/Dist.	Freq.	Var	ID
Redbird	321/15.6	287	06E	RBD (-.-.-... -..)
Cedar Hill	342/18.6	353	08E	CDI (-.-.-.. —)
Lancaster	314/24.9	239	06E	LNC (-... -.-.-.)
Mesquite	276/26.2	248	06E	PQF (.—. —.- ..-.)
Jecca	292/28.9	388	06E	JUG (.— ..- —.)

◆ Dallas Love Field Airport (KDAL)

ARTCC: Fort Worth Center
Flight Service Station (FSS): Fort Worth Flight Service Station
ATIS: 120.150
Regional Approach:
124.300 (North); 125.200 (Sauth
Clearance Delivery: 127.900
Regional Departure:
Jets – 118.550, Props— 124.300 (North)
Jets – 125.125, Props – 125.200 (Sauth)
Ground Control: 121.750; 348.600
Tower: 123.700; 239.300, 118.700
UNICOM 122.950
RADIO NAVIGATION AIDS

VOR Radial/ Distance	Name	Frequency	Variation
TTT: radial – 359; distance – 1.6; Maverick (VOR/DME); 113.100; 06E			
CVE: radial – 267; distance – 6.7; Cowboy (VOR/DME), 116.200; 06E			
FUZ :radial – 081; distance – 7.2; Ranger (VORTAC); 115.700; 06E			

NDB name	Heading/Dist.	Freq.	Var	ID
Redbird	321/15.6	287	06E	RBD (-.-.-... -..)
Cedar Hill	342/18.6	353	08E	CDI (-.-.-.. —)
Lancaster	314/24.9	239	06E	LNC (-... -.-.-.)
Mesquite	276/26.2	248	06E	PQF (.—. —.- ..-.)
Jecca	292/28.9	388	06E	JUG (.— ..- —.)
Travis	274/30.8	260	06E	AVZ (.- ...- —..)
Caddo Mills	243/32.5	316	06E	MII (— .. ..)

◆ San Antonio International Airport (KSAT)

ARTCC: Houston Center
Flight Service Station: San Angelo Flight Service Station
ATIS: 118.900
Approach: 118.050 (141-270); 124.450 (360-090); 125.100 (271-359) 128.05 (091-140)
307.0 (271-359); 318.100 (091-140); 353.500 (141-270); 392.100 (360-090) 125,7; 127.100
251.125; 381.400
As Assigned: 120.300, 121.200; 239.025; 269.100; 285.450; 317.500
Clearance Delivery: 126.700
As ossigned: 120.200; 121.200; 239
Departure: 118.050 (141-270); 1224.45 (360-090); 125.100 (271-359); 128.050 (091-140); 307.000 (271-359); 318.100 (091-140); 353.500 (141-270); 392.100 (360-090); 125.700, 127.100; 251.125; 381.400
Emergency: 121.500; 243.000
Ground: 121.900; 348.600
Tower: 119.800; 257.800
UNICOM: 122.950
RADIO NAVIGATION AIDS

VOR Radial/ Distance	Name	Frequency	Variation
SAT 176/6.6	San Antonio VORTAC	116.800	08E
RND 266/9.7	Randolph VORTAC	112.300	09E
SSF 346/16.6	Stinson VOR	108.400	09E

NDB name	Heading/Dist.	Freq.	Var	ID
Alamo	122/6.8	368	08E	AN (.- -.)
Castroville	052/22.8	338	08E	CVB (-.-. ...- -...)
New Braunsfels	237/24.9	212	08E	BAZ (-... -. —..)
Devine	039/34.1	359	07E	HHH (..... ....)
Pleasantan	357/34.8	275	08E	PEZ (.—. . —..)
Hondo	067/37.9	329	08E	HMA (.... — .-)

◆ Houston ARTCC Remote Transmitter Sites

Hauston: 134.350, 269.000
Arr/Dep US – 124.200, 127.000, 127.800, 128.750, 133.750; 133.850, 134.350, 134.700, 263.100, 269.000, 269.500, 281.500, 306.300, 307.200, 385.500
Alexandria: 126.100, 127.850, 132.700, 133.400, 135.700, 269.200, 299.600, 319.900, 348.750
381.500
Austin: 125.650, 132.725, 363.250, 353.800

Beaumant: 126.950, 363.050
Cameran Co.: 132.650
College Station: 120.400, 125.150, 134.500, 134.800, 135.325, 269.600, 307.800, 319.150, 322.550, 371.900
Fredericksburg: 134.200, 307.300
Galveston: 133.800, 351.800,
Galveston A: 133.400, 306.300
Grand Isle: 134.900, 132.175, 290.450 (353.550 Oceanic Control in Gulf of Mexico):
Hattiesburg: 119.725, 126.800, 281.500, 285.600
Houma: (132.650 Oceanic Control in the Gulf of Mexico)
Kingsville: 128.300,133.750. 273.600, 291.600
Lacombe: 126.875, 281.500
Lafayette: 126.350, 133.650, 263.200, 338.250
Lake Charles: 124.700, 132.950, 317.400360.650
Laredo: 126.750, 127.800, 128.600, 307.200, 319.100, 354.000
Lometa: 132.350, 273.550
Lufkin: 126.950, 132.775, 133.575, 134.800, 269.600, 287.850, 335.650, 335.850
McComb: 133.500, 343.950
Mobile: 125.775, 127.650, 132.600, 288.150, 322.400, 387.050
New Orleans: 127.000, 126.350, 338.250, 385.500
Newton: 134.800. 135.700, 269.600, 381.500
Palacios: 119.175, 132.150
279.600, 360.800
Rockport: 128.150, 134.600, 135.475, 291.750, 322.500, 350.300
Rocksprings: 125.750, 128.500, 132.400, 299.200, 327.800. 346.400
San Antonio: 125.250, 132.800, 134.950, 285.400, 291.700, 343.700
San Antonio A: 120.600, 126.425, 134.600, 322.500, 335.600, 371.850, 385.550
Sealy: 119.175, 126.425, 132.150, 279.600, 360.800, 371.850
Uvalde: 126.100, 134.950, 269.400, 327.000
Vermilion: (120.350 Oceanic Control in Gulf of Mexico)
Victoria: 135.050, 353.600

◆ HF Aeronautical Frequencies

NORTH ATLANTIC A ROUTE
includes Canary Islands, Gander, New York, Paramaribo, Piarco, Santa Maria & Shanwick - 30126, 5598, 8906, 13306, 17946 kHz

NORTH ATLANTIC B ROUTE
includes Gander, Reykjavik, New York, Santa Maria & Shanwick - 2899, 5616, 8864, 13291, 17946 kHz

NORTH ATLANTIC C ROUTE
includes Gander, Reykjavik & Shanwick - 2862, 5649, 8879, 13306, 17946 kHz.

NORTH ATLANTIC D ROUTE
includes Boda, Cambridge Bay, Churchill, Iqaluit, Gander, Reykjavik & Sandrestrom - 2971, 4675, 8891, 11279, 13291, 17946 kHz

NORTH ATLANTIC E ROUTE
includes New York and Santa Maria - 2962, 6628, 8825, 11309, 13354 kHz.

NORTH ATLANTIC F ROUTE
includes Gander and Shanwick - 3476, 6622, 8831, 11336, 13291 kHz.

CARIBBEAN A ROUTE
includes Barranquilla, Boyeros, Guatemala City, Meridia, New York, Panama, Piarco, San Andres, San Jose, Tegucigalpa - 2887, 5550, 6577, 8918, 11396, 13297, 17907 kHz.

CARIBBEAN B ROUTE
includes Barranquilla, Boyeros, Cayenne, Georgetown, Maiquetia, New York, Panama, Paramaribo, Piarco, San Andres - 3455, 5520, 6586, 8846, 11330, 17907 kHz

More of these in our October Column!

◆ West Coast ARTCCs

Seattle ARTCC Remote Transmitter Sites

118.550	Cottonwood
119.225	Spokane
119.650	The Dalles
120.300	Beacon Hill, Yakima
121.350	Redmond, Ore., Rex-Parrett
121.400	Horton, Medford
123.950	Cottonwood, Lakeside, Spokane
124.200	Nassel, Scappoose
124.850	Antelope Mt., Arcata, Medford, Ferndale
125.100	Whidbey Island, Neah Bay
125.800	Horton
126.100	Marlin, Wenatchee
126.600	Larch Mt., Dallesport
127.600	Klamath Falls, Lakeview
128.150	Scappoose, Redmond, Ore.
128.300	Hoquiam, Larch Mt.
128.450	Mohler, Mullon Pass
128.500	Ft. Lawton (Paine Field App/Dep)
132.075	Horton
132.600	Wallula, Yakima
134.900	Klamath Falls, Redmond, Ore
134.950	Stampede Pass, Whidbey Island
135.150	Medford, Ferndale
135.350	Lakeview, Redmond, Ore.
135.450	Kimberly, The Dalles
135.525	Beacon Hill, Yakima
239.000	Horton, Medford
243.000	Horton, Lakeview, Neah Bay
251.100	Yakima, Cottonwood
257.600	The Dalles
257.650	Horton
257.750	Redmond, Ore, Scappoose
263.050	Klamath Falls, Redmond, Ore.
269.000	Hoquiam, Larch Mt.
269.350	Yakima, Wallula
270.300	Stampede Pass, Whidbey Island
273.600	Beacon Hill, Yakima
279.600	Redmond, Ore., Rex-Parrett
281.400	Kimberly, The Dalles
282.300	Cottonwood, Lakeside, Spokane
291.600	Marlin, Wenatchee
291.700	Horton
306.300	Antelope Mt., Arcata, Ferndale, Medford
306.900	Ft. Lawton (Paine Field App/Dep)
307.800	Mullan Pass, Mohler
317.600	Nassel, Scappoose
319.200	Whidbey Island, Neah Bay
321.300	Wallula
335.500	Spokane
335.550	Lakeview, Redmond, Ore.
343.600	Larch Mt., Dallesport
351.700	Klamath Falls, Lakeview
353.900	Beacon Hill, Yakima
360.700	Ferndale, Medford

◆ Oakland ARTCC Remote Transmitter Sites

119.475	Half Moon
119.750	Angels Camp
121.250	Angels Camp
123.800	Fresno
125.450	Half Moon
125.750	Bishop, Mina, Tonopah
125.850	Mt. Tamalpais
126.850	Angels Camp
126.900	Fresno, Priest
127.450	Half Moon, Hollister
127.175	Coaldale
127.800	Mt. Tamalpais, Ukiah
127.950	Angels Camp, Sacramento
128.700	Priest, San Luis Obispo
128.800	Fallon, Reno
132.050	Mina, Tonopah
132.200	Red Bluff, Ukiah
132.800	Fresno, Priest
132.950	Angels Camp, Sacramento
133.050	Half Moon
133.375	Red Bluff, Ukiah
133.700	Fresno, Priest
134.150	Ferndale, Half Moon
134.375	Angels Camp, Fresno
134.450	Fallon, Reno
134.550	Priest
134.975	Red Bluff, Ukiah
257.200	Fresno
257.850	Freemont
269.100	Red Bluff, Sacramento
269.300	Fallon, Reno
273.450	Mina, Tonopah
281.400	Ukiah
281.500	Angels Camp, Fresno
284.600	Angels Camp
285.400	Fresno, Priest
285.500	Fallon, Reno
290.300	Red Bluff
290.400	Angels Camp
290.500	Priest
306.200	Ukiah
307.000	Priest, San Luis Obispo
307.300	Half Moon
316.100	Angels Camp, Sacramento
319.100	Fresno, Priest
319.800	Bishop, Mina
322.550	Angels Camp
323.000	Mt. Tamalpais
323.175	Coaldale
327.000	Angels Camp
343.800	Fresno, Priest
350.300	Red Bluff, Ukiah
353.500	Mt. Tamalpais, Ukiah
353.800	Fresno
357.600	Half Moon, Hollister
379.200	Ukiah
380.300	Half Moon
387.100	Ferndale, Half Moon

◆ TRACON Territory

Oakland/San Francisco Bay TRACON has merged with the Northern California Tracon and they are all one facility now. More about this in October!

That's all for this month. See you in October with a lot of new goodies. Until then, 73 and out.

Doug Smith, W9WI
dougsmith@monitoringtimes.com

Book Reports

Two popular domestic-band DX reference books have released new editions. If you haven't tried these, or if your copies are a few years old, you need to check these out. Sure, Internet resources are free, but there's just something about a book. (A book doesn't generate radio noise... a book won't put up a "blue screen of death"... a book won't lose your place when the lights flicker... you can underline the stations you log on your computer screen, but next time you open the website, the wrong stations are going to be underlined...)

The *FM Atlas* is the standard for FM DXers. Sections list U.S. and Canadian stations by city and by frequency. Mexican stations are also in the by-city lists. Information provided includes power, programming format, and slogan. As the name implies, the first half of the publication consists of maps of FM station locations. During DX conditions, these maps are invaluable for finding other DX targets in the same area.

For AM DXers, the standard is the National Radio Club's *AM Radio Log*. No maps (though the NRC does offer another publication with station location maps) but you will find mailing addresses and phone numbers, as well as all the information in the *FM Atlas*. All U.S. and Canadian stations are listed (no Mexico).

There's nothing new for TV DXers, but the Worldwide TV-FM DX Association does still have a few copies of the *WTFDA TV Station Guide* available. Price is the same as the *FM Atlas* - $23. Make your check payable to Dave Janowiak and mail it to 9209 Vincent Ave. South, Bloomington MN 55431-2157.

The *FM Atlas* is $23 in the U.S.; send your check to P.O. Box 336, Esko MN 55733-0336. You'll find more information on **http://www.fmatlas.com**. The *AM Radio Log* is $25.95 in the U.S. (NRC members qualify for a $6 discount). New York residents must pay sales tax. Send your order to NRC Publications, Box 164, Mannsville NY 13661, or visit **http://www.nrcdxas.org** for more information.

❖ Digital TV DX

Last month, I wrote about the status of the digital conversion. This month, we have big news about digital TV DX.

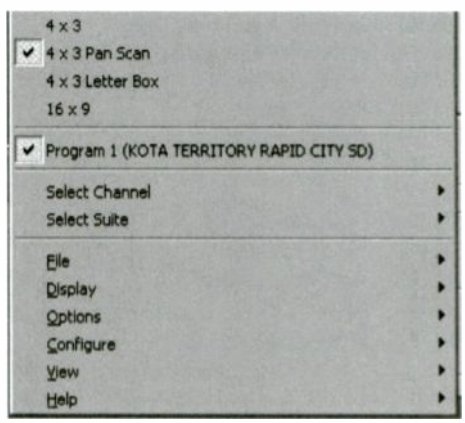
For quite some time, the distance record for digital reception was roughly 550 miles, for reception of Atlanta stations in western Illinois via tropospheric propagation. In mid-May, this distance record was utterly shattered by DXer Jeff Kruszka in Baton Rouge, Louisiana. Again using tropospheric propagation, Jeff received several North Carolina digital stations. The distance record goes to WNCN-DT channel 55 in Goldsboro, NC, for a distance of over 800 miles. However, Jeff's record didn't stand for very long!

Since digital TV first went on the air, DXers knew it would be possible to receive these stations outside their normal service areas, via tropospheric propagation. "Tropo" signals are often alone on their channels, delivering clear signals free of interference and ghosting. Experience with digital reception also showed that at least first-generation digital receivers cannot deal with interference and ghosting; such disturbances will make digital reception impossible. Digital signals do not decode instantly either. A signal must be present (and adequately free of interference) for a few seconds before you can actually see it.

The most exciting TV DX is via "sporadic-E" propagation. This mode allows distances of up to 1,500 miles. Unfortunately it also usually includes considerable ghosting and interference – especially as it only works on crowded channels 2-6. Making things even more difficult, the FCC has not authorized many digital stations in these channels. I only know of eight currently operating. Would a sporadic-E opening ever deliver a readable digital TV signal?

Early on the morning of May 30th, we got our answer: YES!

Beginning just before midnight, TV DXers throughout the eastern part of North America began to observe analog signals from the west. Digital DXer Girard Westerberg in Lexington, Kentucky, pointed his antenna west, tuned his digital receiver (a TV tuner card in his PC) to channel 2, and pulled up the diagnostics screen.



