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

Monitoring Times

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July 2003

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The New Icom IC-R5

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"A shock to the system." *

The new WiNRADiO G303i receives rave reviews. And shortwave radios will never be the same.

* *Short Wave Magazine, February 2003*

The exciting WiNRADiO G303i Software-Defined Shortwave Receiver is now available.

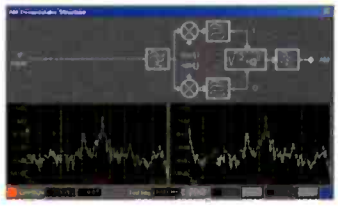
Why is it *Software-Defined*? Because the entire last intermediate frequency stage and all-mode demodulator are implemented entirely in signal-processing software running on a personal computer. This brings about significant advantages: performance, flexibility, configurability, reliability and convenience. There is also reduced risk of obsolescence, as new demodulators for new types of modulation are as easy to add as inserting a CD ROM into a PC drive.

The receiver comes on a PCI card and installs in minutes. Just plug the card in, connect its output to your PC sound card, install the supplied software, and let the world's most innovative shortwave receiver surprise you with its performance and amazing new features.

In addition to the flexible and friendly user interface with numerous functions and facilities not normally available on a conventional receiver, the WiNRADiO G303i Software-Defined Shortwave Receiver excels particularly with the ability of its demodulators: While the Standard Demodulator provides the performance of a highly respectable shortwave receiver, including synchronous AM demodulation and a real-time spectrum scope, the optional Professional Demodulator offers even more: continuous selectivity setting (in 1 Hz increments), interactive block diagrams with additional real-time audio spectrum scopes, built-in performance test facilities, user adjustable filters, and many other features. Additional demodulator types are planned as further options, including a DRM (digital radio) demodulator.

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.

The G303i control panel includes many features such a real-time spectrum analyzer, numerous tuning and scanning options, highly accurate S-meter showing signal strength in various units, sweeping spectrum scope and powerful memory facilities.



The optional Professional Demodulator expands the receiver capabilities yet further by introducing numerous innovative features, world-first for this type of radio, such as variable filter bandwidth adjustment and interactive block diagrams.

Specifications

- Frequency range 9kHz to 30MHz
- Tuning resolution 1Hz
- Modes AM, AMN, AMS, USB, LSB, CW, FM3, FM6, FMN
- Sensitivity 0.3µV (AM, 80% modulation, 10dB S/N)

System Requirements

- IBM PC compatible (CPU 500MHz or higher, PCI slot)
- Sound Blaster 16 (or compatible sound card)
- Windows 98/ME/NT/2000/XP

The WR-G303i receiver was reviewed by the Short Wave Magazine (Feb. 2003), Monitoring Times (March 2003) and Radio & Communications (Feb. 2003), with impressive conclusions. Here are only a few highlights of the reviews:

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." *[SWM]*

On sensitivity: "... higher than necessary in a receiver of its type...". *[SWM]* • "Much of this senstivity 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..." • "With a sharp filter selection using the Professional Demodulator, CW signals as weak as 30nV (0.03 uV) are distinct." *[MT]* • "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." *[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]* • "... an astounding feature to hear when invoked!" *[MT]* • 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]*

Check out the special introductory price of the Professional Demodulator option which includes the following additional features:

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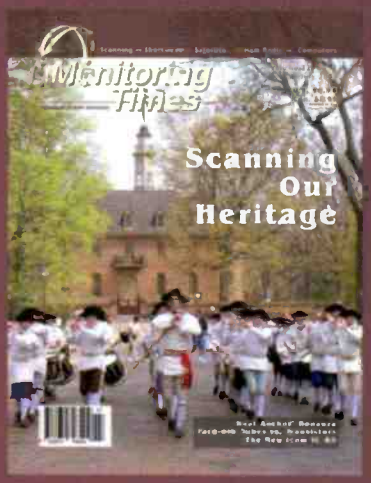
Monitoring Times

Vol. 22, No. 7 July 2003



Cover Story

Colonial Scanning

By Gayle Van Horn

Once again, *MT*'s intrepid monitoring couple takes to the road in search of personal and historical roots. It just so happens, their search also leads them to our national origins – the historic triangle of Jamestown, Williamsburg, and Yorktown, Virginia. Millions of visitors travel each year to this peninsula on the coast of Virginia where the past is so convincingly recreated ..

And where there are people, there are communications and good scanning to be had! Gayle brings the past alive in recounting the events that made these sites significant, followed by the local frequencies that can tune visitors in to the present. Story starts on p. 16.

On our cover: The fife and drum corps leads the march from the Capitol at Williamsburg. (Photo by Larry Van Horn.)

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

Publisher
Bob Grove, W8JHD
bobgrove@monitoringtimes.com

Managing Editor
Rachel Baughn, KE4OPD
editor@monitoringtimes.com

Assistant Editor
Larry Van Horn, N5FPW

Art Director
Bill Grove

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

Reviews:

Marc Ellis's feature article on boat anchors gives an idea of how these old radios compared with each other, but has anyone really pitted an old tube radio against a modern set? Alan Johnson takes on the challenge and compares two eras of radios: the National NC-183D of the 1950s, against the Icom R-71A of the 1980s (p.84).

Bob Parnass compares the new Icom IC-R5 with its other palm-sized competitors and uncovers where it's strong and where it's vulnerable (p.78).

Radio control using a Palm Pilot? Not only is it feasible, it's never been cheaper! John Catalano reviews five programs that are free for the download (p.80).

Radio direction-finding is both a sport and a practical skill. Thanks to Ramsey Electronics' RDFing kits, you can get in on the fun without spending a fortune. Bob Grove explains how RDFing works, and the two different approaches represented by the "Foxhound" kit and the Doppler system (p.82).

Jock Elliott reviews Cobra's excellent FRS/GMRS radio pair – the PR 350-2WXVP. You get a lot for your money...and not very much money at that (p.86)!

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Jorge Rodriguez
jorgerodriguez@monitoringtimes.com

Monitoring and the Law

The Garden State's Garden of Eden Scanner Law

This month we move across the Hudson River for a look at the Garden State's scanner laws. Revised in 1992 after almost 80 years on the books, New Jersey has perhaps one of the best and most reasonable scanner laws of any state. This is thanks in part to the efforts of the American Radio Relay League's (ARRL) volunteer attorneys Frank Terranella and John Norton who worked diligently to get the new law passed.

Instead of struggling with prohibitions on the types of equipment and frequencies which can and can't be monitored, New Jersey's scanner laws simply make it illegal to intercept communications to help you commit a crime or interfere with public safety officials performing their duties. It is also a crime in New Jersey to possess a radio which can tune into police, fire and emergency medical communications while committing a crime or fleeing from it.

Specifically, Title 2C of the New Jersey Code of Criminal Justice section 33-21, titled *Interception or use of official communications* provides that, "Any person who intercepts any message or transmission made on or over any police, fire or emergency medical communications system, or any person who is the recipient of information so intercepted, and who uses the information obtained thereby to facilitate the commission of or the attempt to commit a crime or a violation of any law of this State, or uses the same in a manner which interferes with the discharge of police or firefighting operations or provision of medical services by first aid, rescue or ambulance squad personnel, shall be guilty of a crime of the fourth degree."

The section immediately following that statute, 33-22, titled *Possession of emergency communications receiver*, prohibits, "Any person who, while in the course of committing or attempting to commit a crime, including the immediate flight therefrom, possesses or controls a radio capable of receiving any message or transmission made on or over any police, fire or emergency medical communications system, shall be guilty of a crime of the fourth degree."

Without getting bogged down with what is a portable versus mobile or home radio scanner and which groups of persons are or are not exempt from the law, New Jersey merely prohibits what should be prohibited – using a radio scanner to help you break the law.

In addition to these two scanner laws, New Jersey also prohibits students from possessing pagers on elementary and secondary school property and all persons from possessing them during the commission of certain crimes. It is also against most schools' rules for enrolled students to possess a cell phone on school property or during school.

Lastly, New Jersey in statute 2C:33-23 specifically exempts "radar devices used to monitor vehicular speed" from their definition of what is a "police, fire or emergency medical communications system."

◆ My Two Cents plus 35

Some readers have written asking how they can find out if their city or county has a local ordinance concerning scanners or amateur radios that will tune police, fire and other government frequencies. One way is to look online. Many communities now have their local ordinances available free of charge through the Internet. The trouble here is that not all places will use the same words to regulate scanners. Readers should be creative as they search for such local laws since one community may ban "radios capable of receiving frequencies" while another bans "devices which can intercept communications."

Another way is merely to ask. While the speed of a telephone call may seem preferred, here I would suggest an investment of thirty-seven cents to send your question by regular mail. Such a method is more assured of reaching a person with the correct information and allows him time to reply.

In addition to asking your local Chief of Police or Sheriff, don't overlook the power of your local councilman or councilwoman – your local elected representative – as a source of this information. If your community has an ordinance you didn't know about, this could be the best thirty-seven cents you spend on monitoring this year. If you find your community does regulate scanning radios, please drop me a note so we can share your find with other *MT* readers.

◆ Upcoming Issues of Concern – Scanner Audio Online

Do you operate an Internet Web site that makes available your community's police or fire communications over the Internet? *MT's Monitoring and the Law* is working on a future article of the legal issues surrounding this marriage of technologies. We are interested in hearing from you, especially if you obtained permission from the persons responsible for the communications before starting your webcast or if you've received letters or warnings asking you to remove such rebroadcasts.

◆ South Carolina May Regulate

In April a South Carolina newspaper reported criminals (especially drug dealers) using scanners and two-way radios to avoid arrest. In an article by Jason Foster, *The Herald* reported that children and teenagers in Rock Hill, SC, have been seen on bicycles acting as look-outs while listening to "police chatter on walkie-talkies" or using them to report police presence. A citizen also reported increased presence of cars with CB antennas.

Foster reported that Police Captain Mark Bollinger said "there is no doubt that [criminals are listening to our radios to avoid getting caught]; We just haven't caught anybody at it."

The article went on to claim that Rock Hill Police use "secure radio channels" for dispatching calls for such things as burglaries or drug deals, but didn't explain how children were seen listening to police on "walkie-talkies."

Noting that South Carolina has no scanner regulation, the article closed with a mention of some states that do regulate, and the comments by Dave Fortson, Rock Hill chief of police, who considers the issue "a critical public-safety" concern and thinks the state legislators may need to be persuaded to pass some sort of scanner regulation.