Here's proof digital TV signals can be DX'd

On several occasions overnight, the "Sync Lock" indicator on his PC would come on, indicating that a digital signal was present on the channel. Finally, at 8:22am, the "EQ Lock" came on – the error rate dropped – and Westerberg's PC decoded the "program map table," resulting in the display: "KOTA TERRITORY RAPID CITY SD". The 5kW digital signal of KOTA-TV Rapid City had made the 1,062-mile trip to Kentucky, and the DTV distance record was shattered for the second time in one month.

Unfortunately KOTA's signal didn't stay in long enough to display much else. The screen capture of KOTA's video wouldn't reproduce very well in the magazine, but you can look at the original on Girard's website **http://www.dxfm.com**. It simply consists of a series of pink, purple, and green vertical bars – the result of interference from analog stations on the same channel.

❖ Bits and Pieces

- John Wallace, Sr. of Syracuse wrote asking for information about radios and antennas suitable for listening to the new low-power FM ("LPFM") stations. He also inquired whether these stations will use the same technical standards as conventional FM stations. The answer to the latter question is yes; from a technical standpoint the only difference between a LPFM station and a conventional station is power.

  As for equipment requirements, I've found separate FM tuners (as opposed to stereo receivers with an audio amplifier built-in) are your best choice for reception of weak stations. I use an old Technics ST-G50, but there are many other suitable choices. Check out **http://www.fmtunerinfo.com** . This site also has information on FM antennas. A good general rule for all antennas is "as big as possible, as high as possible, as far from obstructions as possible, and watch out for power lines!"
- Kraig Krist KG4LAC has added another station to his log. In late April CHOK-1070 Sarnia, Ontario, made the trip to his Washington-area location. CHOK is an oldies station, with a website on **http://www.chok.com**.

Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to *dougsmith@monitoringtimes.com*. Good DX!

George Zeller
georgezeller@monitoringtimes.com

KIPM Clarifies its Radio Format

Most North American pirate DXers have heard at least one show from Alan Maxwell at **KIPM**. His complex "Illuminati" drama presentations are probably the best produced pirate radio shows on the air today. The station signal often generates loggings on both the east and west coasts of North America, proving that the station's transmitter is well above average in its coverage area. But, many pirate listeners who are accustomed to the light comedy, satire, and music formats on the shortwave bands have misconstrued the format used by **KIPM** on shortwave, and on some licensed FM stations that occasionally relay the station's productions.

Monitoring Times has previously joined this parade of misinformation about Alan's intent with these shows. We often point out that the subject matter of the drama productions on this station often includes characters who go insane. Sometimes insanity itself appears to be the main focus of these dramas. But, this characterization misses the mark to a degree. Maxwell points out to *MT* that the literary themes of his programs are existentialism, not promotions of mental illness.

Perhaps it is time for many pirate listeners and DX publication editors to go back to school, where we can take some existentialism literary classes. Then, we might be able to recognize this genre when we hear it.

❖ Iraqi Communists

War and political instability are still daily fare in Iraq, even if the intensity of the conflict has muted somewhat. DXers should be aware that plenty of clandestine radio activity is still active in this hot spot of the Middle East. Among the most interesting broadcasts is a tough DX catch from North America, but its unusual frequencies make it worth a try.

Per BBC Monitoring, quoted in numerous other DX information resources, Radio Bopeshawa, the voice of the Worker-Communist Party of Iraq, has announced a frequency shift to 5000 and 7000 kHz. Although WWV normally holds the 5 MHz frequency and amateur radio operators often dominate the edge of the 40 meter ham band, you might want to check these frequencies in the morning to see if you hear anything underneath the time signals and hams. Whether or not you are successful in hearing them, you might try checking out their web site, found at **http://www.wpiraq.org** on the internet.

Moving slightly east to Iran, the Communist Party of Iran also operates a clandestine station. Per BBC monitoring, you can read about this at **http://www.wpiran.org** on the internet.

❖ European Maildrop Addresses

The operator of the SRS European maildrop for pirate station reports indicates that many people have been sending mail to his maildrop with incorrect address formats. This causes confusion at the post office in Germany, and leads to the risk that your reception report will end up at the dead letter office, or the Gestorben Post in the case of Germany.

If you write to this maildrop, you should use a format beginning with the name of the station that you heard (with no abbreviations), c/o SRS Germany, Postfach 1136, 06201 Merseberg, Germany. Other creative freelance address formats apparently cause the German postal system to malfunction. Caveat emptor.

❖ What We Are Hearing

Our readers heard all of these North American pirate broadcasters this month, showing that pirate activity maintains a healthy level. Most broadcasts are found in the area between 6925-6955 kHz, or on nearby frequencies. All pirates operate on a sporadic schedule, but shortwave pirate broadcasting increases noticeably on weekends, and during major holiday periods.

Buckwheat Radio- This occasional performer on the pirate bands has returned with a rock music format and two-way conversations with other pirates. (Uses **buckwheatradio@hotmail.com** e-mail)

Dickhead Radio- Early shows from this relatively new pirate have been dominated by surfing rock music, mostly the music of Dick Dale at **http://www.dickdale.com**. (None announced yet)

Grasscutter Radio- No longer a new pirate, this one has established a rock and roll music and satire format. Sometimes it has two-way QSO conversations with other pirates. (None)

Indira Calling- Normally this station broadcasts a parody of All India Radio, but they will also parody other things, including the Beach Boys and their own maildrop address. (Providence)

Iron Man Radio- Rock and blues music have dominated the productions of this new pirate, hosted by Scruffy Swab. (Belfast)

Lubuvitcher Radio- This medium wave (1710 kHz) fundamentalist Jewish pirate is often heard on the east coast, but it is a tough DX catch elsewhere in the country. (None)

Oxycontin Radio- Several pirates have a habit of promoting recreational drug use. This one gets the promotion right into the station name. (None)

Polka Radio- As the name implies, this oldtimer has returned to the air with many selections of Polka music. This time their announcer utilizes a computer generated voice for identifications. (None)

Radio Pigmeat International- Despite the unusual station name, their format is primarily standard rock music fare. (None)

Ragnar Radio- Some QSLs are materializing for this new rock music pirate, but since it does not advertise a maildrop address, the veries are apparently coming from loggings posted in shortwave bulletins. (None)

Shadow Radio- Also using a call letter identification of **WSDW**, this pirate mixes ancient rock oldies music with relays of old time radio drama shows. (Uses *the_shadow6950@hotmail.com* e-mail)

Sunshine Radio- This relatively new one has been concentrating on rock oldies tunes during their broadcasts. (Uses *sunshineradios@hotmail.com* e-mail)

Undercover Radio- Broadcasting "from the middle of nowhere," Dr. Benway normally concentrates on music programming by various artists. (Uses Merlin and *undercoverradio@mail.com* e-mail)

United Patriot Militia Bingo- Even though notorious fugitives Steve Anderson and Eric Rudolph have entered federal custody after

Continued on page 81

SATELLITE SERVICES

MT TRANSPONDER GUIDE *www.monitoringtimes.com/mtssg.html*

All Frequencies MHz

Robert Smathers
robertsmathers@monitoringtimes.com

Panamsat Galaxy 5

C-Band - 125 degrees West longitude

1(H)	3720	Disney Channel – East (VC2+)
2(V)	3740	Occasional video
3(H)	3760	Trinity Broadcasting Network 5.58, 5.78 Trinity Broadcasting Radio Network 8.00 Trinity Broadcasting Network SAP Channel
4(V)	3780	Sci-Fi Channel – East (VC2+)
5(H)	3800	Cable News Network (CNN) (VC2+) 6.30 CNN Radio News 7.58 CNN Radio News
6(V)	3820	Superstation TBS (VC2+) 6.20 Superstation TBS SAP Channel 6.48 Brother Staire Radio - religious
7(H)	3840	Superstation WGN (VC2+) 5.58, 6.12 WCPE-FM 89.7 Raleigh/Durham/Chapel Hill, NC – classical 6.30, 6.48 WFMT-FM 98.7 Chicago, IL – classical 6.80 Yesterday USA Radio
8(V)	3860	Home Box Office (HBO) – West (VC2+)
9(H)	3880	ESPN (VC2+) 5.80 ESPN Natural Sound
10(V)	3900	Data Transmissions
11(H)	3920	A&C Family – East (VC2+)
12(V)	3940	Discovery Channel – West (VC2+)
13(H)	3960	CNBC (VC2+)
14(V)	3980	ESPN 2 (VC2+)
15(H)	4000	Home Box Office (HBO) – East (VC2+)
16(V)	4020	Cinemax – West (VC2+)
17(H)	4040	TNT – East (VC2+) 6.20 TNT SAP Channel 7.56 La Cadena CNN Radio Noticias (CNN Radio News in Spanish)
18(V)	4060	Spike TV - East (VC2+)
19(H)	4080	USA Network – East (VC2+)
20(V)	4100	Black Entertainment TV (BET) (VC2+)
21(H)	4120	Lifetime Network – East (VC2+) 6.80 Lifetime SAP Channel
22(V)	4140	CNN Headline News (VC2+) 6.30 CNN Radio News 7.58 CNN Headline News Radio
23(H)	4160	A&E – East (VC2+) 6.20 A&E SAP Channel
24(V)	4180	Showtime – East (VC2+)

Panamsat Galaxy 9

C-Band - 127 degrees West longitude

1(V)	3720	(none)
2(H)	3740	Gospel Music Television (VC2+) 5.40 Truth Radio Network 1 5.80 Truth Radio Network 2 7.28 Genesis Communications Network 7.78 American Freedom Radio Network
3(V)	3760	Occasional video
4(H)	3780	STARZ! – East (VC2+)
5(V)	3800	Panamsat Occasional video services (digital)
6(H)	3820	(none)
7(V)	3840	(none)
8(H)	3860	STARZ! – West (VC2+)
9(V)	3880	(none)
10(H)	3900	HBO HDTV – East / HBO HDTV – West (digital)
11(V)	3920	(none)
12(H)	3940	STARZ! Theater – East (VC2+)
13(V)	3960	Data Transmissions
14(H)	3980	Data Transmissions
15(V)	4000	Data Transmissions
16(H)	4020	Encore – East (VC2+)
17(V)	4040	Data Transmissions
18(H)	4060	(none)
19(V)	4080	Data Transmissions
20(H)	4100	Encore Westerns – East (VC2+)
21(V)	4120	(none)
22(H)	4140	(none)
23(V)	4160	Occasional video
24(H)	4180	Data Transmissions

Loral Skynet Telstar 7

C-band - 129 degrees West longitude

1(H)	3720	TVE International – Americas (digital)
2(V)	3740	In-Demand PPV (digital)
3(H)	3760	In-Demand PPV (digital)
4(V)	3780	In-Demand PPV (digital)
5(H)	3800	Playboy Networks (digital)
6(V)	3820	(none)
7(H)	3840	(none)
8(V)	3860	(none)
9(H)	3880	Data Transmissions
10(V)	3900	Occasional video
11(H)	3920	(none)
12(V)	3940	Data Transmissions
13(H)	3960	Occasional video
14(V)	3980	A&E Networks (digital)
15(H)	4000	Playboy Networks, Tennis Channel (digital)
16(V)	4020	The Vision Channel (digital)
17(H)	4040	(none)
18(V)	4060	(none)
19(H)	4080	ViSat from Televisa (digital)
20(V)	4100	(none)
21(H)	4120	America's Collectibles Network (ACN)
22(V)	4140	B-Mania Channel, Chronicle, FamilyNet, Canal Sur, TBN Enlace, Colours, TV Chile, Puma, Latin TV, Cine Latino, TV Super Store, Vida Vision, Russian World (digital)
23(H)	4160	(none)
24(V)	4180	*Pleasure, *The Erotic Network (TEN), TEN*Clips, TEN*Blue, TEN*Blox, TEN*Xtsy (digital)

Loral Skynet Telstar 7

Ku-band - 129 degrees West longitude

1(V)	11720	Occasional video
2(H)	11740	Occasional video
3(V)	11760	Data Transmissions
4(H)	11780	Data Transmissions
5(V)	11800	Data Transmissions
6(H)	11820	Data Transmissions
7(V)	11840	Data Transmissions
8(H)	11860	Data Transmissions
9(V)	11880	Data Transmissions
10(H)	11900	Data Transmissions
11(V)	11920	Occasional video
12(H)	11940	Occasional video
13(V)	11960	Occasional video
14(H)	11980	Data Transmissions
15(V)	12000	Occasional video
16(H)	12020	Data Transmissions
17(V)	12040	Data Transmissions
18(H)	12060	Occasional video
19(V)	12080	Data Transmissions
20(H)	12100	Occasional video
21(V)	12120	Data Transmissions
22(H)	12140	Occasional video
23(V)	12160	Data Transmissions
24(H)	12180	Occasional video

SES Americom Satcom C3

C-Band - 131 degrees West longitude

1(V)	3720	Fox Cable Networks (digital)
2(H)	3740	The Learning Channel – East (VC2+)
3(V)	3760	In-Demand PPV (digital)
4(H)	3780	Lifetime – West (VC2+)
5(V)	3800	Hallmark Channel (digital)
6(H)	3820	CourtTV – East, Northwest Cable News, CourtTV – West (digital)
7(V)	3840	C-SPAN 1 5.20 C-SPAN Audio 1 – C-SPAN Radio 5.40 C-SPAN Audio 2 – BBC World Service
8(H)	3860	Style Channel, Bloomberg Business TV, Game Show Network, WE: Women's Entertainment TV, E! Entertainment TV, Trio, Wisdom Television (digital)
9(V)	3880	MusicChoice (digital)
10(H)	3900	America's Store (analog) / America's Store (digital)
11(V)	3920	Fox Cable Networks (digital)
12(H)	3940	History Channel – East (VC2+)
13(V)	3960	The Weather Channel (VC2+) 7.78 Weather Channel Background Music
14(H)	3980	New England Sports Network, Boston Catholic TV (digital)
15(V)	4000	Viacom Networks (digital) MTV 2 Nick Noggin/The N MTV Jams Nick Games and Sports MTV Spanish NickToons TV VH-1 Classic Rock Nick Too – West VH-1 Soul VH-1 Country VH-1 Mega Hits MTV Hits
16(H)	4020	Showtime Networks (digital) Showtime HDTV – East Showtime Next – East Showtime Family Zone – East Showtime Women - East
17(V)	4040	The Movie Channel – East (VC2+)
18(H)	4060	TV Land (digital)
19(V)	4080	Showtime / The Movie Channel (digital) Showtime – East Showtime Too – East Showtime Showcase – East The Movie Channel – East Flix – East Sundance Channel – East The Movie Channel Xtra – East Showtime Beyond – East Showtime Extreme - East
20(H)	4100	Jones Space Segment (digital) Product Information Network Great American Country Infomercials Occasional video feeds
21(V)	4120	Comedy Central – East (VC2+)
22(H)	4140	Discovery Networks (digital) Discovery Health – East Discovery Kids The Science Channel Discovery Home and Leisure Discovery Times BBC America – East Discovery Wings Health Network Discovery Espanol
23(V)	4160	E! Entertainment Television – East (VC2+) / E! Entertainment Television – West (digital)
24(H)	4180	Oxygen (VC2+)

BELOW 500 kHz

DXING THE BASEMENT BAND

Kevin Carey, WB2QMY
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No LF Ham Band

After nearly five years of watching and waiting, it appears that an LF ham band at 136 kHz will *not* become a reality – at least not in the near term. Things looked very encouraging for the proposal as recently as early May 2003, but efforts by the Power Line Carrier (PLC) industry ultimately prevailed in convincing the FCC to shelve the idea for now. The concern? PLC manufacturers and users believe that amateur activity could disrupt their operation, causing undesired effects to electric power grids.

The FCC did say in its May 14th *Report and Order* that experimental licenses for the 136 kHz band will be reviewed on a case-by-case basis to determine their compatibility with PLC users and may be useful in determining future sharing possibilities on the band. The Commission also recognized the experimental work being done in the 160-190 kHz license-free band, reminding amateurs of its availability for continued operation.

One has to wonder why 1-watt ERP operation on a "sliver" band (135.7-137.8 kHz) poses such a dire threat to Part 15 PLC devices, many of which can be programmed to operate anywhere between 30 and 500 kHz. Are so many of them really clustered around 136 kHz so as to pose a problem? It's worth noting that there have been no reports of PLC interference in countries that already have a 136 kHz ham allocation.

Finally, it seems significant that there were no reports of PLC interference in the days when extremely powerful (3 kW) GWEN stations operated on longwave from multiple U.S. locations. These stations were active well into the 1990s. Granted, the locations and frequencies of GWEN stations were known – allowing for some degree of coordination – but the magnitude of their signals would almost certainly have caused problems if the concerns were real.

There were some bright spots in the FCC report. U.S amateurs will be granted secondary access to five specific channels in the 5000 kHz band at 50 watts ERP. They are: 5332, 5348, 5368, 5373 and 5405 kHz. Hams may use USB emission *only* on these channels in order to be compatible with existing primary users who may need to reclaim frequencies in an emergency. Current users of 5000 kHz include the Department of Defense, Coast Guard, Department of Justice, and 12 others who were not specifically identified by the FCC report.

Going *much* higher in the spectrum, hams were also granted primary status from 2400 to 2402 MHz where they previously were secondary users. The primary status applies to all amateur operation on the band *except* for the amateur satellite service, which will remain on a Non-Interference Basis (NIB) in the 2400-2450 MHz range. Visit the ARRL website at **http://www.arrl.org** for more information on any of the above rulings. Past issues of the *ARRL Letter* contain the details of these actions by the FCC, and offer practical operating guidance.

◆ AM Broadcast Interference?

Are you troubled by interference from a local AM broadcaster? A low pass filter that cuts off at 500 kHz may be the answer. Commercially available filters for longwave reception are difficult to find, but if you're at all handy, you can build a simple filter that will do the job nicely. To determine the necessary capacitance and inductance values, you could consult reference books such as the *ARRL Handbook*, or dig up any of several Lowpass filter projects that have been described in hobby publications over the years.

A very straightforward design for a filter appeared in the June 2003 issue of the *Lowdown* journal. The project, described by Bill Bowers, requires only two values of inductances (coils) and three values of capacitors. The whole thing is built on a simple "perfboard" available at Radio Shack. For reprint information, send an SASE to the *Lowdown* Publisher, Bill Oliver, 45 Wildflower Road, Levittown, PA 19057-3209.

◆ LFE Online

The folks at Low Frequency Engineering have a website worth visiting if you have even a casual interest in the LF/MF spectrum. You can download a full product catalog that includes listings for preamps, converters and antennas, plus additional tutorial downloads on LF topics. A feature I appreciated is the ability to download instruction manuals for many LFE products. Visit this longtime supplier to the LF hobby at **http://www.lfengineering.com**. You can also request a catalog by writing LFE at: 17 Jeffry Road, East Haven, CT 06513.

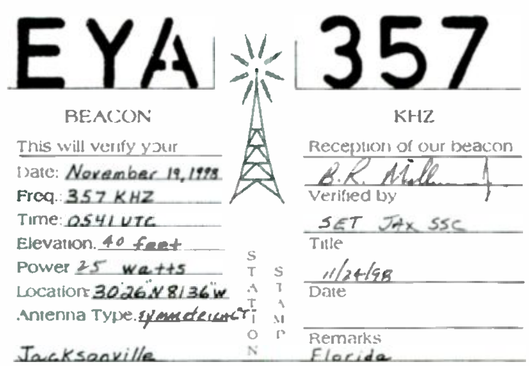
◆ Summertime Strategy

If you've been at the longwave game for any length of time, you know that summer can be a challenging time for monitoring. Natural static (QRN) tends to be higher at this time of the year, and it can cover all but the strongest signals when it flares up. Still, summer is not a time to hang up the phones. It can actually present some opportunities that are not available at other times of the year.

As the "Longwave Wizard" Ken Cornell used to say, get started early! If you listen in the morning, say, before 10 o'clock, your chances for success are much greater. Often, the noise levels are quite low at these hours, and there's still some nighttime skip in effect – especially on frequencies above 300 kHz.

Be sure to have some fresh batteries on hand for your portable. Summer inevitably brings with it a few power outages. During these times, you'll get a rare chance to tune the band without the usual cacophony of light dimmers, computers and motors filling the air with static. Enjoy these opportunities while you can.

Summer is also a great time to track down local beacons, using the directional characteristics of your portable receiver's ferrite antenna. Simply orient the set for a null, and the lengthwise dimension of the receiver case should be pointing towards the station. Of course, you'll need to figure out *which* end of the case points at the prize by plotting multiple readings on a map. The lines will intersect near the beacon's location. When you find it, be sure to snap a picture for possible use in *Below500 kHz*! See you next month.



QSL card from EYA (357 kHz) in Jacksonville, FL. Card courtesy of Allen Renner (PA).

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Power Line Communications

An Editorial Comment

As you all well know by now I've been around amateur radio long enough to qualify as a member of the Quarter Century Wireless Association. (One of these days I may even join.) Throughout those years, both as a ham and as a generalist in all the other aspects of the radio hobby, I have encountered dozens of things that have been raised up as "*a threat to the hobby*," and gets everyone excited. This is not such a bad thing, because usually it brings about an increase in activity on the repeaters and that is always good. Just such a subject is currently causing long-winded folks to time out their local machines.

These days a lot of comments, opinions and technical positions (and, sadly, a certain amount of unsubstantiated folderol) have been going back and forth in the amateur radio community, in the press, online, and on the air, about Power Line Communications, also known a PLC or Broadband over Power Lines (BPL). I have been a bit surprised at how many e-mails have come my way asking me my opinion on the subject. Certainly enough to make me dig a bit deeper into the good sources of information to try to come up with some thoughts that might at least further the discussion. In other words, I guess it looks like time for Old Uncle Skip to get into some controversy. Well, duck and cover, here it comes.

◆ Good, Bad, or Indifferent?

On the surface of it, the concept of PLC/BPL is intriguing – using existing power lines to carry high speed broadband Internet signals. You've got an existing infrastructure and supportive services (including billing and administration). Why isn't everybody smiling?

Well, for one thing, at its existing level of technology and with the current theories on deployment, it has the potential to cause serious noise and interference problems in the HF spectrum. Where I come from, HF means *Ham Frequencies*, so we should all be keeping at least one eye on this technology. Life is hard enough trying to dig out an S2 signal under a solar flare. Nobody needs more interference than we already encounter.

But notice the phrasing I used in the last paragraph... PLC has the *potential* to cause interference at this stage of the game. While all hams are right to be concerned and should make a point of filing comments on any FCC Notices of Proposed Rulemaking (NPR) in these areas, let's be careful here. Last time I checked, the amateur radio community was supposed to be made up of folks who embraced advances in technology and, more importantly, worked to make existing and potential technologies better.

If you don't believe me, reach into your pocket and pull out your cell phone. Who do you think figured out how to bring this technology to a place where it was made marketable? As I recall, hams were repeating and networking radio (cell phones are radios remember?) long before anyone used a pocket phone to order a pizza. Through our comments (and hopefully our experiments) we may find ways to make this technology coexist with ham radio. I expect that if PLC becomes a reality it will be in an advanced form that takes into account spectrum use for HF services (including ham radio). I also count on the vast technological base of dedicated and tenacious hams to find new ways of getting around this problem and, in so doing, improve the radio art even further. I can hardly wait to see the advances in notch filter design.

Now to really go out on a limb, let me give you my thoughts on why this technology may not be a threat at all.

How many times have we heard in the past about a "*promising new technology that will change our world forever*"? See where I am going with this? Even if the basics of the technology are sound and the power companies have dollar signs in their eyes, that doesn't mean this dog is gonna' hunt. That power juice that leaks out of your plugs at home comes by way of a relatively lossy system when you start to talk about higher and higher frequencies. There are miles of uninsulated (and corroded) wire out there running from pole to pole. You can get away with all kinds of things when you're down below 500 kHz. You may not know that even today your local utility company is probably sending control signals via their overhead wires at very low frequencies.

But when you start moving that signal up into the legitimate HF range or higher, a lot of other factors are going to come into play – everything from the quality of the cabling to the connectors and the power generating equipment itself. Even cable TV companies and telephone companies currently scrambling for their piece of the broadband Internet pie, and whose systems were more or less initially designed to manage data transmissions, are encountering infrastructure and deployment problems.

Power utilities were only designed to deliver electrical power at some very specific (and very low) frequencies. Sure, it might work just fine in a lab or a short range test. But I'll bet long runs will create a whole new set of problems that may make the whole project less than cost efficient for the power companies. Utilities are highly regulated industries and they have to work very hard to preserve what they perceive to be a reasonable profit margin. They simply can't afford to go off on a technological tangent. Their R&D budgets are as tight as a drum.

And if you poke around a bit on the Internet and in a few books, you are likely to find that a form of PLC already exists in many places and it is having zero negative effect on amateur radio operations. What I am referring to is the "*HomePlug*" specification. HomePlug is a technology used for powerline computer and control system networking within a building or complex of buildings. This specification requires filtering to prevent interference with all types of over-the-air radio communication.

A great deal more information and study from reliable resources can be found at the American Radio Relay League (ARRL) Technical Information Service site: **http://www.arrl.org/tis/info/HTML/plc/** My good friend Ed Hare, W1RFI, ARRL Laboratory Manager (and

QRP Sensei) has gone to great pains to assure that the facts of this technology and its potential impact on amateur and other radio services is available to hams everywhere.

So the bottom line from Old Uncle Skip's end of the universe is:

Will we see PLC deployed?

Maybe.

When will we see it?

On a small scale, in a couple of years, but unless some of those bigger issues are worked out I wouldn't expect it to be widespread within the next 5 years or even more. Technologies of all shapes and sizes will continue to advance during that 5 year period as well. Any one of these technologies might prove more practical (and profitable) than PLC.

Will PLC have a negative impact on Ham Radio?

Yes, but only if we do not work on our own behalf to protect our spectrum from this and any other potential source of interference. While PLC might have a negative impact at some point in the future, at the present time more hams are probably affected by interference from improperly managed VHF/UHF paging transmitters. When was the last time you contacted the FCC to get them to improve enforcement in this area?

The key here is to remain informed. Any ham that doesn't log onto the FCC **http://www.fcc.gov** and ARRL **http://www.arrl.org** Web sites daily and act on the news and information provided there gets what they deserve. Things move fairly fast in this regulation/deregulation game and windows of opportunity to provide comments to the FCC and government officials can be fairly narrow.

❖ Making Your Voice Heard

The good news is that the FCC usually accepts public comments on any of their Notices of Proposed Rulemaking (NPR). They have even developed an excellent Web site that makes filing comments a fairly simple procedure. Their site can be found at: **http://www.fcc.gov/cgb/ecfs/** All you need to provide comment is the *docket number* for the NPR in question. These are usually easy to find with a search on the topic either at the FCC main Web site or at the ARRL Web Site. Most any subject of particular interest to the amateur radio community will be well covered in the hobby press, as will references to the various NPR's docket numbers and their filing deadlines.

Knowing the docket number is important, because that is how you reference the topic you plan to comment on at the FCC site. Even a brief comment of just a few lines is valuable to the process. Let's go over a couple of points that will help you be heard.

You are filing a *comment* not a *complaint*. Even if you are very excited about a matter and have very strong feelings, try your best to make your comments in a way that is informative and critical without being confrontational. Take some time to develop your position off line. How many times in the past have you sent someone an e-mail message only to regret that you hit the Send key. A little planning will give even a brief comment plenty of power.

Another important thing to remember is that, unless you are very well versed in the engineering and or legal aspects of any matter in a NPR, you may want to try to refrain from talking about the subject beyond your personal level of expertise. Stick to honest expressions of your concern for the rule's effect on your ability to continue to enjoy your use of the radio spectrum. This has just as much value during the comments stage of the FCC process.

While I am sure it comes across in almost any comment posted by a ham on the FCC site, never forget to remind folks of the service that amateur radio provides. It is our history of service to the community that has been responsible for our ability to have our comments count in past matters before the FCC and Congress. The FCC could care less if you can't have your regular Saturday morning roundtable, nor do they care what your score was in last month's DX contest. What continues to "pay the rent" for the ham community is our public service in times of emergencies.

While the FCC comments page allows for the sending of attached files, don't complicate matters by duplicating efforts. For example, sending a copy of an article from a magazine such as *QST* is redundant. The League will have already seen that all relevant material has been entered into the process. Unless the information you are providing is likely to be something new to the matter, save the bandwidth.

As an example of a comment, please look at the sidebar to this month's column. There you will see my brief comment filed in relation to NPR Docket #03-104, a recent NPR related to PLC. In a few short lines I let the folks in Gettysburg and Washington know my position on Power Line Communication.

Keep an ear to the ground and your eyes on the Web for future opportunities to add your comments to matters that could change the way we enjoy our hobby in the future. Hang in there. I'll still see everyone at the bottom end of forty meters for many years to come, as long as we all stick together.

Uncle Skip's Comments sent to the FCC concerning PLC/BPL

"As an active amateur radio operator, I am most concerned that BPL communication might have a negative and interfering effect on my ability to serve my community and my country. Unless the potential for serious interference to the amateur and other radio services are addressed, BPL should not go forward in its present form. In times of national and local emergencies, 'hams' have always been ready willing and able to answer the call to duty. I guess the real question is, if BPL is allowed in its present form, will hams be able to hear that call under all the noise?"

UNCLE SKIP'S CONTEST CORNER

10-10 Int. Summer SSB Contest
August 2 0000 UTC – August 3 2400 UTC

European HF Championship
August 2 1000 UTC - August 2 2200 UTC

North American QSO Party (CW)
August 2 1800 UTC - August 3 0600 UTC

ARRL UHF Contest
August 2 1800 UTC - August 3 1800 UTC

Maryland-DC QSO Party
August 9 1600 UTC – August 10 0400 UTC
August 10 1600 UTC – August 10 2400 UTC

North American QSO Party (SSB)
August 16 1800 UTC - August 17 0600 UTC

New Jersey QSO Party
August 16 2000 UTC – August 17 0700 UTC
August 17 1300 UTC – August 18 0200 UTC

Ohio QSO Party
August 23 1600 UTC – August 24 0400 UTC

Hawaii QSO Party
August 23 0700 UTC – August 24 2200 UTC

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Antenna Testing and Maintenance

Generally speaking, antennas are pretty rugged devices, but they do occasionally have problems. So this month let's talk about some things we can do to check out our antennas and keep them working for us.

❖ Don't Fix What Ain't Broke

There are times, on the HF band in particular, when the band is not open and no locals are on. The absence of signals at such a time may cause you to incorrectly think that your antenna is not performing as it should. To check the antenna's functioning turn the volume control and RF gain (if any) up. Then rapidly disconnect and reconnect the antenna at the receiver several times. Listen for a drop in the noise level as the antenna is disconnected. If there is a portion of noise that "goes away" when you disconnect the antenna then the antenna is receiving noise. The antenna is functioning, at least to some degree, and is probably OK.

Because there is often little received-noise levels at frequencies above the HF band this test is generally effective only on the HF band and lower.

❖ Inspection and Testing

Discolored feed line will almost certainly perform less than optimally, and can indicate a serious source of trouble. Breaks in the outer insulation of coax let in moisture and usually indicate trouble. With either problem the line should be replaced with new line.

Oxidized, corroded, or dirty connections can cause open circuits (preventing current flow) or even short circuits (allowing current to flow where it shouldn't). Oxidation, corrosion, or dirt should be cleaned away completely. Then surfaces involved should be protected with some cover such as coax sealant. Broken wires may be a sign that the antenna has been under excessive strain, or that the broken wire has been bent too often, perhaps as the antenna sways in the wind.

Antenna Joke Alert!

A woman consulted a psychiatrist about her husband's mental condition. "Doctor," she said, "He thinks that he's a satellite dish antenna. Can you help him?" The good doctor thought it over and said "This is a rare condition, and will be a difficult case to treat. It will take a lot of therapy, but for $100,000 I think that I can cure him." The woman thought for a while, and then said: "We really can't afford $100,000 to cure him, so how much would you charge just to adjust him so we can get better reception?"

If the antenna performs intermittently, with signals cutting in and out accompanied by pops and crackles, then the old "wiggle test" may be needed. For this test, tune in a station and listen to it as you wiggle the antenna's various components: feed line, elements, balun (if there is one), etc. If you can't hear the receiver from the antenna's location, then transceivers or a wireless, battery-operated baby monitor can be used listen to the receiver at a distance.

An indicator of current flow (continuity), such as an ordinary volt-ohmmeter, can be used to check for open circuits and short circuits. For this test you will need to know just how your antenna's elements and feed line are supposed to be connected electrically. A circuit diagram of the antenna often comes in its instruction booklet, or you can find a diagram for your antenna-type in an antenna book (see examples in fig. 1).

Check for current flow through elements and between elements which should be connected together electrically (fig. 1). Between elements with no electrical connection there should be no current flow (infinite resistance). Testing continuity right at the connection between conductors should show very close to zero resistance; even one ohm is too high here.