Disclaimer: The information in this column is not legal advice. Persons wishing specific legal advice should consult an attorney licensed to practice law in their area.

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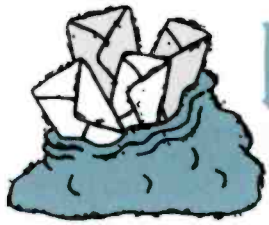


LETTERS TO THE EDITOR

MT Marks a Milestone

It's hard to believe that my colleague here at *MT*, Larry Van Horn, who serves as assistant editor, technical editor, and columnist, has been writing for us for two decades. Time passes so fast, and we've watched many changes in the field of radio.

Larry sits in an office down the hall from me, and an entire day can go by without my seeing him. But I know that he's busy keeping up with his electronic files of frequency lists, possibly the most exhaustive – and arguably the most accurate – in the hobby.

Readers have come to trust his judgment in identifying frequencies accurately. We are fortunate to have a reliable stable of monitoring contributors who do off-the-air identification of signals, many of which are heard from their local agencies. It then becomes a matter of some sleuthing, comparing recent contributions to archival information in our databases.

Larry and I were both writing for the former Radio Communications Monitoring Association (RCMA) bulletin when we first met in print; Larry was the *Signals from Space* columnist, and I was doing the *Federal and Military* column.

Over time it became apparent that Larry's enthusiasm was irrepressible, and his sources were inexhaustible. What a nice combination for a columnist!

After inviting him to come aboard the *MT* team, we introduced him at one of our popular Grove/MT Expos in Atlanta; Larry, his wife Gayle (also a long-time *MT* columnist), and their son Loyd moved to Brasstown in 1993. Larry's primary assignment was (and still is) to provide accurate information on his favorite subject, utilities – the two-way users of the radio spectrum. Federal, military, and satellite comms have always been his favorite monitoring targets.

Larry has never disappointed us with his prodigious writing. Continuing his specialty of satellite monitoring, we published three successive volumes of Larry's popular frequency directory, *Communications Satellites*, two extensively-revised editions of the *Grove Shortwave Directory*, and followed with the *Grove Military Frequency Directory* and the *Grove Federal Frequency Directory*.

Looking for more to do in his copious spare time (!), Larry took the helm as Managing Editor of our four-year sister magazine, *Satellite Times*, the industry's first comprehensive magazine with such depth.

During a typical work week here at Grove Enterprises and *Monitoring Times*, the telephone stays quite busy; Larry often takes time from his writing to assist our clients with problems they are experiencing with their monitoring installations, answering questions and offering seasoned advice.

It is through this dedication to professionalism that Larry has played a major role in maintaining *MT*'s worldwide reputation for being the leading monitoring publication over the past two decades. And as the field of radio continues to evolve technically, Larry will continue his journalistic leadership, informing our tens of thousands of readers of the latest news in the monitoring field.

Bob Grove
Publisher

When Larry first began writing for *Monitoring Times*, I was doing the layout on the magazine; I also typed and assembled the manuscript for his first book. I quickly appreciated his methodical, consistent organization of data. This meticulous record-keeping is one of the secrets to his phenomenal success in recognizing patterns (or aberrations thereof) and sleuthing out new communications systems.

If you think this sounds like a pretty dull and boring existence, you haven't seen Larry bursting with excitement at identifying a new signal, receiving a key bit of information from an *MT* contributor, or getting a coveted QSL in the mail. The rest of us shake our heads in wonder; I recently asked him how, after all these years, he avoids burn-out? Here's the answer he wrote to me:

"The key is I don't just listen to one or two services/bands. I listen to all sorts of radio communications. Today, if I'm in the mood to chase ham DX, I will, because I can: I've equipped my shack to perform that task. If I'm on 10-meters and see the skip distance getting shorter during an e-skip opening, I know that the 30-50 MHz band is open for the long haul business. I know I should also be watch-

Frequent MT contributor Norman Hill is pictured on the left with fellow Federal City REACT members. Norm uses a specialized UHF TV antenna in the attic of his Arlington, VA, home. Check out the Federal City REACT repeater on 462.6000, 462.6750, and 462.7000 MHz.

ing for a VHF TV channel 2-6 opening, or maybe even an FM broadcast DX opening. But this all starts with turning the radio on and listening. Also, the more capability I have added to my shack has meant being able to monitor more on the bands, and that keeps my interest sharp and the burn-out bug away."

It's this full-spectrum, hands-on knowledge, plus Larry's own journalistic experience, that I rely upon in every issue of *MT*. I am, of course, extremely appreciative of Larry's wholehearted support of the magazine, but you, the readers of *Monitoring Times*, are the main beneficiaries of his dedication. Larry, we all hope you continue having fun and sharing the results with us for a long time to come!

Rachel Baughn
Editor

Re: Shortwave and Going Digital

"In recent years many shortwave broadcasting stations have gone off the air or cut back programming, citing audience shifts to satellite, internet, or local FM services. Some speculate that international HF broadcasting will cease altogether. But two recent developments may change this picture. One, discussed in the April *Monitoring Times*, is digital modulation, which may yield FM fidelity on the shortwave bands.

"The other development is the hacking of Al Jazeera's inaugural English-language website. Many have come to rely on the Internet as a source of international news and opinion. But when we see how effectively the Al Jazeera website was shut off – whether by malicious private hackers or by covert government action – it becomes apparent that the Internet may not always be such a free and dependable source of information. Digital HF may be a more effective way for dissident opinions to get through. There is a long history of jamming of broadcasts (such as Radio Baghdad just before the first Gulf War); it will be interesting to see how resistant digital HF is to jamming."

– Chuck Porter, Troy, NY

"That DRM article was very interesting. This mode looks like it will be a Quantum leap for all kinds of comm's. My earlier tongue in cheek predictions for a dream receiver that prints out QSLs may just become a reality! The author states that only the station name / id need be known for broadcast tuning. (I doubt if that will be the case for hams and other utility users.)

"I would assume that the new Grundig 900 will be DRM compatible? I guess many comm companies have been revising designs for this new mode.

"That EH antenna article was also very interesting.

"Our ARISS (Amateur Radio on International Space Station) contact with the ISS a couple of weeks ago was a 'no go' as Commander Bowersox had a higher priority mission pop up. Unfortunately this resulted in quite a few disappointed school kids in the Tallahasee, Florida, school we telebridged to. We had a good overhead visual for most of the pass, too."

– 73 and Aloha, Paul Perretta KH6 / G3SEA

"I really enjoyed the articles on DRM in the April Issue. In Lee Reynold's article he says 'Decoding software for DRM has been available for a number of weeks now and comes in commercial (...) and freeware (compile it yourself).' I would really like to know where the 'freeware (compile it yourself)' software is available."

Jack Botner

"Here's a spot for him to get started - **http://www.tu-darmstadt.de/fb/et/uet/fguet/mitorbeiter/vf/DRM/DRM.html"**

Lee Reynolds

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

Hams Win One, Lose One

The FCC has rejected a request to grant amateurs a sliver-band allocation at 136 kHz "at this time." However, in a compromise with government users, the Commission decided to give amateurs five discrete 2.8-kHz-wide channels in the vicinity of 5 MHz instead. The FCC also agreed in the Report and Order released May 14 to elevate the Amateur Service (but not the Amateur-Satellite Service) to primary status at 2400 to 2402 MHz.

"We are disappointed that the FCC could not see its way clear to providing even a narrow LF allocation to the amateur service, given earlier encouraging signs and the general trend in other countries," ARRL Chief Executive Officer David Sumner, K1ZZ, said of the FCC's decision.

The FCC was persuaded by arguments from electrical utilities and others that amateur operation at 136 kHz might interfere with power line communications (PLC) used by electrical utilities to control the power grid.

The five frequencies granted were: 5332, 5348, 5368, 5373, and 5405 kHz, to be used on USB only, with a maximum effective radiated power limit of 50 W. The channels – each with a maximum permissible bandwidth of 2.8 kHz – will be available to General and higher class licensees.

Sumner said the ARRL was pleased to see 2400-2402 MHz upgraded to primary, where amateurs already have been experimenting with high-speed multimedia operation in the band using IEEE 802.11b protocols.

To see the Report and Order online, go to: **http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-105A1.doc**

Broadband over Power Lines

Power line communications (see preceding item) is a hot topic of discussion. The FCC currently has a Notice of Inquiry (NOI) under consideration – FCC ET Docket No. 03-104, an Inquiry Regarding Carrier Current Systems, including Power Line Broadband Systems. **http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-100A1.doc**

You may hear the technology referred to by various names and acronyms: Power Line Communications (PLC), Power Line Telecommunications (PLT), Power Line Broadband (PLB) and Broadband Over Power Line (BPL). All are "carrier-current" systems, a term used to describe systems that intentionally conduct signals over electrical wiring or power lines. Systems which operate in-building or the utilities' own control system, which operates below 500 kHz, pose no threat to shortwave (HF) signals.

However, the proposed broadband system will operate by injecting a broadband signal on power lines in the frequency ranges of 2-30 MHz. These are broad-spectrum signals that will effectively make the wiring in a person's home and community a noise generator throughout the HF broadcast spectrum.

Similar systems are being implemented in Europe, with disastrous results (See **http://www.powerline-plc.info/video**). Japan last year totally rejected BPL as a method of Internet distribution because of its disastrous effects on the HF bands.

Jeff White, President, National Association of Shortwave Broadcasters, and Nickolaus E. Leggett, N3NL, both wrote to encourage SWLs and hams to research the sites mentioned at **http://www.arrl.org/tis/info/HTML/plc/** and to write to the FCC in response to this NOI. Make the FCC aware that there are shortwave enthusiasts in the United States that are opposed to any system that would further degrade the quality of their hobby of shortwave listening.

When writing a response, an original and four copies should be sent to:

Commissioner's Secretary
Office of the Secretary
Federal Communications
Commission
445 12th Street, SW
Washington, D.C. 20554

What? We Have to File?!

Have you heard about the Nevada Highway Patrol system that has been operating illegally for the past three years? After 10 years of planning and construction and expenditures of more than $15 million, the project's new manager came to an awful realization: no one ever filed with the Federal Communications Commission to reserve the necessary radio frequencies to operate the system.