As shown in fig. 1, when an antenna is in good condition there should be continuity between the feed point terminals of a folded dipole, but not between the feed point terminals of an ordinary, half wave dipole, and so on as shown in fig. 1. Of course, there should be continuity along the entire length of any single, continuous antenna element. For elements 20 ft or less this resistance should be no more than an ohm or so. For longer runs such as 100 ft, resistance should be no more than a very few ohms, say 5 or less. Some antennas, such as the T2FD (fig. 1), and terminated rhombic, have resistors in their circuitry, and this resistance will add to the total resistance in their continuity testing.

Measuring resistance across the inner and outer conductors of a disconnected feed line should give an infinitely-high resistance reading. The line should show a very low resistance when the far end has both conductors connected together (shorted). If the short is well made so that it has essentially no resistance in itself, then runs up to 100 ft or so should have something like five ohms resistance or less. For the larger half-inch diameter coax, the resistance should be much less.

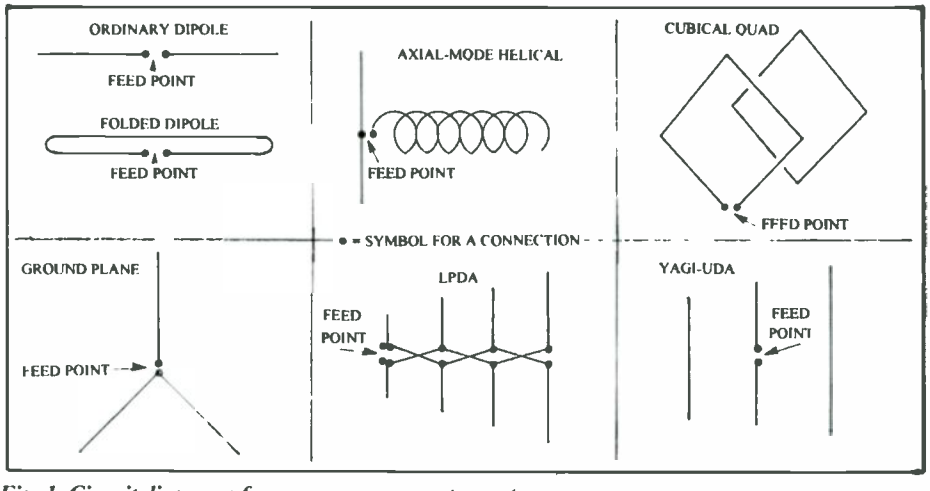

Fig. 1. Circuit diagrams for some common antenna types.

❖ Siting

Sometimes when an antenna just doesn't perform up to expectations, the problem is that it is poorly sited. Mounting an antenna close to conductive material, such as a metal gutter or metal building can seriously degrade performance. Separation from such objects should be several feet at least.

Putting your antenna as high and in the clear as possible is generally a good rule. One exception to this rule is keeping antennas at a certain height to attain specific vertical propagation characteristics.

❖ Matching Impedances For Receiving-Antenna Systems

Poor performance by an antenna can sometimes be due to a mismatch of impedances between antenna feed-point and feed line, and/or

This Month's Interesting Antenna-Related Web Site:

For a discussion of some antenna concepts, check out:
http://www.tpub.com/neets/book10/42b.htm

between feed line and the receiver's antenna-input. Modern receiver antenna-input impedances are designed to be nominally at 50-ohms. So a modern antenna system is impedance matched if you are using 50-ohm impedance feed line and a 50-ohm feed point at the antenna.

Of course not all antenna feed points have impedances of 50 ohms, not all cables have 50-ohm impedances, and some older receivers antenna input circuits have 300-ohm impedance. There are a number of different circuits for matching antenna feed point impedance with feed line impedance. There are also matching devices, called "antenna tuners," which can be added between receiver antenna-input and antenna feed line. The *ARRL Antenna Book* is a good source for these circuits.

It is useful to realize that, when received-noise is relatively high, as it typically is at HF and lower frequencies, quality of reception is determined primarily by signal-to-noise ratio. Thus impedance matching on receive-only antenna systems is often of little value for HF and lower frequencies. On the other hand received-noise levels are typically low at VHF and higher frequencies, and sometimes even down into the upper portions of the HF band. Matching of antenna-system impedances is important for optimum performance in these low received-noise situations.

❖ Matching Impedances for Transmitting-Antenna Systems

Matching of impedances is usually important when an antenna is used for transmitting. Poor performance in transmitting can result from a mismatch between antenna and feed line, or feed line and transmitter output. Standing wave ratio (SWR) is often used as an indicator of the degree of mismatch in antenna systems. However, other factors must be considered here, and even a high SWR value is acceptable in some situations. We will be discussing SWR further in an upcoming column. Again the *ARRL Antenna Book* is a good source of matching circuits and information on matching.

❖ Prevention

When constructing or installing an antenna, consider the effects of the environment in which it will exist. Seal any exposed connections to feed lines, baluns, or other places rain, snow or dust can enter. Coax sealant is good for this. The catalog number for Radio Shack® coax sealant is 278-1645. Black plastic tape, liberally used, usually works, at least for a few months, if you don't have sealant.

Wood parts should be varnished or painted. In areas where salt spray occurs, even metal parts should be protected with varnish or paint. Take care paint doesn't seep into bolted connections and raise their resistance. Stainless-steel bolts, nuts, and washers are much more durable than other kinds. Solder electrical connections for maximum durability if possible. Propane soldering irons are available for outdoor work with antennas.

RADIO RIDDLES

Last Month:

I asked: "What is the meaning of the term "quad" in "cubical quad"? For that matter, what is the meaning of the term "cubical?"

Well, "quad" is short for "quadrilateral" which is a four-sided figure. And the each element of the cubical quad is in the shape of a square: a quadrilateral. The two elements of the antenna, with their square shape, form the outline of a cube. Thus the name "cubical quad" nicely describes the appearance given by the elements of the antenna we discussed last month.

This Month:

Ordinarily, the strength of signals which we receive is at the microvolt (a millionth of a volt) or millivolt (a thousandth of a volt) level. On the other hand, there are situations which sometimes occur in which there are no signals on the band to be received, and yet there may be an input of many volts from the antenna to the receiver. What situations can cause this?

You'll find an answer for this month's riddle, another riddle, another antenna-related web site or so, but no antenna jokes unless you send me some, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Marc Ellis
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The Hallicrafters S-40A: Cosmetic Problems

This has been a rather frustrating work session. It happens sometimes, but my attitude has always been to report all the problems as well as all the successes that accompany the projects I do in this column. A couple of the current difficulties have been nicely resolved, but one of the goofs involved the cosmetics of the front panel and will not be reversible. Because of that, I was almost tempted to shut down the project, apologize, and go on to something else. But on reflection I felt it would be better not to leave the work hanging. The restoration should be just as interesting to folks even with the front panel blemish, and there will be an excellent opportunity to learn from my mistakes.

◆ Refinishing the Chassis

At the end of last month's work session on our S-40A restoration, the receiver had been partially disassembled to free the front panel for freshening up and clear the chassis for refinishing. Although there is a great deal of electronics work to be done under the chassis, I decided to devote this month's session to some of the cosmetic issues. I began by wiping down the upper surface of the chassis carefully with mineral spirits. That removed the surface grime, but the surface was still covered with spots where oxidation had eaten into the anodized finish.

Of course if this were to be a "grand prix" restoration, I would have to strip the chassis clean of all parts and wiring so I could send it out to be sandblasted and re-electroplated. Normally I don't do that extensive of an intervention – especially on a set that would be worth maybe a hundred bucks or so even in mint condition. My philosophy is to do what I can to reverse the effects of time and neglect on the appearance of a radio without going nuts with it. I do insist on a perfect and complete electronic restoration and realignment, however.

Accordingly, I decided to give the chassis (top only) a coat of aluminum paint to match the original plating as closely as possible. Regular readers will recall that I once painted the chassis top of a National SW-54. That radio chassis had a copper finish, and I achieved really satisfactory results using a justifiably expensive paint by Modern Masters.

Aluminum paint being a little easier to find than copper paint, this time I just used an Ace Hardware product basically intended for doing over cast iron radiators and steam pipes. After two coats, I saw I had the wrong product. The aluminum color was uneven, the paint went on splotchy even with careful brushing, and the brush marks showed big time.

I realized that I needed the Modern Masters stuff – so I went out and found some in an aluminum color (actually called ME150 Silver [Opaque]). Eleven bucks for a six-ounce bottle! Before applying it I thought I should give the chassis top a light steel wooling just to knock down some of the irregularities of my previous paint job. Much to my surprise, I found that the surface was still sticky, even though it was now the next morning. In fact, I found that I could easily wipe the old paint off by applying just a little elbow grease with a rag soaked in paint thinner.

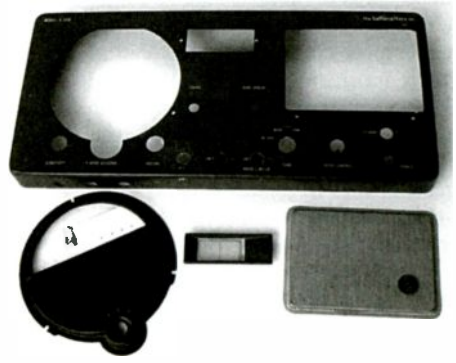
After carefully drying the surface (the Modern Masters product is water-based and wouldn't like the mineral spirits), I began to brush on the replacement paint. It was a pleasure to use – covering nicely in one coat and drying quickly with much of the brush-marking smoothed out. It probably would have dried even more smoothly if I had used a brush with softer, finer bristles – which I'll definitely acquire next time I paint a chassis.

Incidentally, I have found that it is faster not to bother with masking such chassis features as tube sockets and i.f. cans. The metallic paint flows on so nicely and in such a controllable manner that it is really easy to put where you want it. The extra time you have to take to be careful is less than the time needed to mask.

◆ Dial Window Difficulty

I next turned my attention to the S-40's front panel, removing the speaker and its grille as well as the bandspread and main tuning dial window plates. Now I was ready to see what I could do to freshen up the panel using an automotive polishing compound/scratch remover. I worked carefully and gingerly at first for fear the product might attack the painted finish or the silk-screened control labels. It didn't, so I went ahead with a little more authority and my blackened polishing rags attested to the amount of grime an oxidized paint that I had removed. I was pleased to see how much brighter the panel now looked.

With my sense of caution dulled by success with the panel, I proceeded to clean the plastic window in the main tuning dial plate.



The S-40 front panel as further disassembled for cleaning and restoration.

This window was marked with the numbers one through four to indicate the scales selected by the similarly-numbered positions on the bandswitch. I was using a soft cloth dampened only with water, but the little white numbers began to wipe off under my horrified eyes!

Realizing that the numbers could be easily restored with dry-transfer type, I paid another visit to the hobby shop. There I found a sheet of characters including some just about the right size. Luckily, enough remained of the original numbers so I could determine their size, spacing and position on the window. Using my computer, I printed out a properly-sized and spaced strip of numbers. This, I scotch-taped to the backside of the dial window in the proper position using the remains of the old numbers (which had been applied

A computer-generated number strip was created as a template for replacing wiped-off numbers on the dial window (see text) with properly-sized dry-transfer numbers selected from a hobby-shop sheet (corner seen at left).

to the front of the window) as a guide.

Now I could thoroughly clean the glass (removing the remains of the old numbers) and dry-transfer new numbers into the positions indicated by my template strip. The new numbers are not only quite convincing but crisper and brighter than the originals.

❖ Panel Paint Disaster

I believe I mentioned last time that the paint had been scratched down to bare metal around one of the toggle switches (the AVC control). That's what happens when one tries to remove a switch mounting nut with a pair of pliers instead of a proper wrench, and it's a look I hate. My plan was to touch up the scars very carefully with a fine brush and some closely matching paint.

Close-up of cleaned-up panel shows my unfortunately-necessary patch on the paint surrounding the AVC switch location. Silk-screened "noise limiter" label was already damaged.

Have you ever shopped for model paint at a well-stocked hobby shop? In the one I went to, the racks of multicolored bottles seemed to go on for miles; there was very little information about the function and gloss characteristics of the various types; the color chips were tiny and a little grimy. The labels on the bottles were also tiny and virtually indecipherable even with my reading glasses. At any rate, I had brought along the little bandspread window plate for a color match and turned over about a million little bottles to look at the color through their clear bottoms. Finally, using a little voodoo and some intuition I settled upon ModelMaster #2712 Graphite Metallic (made by Testor).

After applying the paint, I found that I had made a good color choice, but the surface had a high gloss that was very conspicuous against the satin finish of the panel. After it dried, I decided to see if I could kill the gloss with more of the automotive polishing compound. The process involves buffing with a clean dry rag after an initial polishing. Though my rag looked clean and dry, it apparently had a residue of mineral spirits left over from my chassis paint removal project of the day before.

Gentle readers, I have to inform you that the paint Hallicrafters put on the panel of the S-40 seems to be soluble in mineral spirits! Before I realized what was happening, my buffing had partially denuded an area about the size of a quarter in the vicinity of the switch opening I had been trying to touch up. That's the point where I had been thinking of throwing in the towel and quitting the project.

But once I decided to push on, I applied a patch of the Testor paint to the area and, to save time, dried it with a heat gun. But before the patch was bone dry, I killed the gloss by rubbing, v-e-e-e-r-y carefully, with 00 steel wool and followed up with more polishing compound (this time using FRESH rags).

Looking at the panel straight on, you almost don't notice the patch. But in a glancing light, you can see its somewhat greater gloss. Also, the "off" marking for the AVC switch is forever obscured, though most of "on" is still there. Live and learn!

❖ Reader Refinishing Tip

It's very difficult to refinish a wood radio cabinet in the manner done by the original manufacturer. The materials used sixty years ago don't necessarily exist now, and the shortcuts used then to facilitate mass production would be difficult for individual restorers to duplicate. If the original finish is photographic, as was the case with the Zenith table model previously restored in this column, it would be virtually *impossible* to recreate.

One should try to preserve the old finish on wood radio cabinets wherever possible – resorting to spot-staining and other local fixes to improve the appearance. If the original finish is so far gone that the only alternative is to strip it off and start again, the restorer must try to use modern methods to mimic the radio's original appearance – *if* he knows what the radio should look like. If not, he would do well to apply a finish that would make the radio look presentable and displayable, but which could be easily removed later, by him or a later owner, if more accurate information about the set's appearance becomes available.

Such a method, a simplification of the ancient "French polishing" technique, is used by reader Gordon Bell (WA2YQY@compuserve.com). I've had Gordon's e-mails on ice for some time some time waiting for a good opportunity. Quoting from them:

. . . I've tried many wood finishes over the years, but the one I learned in high school in 1952 wins every time: alternate applications of orange shellac and Butcher's finishing wax, rubbed until warm and dry. The shop teacher called it "French polish." I've never seen it described in print.

I fooled with varnishes, but fell back on this method because it's easy to apply, relatively permanent, and easy to strip and maintain. I use orange shellac, wax, then shellac, then wax, etc. for 5-7 total coats, as thin as possible, always ending with wax.

There's enough alcohol in the shellac to blend with the wax.

The trick is to use enough friction to dry each successive coat.

I'm including Gordon's photo of his Zenith 7S529, which sports a French-polished cabinet. He points out that it does not have the original black striping and the knobs are refinished with model paint. Nevertheless it is a beautiful example of this cabinet restoration method. And, being a shellac-based finish, it can be readily removed, if desired, using an alcohol as a solvent.

Gordon Bell's "French polishing" technique allowed him to get this nice Zenith 6S529 into displayable condition with a minimum of effort.

I've spent a little time on the internet researching French polishing and found that it can be quick and easy as practiced by Gordon or incredibly lengthy and detailed as handed down by the old-time furniture finishers. For a taste of the latter method, you might enjoy a visit to "Dave's Galoot Lutherie" at **http://home.pacifier.com/~davewe/Index.html**. Click on "French Polishing."

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Software for the ICOM IC-R10 and IC-R5 Receivers

This column introduces tk10 and tk5 cloning software for ICOM's IC-R10 (March 1997 *MT*) and IC-R5 (July 2003 *MT*) portable receivers. Tk10 and tk5 are not commercial products and won't cost you a dime. Both programs are multiplatform and open source, terms which may be unfamiliar to you.

Multiplatform software can be executed on a variety of operating systems. Though most people who own computers run a Microsoft Windows operating system, a growing number of folks like me use and prefer Linux, BSD, MacOS X, Solaris and other alternatives.