"Never in my wildest dreams did I think to ask, 'Are we legal?'" said NHP Col. Dave Hosmer. "We are licensed for no frequencies at this time."

The highway patrol's new Motorola system was intended to enable its officers to communicate with each other, the dispatch centers and some other law enforcement agencies, especially rural systems operating on 150 MHz. Though the system began operation in 2000, the highway patrol did not apply to the FCC for the frequencies until mid-2002, when it sought a temporary permit. When that permit expired, the patrol never moved for permanent approval.

The FCC ordered the state to abandon the frequencies it has been using by June 9 and return to a conventional system. Some of the 150-megahertz frequencies being used are dedicated to railroads, which have complained that highway patrol traffic interrupts their communications.

Christopher Perry, a highway patrol officer, has been assigned to find the answers needed to meet the June deadline and to find a longer-term solution to keep the system going. The patrol, he said, apparently had been operating illegally on 140 channels. The governor's office and FCC are also working with the NHP on a permanent solution.

The patrol operates on a 150-megahertz system. The FCC says there is a limited number of these channels available, and they prefer law enforcement groups to use 700- or 800-megahertz frequencies. However, in some rural counties, the highway patrol trooper is backed up by the sheriff's office and vice versa. If the highway patrol converted to the Nevada Transportation Department's 800-MHz system, not only would it mean replacing most of the equipment in the present system, but rural counties fear that would hurt their law enforcement efforts.

The governor's office said there is a possibility that converters could be purchased to up-

BULLETIN BOARD

July 1 - Aug 31: Broadcast Listener Contest
Open to all BCLs and SWLs. To win you must hear a maximum of radio stations or countries from North, Central and South America and the Carribean. (QSL cards not required.) You must send your list of stations and countries heard (Jul1-Aug31) before 15 September 2003 via e mail or via post letter to the contest manager: Frank Parisot, P.O.Box, Vanves Cedex, 92173 France. If by letter please include 1 IRC or 1 US $. Winners will receive gifts offered by sponsors. Only shortwave broadcast stations in AM are authorized: No CB, ham, pirate, utilities, or clandestine. You must choose your category: country or station. There are many stations to hear in this contest but only 28 countries. For more information http://www.swlcontest.homestead.com

July 12: Oak Creek, WI
South Milwaukee ARC Swapfest at the American Legion Post 434 (9327 South Shepard Ave), 6:30a.m.-2p.m, $5 admission, talk-in 146.52. Food, hourly prizes. For more information phone 414-762-3235 or email ryatex@aol.com . Club auctions 1st Wednesday in March, and 1st Wednesday in October, 6p.m. Upper Legion Building.

July 13: Kimberton, PA
Mid-Atlantic Amateur Radio Club Valley Forge Hamfest and Computer Fair, Sunday, July 13, 2003 at the Kimberton (PA) Fire Company Fairgrounds, Route 113, south of the intersection with Route 23, rain or shine; 8:00 am., adm $6.00 (unlicensed family members free). Talk-in 146.835 MHz/- and 443.800 MHz /+ (PL 131.8). Door prizes, dealers and demonstrations, food vendors. For information, e-mail Hamfest-info@marc-radio.org or write MARC, PO Box 2154, Southeastern PA 19399-2154; http://www.marc-radio.org.

July 19: Loveland, CO
Northern Colorado ARC annual Superfest at Larimer County Fairgrounds (700 Railroad Ave); 8am-2pm, talk-in 145.115 (-100Hz). Commercial exhibits, computer/radio goodies. Contact Willis Whatley WA5VRL (970-407-6599)

July 26: Cincinnati (West Side), OH
OH-KY-IN ARS flea market 6a.m.-1p.m. at air conditioned Diamond Oaks Career Development Campus (6375 Harrison Ave; just east of I-274 and I-74; take I-74 to Rybolt Road/Harrison Ave exit #11, east on Harrison, on right side, less than one mile from exit), talk-in 146.70(-); $6 admission. Seminars, tx hunts, indoor vendors, outdoor flea market, VE exams (8am, walk-ins accepted). Contact Lynn Ernst WD8JAW, wd8jaw@arrl.net, 859-657-6161 or visit http://www.ohkyin.org

grade the systems and alleviate those concerns.

The patrol said its study on the mistakes will be sent to the state attorney general's office to determine whether criminal charges should be filed. Meanwhile, all are hoping the FCC will not levy the billion dollars in fines that could potentially be owed for the illegal operation.

Stay tuned. As Col. Hosmer reportedly said, "It's buffoonery at its finest."

Hoka in Hot Water

A Dutch electronics firm provided Iraq with technology and training that were used to spy on NATO, documents unearthed in Baghdad have revealed. Horst Diesperger, the company's director, confirmed that he had traveled to Bulgaria to carry out training, but said the clients had told him they came from Jordan and Syria. He said Hoka "supplied the equipment not directly to the end user."

Knowingly providing Iraq with such equipment would constitute a violation of United Nations sanctions, which prohibited the sale to Baghdad of items with potential military uses. According to Hoka, the company's main business is "development and distribution of software-based decoders" such as CODE30, CODE300 and CODE3-GOLD. An Iraqi who helped to broker the Hoka deal said Saddam Hussein's ousted regime had acquired all three.

Diesperger said Hoka would have had "no problem" supplying Iraq in spite of UN sanctions because no applications were rejected. "If we have a customer in whatever country and he wants a disk, we send it to him," he said. He said it never occurred to him that his products might violate sanctions: "It's software and we sell it worldwide."

Michigan Doubles Fine

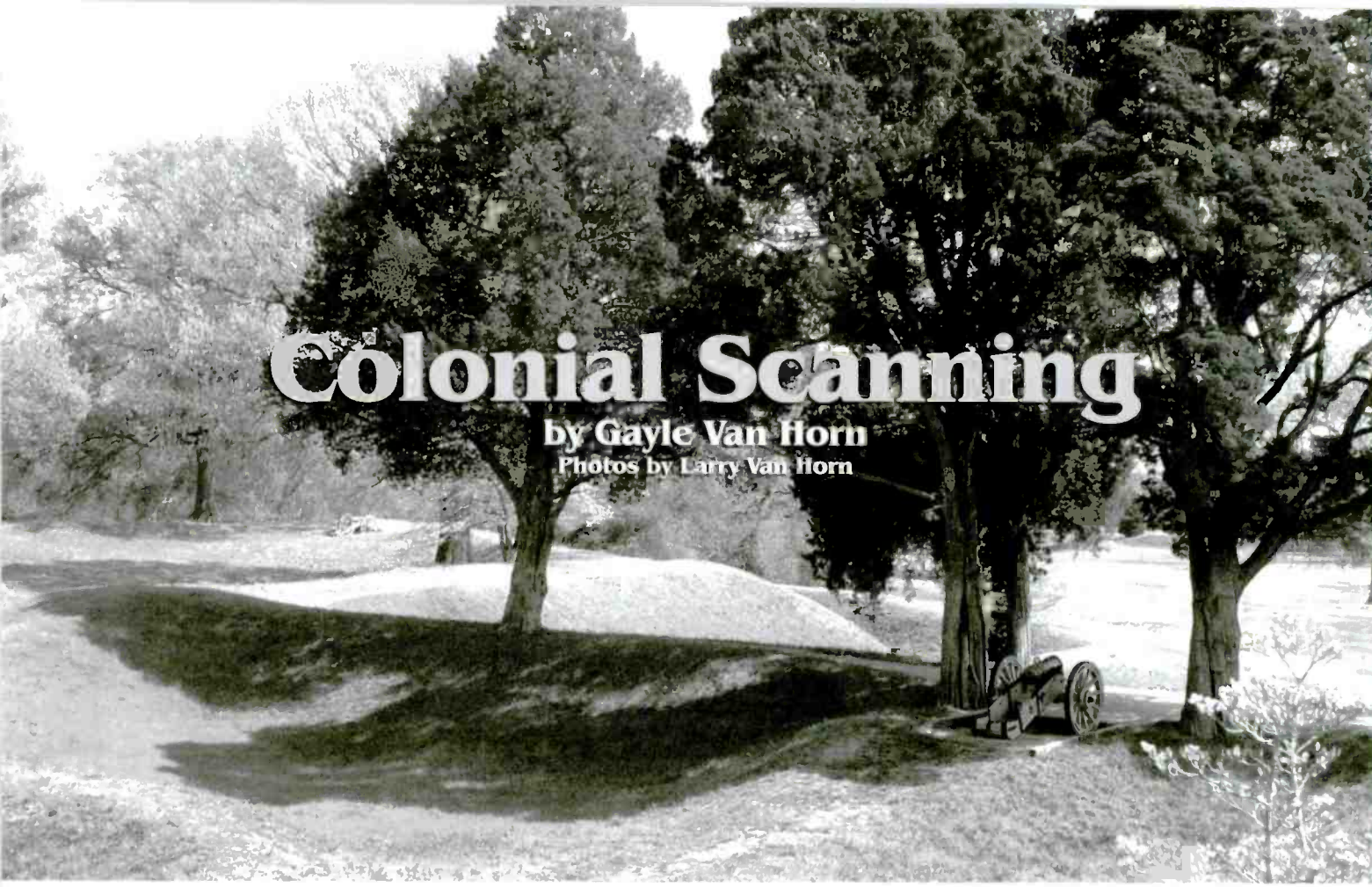
The Michigan Legislature effective March 2003, updated MCL750.508 (Michigan's Mobile scanning law). The old fine has been doubled from $500.00 for traveling with a scanner in your car to $1000.00.

Free Mobile Scanning Permits are still available from the Michigan State Police and non Michigan residents can still apply. (*Mark Bajek*)

Communications is compiled by editor Rachel Baughn, KE4OPK, from news and clippings supplied by our readers. Many thanks to this month's reporters: Anonymous, Ballston Spa, NY; Sterling Marcher, La Mirada, CA; Doug Robertson, Oxnard, CA, Brian Rogers, Melvindale, MI; Richard Sklar, Seattle, WA; and by email: Mark Bajek, Maryanne Kehoe, Nick Leggett, John Mayson, Tom McKee, Jerry None, Lee Reynolds, Larry Van Horn, Dan Veeneman, Jeff White, Robert Wyman, Daniel Wyrick, Ed Yeary.

Colonial Scanning

by Gayle Van Horn
Photos by Larry Van Horn



The earthworks at Yorktow

Scholars say that history is more than dates, figures and facts. They say that history gives us a sense of who we are and where we've been as individuals and as a nation. Our heritage provides us with insights that we can use in our daily lives from the experiences of the past.

My passions are well known by those that know me personally – history and radio. Some of our *MT* readers may recall that last year I retraced my great grandfather's battlefield service in the Civil War in an article I wrote for *Monitoring Times* (*Hallowed Ground, July 2002 MT*). That trip gave me an opportunity to observe that bit of my heritage firsthand, as well as to monitor radio communications from a variety of national parks and local/state services.

Recently, history and radio came together again when my husband Larry and I visited our colonial heritage during a vacation to the historic triangle of Jamestown, Williamsburg, and Yorktown, Virginia. Armed with our digital camera, notepads and a Uniden BC-250D scanner with APCO-25 board, once again we followed our family histories while also monitoring federal, state and local communication systems during our travels. The result was a better understanding of our personal and national origins, while getting a chance to monitor some fascinating radio communications associated with each of the sites.

JAMESTOWN – AMERICA'S BIRTHPLACE

Let's go back in time to almost 400 years ago. It requires a leap of historical imagination, but picture a scene along the James River. It is May 13, 1607. Three vessels (*Discovery, Godspeed* and *Susan Constant*) carrying 144 men and boys, anchor alongside a dense forest surrounded by swamp lands. The promise of gold has drawn the English on this four-and-half month voyage to unknown shores. However, the results are far different from what they expected: Thirty-nine of those who sailed are dead, and the future looks bleak and uncertain.

These first Jamestown settlers used crude tents or huts for shelter. They had little meat and some fish, but lived mostly on herbs, berries and roots. Eventually, they did build a fort and establish the colony of Virginia – with Jamestown as the capital – under a charter granted by King James I to the Virginia Company of London. A stockade and church are built and the men and boys begin their adventure.

By the summer of 1607, colonists are dying from drinking brackish water, and from disease, starvation, civil unrest and wars with the Powhatan Indian tribes. Fortunately, under the leadership of Captain John Smith, the colony does eventually persevere.

As more settlers arrive, the population continues to be ravaged by sickness, malnutrition, an unhealthy environment and a devastating drought, the worst in 800 years. By 1619, all but 1,000 of those who have come to Virginia with a promise of prosperity have died. That year, the elected burgesses who represent the town met in the church at Jamestown to begin the first representative government in the western hemisphere. During the next year, 90 unmarried women arrive, and family life begins to take root.

During its brief life, Jamestown wore many faces: a tiny fort at the edge of the wilderness; a small community growing to meet the needs of the land; the center of religious, economic and political life in an eventually prosperous colony.

Visiting the Past

The Jamestown of today is only a memory of those early times: Old Jamestown exists only in ruins and in the pages of history. Of the original buildings constructed during the 17th century, the only original structure that remains is the brick tower of the church. Over those original church foundations, the present Jamestown Island Church was reconstructed in 1907. Outside in a church yard cemetery, several graves of the settlers remain, including one of my ancestors – just one of several family links I have found to the colony at Jamestown.

Since 1934, research and archeological excavations have exposed ruins and original foundations with brick walls, and have led to an approximate diagram of the original settlement. In September 1997, digging paid off when archaeologists from the Preservation of the Virginia Antiquities (APVA) announced to the world that they had found the original James Fort – long thought to be lost to the James River. So far, about 15 percent of the 1607 fort has been excavated, but it will take at least another 30 years to uncover and analyze the rest of the fort and surrounding New Towne sites.

If you visit Jamestown, the Visitor Center and Museum should be your first stop. A 15-

minute film presents the Jamestown story. The museum contains one of the most extensive collections of 17th century artifacts in North America. Park Rangers conduct guided tours of the town site year round, or you may choose to explore the island at your leisure as we did. Living history programs are offered by interpreters in period dress on weekends in the spring and fall, and daily in the summer. You may also rent interpretive audio tapes at the museum store.

The "New Towne," areas of monuments and markers are near the "Old Towne" sections of the park. Both areas have walking tours of the historical town sites, including the old church tower previously mentioned. Statues and monuments dot the landscape of the park commemorating important personalities and events of the colony, including one of Capt. John Smith gazing out at the James River.

You should also visit the Dale House in Jamestown. This interesting research laboratory is where artifacts are cataloged and cleaned. The Jamestown Rediscovery project has yielded a collection of over 400,000 objects, most dating to the Elizabethan era. One interesting exhibit on display is a complete skeleton of one of the early settlers, a white male in his early twenties who died from gunshot wounds to his leg. As I viewed the relics I wondered what stories they could tell, as well as who the man was.

An excellent way to explore Jamestown Island is on the 3- or 5-mile loop driving tour. The wilderness and swamps on the island remain much like those seen by the first colonists. Illustrations and markers along the way help tell the story of the island.

Jamestown, Virginia, lies at the western end of the Colonial Parkway on the peninsula between the York and James rivers. This scenic 23-mile parkway, patrolled by the National Park Service, links the historic triangle of Jamestown, Williamsburg, and Yorktown. The Colonial Parkway was created by an act of Congress in 1930. It is open 24 hours a day and is the best way to travel around the historic triangle. Be sure to monitor 168.425 MHz during your travels on the parkway.

Soon it was time leave Jamestown, and follow colonial history to nearby Williamsburg.

Table 1: James City County Frequencies

James City County Public Safety
Motorola ASTRO 3600 baud
Frequencies: 867.125 867.175 867.375 867.600 867.850 867.900 868.3625
Note: This system was not heard on the air in April 2003.

Fire Department 154.355 (F1-Dispatch)
154.235 (F2-Inter Departmental)
154.265 (Peninsula Fire Mutual Aid)
460.425 (Talkground and special events)

Police Department 453.100 (F1)
460.175 (F2)
453.250 (F3)
453.800 (F4) (T-CAP)

Virginia Peninsula Jail 460.150 460.400 460.425 (Licensed but not heard)

Local Government 37.18 Service Authority
39.82 Dog Catcher/Code Compliance
39.90 Government Administration

James City County/Williamsburg Schools
WPOX708 Johnson LTR Regular
Frequencies: 866.375 866.5125 868.6375 868.775

WILLIAMSBURG – A NEW BEGINNING

The sounds of the fife and drum corps echo through the old streets to the tune of *York March*. The crowd follows as they pass the Capitol building, the Courthouse, Magazine and Market Square, to an imposing finale on the parade grounds of the elegant Governor's Palace. This is Colonial Williamsburg, and this portion of the trip allowed me to travel back in time to an era of our founding fathers in the 18th-century.

In 1699, after nearly a hundred years of battling pestilence, famine, fire and Indians, the leaders of the Virginia colony abandoned Jamestown for a new capital and named it Williamsburg for the reigning King William III. Also known as Middle Plantation, the new model city was a perfectly planned community, a lively mercantile center with elegant public buildings. From 1699 to 1780, Williamsburg was the political, social and cultural capital of Britain's largest, wealthiest and most populous colony.

Every year, over four million tourists come to Williamsburg. When you visit the old city, it still looks and feels like 1775 in Colonial Williamsburg, part of the British Empire. The area known as Colonial Williamsburg Park is a mile long and nearly a half-mile wide. Through extensive research, it has been meticulously restored or reconstructed as nearly as possible to the original 18th century appearance. The modern city of Williamsburg surrounds the outer borders of the park.

Members of the colonial court getting ready for a trial at the courthouse in Williamsburg

The Past Comes to Life

In the early years of the 20th century, the Reverend W.A.R. Goodwin, rector of Bruton Parish, dreamed of restoring Virginia's colonial capital to its former glory. His vision was to introduce future generation to colonial history as a reminder of our nation's principles, events and the people that fostered the birth of a new country. Goodwin's initial efforts met with little success or support. In 1926, he persuaded John D. Rockefeller Jr., heir to the Standard Oil fortune, to tour Williamsburg. Rockefeller agreed to support and fund the project on one condition – that it would encompass the entire town, not just parts of it. His fervent commitment continued for thirty years.

Like Jamestown, archaeological excavations have revealed much about the lifestyles of the colonists. Exploratory cross-trenching unearthed foundation walls, cellars and doorways. The most important find, however, was discovered in the Bodleian Library at Oxford University in England. It has the only known 18th-century architectural drawing of colonial Williamsburg's principal buildings, and this became the foundation of reconstruction. Today, many of the edifices stand on the original foundations or have been rebuilt and refurbished inside and out to original specifications or scrupulously researched estimates.

Along these streets, George Washington and other patriots laid the groundwork that would lead to the birth of a new nation. Patrick Henry thundered his defiance of King George III's Stamp Act, and it was here that young Thomas Jefferson studied law and later served as Governor of the Commonwealth of Virginia. And, according to colonial legend, it was here that Betsy Ross was asked to sew the new nation's first flag by George Washington and members of a secret committee from the Continental Congress.

Today, Thomas Jefferson still walks the streets of Williamsburg in his colonial-style frock coat, knee breeches, tri-cornered hat, and buckled leather shoes. This Jefferson, in his measured Virginia accent, is still worried about public education and tells the tourist he hopes England and the colonists "proceed peaceably" in resolving their disagreements.

During our spring visit, shopkeepers in period-dress and 18th-century conversational speech set up their open-air market selling cider near the six-sided magazine that served as the arsenal for the Virginia colony. We could hear gossip among the shopkeepers, as well as talk of an impending war with England. When I asked if I might take their photo, they were perplexed at our "magic box." Other tradesmen, including a wheelwright, demonstrated his profession to Larry, whose fifth-generation great grandfather had once performed the wheelwright trade. In a horse-drawn carriage, the driver nods "good day" to us as we walked down the stately Duke of Gloucester Street.

Entrance to the NPS visitors center at Jamestown.

Colonial Williamsburg is now the world's oldest and largest living history museum. The thriving Historic Area, with its costumed interpreters, offers an opportunity to experience a slice of 18th-century life. Many of the restored buildings are residences for Colonial Williamsburg employees. Other buildings are hotel facilities, taverns, public buildings and shops.

Williamsburg is also home to William and Mary University, founded by Royal Charter in 1693, and second in age only to Harvard University in Cambridge, Massachusetts. Known as the "alma mater of a nation," William and Mary has educated four U.S. Presidents.