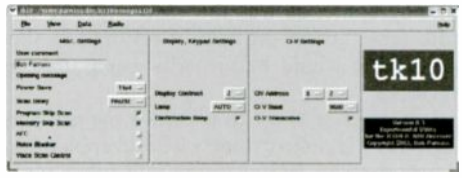
Open source software means that user can view the program instructions in the language in which it was written. I wrote tk10 and tk5 in the Tcl/Tk scripting language.

You can change open source software to suit your own needs. In contrast, almost all commercial software and most freeware and shareware programs are closed source. A user cannot fix a defect or make improvements. Closed source has been compared to buying a car with the hood locked shut and the manufacturer possesses the only key.

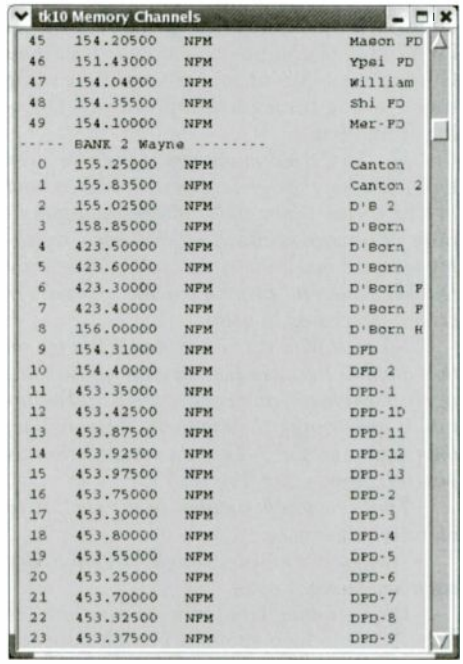
My earlier columns have described open source, multiplatform software for other radios, including the ICOM IC-R8500, IC-R2, IC-R3, IC-Q7A, Japan Radio NRD-545, Radio Shack PRO-92, PRO-2067, Yaesu VR-120, VR-500, and Standard VR-150. You may download these programs freely from **http://parnass.com**, but I don't warrant the software.

❖ Tk10 Software

Tk10's main window affords access to the radio's scanning, display, keypad, power saver, and other settings.



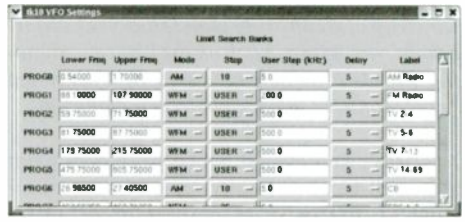
Users have the choice of viewing memory channels in a tabbed notebook style or a simple scrolled list.



The tabbed notebook applet requires more computer memory and a faster CPU, but it is powerful and permits one to change memory channel settings. It displays the memory channel controls bank by bank. Channels can be deleted, new channels can be inserted, and adjacent channels can be swapped.

Memory channel information may be exported to a csv (comma-separated values) file and changed using a separate text editor or spreadsheet program. The updated csv file can then be imported back into tk10.

The VFO Settings window controls the limit search settings, e.g., frequency, mode, step, label, delay, etc.



Tk10 Acknowledgments

Joost van Stuyvenberg compiled an IC-R10 memory map detailing the internal structure of information within the radio.

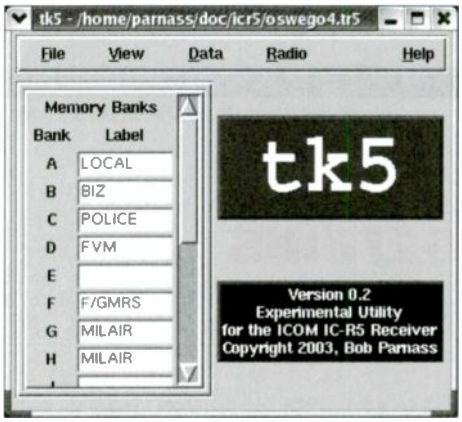
Bruce A. Pope published detailed information about the IC-R10 protocol and file layout in his paper entitled "Everything You Always Wanted to Know About the IC-R10 that Isn't in the Manual," available from the Files section of the Yahoo Icom_R-10 discussion group, **http://groups.yahoo.com/group/Icom_R-10**. Additional IC-R10 information may be viewed at the ScanShack web site, **http://www.scanshack.com/r10**.

Developing software for a radio is made more difficult if you don't have the radio in hand. Thanks are due to Mike Failing, K9MIK, who lent me an IC-R10 for software testing.

❖ Tk5 Software

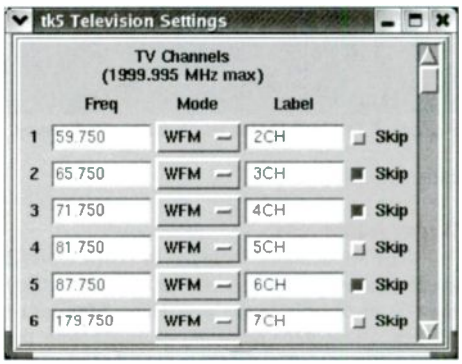
Tk5 provides the ability to change the IC-R5's memory, search, and TV channel settings. Currently, the early version of tk5 is simpler than its tk10 cousin, though additional features may be available by the time you read this column.

Unlike tk10, the early version tk5 lacks display, scanning, power saver and other controls. It does not permit editing memory channel settings directly within the program. They must be exported to a csv (comma-separated



values) file for editing by a separate text editor or spreadsheet program, then imported back into tk5.

The IC-R5 has a hidden bank of 70 television channels. Enabling the TV bank requires the use of software or direct cloning by a TV-enabled IC-R5. Tk5 supports the TV channel bank feature and lets you program frequencies, mode, and skip settings for each of the 70 channels. You can program other frequencies, e.g., CB radio or air band, into the TV channels, but the radio supports only WFM or AM modes in these slots.



Internally, the IC-R5 represents frequencies and labels differently than the earlier ICOM radios. Therefore, I was unable to reuse these parts of my earlier software in constructing a cloning program for the IC-R5.

Each frequency in the IC-R5 is represented as two numbers. One number can be 0, 1, 2, or 3, which corresponds to a frequency increment of 5, 6.25, 8.33, and 9 kHz. The other number is a multiplier. When the frequency increment (e.g., 6.25 kHz) is multiplied by the multiplier (e.g., 73684), the result is the operating frequency in kHz (e.g., 460525).

The use of a pair of numbers is only one reason why IC-R5 cloning software is more difficult to design. Another reason is that the pair of numbers is packed into bit fields which the software must be capable of extracting.

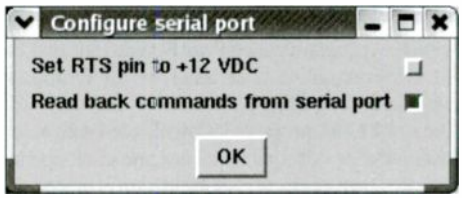
The IC-R5 represents Memory channel labels differently than the IC-R3 and IC-R10. The older models simply stored one ASCII character per 8-bit byte. The IC-R5, however, represents each character as a special 6-bit value. A 6 character long label is represented using a 36-bit long string, spread across 5 bytes.

Tk5 Acknowledgments

David Owen, G1OXB, provided information about the IC-R5's protocol and file layout. Lee M. helped test tk5 using a Japanese version IC-R5. Thanks to Grove Enterprises for the loan of a USA version IC-R5 for software testing.

Radio/Computer Connection

Before using tk10 or tk5, you must connect your radio to your computer's serial port using a suitable TTL-to-RS-232 level converter. The voltages present at a computer's serial port are different from those at the radio's cloning jack. Therefore, a simple, direct connect cable won't work and could damage the radio or computer.



There are several different PC cloning cables from which to choose and tk5 and tk10 let you alter two serial port settings to function with various cables. Experimentation is required to find the correct settings for your cable.

You can buy a CT29A cable from RT Systems, P.O. Box 12188, Huntsville, AL 35815, telephone 1-800-750-9689 or visit their web page at **http://www.rtsars.com**. The CT29A is my favorite because it works with ICOM's IC-R2, IC-R3, IC-R5, IC-R10, Yaesu's VR-500, VR-120, VR-150, and other radios. It will work with the ICOM IC-Q7A and various other walkie-talkies when fitted with a CT-28A 4-conductor adapter.

Tk5 and tk10 have been tested with the Purple Computing PCL35S cable, available directly from the manufacturer at **http://pfranc.com/pclink/ScannerDeal.shtml** or from other dealers.

Software users have reported success with the ICOM OPC-478 cable, too.

Before using any software with a portable receiver, make sure your radio's batteries are sufficiently charged. Low battery voltage interferes with the cloning process. I prefer to use ordinary alkaline cells, which have a higher voltage than NiCd cells.

Satellites continued from page 23

sages to other vehicles and to Tactical Operations Centers (TOC) that control logistics assignments. MTS also uses PLGRs for GPS information and automatically transmits location and status information to a central computer at regular intervals.

MTS was used routinely in Iraq to coordinate deliveries and keep supply convoys on time and on the right track. On more than one occasion the MTS messaging capability was used to redirect trucks around hostile forces, keeping drivers and supplies away from ambush.

Information Superiority

In the 1991 Gulf War the prevailing doctrine was "overwhelming force." Large numbers of soldiers moved across the battlefield in a wedge formation, engaging everything in their path. The wedge could only move as quickly as the slowest element, and any contact with the enemy resulted in everyone being slowed down or stopped.

Real-time communication systems like FBCB2 and MTS have changed all that.

In Operation Iraqi Freedom the military is using rapid information dissemination in place of soldiers. In the early days of the war, smaller, fast-moving groups crossed the desert quickly. If any group encountered resistance or needed support they would send a C2 message requesting assistance. Nearby ground troops and available air assets would come to their aid and resolve the situation on an as-needed basis. This allowed a smaller fighting force to achieve the same objectives that would have required a large contingent without such communication links.

As planning for future conflict evolves, satellite-based communication will remain a critical piece of U.S. military capability. Information superiority on the battlefield will allow conflicts to be resolved more quickly and soldiers to return home safely.

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1 Another report on media use of satellites in Operation Iraqi Freedom appeared in the May 2003 issue of *MT*.

2. For more information on monitoring Inmarsat see the November 1998 issue of *Monitoring Times*, with the caveat that Swagur Enterprises is no longer in business.

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A Potpourri of Useful Programs

onnect PC's serial port to receiver serial port via level converter and null modem adapter making sure that the audio cable is terminated in a stereo jack on the computer side and a mono jack on the radio side connect ..."

Enough already!

After trying out complex radio programs that have a mind numbing number of wiring permutations, sound card setup options, and radio operating modes, this time I thought we should take a break and look at some very useful, but simple-to-use programs.

◆ Simple Is Good

How many times would you have liked to print out a Window's screen exactly as it was displayed on your monitor? **Print Screen Plus** does that and much more with just a touch of a key. And for those of you who don't like math but need to make electronic calculations such as antenna dimensions, the latest version of an old favoriet, **HamCalc**, might just be what you're looking for. Finally, we'll revisit the free spyware program, **Ad-Aware 5.62**, and see how the latest version, 6, works. As promised, no cables in sight, so let's go.

◆ Reviving the "Print Screen" Key

Take a good look at your PC keyboard and you will probably find a key that reads "Print Screen." This key is a vestige from the days when DOS (Disk Operating System) ruled the earth and PCs. But the Print Screen key has not worked since the dawn of Windows.

Under DOS, the key was very useful and allowed the user to send what was on the monitor to a printer or save it as a file. You can imagine that report writers used the key quite a bit, including this writer. Under the Windows operating system it all ended.

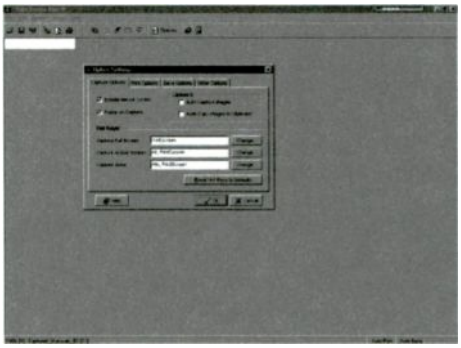

Figure 1 Print Screen Plus Main Screen

The solution is just a click away. Just like the line from the movie *Terminator* says the power is back. A program called Print Screen Plus makes the key come alive once more for all Windows users including 95, 98, ME, 2000, XP and NT. The small 828K program is downloaded with ease. Installation is very quick and is a one-click operation. For convenience, a shortcut icon is placed on the desktop. Once the program is started it opens an icon on the start tray at the lower right of the desktop screen.

Figure 1 shows the Print Screen Plus version 8.1.0 Option screen where you can set the keys for full screen, active window or a user specified capture area. It's that simple and easy to use. You can print or store the image as a PDF file, or in an image file format such as jpg.

Want More?

If the user wants more control it's theirs with just a few more clicks. This includes selection of saved image format and location, addition of time and date to image, image size, and many other parameters. As their website proclaims, "Save, Crop an image, Encrypt, Zoom and Email the Image with Print Screen Plus."

But for those of us that just want to use the Print Screen key again, we can ignore all the extras. Print Screen Plus also includes a simple image viewer and more features for a special price of $19.95 at the time of writing (May 20th); the regular price is $29.95. You can find out more and download a free 15-day evaluation version at their website **http://www.printscreenplus.com.**

◆ Computation Made Easy

HamCalc has been around since my first days on an IBM XT. The first version operated exclusively in DOS. The current version 62 (note, that's 62 version, no decimals) operates under Windows but still uses a DOS environment running GWBasic.

The program is menu driven and allows the user to solve about 248 different electronic computations without using any math. See Figure 2. Most of the applications use an interactive format that asks the user to input their specific conditions such as antenna frequency, wire size and such.

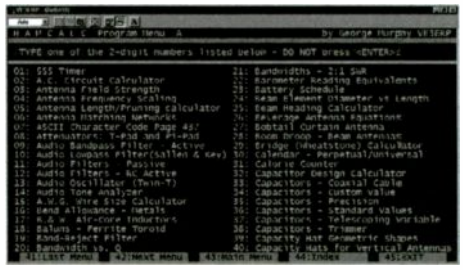

Figure 2 One of Seven HamCalc V62 Applications Screens – 248 Total Apps

When it has all the required input, the applications provide the answer. In many cases the answers are given both numerically and graphically. See Figure 3.

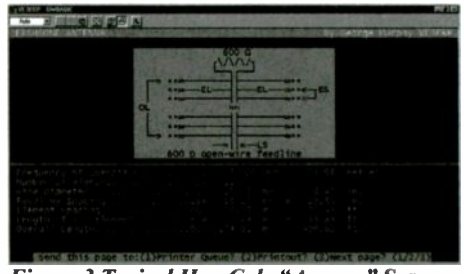

Figure 3 Typical HamCalc "Answer" Screen

Target Audiences

The applications included in HamCalc v62 are limited and basic in concept. However, they may be invaluable to the new Ham, Monitor or SWLer. A few of the applications might pique the interest of even well seasoned "soldering iron folk."

HamCalc is a 2.5 Meg file (actually in three parts) that works on just about any PC using a Microsoft operating system. It can be obtained from the author, George Murphy, VE3ERP, at his email *ve3erp@encode.com*. The program is freeware with any donations going to the Canadian National Institute for the Blind.

◆ Ad-aware Revisited

A while back we looked at an application that hunted out programs which may be lurking on our computers and sending our data out without our knowledge. These spy programs are NOT removed, or even detected by virus software, since technically they are not viruses. But a program by Lavasoft, Ad-aware version 5, was quite good at finding and silencing these unwanted demons.

However, since spyware programmers are always developing new and better methods, so must the defender of our privacy, and Lavasoft has keep pace. I ran version 5.62 one last time before the new version and was told my system was clean of any Spyware type programs. But was it really?

Enter Version 6.0

This version is twice the size of the last ver-

sion, coming in at 1.5Meg. Just to be sure, I used the Windows Control Panel to remove the old version before I installed 6.0. The installation went without problems. Take a look at Figure 4, an important command screen. Using the commands listed on the left side of the screen, I immediately performed a "Deep Scan" of my system that took 13 minutes and looked at 52827 files!