My favorite exhibit was the ornate splendor of the Governor's Palace and surrounding gardens. It served as the executive mansion for the commonwealth's seven royal governors as well as Patrick Henry and Thomas Jefferson, until the capital was moved to Richmond, Virginia in 1780. This imposing residence was meant to impress visitors with the prestige and power of the king's representative in Virginia.

Larry's favorite spot was the Capitol. It was from this building in the House of Burgesses that Patrick Henry railed against British taxation. One of Larry's ancestors had also served in that very same House of Burgess.

Customize Your Tour

A good place to orient yourself after your arrival is the Visitor Center. Streets in the Historic Area are closed to motor vehicles, so you are required to park in the Visitor Center parking lot. Shuttle buses leave every few minutes, or you may walk the short distance to the Historic Area along a wooded path that goes from the Visitor Center to the Gateway Building in the Historic Area.

While at the Visitor Center, you may plan your visit with one of the orientation specialists. Don't forget to view the *Williamsburg-The Story of a Patriot*. This is a 37-minute dramatization of events in Williamsburg on the eve of the American Revolution and plays throughout the day at the Visitor Center and in most motel and hotel rooms.

There are various admission ticket plans available. Once inside the Historic Area, if you're a first time visitor, I'd highly recommend you take the 30-minute Orientation Walking Tour that begins at the Gateway Building. The tour is part of your admission ticket and usually leaves at 10 to 20 minute intervals, depending on time of day. This will give you an excellent introduction to Colonial Williamsburg on topics not routinely covered during building tours.

As you walk the streets of the Historic Area, look for the British flags at the curb. These indicate which buildings and sites are open to the public. If you're really on a tight budget, admission to the Historic Area is free; however, you will not be permitted to enter any of the buildings, shops, taverns, theater, museums or carriage rides flying the Union Jack.

Time really does stand still in Colonial Williamsburg if you immerse yourself in the surroundings of the park. For me, it was easy to imagine a city in the forefront of many events that would lead to independence and the establishment of a new American society. But now that we were brought to the verge of revolution, it was time to move on and visit historic Yorktown, Virginia.

Table 2: Williamsburg Frequencies

Fire Department 154.145 (Dispatch)
154.445 (Alternate)
153.885 (Tactical)
155.260 (Fireground)
Colonial National Historical Park (KIH 348)
Uses same freqs as Fire Dept
Local Government 453.425
Police Department 460.050 (F1)
460.175 (F2)
Colonial Williamsburg Park (WPRZ944)
Johnson LTR Regular
Frequencies: 451.825 452.225 452.725 461.275 461.7625 462.275 463.4375

One of the many archeological digs on the Jamestown Island complex

YORKTOWN – INVENTING A NATION

To complete your understanding of the story of our nation's birth, a visit to Yorktown is a must. Americans won their independence here during the last major battle of the American Revolution. On October 19, 1781, British troops led by General Cornwallis surrendered to General George Washington and his French allies. Each year on the anniversary of the British surrender, Yorktown is the scene of patriotic festivals and reenactments.

Yorktown is a tiny village along the York River, at the eastern end of the Colonial Parkway. Although smaller today than during colonial times, the town continues to function as an active community and it retains many of the restored colonial dwellings.

The National Park Service maintains the restored home of Thomas Nelson Jr., a signer of the Declaration of Independence. His home still bears the scars of artillery bombardment during the siege of 1781. All of the colonial structures give the town much of the character of a long-vanished era. In the summer months, the Fife and Drums of York Town perform free concerts on Tuesday and Sundays, while walking tours are offered daily year round.

Among Nelson House, the Customhouse and other colonial structures, stands Grace Episcopal Church, on the eastern end of

Jamestown Island Church

Colonial Parkway. Built in 1697, it was used by the British during the battle as a magazine. It was partially burned in 1814 but was later rebuilt. Among the graves in the churchyard is that of Thomas Nelson Jr., and "the father of Yorktown," Nicholas Martiau, 12th great grandfather of Larry Van Horn.

The Yorktown Victory Monument, erected by the United States to commemorate the victory over Cornwallis, stands at the east end of Main Street. The cornerstone of this monument was set in 1881 at the centennial celebration of the surrender. Inscribed on the monument are the names of Americans known to have lost their lives in the Yorktown campaign. Nearby, in the area where America's French allies were encamped under the leadership of General Rochambeau, is a monument bearing the names of French soldiers who died at Yorktown.

The Yorktown Victory Center, located at the intersection of Route 1020 and the Colonial Parkway, is a "must-see" on any tour of Yorktown. At the center, America's revolution is chronicled through exhibits and an outdoor living history that emphasizes the experiences of ordinary people.

A visit to the Yorktown Battlefield is also a necessity, and you should begin with the Visitor Center. The battlefield is also part of the Colonial National Historical Park. For small park entrance fee, payable at the center, you will learn about the events of the siege and the story of the town through a theater program and multi-media exhibits. A 16-minute film, *Siege at Yorktown*, depicts the battle and its significance. Two separate auto tours will give you the complete story of events at Yorktown. Before you leave the center, I'd recommend you visit The Siege Line Overlook on the roof of the Visitor Center. From here you'll see a panoramic view of strategic points on the battlefield.

Tours of the battlefield are conducted from the Visitor Center by Park Rangers, or maps are available for the self guided driving tours. As you wind through the battlefield you will see fortifications and markers depicting chronological events of the siege.

The original allied earthworks were leveled on Washington's orders immediately after the siege. Through careful examination of 18th century military maps and archaeological excavations, the National Park Service has reconstructed a nearly complete picture of General Washington's siege. Earthworks and siege lines mark the pattern of British and American troops during the battle. The earthworks are priceless treasures, and should not be overlooked on your tour. Cannons used during the battle are also mounted in several of the reconstructed redoubts and batteries.

There is so much to see at the Yorktown Battlefield, where numerous significant historic events took place. Of the rebuilt fortifications, Fusiliers' Redoubt of the British, Grand French Battery and Redoubte No. 9 and 10 should be included in your stops.

Finally, visit the Augustine Moore house, where officers of both sides met to negotiate the surrender terms of Cornwallis's army on the battlefield. From there, go to Surrender Field where the British laid down their arms, thus ending the Revolutionary War and virtually assuring American independence.

Table 3: York County Frequencies

York County E-911 (WPVB303) Type System is unknown
This 12 frequency system is licensed with the FCC but was not on the air in April 2003.
Frequencies: 866.250 867.2625 867.325 867.350 867.775 867.875 867.950 868.525 868.5375 868.6625 868.800 868.8125
Newly Licensed Additional Frequencies (WPUZ484): 866.0125 867.0125 868.0125

County Fire Department (WNUR469)
154.400/154.010 (Dispatch)
154.175 and 154.325 (Fireground)
Local Government 39.18
154.815/159.300
Sheriff Department (WPNT363)
453.150 (Dispatch)
453.200 (Poquoson Police)
[Licensed but not heard: 453.6375 453.7375 460.1125]
Unidentified Public Safety (WPLW665) 460.225 460.275 460.375
Utilities Department (WPQG831) 453.6375 453.7375 460.1125
Wolftrap Park 466.1125

FINAL THOUGHTS

So what really is the point of history, you ask? The point of history is to remember those brave men and women that fought for their beliefs, and gave their lives so we could be free. Each has their own story to tell, and each possesses an eminent place in American history.

If we as a nation do not understand where we began and how we have gotten to where we are today, chances are we will never understand our present world. History gives us a sense of who we are, where we've been. It also gives us a sense of where we are going in the future.

Our weekend touring Jamestown, Williamsburg, and Yorktown was one that touched us both in special ways. This was an opportunity to honor our personal and our national heritage. In addition, the region was as rich a monitoring environment as we two scanner hobbyists could hope for. What more could one possibly ask of a vacation?

Table 4: Miscellaneous Area Frequencies

Anheuser-Busch Brewery (WPHN688)
Williamsburg Motorola Type II
Frequencies: 855.0375 855.3125 855.3375 855.5375 855.5875 855.7875 857.8875 858.8875 859.8125 859.8625 859.8875 860.8125 860.8875 860.9125

College of William and Mary (WNZI912)
Williamsburg Motorola Type I
Frequencies: 856.8125 857.8125 858.8125 860.8125

Colonial Historic Park (National Parks - Jamestown, Yorktown and Colonial Parkway)
168.425/169.125 Park Repeater System (Cheatham Annex)
KID 700 Yorktown Visitors Center
KID 701 Jamestown Maintenance Area
KID 757 Williamsburg Ranger Residence

Jamestown/Yorktown Foundation (WPQC568)
457.600

Langley AFB - Motorola ASTRO 3600 baud APCO-25 compliant
Frequencies: 406.550 406.750 407.150 407.950 408.550 408.750 408.950 409.150 409.350 409.950

Monument to Captain John Smith overlooking the James River

Parade of the Boat Anchors

Part 1 — "Starter" Receivers

By Marc Ellis

Even though I regularly comb the flea markets and classified ads for old radios, I'm not a radio collector in the truest sense. Mostly I'm on the lookout for receivers and test instruments that will make interesting projects for the monthly restoration column I've been writing for well over sixteen years. The bulk of my projects have involved vintage broadcast receivers, but about seven years ago, when I took over the editorship of the Antique Wireless Association quarterly bulletin (*The OTB*), my interests began to change.

Through my attendance at AWA meets and contacts with AWA members, I began to be more aware of the charm and lure of the old tube-type communications receivers used by radio amateurs and the military. Once I began writing for *Monitoring Times*, I obviously had even more reason to focus on such radios. You'll be seeing more and more of them in my "Radio Restorations" column as time goes on.

Like all heavy old tube gear, these radios are generically known as "boat anchors." The term implies that the best use for the weighty old instruments is to prevent a boat from floating away. It's used both affectionately by those who love the sets and sarcastically by those who have little use for them.

Back when I first began to spend time at radio meets, the old communications gear often went begging for customers. There just wasn't a lot of interest. Today, collecting and restoring these sets has become much more popular. However I would say – rather loosely I admit – that high-interest communications sets are, as a group, more affordable than high-interest broadcast radios.

I thought it might be fun to introduce *MT* readers who may not have met these radios before to some of the common (as well as a few of the more uncommon) sets they might run into at radio meets. This is Part 1 of the two-part article that resulted. It's devoted to the simpler, basic receivers I call "starter sets," such as were purchased by beginning radio amateurs and shortwave listeners. In the second part, to be run in the August issue, we'll take a look at some of the more sophisticated radios that were in the hands of the more experienced and/or well-heeled users.

Keep in mind that this "Parade of the Boat Anchors" will be far from comprehensive. We'll have room to discuss about fifteen sets here in Part 1 and another fifteen in Part 2. There are hundreds of models out there, and all we can hope to do is show you a number of typical sets and whet your interest. You'll discover many more examples for yourself if you become interested in this engaging area of radio collecting.

A little less than half of the receivers you'll be seeing in these articles came from my own collection and the rest were photographed at the A.W.A. Electronic Communication Museum in Bloomfield, New York. The museum kindly gave me free run of its shelves to pick and choose interesting sets. I'll include more information about the museum in Part 2.

I've tried to arrange the radios on these pages roughly in chronological order of their original release dates. For each one there is a brief summary of general and technical information. Not every radio you see will be exactly in mint condition. Some are obviously awaiting restoration and may look a little rough. However, all the sets are in good enough shape so you'll be able to identify the same models when you see them at the meets. In fact, many of the sets you'll find are likely to have similar flaws.

You'll notice that the Hallicrafters Company seems to be disproportionately represented among the models shown here in Part 1. But that is simply a reflection of the dominant position the company held in this arena. You'll find that Hallicrafters radios will be generally more common among the "starter sets" and originally medium-priced models offered at radio meets and flea markets.

HALLICRAFTERS S-19R "SKY BUDDY"

General: Introduced in 1939, the S-19R looks identical to the S-19 of 1938 except for the addition of a fourth bandswitch position allowing coverage of the newly-popular 10-meter band. Bandspread was now electrical instead of mechanical. The "German silver" tuning dial was typical of earlier Hallicrafters radios. This set and its predecessor are strongly associated in many people's minds with 1930s ham radio. *Tuning range*: 545 kHz - 44 MHz in four bands. *Dimensions*: 17-1/2"w X 8-1/2"h X 8-1/2"d. Black crackle finish. *Original price*: $29.50.

Circuitry: Transformer-powered superhet. No r.f. stage; one i.f. stage; bandspread; built-in speaker; BFO. *Tube complement*: 6K8 oscillator/mixer; 6SK7 or 6K7 i.f. amplifier; 6SQ7 or 6Q7 second detector, AVC and first audio; 41 audio output; 76 BFO; 80 rectifier.

HALLICRAFTERS S-20R "SKY CHAMPION"

General: Released along with the S-19R in 1939, this set was an upgrade of the 1938 S-20 version – which had a "German-Silver" tuning dial and other styling like that of the S-19. Its new look included a backlit tuning window, more dressy appearance, including stylish chrome trim on the end panels. Added were a noise limiter circuit and an extra tube to allow a second i.f. stage. *Tuning Range*: 545 kHz - 44 MHz in four bands.

Dimensions: 18-1/2"w X 8-1/2"h X 9-3/8" d. Grey paint finish. *Original Price*: unbelievably maintained at the S-20s $49.50. Accessory "S"-meter (Model SM-20R) available at $11.75.

Circuitry: Transformer-powered superhet. One r.f. stage; two i.f. stages; bandspread; built-in speaker; BFO; noise-limiter; drift-compensated HF oscillator. Tube complement: 6SK7 r.f. amplifier; 6K8 oscillator/mixer; 6SK7 first i.f. amplifier; 6SK7 second i.f. amplifier; 6SQ7 second detector, AVC and first audio; 6H6 noise limiter; 6J5 BFO; 6F6 audio output; 80 rectifier.

HOWARD 436

General: Their interesting styling and unusual dial designs make the Howard receivers interesting finds for collectors. Though quite rare compared to the products of Hallicrafters and other mainstream manufacturers, these sets still can occasionally be found at swap meets and flea markets. The 436 was introduced in 1939. *Finish*: Grey crackle. *Tuning Range*: 545 kHz - 43 MHz in four bands. *Original Price*: $40.00. Available accessories were: external speaker, 6v dc power pack, preselector and "S"-meter.

Circuitry: Transformer-powered superhet. No r.f. stage; one i.f. stage; bandspread; built-in speaker, BFO; noise limiter. Tube complement: 6K8 oscillator/mixer; 6SK7 i.f. amplifier; 6SQ7 detector, first audio; 6C5 BFO; 6H6 noise limiter; 6K6 audio output; 80 rectifier.

Note: Second, fourth and fifth knobs from left are not original.

ECHOPHONE EC-1

General: The Echophone Company was a casualty of the Depression. In 1936, its manufacturing plant and RCA licenses were purchased by Hallicrafters. The brand name remained unused until 1941, when Hallicrafters wished to introduce a line of radios that would be easier to manufacture given the scarcities of materials brought about by gathering war clouds in Europe. Because of the cut corners, Hallicrafters preferred not to use its own brand name—hence the resurrection of Echophone. In spite of the manufacturing compromises, the EC-1 in my collection is a very hot little receiver and a lot of fun to operate. *Tuning Range*: 550 kHz - 30.5 MHz in three bands. *Dimensions*: 10-3/4"w X 8"h X 7-3/4" d. Grey crackle finish. *Original Price*: $20.00.

Circuitry: a.c.-d.c. superhet (no power transformer). No r.f. stage; one i.f. stage; bandspread; built-in speaker; BFO. Tube complement: 12K8 oscillator/mixer; 12SK7 i.f. amplifier; 12SQ7 detector, AVC, first audio amplifier; 12J5 BFO; 35L6 audio output; 35Z5 rectifier.

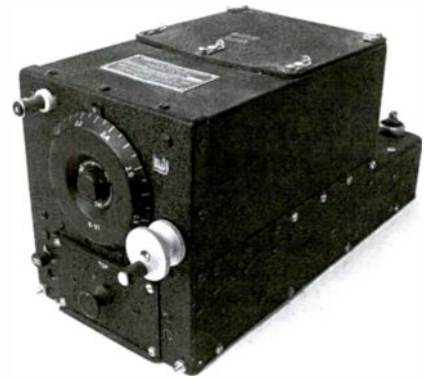
ECHOPHONE EC-2

General: Introduced in 1941. See the EC-1 writeup for other general comments. Tuning range: 50 kHz - 30 MHz in three bands. Grey crackle finish. Original Price: $29.95.

Circuitry: a.c.-d.c. superhet (no power transformer). One r.f. stage; one i.f. stage; bandspread; built-in speaker; BFO; noise limiter. Tube complement: 6SG7 r.f. amplifier; 6K8 oscillator/mixer; 6SK7 i.f. amplifier; 6H6 detector, AVC, noise limiter; 6SC7 BFO, first audio; 25L6 audio output; 25Z6 rectifier; ballast tube.

R-25 "COMMAND SET"

General: I'm considering this example of an all-time favorite military surplus series as a post-war release because that's when the sets came to the attention of the ham and SWL community. Of course the command set series was probably developed in the late 1930s and soon after became a communication mainstay in the fighter planes and other smaller aircraft used by the military. After World War II, the radios hit the surplus market in large amounts and were sometimes offered, brand new, with tubes, for under $10.00. They sold like hotcakes because of their beautiful ugliness, jewel-like construction and rock-bottom price. The radio shown here is a rare mint 1.5 - 3 MHz model (R-25) from the navy ARC-5 series. It is available only in the navy series. The almost identical army series of command sets was designated SCR274-N. The other frequency ranges, available (in either the army or navy series), were 190-550 kHz, 520-1500 kHz, 3-6 MHz and 6-9.1 MHz.

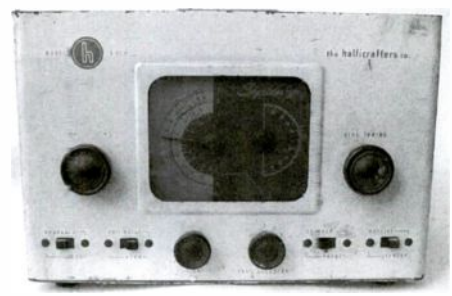


Circuitry: Dynamotor-powered superhet operated from the plane's 24-volt electrical system. One r.f. stage; two i.f. stages; BFO; headphone output only. Tube complement: 12SK7 r.f. amplifier; 12K8 oscillator/mixer; 12SK7 first i.f. amplifier; 12SF7 second i.f. amplifier/AVC; 12SR7 detector/BFO; 12A6 audio amplifier.

Note: The set is pictured with a crank knob utilized for local tuning. Normally these radios were tuned via flexible cable by controls located elsewhere in the plane.

HALLICRAFTERS S-41W "SKYRIDER JUNIOR"

General: Hallicrafters released the S-41 in 1945. It was electrically identical to the Echophone EC-1A (itself an update of the EC-1) and seems to have been the first bare-bones communications receiver marketed under the Hallicrafters name. The firm was very much into making their products attractive not just to hams and SWLs, but to the postwar buying public in general. The set was available in a choice of colors: the S-41G in a tricky gray and black paint job or the S-41W (pictured) in white. *Tuning Range*: 550 kHz - 30 MHz in three bands. *Dimensions*: 11-3/4"w X 8"h X 7-5/8" d. Painted finish. *Original Price*: $34.00



Circuitry: a.c.-d.c. superhet (no power transformer). No r.f. stage; one i.f. stage; bandspread; built-in speaker; BFO. Tube complement: 12SA7 oscillator/mixer; 12SK7 i.f. amplifier; 12SQ7 detector, AVC, first audio amplifier; 12SQ7 BFO; 35L6 audio output; 35Z5 rectifier.

HALLICRAFTERS S-38C

General: The S-41 had been on the market for only a matter of months, when it received yet another facelift by the famous designer Raymond Loewy, who had been retained to give the Hallicrafters line an exciting new postwar look. The result was the S-38, the first of a continuously evolving series, introduced between 1946 and 1956, that included the S-38A, B, C, D, and E. Primarily suitable for SWL rather than ham use, the S-38 and its updates probably comprise the best known and most-listened to communications receivers of all time. The S-38C discussed here, released in 1952, had an attractive gray steel cabinet and black tuning dials with white lettering. *Tuning Range*: 540 kHz - 32 MHz in four bands. *Dimensions*: 12-7/8"w X 7"h X 7-3/4 d. Painted finish. *Original Price*: $50.00

Circuitry: a.c.-d.c. superhet (no power transformer). No r.f. stage; one i.f. stage; bandspread; built-in speaker; BFO. Tube complement: 12SA7 oscillator/mixer; 12SK7 i.f. amplifier/BFO; 12SQ7 detector, AVC, first audio amplifier; 35L6 audio output; 35Z5 rectifier.