You can also see in Figure 4 that 65 (yes Sixty-five) "Dataminer" programs were found by Ad-aware version 6! Remember that I had just run version 5 that told me I had no problems. These Dataminers have been collecting information about my system and then sending it *without* my knowledge. Here is real proof that virus and spyware software requires constant updating to

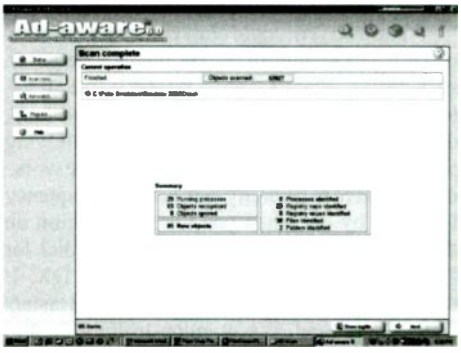

Figure 4 Ad-aware 6 Scans 52,000 Files and Finds 65 Bad Guys

be useful.

I used the Log Save feature so I could have a record of the "bad guys" and try to figure out from which download I picked them up. Some were identified as cookies (Internet trace files) and others as embedded files. Most of these entries seemed to be associated with the same name site, or the initials of the name. I'll leave out the specifics for now until I can do more research on these "gentlemen."

Now What!?

Just clicking the "Next" button at the bottom of the screen leads the user to the Quarantine and Remove screen. With a single click all the offenders are banished and the computer is secure once more.

I must say that as I clicked the Remove key I thought, " Will I now have a problem accessing some of my favorite sites?" I'm only a few hours into it, but I can report that so far, so good. However, it's good to know that Ad-aware 6.0 does have a Restore feature that allows removed files to be restored to full functionality.

Ad-Aware 6.0 can be downloaded for free from many sites. I suggest you go to the Lavasoft's website at **http://www.lavasoftusa.com/software/adaware/** for the latest list of download sites.

❖ Till Next Time

Well, that just about does it for this month. I hope you found these programs as useful as I have. (Holy cow, 65?!) Now that we have cleaned up our system and added some useful functions, next time we'll go back to the cables and radios. I'm working on some new and very slick receiver/scanner control program suites. Now where does this cable go .... ?

Outer Limits continued from page 69

their capture near MT headquarters, the parodies of Steve's ultra-right wing clandestine broadcaster continue. (Merlin)

Voice of Captain Ron Shortwave- Rock music is the normal fare on Captain Ron's station, but he will also show up in cameo appearances on other pirates. (Uses captainron6955@hotmail.com e-mail)

VUDU Radio- This rock music pirate claims to broadcast from Nevada, but its real location is of course unknown. (Uses *vudu11@hotmail.com* e-mail)

WHYP- The James Brownyard memorial station remains one of the most active pirates on the air. Their by now well known format consists of antique audio clips from the licensed radio station WHYP in North East, PA, mixed with comedy, rock music, and pirate radio commentary. (Providence and *whyp6925@yahoo.com* e-mail)

WMFQ- Still one of the most identifiable pirates on the air today, they play rock music while making an announcement of "Where's My *#%&#ing QSL" during all identifications. (Providence)

WMPR- The "dance party" techno rock programs from "Micropower Radio" are still frequent occupants of the pirate bands. (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, identified above in parentheses: PO Box 1, Belfast, NY 14711; and PO Box 28413 Providence, RI 02908.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for sending pirate loggings with a hope that pirates might QSL them remain The ACE ($2 US for sample copies via the Belfast address above) and the e-mailed Free Radio Weekly newsletter, still free to contributors via *niel@ican.net*. The Free Radio Network web site, another outstanding source of content about pirate radio, is found at **http://www.frn.net** on the internet.

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Dave Balint, Wooster, OH; Artie Bigley, Columbus, OH; John Calabro; Ross Comeau, Andover, MA; David Crawford, Titusville, FL; Rich D'Angelo, Wyomissing, PA; Brian Duddy, Nyack, NY; Harold Frodge, Midland, MI; William Hassig, Mount Prospect, IL; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; Alan Maxwell, Elkhorn, NE; Bill McClintock, Wellington, OH; Mike Prindle, New Suffolk, NY; Lee Reynolds, Lempster, NH; Martin Schoech, Merseburg, Germany; John Sedlacek, Omaha, NE; Lee Silvi, Mentor, OH; Ronnie Stroup, Wooster, OH; John Taddeo, Parma, OH; John Tomlinson, Blackwell, TX; Steve Waldee, San Jose, CA; Edward G. Walsh, Birmingham, AL; Richard Weil; Niel Wolfish, Toronto, Ontario, and Joe Wood, Gray, TN.

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.

MT REVIEW

The Grundig Classic 960: Instant Antique Radio

By Ken Reitz KS4ZR

Personally, I blame *Antiques Roadshow*, the popular PBS weekly TV program which has made collecting a national passion and has increased public awareness about commonplace items of days gone by. Over the past several years some radio related companies have tried to cash in on the nostalgia craze by rolling out what look like a series of old time radios. The Radio Shack catalog has one page of these surprisingly pricey items. Of course, to anyone who has actually seen an antique radio, most are shameless cons.

Among the exceptions is Grundig's Classic 960. In the late '90s Grundig, the venerable radio manufacturer from Germany, wanted to celebrate its 50th anniversary by releasing a replica radio representative of the era when, at least in Europe, shortwave was king and post war consumers were looking for quality and innovation.

Grundig's Early Success

Starting out in post war Germany, 1945, Max Grundig made a good living producing tube and circuit testers. But, since the occupying Allied forces had rules about Germans producing complete radios, he was barred from doing so until 1948 when he introduced the Weltklang, a four tube radio with wood cabinet and front mounted speaker. The radios were extremely popular. By 1950 Grundig had a thousand people working for him in a new factory and already had two new hit radios on the European market: the 186 B/GW and the Grundig Boy.

His next radio, the Grundig 380W, was a superhetrodyne receiver which tuned the AM and FM bands. It, too, featured a front mounted speaker and for the first time band switching was done with pushbuttons. By 1954 the 5050W/3D was brought out which introduced Europeans to the world of high fidelity radio broadcasting. There was no stereo yet, so the "3D" sound was achieved using five speakers, including two which were side mounted. This masterpiece cost twice as much as the 380 (695 marks) and tuned in VHF-FM, AM, LW and shortwave bands.

The Grundig Classic 960 is old only in appearance. Inside a solid state superhet receiver tunes two popular shortwave bands, AM, FM Stereo and can play CD's through a rear mounted jack. (Courtesy: Grundig Corp.)

The ensuing years brought prosperity and a growing reputation for product reliability and high fidelity sound to the company . Even today Grundig continues to enjoy that reputation for quality and innovation with the current models on offer. Their Yacht Boy series are legendary and they've recently scored another huge hit with their hand-crank powered FR-200 shortwave radio.

A Hit and Miss Celebration

With such a storied history as Grundig's who could fault them for wanting to celebrate their 50th anniversary in style? To do so they crafted a replica radio of extraordinary detail. The Classic 960 features a heavy wooden cabinet with a beautiful finish, trimmed in hand-painted gold. The grill cloth is a special weave which duplicates the cloth used on their models of half a century ago. The knobs are heavy plastic with brass trim rings typical of the period. Even the logos studded onto the grill are brass.

The front panel features the innovative pushbutton band switching, and the "3D" sound is replicated with a 4-inch front mounted speaker and two 3-inch side-mounted speakers. The Classic 960 tunes AM, FM stereo and shortwave from 4.5 MHz to 22.0 MHz in two bands.

The rear, complete with genuine Masonite back panel with drilled air holes, features the AC power cord (which doubles as an FM antenna), mini external FM/SW antenna jack (the 960 comes with the 20-ft. Grundig AN-03 roll-up antenna for shortwave) additional external terminals for antenna and ground, and auxiliary stereo RCA-type inputs for a CD player – a nice modern touch.

The tuner features a heavy steel flywheel for smooth, old-fashioned analog tuning, separate tone controls for treble and bass, and the tuning indicator has a bright LED which gives off an authentic looking yellow glow. In fact, if you look through the holes in the Masonite on the back while the radio is on, you'll have to do a double take. You'll see what appears to be tube filaments glowing inside. The tuner is, of course, solid state.

I first ran into the Classic 960 a year and a half ago and was disappointed with several aspects of the actual tuner part of the radio. There was a noticeable hum in the audio and the tuner had little to recommend it. Last fall, while working on a review of the FR-200, I decided to take another look at the Classic 960 which, a Grundig technician told me, had been revamped in March '02.

The 960 is a single conversion superhet receiver and exhibits all the problems inherent in such radios. There's a good reason we're all listening to triple conversion, phase locked loop, digitally tuned receivers! The most annoying problem is that the tuning scale is not quite working. You have to be pretty familiar with frequency locations by ear when you tune in a station on this radio. Don't look to the slide-rule dial for help. It's also not a serious radio for DX. It tunes in the standard international broadcasters well enough and, if you enjoy trolling up and down the two shortwave bands just to hear what you can hear, you'll be happy with this radio.

While there may be little anyone can to do with the tuning problems, they did improve the audio. The hum was gone and, I believe, the tone fairly represents the audio found in the old table-top shortwave sets. There was plenty of audio in the amplifier and the speakers did a good job filling the room with listenable fidelity.

Tuning Down Memory Lane

The Grundig Classic 960 has a mellow sound on the shortwave bands with notable fidelity typically missing in today's little shortwave portables with their tinny little speakers. It's a good thing Grundig includes the roll-up antenna because tuning the shortwave bands, especially during the day, is not possible without it. Even so, I found that hooking up the Grove Tunerless All-Band antenna (a homebrew design discussed frequently in the *Beginner's Corner*) improved reception so well that tuning the bands was actually enjoyable. All the big International Broadcasters came booming in with

Look Grandma, no tubes! Inside the Classic 960 shows front mounted speaker as well as two side mounted speakers driven by a solid state amp. Note heavy fly-wheel for old time speedy dial tuning. (Courtesy: Author)

Rear panel features genuine Masonite back complete with unnecessary air-holes. Antenna terminals (left) allow serious antenna connection while antenna jack (right) is for the AN-03 roll-up antenna which is included with the radio. RCA stereo input jacks allow hook-up for CD, cassette or other accessory. (Courtesy: Author)

a fidelity I've not heard on my Kenwood general coverage ham transceiver. It was a treat to tune in the AM ham operators on 40 meters who all sounded great. Incidently, the tuning dial is properly labeled in KC and MC.

FM tuning outside the suburbs will require an external antenna as well. While there is no terminal for a 75 ohm coax connection, the manual shows how to hook up a 75 ohm cable by stripping the coax and attaching the center conductor to the antenna terminal and the shield to the ground. I like testing FM tuners down in the Public Broadcasting portion of the band because this is where weak stations mix in with strong stations and the programming is unpredictable. Separation was actually better than on my Kenwood stereo receiver. And while the 960 is no Kloss or Bose the audio was acceptable and the stereo separation at least noticeable. I would like to have had a stereo indicator light or other tuning aid.

I found the built-in AM ferrite antenna inadequate for nighttime AM DX listening, but it was greatly enhanced with the Radio Shack tunable AM loop antenna. I have to say that I enjoyed tuning the AM band the most. Knowing the band so well, it didn't matter that the tuning calibration was off. With the loop, for instance, I could tune every frequency from 650 (WSM, Nashville) to 810 (WGY Schenectedy) which included Chicago (three stations), Raleigh, Quebec, Cincinnati, Toronto, Atlanta, Detroit, NY (three stations), and Ontario. The audio was great and there was plenty of bandspread in between stations.

The most fun was tuning CHWO, 740 Toronto, when they were playing vintage Big Band tunes. I had to crank up the volume and, while the music played, the Classic 960 transported me to the early '50s and what it might have been like. If band conditions had been better I might have been able to snag some real DX.

❖ Pricing Issues

When the Classic 960 was first introduced it was outrageously priced and I imagine the combination of price and poor reviews has led to the apparently abundant supply of these radios which have now surfaced in the discount catalogs at a reasonable price. The improved version of this radio typically sells for $169 in various catalogs and on-line. Universal Radio has it in their catalog for $149.95. I've also found factory refurbished units at Heartland America for $99.

Of all the radios I have in the house this is the one that consistently gets the most comments, even from people who are not radio enthusiasts. "Oh, that's a great old radio," they'll say, "does it work?" When I turn it on and they start tuning around they usually say, "Oo, look it's got shortwave bands!" I wouldn't be surprised to see these radios turning up at Antiques Roadshow.

Specifications:

Amp. power: 7.3 watts 10 % harmonic distortion
Speakers: 1 4" 8 Ohm 5W and 2 3" 4 Ohm 5W
Tuning ranges: FM 88-108 MHz
AM 530-1710 kHz
SW 4.5-22 MHz in two bands
Antenna: Built-in ferrite bar antenna (AM)
Two external antennas (FM/SW)
Antenna switch (rear)
Dimensions: 15.25"L x 11.25" H x 6.5" D
Actual out-of-box weight: 12.5 pounds
It may be German-engineered, but this product is made in China for American-owned company E-Ton.

Sources:

Universal Radio 6830 Americana Pkwy. Reynoldsburg, OH 800-431-3939 http://www.universal-radio.com
Heartland America 8085 Century Bvd. Chaska, MN 55318 800-229-2901 http://www.heartlandamerica.com

The Great RX-320/G303i Face-off

By Lee Reynolds

Every so often fate drops interesting things into your lap, so I was pleasantly intrigued when I was asked to perform a comparison of the Ten-Tec RX-320 and the WiNRADiO G303i computer-based/computer-using radios for the *MT* readership. I've been playing with radio for the last 37 years or so; I built my first computer back in 1981 and I've been fooling with them both since then, so I figured that this was going to be an interesting task.

This comparison is *not* intended to be one of those number-filled pieces. I read those, I enjoy them and then I go lie down and wait for the headache to go away. Sometimes those numeric comparisons are so close and finicky that only bats and bloodhounds can tell the difference in the real world. If you do want to dig further into the details of each radio, I'd respectfully refer you to -

- The March 1999 edition of *QST* and the Radio Netherlands International web site for information on the RX-320.
- The February 2000 edition of *Short Wave Magazine* and the March 2003 edition of *Monitoring Times* for information on the G303i.
- The web site of each radio's manufacturer carries some informative tidbits.
- There's also a lot of information on the 'net and both an RX-320 and WiNRADiO Yahoo group.

In brief, the RX-320 is a small external black box that is controlled via your PC's serial port. It offers a wide range of IF DSP bandwidth filters and has a wide range of third party software available for it. You can feed its audio directly to an external speaker and/or to your PC's line input jack for further processing. After initial setup and tuning, you can even leave the radio running on a chosen frequency and turn the PC off – the PC is only used to control the receiver, nothing more.

The G303i is a full length PCI for factor card that fits inside a PC. It offers a large number of IF DSP bandwidth filters as well as a continuously variable filter bandwidth between 1Hz and 15kHz.The G303i and your computers' sound card acts as an additional IF and audio stage by performing demodulation and DSP operations on the receivers' hardware IF chain output. The G303i hardware is the first two thirds of a radio receiver; the G303i software plus your sound card is the remaining third. The computer has to be on at all times when using the G303i.

Some comments before we get started – the G303i was being used with the Professional Demodulator software, the RX-320 was being used with various third-party control software packages. This was because I wanted the radios to offer their best performance and the widest range of options. I'd also replaced the RX-320's RF transformer in the mixer stage with the new version that is being used in the RX-320D – this has the effect of greatly improving the LF performance of the RX-320. Both radios were fed from the same antenna via an HF multicoupler and I used a JRC NRD-525 as another signal listening/sanity checking source.

SPECIFICATIONS	G303i	RX-320
Frequency Range	9kHz-30MHz	100kHz-30MHz
Modes	AM, AMN, AMS, LSB, USB, DSB, ISB, CW, FM3 FM6, FMN**	AM, LSB, USB, CW
Tuning Resolution	1Hz	1Hz
Selectivity	1Hz-15kHz continuously variable, also user-selectable presets **	34 filters offering a 1.5:1 shape factor between 300Hz and 8kHz***
Sensitivity	0.25uv for 10dB S/N at 80% modulation (AM)**	0.64uv for 12dB S/N at 80% Modulation (AM)*
Image Rejection	>60dB	>60dB
IF Rejection	>60dB	>60dB
Third Order Intercept	+5dBm (@20kHz)	+10dBm
IF	45MHz, 12kHz	45MHz, 455kHz, 12kHz
DRM Capable? (With third party software)	Yes	Yes

*(*Additional RX-320 specifications indicate that the difference in sensitivity between it and the G303i may not be as great in modes other than AM.*
***Additional modes, variable bandwidth and improved sensitivity are functions only available with use of the professional demodulator package.*
**** To get at all the filter goodies in the RX-320 easily a third party software package is the best way to go.)*

According to the Specs

Okay, this is the only table with lots of figures that you'll be seeing in this comparison. It just shows some basic information on how well each receiver should perform. I've only quoted published specifications where they are held in common between the receivers and are therefore reasonably easy to compare.