HALLICRAFTERS S-40B

General: Appearing along with the S-38 in 1946, the S-40 was Raymond Loewy's cosmetic update of the S-20R "Sky Champion" pictured earlier in this article. This radio was a truly practical, though very basic, ham receiver. It, too, went through a few revisions: The S-40A of 1947 and (discussed here) the S-40B of 1950. *Tuning Range*: 540 kHz - 43 MHz in four bands. *Dimensions*: 18-1/2"w X 9"h X 11"D. Black Painted finish. *Original Price*: $89.00

Circuitry: Transformer-powered superhet. One r.f. stage; two i.f. stages; bandspread; built-in speaker; BFO; noise-limiter. Tube complement: 6SG7 r.f. amplifier; 6SA7 oscillator/mixer; 6SK7 first i.f. amplifier; 6SK7 second i.f. amplifier; 6SL7 BFO/second detector; 6H6 noise limiter/AVC; 6F6 audio output; 5Y3 rectifier.

NATIONAL SW-54

General: The National Company was not generally known for producing "starter" radios, preferring to use its superb design and construction expertise on more sophisticated models. But in 1950, the company took a flyer and introduced one of the most charming inexpensive communications receivers ever made. Positioned to sell against the Hallicrafters S-38, the radio was more compact because it made use of miniature tubes in all stages except the rectifier (Hallicrafters was still using exclusively octal-base tubes during this era). With its slide-rule dial, snappy grey and red color scheme, and offset tuning knob with thumbwheel "vernier," the appearance of the SW-54 didn't have to take a back seat to Loewy's Hallicrafters designs. However, the "vernier" thumbwheel, which simply allowed the tuning knob to be turned farther out on its radius, was no match for the S-38's electrical bandspread. *Tuning Range*: 540 kHz - 30 MHz in four bands. *Dimensions*: 11"w X 7"h X 7"d. Grey-painted cabinet. *Original Price*: $50.00

Circuitry: a.c.-d.c. superhet (no power transformer). No r.f. stage; one i.f. stage; thumbwheel tuning aid, but no bandspread; built-in speaker; BFO. Tube complement: 12BE6 oscillator/mixer; 12BA6 i.f. amplifier/BFO; 12AV6 detector, AVC, first audio amplifier; 50C5 audio output; 35Z5 rectifier.

KNIGHT OCEAN HOPPER

General: Knight Kits were marketed by Allied Radio, and the line included a variety of low- and medium-priced short-wave sets targeted for young hobbyists. The firm had a knack for giving the sets romantic names – which included the "Space Spanner" and "Span Master" as well as the subject of this entry. The set was introduced in 1953 at $11.00 with a coil for 530 - 1900 kHz. An updated version appeared in 1963 with the same tube complement, front panel design and coil, but including a wood cabinet, for $17.00. Four short-wave coils and a long wave coil were offered at nominal cost. The set pictured here may be the earlier version because it has no cabinet. *Dimensions (Of set in cabinet)*: 10-1/2"w X 6-3/4"h X 5-1/2" deep.

Circuitry: a.c.-d.c. regenerative (no power transformer). Headphone output (though use of speaker possible with strong stations); electrical bandspread. Tube complement: 12A6 regenerative detector; 50C5 audio output; 35W4 rectifier.

HALLICRAFTERS S-38D

General: Perhaps prompted by the National SW-54's slide-rule tuning dial, Hallicrafters revolutionized the appearance of the S-38 with the "D" model, introduced in 1954. Gone were the familiar semicircular main tuning and bandspread dial windows, replaced by generously large slide-rule scales spread out over most of the front panel. However, there was no attempt to emulate the SW-54's use of miniature tubes. *Tuning Range*: 550 kHz - 30 MHz in four bands. *Dimensions:* 13"w X 7-1/2"h X 8-7/8"d. Gray-painted cabinet. *Original Price*: $50.00

Circuitry: a.c.-d.c. superhet (no power transformer). No r.f. stage; one i.f. stage; bandspread; built-in speaker; BFO. Tube complement: 12SA7 oscillator/mixer; 12SG7 i.f. amplifier/BFO; 12SQ7 detector, first audio amplifier; 50L6 audio output; 35Z5 rectifier.

HALLICRAFTERS S-120

General: By 1960, the S-120 had replaced the final S-38 model (S-38E) as Hallicrafters' low-end communications receiver. The extended slide-rule scales were a handsome silver-on black with controls attractively laid out below on a silver panel. Most of the annoying little slide switches were gone, replaced by rotary units. The set had a built-in ferrite loop antenna for broadcast and 45" telescoping whip antenna. The company had finally switched to miniature tubes with the S-38E and this usage was continued in the S-120. *Dimensions*: 13-1/2"w X 5-7/8"h X 8-3/4"d. Gray-painted cabinet. *Original Price*: $60.00

Circuitry: a.c.-d.c. superhet (no power transformer). No r.f. stage; one i.f. stage; bandspread; built-in speaker; BFO. Tube complement: 12BE6 oscillator/mixer; 12BA6 i.f. amplifier/BFO; 12AV6 detector, first audio amplifier, AVC; 50C5 audio output; selenium rectifier.

HEATHKIT GR-64

General: Introduced in 1963, this kit was sold at a rock-bottom price yet included some features not normally found in entry-level sets, such as an "S" meter, noise limiter, an r.f. gain control and transformer power. Front-panel design was reminiscent of the Hallicrafters S-120. Built-in ferrite loop for broadcast listening. *Dimensions:* 13-1/2"w X 6"h X 9"d. *Original price*: $38.00

Circuitry: Transformer-powered superhet. No r.f. stage; one i.f. stage; bandspread; built-in speaker; BFO; noise limiter. Tube complement: 12BE6 oscillator/mixer; 12BA6 i.f. amplifier/BFO; 12AV6 detector, first audio amplifier; 12AQ5 audio output; semiconductor diodes.

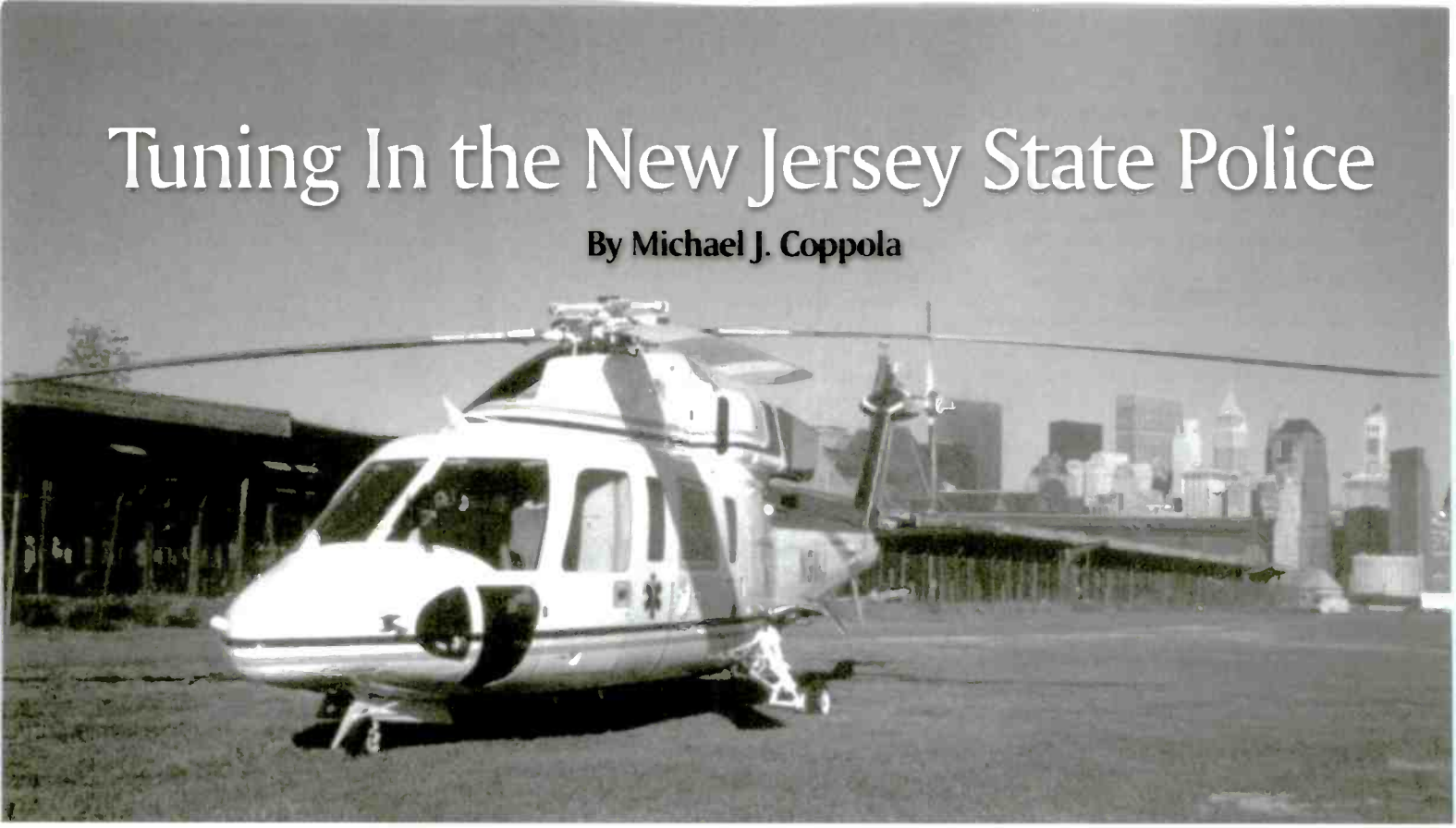
KNIGHT STAR ROAMER

General: Another of Allied Radio's romantically-named Knight kits. However this one, while still inexpensive, is a much more serious radio. Layout of handsome front-panel design is similar to that of the GR-64 and S-120. features and price are quite similar to those of the GR-64. Dimensions: Front panel 12-1/4"w X 5-1/2"h X 8"d. Charcoal gray cabinet. *Original price*: $39.95.