Casting an eyeball over the table below, you can see that the G303i claims wider frequency coverage, more modes, continuously variable IF filtering and slightly better sensitivity. (Given the price differential I'd hope that this *would* be the case!) The specs on them both aren't bad, overall, and unless you're planning to try something like MW DXing from the middle of the Meadowlands in New Jersey (that place is RF alley – you can practically light up a fluorescent tube by merely holding it up in the air!) you shouldn't be seeing any problems with images or overload.

In case you're curious, no, the location of the G303i inside the computer *doesn't* seem to result in a noise problem. I don't know how WiNRADiO did it, I strongly suspect that they made a pact with Satan to achieve this result because I'll be danged if I know of anyone else that's done it this well for the consumer market!

Enough of the table; time for the Dog and Pony show – how well do they each do their job, how well do they compare against each other? That's what matters most!

Real World Operations

- Starting off at the low end of things I did some burrowing around in the 20-500kHz range and tried for some nondirectional beacon (NDB) station reception and other oddities. The G303i performed very nicely all the way across and was able to produce the naval transmissions down in the 21-24kHz range, LORAN-C signals in the 100kHz region and a slew of good beacon stuff in the 200-500kHz range.

The RX-320 is spec'ed down to 100kHz only, so I tested accordingly. First of all, it performs far, far better than it used to with the new (D-model) RF transformer in place. That's not to say that it's perfect, though. I couldn't

recover the LORAN-C signals down near 100kHz – that's very near to the bottom of its range and individual receivers are subject to variation – mine may just be a little under par there. Higher up, though, it performed very nicely and was usually the equal of the G303i on most signals.

The usual suspects were rounded up and beacons were heard from a number of states. Both receivers would make fine LW DXer radios if you coupled them with LF active antennas, the edge, I think, going to the G303i for having a wider coverage and slightly better gain.

- Going next to the band inhabited by far right lunatics, UFOs, and Gold Bond Medicated Foot Powder (yep, medium wave!), I put the receivers through their paces once again. Performance between the radios was pretty much equivalent in terms of sensitivity; if anything I found that the main differences here were those engendered by the features available, rather than by reception ability.

Bandscan graphs indicated roughly equal sensitivity and ability to find signals; both radios had filter sets that were more than adequate to the task of sorting out weak stations from the shadow of much stronger ones. The RX-320 can offer a passband-tuning-like feature (via some software) that proved to be useful; the G303i has a synchronous AM decoder that works nicely. Both acquitted themselves well.

- Next came a nice wander up and down the regular shortwave bands. Performance in the broadcast sections was good for both radios; there wasn't anything that couldn't be heard on the other. Rooting around in the maritime, utility and amateur bands turned up nothing surprising, either. Even chasing after the worst of the Spanish Fishermen signals was easy enough.
- Up in the stratosphere (well, over 25MHz, anyway) both receivers exhibited good sensitivity. Chasing after some 10-meter amateur beacons above 28MHz I noticed that the G303i would follow the signals down into the noise further than the RX-320, but that on slightly stronger signals the RX-320 had a little less noise and was more listenable. This may be an artifact of their respective DSP implementations, or it could just be my middle-aged ears playing tricks, or it may just be a logical result of the G303i's slightly better sensitivity. *(If anyone out there has any insights on this, I'd be interested in what you have to say!)*
- DRM – If you're a regular *MT* reader you'll have probably perused the recent spate of articles on this new HF digital broadcast mode, so I won't go into the specifics of it here, but seeing as both receivers actually *are* DRM-capable (I use both of them regularly to monitor DRM broadcasts), I felt I had to compare them. Instead of going for one of those rock crusher DRM signals that'll give you great audio with no dropouts, I chose to try to copy one of the rattier, more distant DRM signals. I turned on the logging ability in the DRM decoder software and left it running for a half hour on both radios simultaneously. Inspecting the logs afterwards revealed that both radios performed very similarly, providing SNRs (signal to noise ratios) within a dB or so of each other. The G303i had an edge of about 1dB now and then. Too close to matter, really.

What's to like -	
RX-320	G303i
Price	Has excellent S-meter abilities
Simplicity	Complexity of feature set
Portability	PCI (*not* ISA) form factor
Low computer system requirements	Moderate system requirements
Very wide range of available software	Sophistication of available software/user interface
Great price/performance ratio	Availability of a reasonably wide range of useful software plug-ins
Easily modifiable by user	TWO excellent band graphing capabilities
Frequency calibration is simple	Gives you a real feel for what DSP does, and how

What's not to like -	
RX-320	G303i
Antenna Connector (RCA Phono jack)	Antenna Connector (SMA) is accident waiting to happen
No attenuator	18dB Attenuator only
No native passband tuning	No passband tuning
Relatively slow interface (1200 BPS serial)	No additional DSP abilities like auto notch, noise reduction
Limited feature set (by comparison to the G303i)	Uses a limited resource (sound card)
No RF Gain	No RF Gain
On/Off switch is on the back panel	No frequency calibration software
No power status indicator	Requires thought to understand and drive properly
Price (since the 'D' model came out they upped the price to a point where it's now slightly more than half that of the G303i with the Pro software!)*	Requires the Professional Demodulator software to really perform up to its full potential

*(*It's psychological – before the price increase you could buy "Two for the price of one" if you were comparing it to the G303i – now, you can't!)*

Bottom Line

Ultimately, choosing a radio for hobby purposes is a personal choice, so the above chart has my own thoughts and opinions on these receivers.

Although they sound as if they're competing items, I really don't think that this is the case. They're devices that have computers, DSP and shortwave radio in common, but the way they work and interface with the user are likely to appeal to different segments of the hobbyist population. These are both good radios; I think that what makes for a difference between them isn't the performance as much as the features and options offered by them.[1]

The RX-320 is a great little radio that performs extremely well at a price that's hard to beat. You can throw it in your bag along with your laptop and you've got an excellent portable/traveling SW receiving setup. There's a great deal of software available for it, much of it is free, and you really can start using it without reading the manual first. It's a great workhorse and the novice or the expert can use it with good results. A good all round receiver.

The G303i is a different matter entirely – if you're into complexity and wide-ranging feature sets, then you simply won't be able to resist it. This bad boy gives you quite a few reception modes, a filter setup that can be varied between 1Hz and 15kHz in 1Hz steps, AND it lets you get into the guts of its DSP filter routines and start to play around with how they work. Customize your AGC constants, fool with filter lengths, change IF gains and all kinds of nasty, unwholesome stuff!

This is a good, serious radio that performs well and will teach you things if you're willing to learn them. About the only thing I can fault it on is the fact that I had to install a second sound card in my PC specifically to serve it and to enable me to use it along with sound-card-based demodulators in the one box. (It makes a really, really dandy HFDL monitoring setup that way!)

In summary – they're both good and they're *very* different from each other. Think hard about what you want to do with the radio and choose accordingly. A good rule of thumb is that if you want quick, inexpensive, simple and effective, go for the RX-320. If you want effective, more features and extended abilities (at somewhat more cost and with a small learning curve) go for the G303i *plus* the Professional Demodulator software. *(Do NOT get just the standard demodulator – that's like buying the Pacer instead of the Mustang!)*

...and, for what it's worth, Judy (Grove) isn't getting the review unit G303i back from me – I'm buying the darn thing...

Sources:

TenTec Inc, 1185 Dolly Parton Parkway, Sevierville, TN 37862, 800-333-7373

WinRadio, (US sales) Grove Enterprises, 7540 Hwy 64 West, Brasstown, NC 28902, 800-438-8155

[1] *(This is something that we're seeing in the ham segment of the radio market, too – once you've gotten the rig's noise floor below the natural noise floor, you've pumped up the dynamic range to the realms of the ridiculous, and the thing fits in a small shoebox – what next? Well, you start adding features and you start exploring the realms of DSP where you can get a heck of a bang for your buck! Nobody's going to stay in business with the margins on a $50 all band all-mode no-frills transceiver, but everyone keeps their job and we all get to have fun if features can be improved (or new ones added) and we start playing with cutting edge technologies – like DSP!)*

This is your equipment page. Monitoring Times pays for projects, reviews, radio theory and hardware topics. Contact Rachel Baughn, 7540 Hwy 64 West, Brasstown, NC 28902; email editor@monitoringtimes.com.

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Minelab's Fascinating Explorer II

Okay, pop quiz: what transmits on 28 frequencies from 1.5-100 kHz and finds stuff in the ground?

Aw, you peeked! Yes, it's a metal detector. But it's not just any old metal detector, it's Minelab's new Explorer II.

I've been fascinated with the *idea* of finding hidden loot since I was a kid. I've read bunches of books on treasure hunting, and messed with metal detectors a couple of times, but never got them to work for beans. All of the metal detector manufacturers tend to make basically the same claims (our machine will find stuff, is more sensitive, will help you identify the target, and so forth) but few offer any *technological reason* why their claims should be true. That is, until Minelab.

Principles of Operation

Most metal detectors operate pretty simply. They transmit a radio signal into the ground on a single frequency. The conductivity of any metal object in the ground causes it to react and emit a signal that is then picked up by the detector. So, basically, all conventional metal detectors measure a single thing: the conductivity of metal items in the ground. The problem is that many different items – for example, a beverage can pull tab and a gold wedding band – may have the exact same conductivity. How can you distinguish between the two while underground? Answer: you can't. You have to dig them up to figure it out.

The Minelab Explorer II, however, transmits on 28 different frequencies (as well as harmonics, using a technology they call Full Band Spectrum). Because various metals react differently at different frequencies, the Explorer provokes an optimal response from the metal in the ground. Even more importantly, the Explorer doesn't just measure conductivity. It also measures the inductance value of the target. That means the Explorer can measure two different data points for each target. So while a pull tab and a ring might have the same conductivity, they probably don't have the same inductance (or if two metals have the same inductance, the conductivity is likely different).

The Explorer actually displays the two different values – as Ferrous/Non-Ferrous (for inductance) and Conductivity – digitally on the screen of the detector or graphically in a kind of x-y chart. The bottom line is that this so-called SmartFind™ discrimination system makes it easier to distinguish between targets, so that the person running the detector digs up less trash and more stuff of value.

Even better, the Explorer II has the capacity to learn the inductance/conductivity signature of a particular object (a particular kind of pull tab, for example) and then can be programmed to reject that object. One metal detectorist I know uses this feature when hunting on a strange beach. He visits the campfire ring, identifies the favorite pull tab, rejects it on the Explorer, and then doesn't have to worry about hearing or seeing signals produced by those unwanted pull tabs.

To account for the mineralization of the soil, conventional detectors must be "ground balanced" to prevent erroneous readings. Some detectors do ground balancing with the touch of a button; others require a manual operation, but either way, it has to be done. By contrast, the Explorer uses the response it gets from 28 frequencies to automatically and continuously compensate for the mineralization of the ground as the detector is being used.

Putting the Explorer to Work

The Explorer II is 55 inches long when fully extended, and weighs about 3.5 pounds, excluding batteries. It comes with a pair of custom Koss headphones, a rechargeable battery pack and charger, an in-car charger, and an alkaline battery pack that holds eight AAs.

The folks at Minelab claim that the Explorer II is a real double threat: you can turn it on and be detecting in just 5 minutes or, if you are an experienced detector user, you can use many of its customizable smart features to program the Explorer to search particularly for just about anything that you want. Want to hunt for gold nuggets, meteorites or Civil War relics? You can custom-configure the Explorer II to do the job.

As to the claim that you can turn on the Explorer II and be detecting in just minutes . . . I found it to be absolutely true. Cruising around my yard for a few minutes I found two metal objects that were hidden several inches under the ground. The detector beeped, and I used its pinpointing feature to zero in on them. Alas, there were no doubloons or Spanish reales. One was a flattened screw-off bottle cap and the other is some sort of pipe fitting. Was I disappointed? Heck no – I had no idea these objects were down there until the Explorer let me know. (In addition, I had made no effort whatsoever to learn the signals of "good" targets beforehand – I simply went out and started detecting.)

When I compare my experience with the Explorer II to the unintelligible squeaks, squawks and grunts of conventional detectors I've played with, the difference is like night and day. The ease of using the Explorer makes me want to get outside and see what else might be found. Further, the excellent manual offers a number of terrific suggestions for getting the most out of the powerful machine.

It seems to me that the Minelab Explorer II represents the state-of-the-art in metal detectors. All that sophistication comes at a price, though; SRP for the Explorer II is $1395. But if you have a hankering to search for treasures under the ground, to find "the hidden thing," the power of the Explorer II seems a bargain. For more information, visit **http://www.minelabusa.com** or call 1-702-891-8809 and ask for an information packet.

The Minelab Explorer II represents the state-of-the-art in metal detectors.

G3 WiNRADiO g303i

Introducing a breakthrough

Just when you thought that there is nothing new in radios, along comes the new WiNRADiO G303i software-defined shortwave receiver!

This new, low-cost receiver inaugurates the third generation of wide-band, PC-based receiving equipment from WiNRADiO. It is the first commercially-available receiver where the final IF stage, as well as the all-mode demodulator, are entirely executed in software, controlled by your personal computer.

While the Standard Demodulator of the G303i provides the level of performance of a quality shortwave receiver--including synchronous AM demodulation and a real-time spectrum scope--the optional Professional Demodulator of the G303i-P offers continuous IF filter bandwidth adjustment, interactive block diagrams, two additional audio spectrum scopes, and even inbuilt THD and SINAD measurement facilities. Additional software upgrades, including a Digital Radio Mondiale (DRM) demodulator, will be available soon!

What's included?

The standard WR-G303i package includes:
WR-G303i receiver card
Application software
Comprehensive user's manual
Start-up antenna
Audio lead
BNC-to-SMA adapter

Technical Specifications

Frequency range	9 kHz to 30 MHz
Tuning resolution	1 Hz
Modes	AM, AMN, AMS, LSB, USB, CW, FM3, FM6, FMN *(The optional Professional Demodulator also includes DSB and ISB modes.)*
Antenna	50 ohm (SMA connector)
Dynamic range	95 dB
IP3	+8 dBm

Selectivity

AM	6 kHz
AMN, AMS	4 kHz
LSB, USB	2.3 kHz
CW	0.5 kHz
FM3	3 kHz
FM6	6 kHz
FMN	12 kHz

Sensitivity

AM	1 uV
LSB, USB	0.3 uV
CW	0.18 uV
FM	0.4 uV

Notes

1. Selectivity values are at -6dB. These values apply only to the *Standard Demodulator*. The optional *Professional Demodulator* has IF bandwidth continuously adjustable from 1 Hz to 15 kHz.

2. Sensitivity is shown for 1.8 to 30 MHz, 10dB S/N.

3. Specifications are subject to change without notice

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What's NEW

Tell them you saw it in Monitoring Times

New Radios Coming Soon

...Radio Shack/ GRE Pro-96

The new Radio Shack/GRE Pro-96 handheld digital scanner has been approved by the FCC. The PRO-96 will be nearly identical in size to the current Radio Shack PRO-95, but weigh just a bit more. The frequency coverage and feature set will remain largely identical with a few new updates. The specifications page shows the exact same numbers for sensitivity, rejection, IFs and scan/search speed but this may not be indicative of the PRO-96's final numbers.

The big news is the radio's ability to follow 9600 baud digital signals. The PRO-96 will be able to decode Motorola Analog and ASTRO 3600 as well as APCO P25 Phase 1 9600 baud systems along with the usual GE/Ericsson EDACS. With on-board DSP processing, the PRO-96 will be able to automatically determine digital signal type and adjust the audio signal for best voice reception. Another big addition will be the inclusion of the PRO-92's CTCSS/ DCS capabilities for both decoding and squelch operation. Trunking IDs in the five lists/bank will be increased from 20 to 30 IDs per list.

The 96 will have four-line alphanumeric display with tags for banks, channels, trunk lists and IDs, the 20dB attenuator, service search, weather alert with SAME/FIPS, data cloning, PC interface and more. More information on this unit can be found on page 64. Call your favorite radio dealer for pricing and availability.

...MAYAH DRM 2010

The MAYAH DRM 2010 is the second generation receiver for the Digital Radio Mondiale (DRM) standard. It is the result of a joint development effort of German company Mayah Communications, Coding Technologies and AFG. The receiver is based on standard components and is smaller and lower cost than the first-generation demonstration model.

A DSP module performs all the DRM specific decoding functions. The software of the DSP module can be updated via the USB interface. The USB interface also provides the data stream for further processing with a PC. Full stereo reception is available at the headphone outputs.

Besides the DRM standard the receiver also supports reception of analog AM programs in the MW, LW and SW bands as well as FM programs. For more information and availability, visit **http://www.mayah.com**

Long Wire Antenna Adapter

The WiNRADiO WR-LWA-0130 Long Wire Antenna Adapter is used to match the impedance of a long wire HF antenna to a 50 ohm input impedance of a receiver. Such impedance matching, using what is also called a long wire balun, may result in a significant signal strength increase, compared to the long wire antenna connected directly to the antenna input of the receiver.

The device is designed to work on medium and short wave bands, covering a frequency range from 0.1 to 30 MHz, and employs a dual broadband transformer technique for improved performance over coneventional adapters. It is especially suitable for use with WiNRADiO shortwave receivers, such as the WR-G303i receiver. The WiNRADiO WR-LWA-0130 Long Wire Antenna Adapter retails for $39.95. Contact Grove Enterprises (1-800-438-8155 or **http://www.grove-ent.com**) or WinRadio (**http://www.winradio.com**) for more information or to order.

Quick Radio Grab

Unless your fanny pack has numerous pockets, a small handheld radio (or cellphone) is liable to end up in the bottom along with paraphernalia and food. And you're likely to punch wrong buttons trying to grab it out quickly if you need to respond to a call.

Cutting Edge Enterprises has the solution, as always – the PowerPort QuickZip Radio Pouch. The radio has its own padded 11-inch by 6.5-inch compartment in the section closest to your body, with a holster to hold it from shifting around. When you need fast access to the radio, don't fool with zippers: grab the tab at the right or left side of the pouch and pull diagonally to expose the radio.

A deep secondary compartment can hold accessories, spare batteries, etc., and two more pockets can accommodate a sandwich, glasses, and wallet.

The QuickZip Radio Pouch is constructed of tough, padded, waterproof nylon for $36.95. (Also available in glove quality leather; call for pricing.) Cutting Edge Enterprises, 130 Anacapa Circle, San Luis Obispo, CA 93405; 800-206-0115; **http://www.powerportstore.com**.

Hints & Kinks for the Radio Amateur

Hot Tips from the pages of *QST*

Hints & Kinks has been around since 1936 in the pages of *QST* (the ARRL's monthly magazine) and is one of the most popular columns ever written. Hams eagerly await each issue to see what new hint, trick, mode or kink they can use in their shacks.

Hints and Kinks began in *QST* from an earlier *Experimenters' Section* column that started in 1923-24. The Experimenters' Section was a body within the ARRL organization with many registered members. The column *Experimenters' Section* reported on activities of those members, but continued well after their registry ceased in 1930.

The League, seeing how popular the column was, started producing a regular publication which compiled previous columns under one cover.

The new 176-page 16th edition is now available for sale. In it you'll find something on every page to solve problems, improve your operating, and simply have more fun on the air. Some of the more interesting items in this edition include: Equipment Tips and Mods; Batteries and Other Power Sources; Digital Modes; Troubleshooting; Restoration; Construction / Maintenance; Test Gear; Antenna Systems; Operating; Station Accessories; and Interference (RFI/EMI).

You will also find more emphasis on computers and software, since these have become a staple in today's modern ham shack. There is also a newly updated list of suppliers.

Also in this edition you will get feature articles from the popular *QST* column *The Doctor is IN* (my second favorite *QST* column).

Hints & Kinks for the Radio Amateur (ISBN: 0-87259-892-6) #8926 - $15.95 plus shipping and handling from the ARRL, 225 Main Street, Newington, CT 06111-1494; 1-800-277-5289, http://www.arrl.org .

Reviewed by Larry Van Horn, N5FPW

What's NEW

Tell them you saw it in Monitoring Times

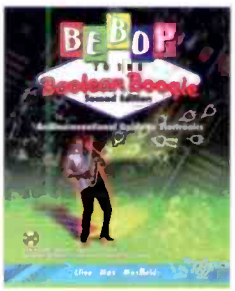
Bebop to the Boolean Boogie

By Clive Maxfield

It's easy to see why the first edition of this book by Newnes Press became a hit at Yale and other universities as the textbook for an introductory electronics course. Using language that's anything but dry, Clive (call me "Max") Maxfield leads the reader almost unawares from simple, basic concepts to deep into Boolean Algebra and Nanotechnology.

Actually, I shouldn't say "deep," since, true to the "bepop" metaphor, the author jumps from topic to topic without getting bogged down in one field. Chapter one explains digital versus analog (spelled analogue in England "and pronounced with a really cool accent"), followed by atomic theory, followed by semiconductors.

We don't stay on familiar ground long before Max gets into his larger topic – logic systems and their electronic applications. If you think that's irrelevant to radio, check out Chapter 7 on alternative numbering systems and check out hexidecimals as used in some trunked systems!



Part two of the book discusses components and their applications – integrated circuits and circuit boards of various sorts, how they're made and why. If the insides of a computer or your digital radio leave you clueless, you'll get a lot of help here.

Then it's on to some fun stuff – Chapter 21 concerns alternative and future technologies, the kinds of things we read about in the newspaper – fiberoptic connections, optical memory, virtual hardware, nanotechnology, etc. The Appendices go into more detail on a variety of subjects which resemble the mystic arts to this reader (Reed-Muller Logic, Linear Feedback Shift Registers?!), except perhaps for Pass-Transistor Logic. But once you've waded through the data, you're rewarded with Appendix H, "No-Holds-Barred Seafood Gumbo" (a cool recipe), an invaluable glossary, and a list of abbreviations and acronyms.

There's another bonus to this book – or actually, two: the book contains a CD which contains the book (hm-m-m, which brand of logic is that) in searchable PDF format, and better yet, the disk contains a bonus chapter, "An Illustrated History of Electronics and Computing." In relatively short order Maxfield summarizes the major developments in communication and computation from the stone age to the PC, including the development of telegraphy, fax machines, radio, and television.

As you can see, "this isn't your mother's electronics book," but it will bring you up-to-date in the modern age of electronics.

Bebop to the Boolean Boogie (ISBN 0-7506-7543-8) $39.99 from Newnes Press, **http://www.newnespress.com** or call 800-545-2522.

Reviewed by Rachel Baughn, KE4OPD

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to Rachel Baughn, editor@monitoringtimes.com

Lawrence Harris
lawrenceharris@monitoringtimes.com

Digital Weather Satellite Transmissions – LRIT

Within a few days of my writing these notes, Europeans will be receiving their first transmissions of LRIT. I am one of those monitors, standing by with the equipment ready for reception. So what is it? *Low Rate Information Transmission*: essentially, the replacement for WEFAX.

The **National Oceanic and Atmospheric Administration** (NOAA) currently uses weather facsimile (WEFAX) – a meteorological analog broadcast service – to disseminate *Geostationary Operational Environmental Satellite (GOES)*, *Polar Orbiting Environmental Satellite (POES)*, and foreign satellite meteorological data to users using the GOES L-band downlink frequency (see list at end). This service has been available for decades, and is used by thousands of users throughout the world. With geostationary WXSATs located around the world, most areas are covered by at least one WXSAT. By international agreement, WEFAX is transmitted by many, but not all, geostationary WXSATs.

The **Coordination Group for Meteorological Satellites (CGMS)** has regular meetings and helps to ensure standards in WXSAT operational usage throughout the world. It negotiated recommendations for digital meteorological satellite broadcasts, and these are being implemented by NOAA. In the follow-on series, GOES satellites will replace WEFAX with the new digital service called LRIT. The USA announced at the CGMS XXVIII meeting, in document USA-WP-11, a transition to LRIT on the existing GOES I-M series. The transition from the analog WEFAX format to the digital LRIT format requires a modification to the Central Environmental Satellite Computer System.

◆ New format – new equipment

Because WEFAX and LRIT transmission formats are incompatible, current WEFAX users have to upgrade or replace existing WEFAX stations if they wish to receive the new LRIT products. The development of relatively inexpensive ground stations for receiving LRIT transmissions is a major goal of NOAA.

During the transition period, NOAA is using a GOES I-M spacecraft. The new ground equipment at the Wallops CDA stations and the LRIT test schedules allow an orderly transition to LRIT without the need to be unduly concerned with an exact GOES-N launch date. NOAA plans involve timesharing between WEFAX and LRIT on individual spacecraft for a limited time period (for example, 1 to 2 years), followed by a total transition. The transition from WEFAX to the new LRIT has had to consider the requirements and concerns of the existing user population – thousands of amateurs and professionals – as well as the availability of NOAA resources, such as satellites, ground communications and personnel.

There will be significant differences between the analog WEFAX, and the new digital GOES LRIT. LRIT will comprise near-real-time GOES imagery derived from the GVAR (GOES variable) data stream. The initial transition plan is to have an hourly northern hemisphere infrared transmission, with full disc every synoptic hour, at a resolution of 4km with an 8-bit pixel depth (GVAR is 10-bits). Water vapor may also be included. Visible imagery may be transmitted this way, or may be jpg, which is more lossy as it is compressed. The biggest problem is bandwidth. There is no longer going to be an initial 64kb LRIT stream; NOAA utilizes full 128kb from the start.

◆ In the beginning

GOES LRIT will be timed-shared with GOES WEFAX, hopefully sometime in July (unless the delivery of equipment causes a delay). NOAA anticipates 25 minutes LRIT and 35 minutes WEFAX every hour. GOES LRIT will also include other products as they become available. Unfortunately, due to restrictions, NOAA is not able to rebroadcast directly-received MSG data.

Charlie Vance of NOAA comments that they have worked hard to keep the costs of receiving equipment down, and to allow the re-use of many WEFAX components.

Specifications and software are available for download on the **http://noaasis.noaa.gov/WEFAX/** web site. [Note that at the time of writing, this site was not available.]

Charlie notes that the software (for download) is very basic and designed for only one type of receiver card. The source code is available so anybody can modify it to suit their specific card or applications. NOAA anticipates that the value added market should have time to develop LRIT products.

Summarizing, the resolution and timeliness of GOES LRIT is far superior to WEFAX. Although there are no actual LRIT images available on the NOAA web yet, NOAA has them in-house and recently successfully conducted the first broadcast of test via a GOES-12 downlink.

I will be keeping a regular watch on the developing LRIT scene – and should have sample LRIT images from MSG-1 in this column next month.

◆ Internet site reminder

I often visit a number of web sites to see the latest WXSAT images from different satellites. A recent addition to my "favorites" list is the Indian communications satellite transmitting regular images from geostationary location above the Indian ocean. Visible, infrared, and a color composite image are available.

Fig 1: Indian communications satellite image showing north-west quadrant June 9, 2003 at 0600UTC. Image courtesy ISRO http://www.imd.ernet.in/section/satmet/dynamic/kalpana1.htm

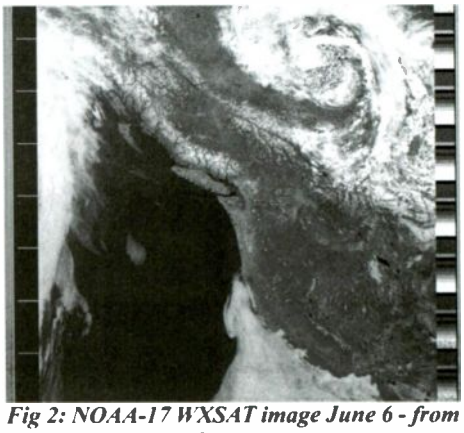


Fig 2: NOAA-17 WXSAT image June 6 - from Dale Ireland, Seattle

Frequencies - APT

NOAA-12 and -15 transmit APT on 137.50 MHz
NOAA-17 transmits APT on 137.62 MHz
GOES-10 (west) and GOES-12 (east) use 1691 MHz for WEFAX

INDEX OF ADVERTISERS

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Closing Comments

This page is open to thoughtful opinions on radio-related topics. Submissions should be about 800 words in length and may be mailed to Closing Comments, care of this magazine, or emailed to editor@monitoringtimes.com

A Bad Law Narrowly Averted

By Rachel Baughn, editor

At the eleventh hour radio hobbyists in Nevada and around the country learned of wording included in Nevada Assembly Bill 441 which could have made public safety frequency lists against the law if the Governor deemed them to be sensitive because of terrorist activity, whether real or anticipated.

The Bill on Homeland Security was proposed by Assembly member Richard Perkins and had already passed the Assembly. Perkins is or was a member of the Henderson Police Department in Nevada. The alarm was raised by Nevada Senator Bob Coffin, who wrote W6OLD, "Please get the word out to everyone that they need to email and call all legislators and their own senators and assemblymen. I can't believe this got out of the Assembly and came here to me in the Senate without a bit of noise...Check it out at our website and forward the address to others after you read the bill. Address is **http://www.leg.state.nv.us/72nd/bills/AB/AB441_R2.html** - (Section 21 (f)specifically)... and it can be either a misdemeanor or felony, depending on how a court determines a defendant's 'intent'."

Although it was questionable how much influence opinions from outside the state would bear, *MT* staffers Jorge Rodriguez and Larry Van Horn wrote to the Bill's author and to senate finance committee members, the last stop before final approval. Both letters pointed out the folly of criminalizing federal public domain information.

Jorge Rodriguez wrote: "We've just learned of the provision in your bill to outlaw published frequency lists and would like to learn more about its intent and purpose and recommend against it.

"We're opposed to the provision in sec. 21 (f) of the bill AB441 prohibiting published frequency lists. The current state of the art in programmable radios and computer controlled radios makes such a provision ineffective. It would merely criminalize the conduct of well intentioned Nevada citizens without enhancing homeland security.

"Such lists are even published by the Federal Communications Commission and AB441's radio frequency publishing prohibition would be in conflict with the Federal government's practice; it would make the Federal government a law violator.

"On a fundamental basis, it would also violate the free speech and freedom of the press provisions of the Nevada State constitution and Federal constitution which all Americans cherish.

"Thank you for your well intentioned concern."

Larry Van Horn received the following reply on June 12th, from William J. Raggio, Senate Majority Leader:

"I write in response to your e-mail regarding your opposition to the section of Assembly Bill (A.B.) 441 that refers to radio frequencies.

"Section 21, subsection 2, paragraph f, was deleted from the bill by amendment. The Senate Finance Committee, of which I am chairman, recommended this amendment. Thank you for contacting me on this important issue, and I am glad we were able to address your concerns."

Dick Flanagan, a Nevada amateur radio operator, reported on the final compromise: "As originally written, Nevada Assembly Bill 441 would have made the publication, sale and possession of 'emergency response' frequencies against the law if the Governor determined it was necessary because of real or potential terrorist activity. Because of the wide public availability of this information, such a restriction would have been unenforceable and simply not in the best interests of both amateur radio and public safety interests.

"Because of a concentrated effort by the amateur community, this section of AB-441 has been rewritten!

"According to the Nevada Legislature web site, AB-441 passed the State Senate with the following replacement for Section 21 Subsection 2 Paragraph (f):

(f) Documents, records or other items of information regarding the infrastructure and security of frequencies for radio transmissions used by response agencies, including, without limitation:

(1) Access codes, passwords or programs used to ensure the security of frequencies for radio transmissions used by response agencies;

(2) Procedures and processes used to ensure the security of frequencies for radio transmissions used by response agencies; and

(3) Plans used to reestablish security and service with respect to frequencies for radio transmissions used by response agencies after security has been breached or service has been interrupted."

"The amended bill now goes back to the Assembly where passage is expected."

We don't know all the players in defeating this misguided legislation, but thanks are definitely due to Senator Bob Coffin, who raised the alarm, and to Harry Marnell and others who spread the word. Those who deserve the most credit are the ones who picked up pen, phone, or computer keyboard and contacted the decision-makers. Their efforts paid off even though the time for action was very short, and it shows what can be done when citizens get involved.

As Larry points out, "I think we have been very fortunate over the last few years to get both federal and state anti-scanner laws defeated or amended. I believe the internet has really revolutionized this process." It makes one wonder, if we had had the Internet back in 1986, might the language in the Electronic Communications Privacy Act have come out differently...?

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VR-3500 (External)	RCV 49-E	$2395.95
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