Circuitry: Transformer-powered superhet. No r.f. stage; one i.f. stage; bandspread; built-in speaker; BFO; noise limiter. Tube complement: 6BE6 oscillator/mixer; 6HR6 i.f. amplifier; 12AX7 detector, first audio amplifier; 6AK6 or 6AR5 audio output; semiconductor diodes.

Tuning In the New Jersey State Police

By Michael J. Coppola



On March 29th, 1921, the New Jersey State Senate signed into the law the "State Police Bill" forming the New Jersey State Police. On July 1st 1921, Herbert N. Schwarzkopf was sworn is as the first Superintendent of the New Jersey State Police and began his career of designing New Jersey's top law enforcement agency. You probably are more familiar with his son, General Norman Schwarzkopf, known for his role as Commander of the Desert Storm War in Iraq.

Back then, the State Police operated like most other agencies, using horses and motorcycles for patrol and landline phones for communications. But a lot has changed since then. The State Police first operated a radio system on low band, then migrated to VHF conventional (now being used for some "operational" roadside assistance patrols), and currently operates on 800 MHz.

When the 800 MHz system was first put into place, it was a Type I trunked system (with exception of the standard ITAC[3] channels). The current system is a Type IIi system which is in the stages of upgrading again to a total Type II system. And then, in the not so distant future, it plans to become a mixed-mode digital system. Confused yet? Well, let's break down the state and show you how it's going to work.

One Division, Three Troops

First, the State of New Jersey has 21 counties and approximately 512 towns. Of these, the New Jersey State Police (NJSP) is considered "supplemental" patrol for towns with police departments, and is the primary patrol for state-owned and interstate roadways as well as towns unable to provide their own department. In other words, if a town is unable to provide police patrol, the NJSP, by state law, must be able to supplement that town's patrol. An example of this would be Victory Gardens in Morris County. They do not have a primary police department and the NJSP is the primary responding law enforcement agency.

NJSP also covers major arteries such as Interstate 80 (beginning at the George Washington Bridge through to Pennsylvania), and Route 95 (aka: NJ Turnpike) which extends from New York to Delaware.

There are over 130 specialized divisions of the State Police, including an Aeromedical program, Marine Divison, and SWAT teams (aka: TEAMS unit). The TEAMS unit is a comprehensive SWAT, Bomb, Dive, Rescue, and similar emergency services unit which is the "Best of the Best" type division. The NJSP is also the "model" agency for all of NJ's law enforcement agencies in regard to standard procedures.

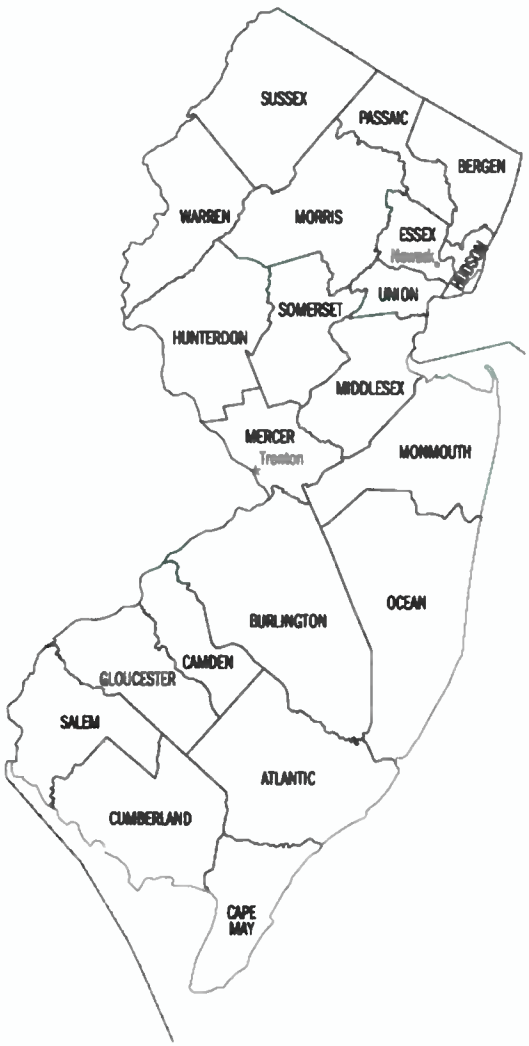
Now that you have a *basic* understanding of the NJSP, I'll get into the radio system. The State Police comprises one Division (Department of Law and Public Safety, Division of State Police), which is the main headquarters in Trenton, NJ, for all NJSP Troops. Each Troop (total of three: A, B, and C) covers seven counties each. Troop A covers the Southern section of NJ, Troop B covers the Northern, and Troop C covers the central. Each Troop Headquarters supervises stations (what were formerly called *barracks*, from the days when troopers used to live at the station during patrol weeks).

Each Troop's system has its own set of control channels and talkgroups for its respective area. Each station has its own talkgroup/subfleet on that troop's system. Though there are three totally separate systems, certain divisions such as the Statewide Medical Program and the JEMSTAR program (medevacs) have linked talkgroups. For example, Northstar on the northern border of NJ can access the Troop B system and talk to Southstar who can be on the southern border of NJ and accessing the Troop A system. Division headquarters has the capability of coming up onto any system and talkgroup it wants. (The luxury of being the boss, apparently.)

Listening to the NJSP

If you program your scanner/radio for the NJSP system, you will find several things. First, there are *major* coverage problems. Ever since the World Trade Center collapsed, Troop B lost their main transmitter site. Since the system is still in replacement and upgrading stages, some troopers are now forced to use old conventional VHF channels and even cell phones in bad coverage areas.

Other concerns are ... you guessed it, Nextel. Where certain signals are weak, a strong Nextel tower can cause a shadow in



the coverage. Secondly, the system goes into "failsoft" occasionally, due to microwave uplinks that are having some problems. These are gradually being addressed by the upgrade solutions that are being put into effect. Last, but certainly not least, you will notice that some troopers are talking on Type IIi talkgroups and simulcasting on Type II talkgroups. This is because of the upgrade. As I explained earlier, the final plan is to upgrade the entire system to a Type II, Smart-Zone, Mixed-Mode system.

Huh? Exactly. Since the NJSP system is a baby of Motorola, it works like a typically muddled Motorola machine.

Simply put, Type II means the protocol of the system itself. Then there are three types of Motorola trunking. Privacy Plus (found in old business systems no longer in use), Smartnet (which was geared for public safety and is also being phased out), and finally, Smart-Zone.

Smart Zone takes several trunking systems and links them together via one main computer system. A quick scenario would be, if Troop B and Essex County were on a linked Smart-zone system and a trooper started a pursuit, he could go into an area of terrain that his system was unable to cover and the radio would automatically start working off the Essex County system. He would then come back over to his system when back in a better area. He would be on his own talkgroups, so the other system wouldn't even hear him. This is a great idea if you have spotty coverage areas.

In the same process, the State Police is trying to convert of their talkgroups to digital. However, this will be some time in the future, due to money concerns and equipment availability. They simulcast the talkgroups so that trooper cars on the old system can still talk to the cars that are already reprogrammed.

The radios used by the NJSP are as follows: Cars - Astro Spectras; Portables - currently MTS2000s with full keypads but upgrading to XTS3000s. Aviation has Astro Spectras, as well as other aviation radios which allow them onto any frequency and PL they want. Special stations for toll roads (such as the NJ Turnpike and Garden State Parkway), have a radio on VHF in the trooper car as well (these are MCS2000s).

Each Troop has one main communication center. Example: Troop A is run out of Division Headquarters, Troop B is out of Totowa, and Troop C is out of Princeton. There are two exceptions to the Troop Headquarters: The NJ Turnpike and Garden State Parkway have their communications center located at Cranbury Station. This station is responsible for communications for all stations on the entire length of those highways. In addition, each communication center can log into each other's CAD (computer aided dispatch) system. This is useful when units are on assignments outside their primary coverage area.

I should also mention that NJ has what is called a State Police Emergency Network also known as SPEN. These are VHF conventional channels used for all agencies in NJ to interact with each other. SPEN 1 (154.680), SPEN 2 (155.475), SPEN 3 (154.725), and SPEN 4 (153.785) all use a common PL of 131.8. Each is simplex and has designated uses. SPEN 1 is for inter-police-agency emergency communications, 2 and 3 are for backup channels for interagency communications, and 4 is for Fire and EMS coordination.

The following is the *basic* layout you'll need to know to hear the NJSP systems. I say basic, because I'm including the primary patrol radio layouts, but this does not include all the outside NJ agencies that utilize the system. Other agencies, for example, would be Division of Agriculture, Department of Corrections, Division of Elections, and so forth.

TROOP A

Control Channels: 860.9375, 859.9375, 858.9375, & 857.9375
System ID - B106; Size code - O or S13; Fleet ID - 000

Talk group	Display	Coverage
1	A1-01 CALL	Division Call to other stations
2	A1-02 TRP HQ	2-Comm, Specialized Units
3	A1-03 EAST	3-Comm, Buena Vista & Tuckerton Stations
4	A1-04 SOUTH	4-Comm, Bridgeton, Port Norris, Woodbine Stations
5	A1-05 WEST	5-Comm, Bellmawr, Woodstown Stations
6	A1-06 MARINE	Atlantic City Area Marine Coverage
7	A1-07 OPS	Car to Car for 2, 3, 4 & 5 comm units
8	A1-08 COM PST	Command Post for large incidents
9	A1-09 INTOPS	Interops, usually simulcast with SPEN 1 (Also Parkway car to car)
10	A1-10 MARINE	Burlington County Area Marine Coverage
11	A1-11 EPB	Executive Protection Bureau (Governor Detail)
12	A1-12 ACE	Atlantic City Expressway
13	A1-13 CAR	Turnpike Car to Car
14	A1-14 TPKE	Turnpike Dispatch
15	A1-15 PKWY	Parkway Dispatch
16	A1-16 FLTWD	Fleetwide coverage

TROOP B

Control Channels: 860.9625, 859.9625, 858.9625, & 857.9625
System ID - B11D; Size code - O or S13; Fleet ID - 000

Talkgroup		Display	Coverage
1	B2-01 CALL	Division Call to other stations	
2	B2-02 TRP HQ	2-Comm, Sussex County Town coverage	
3	B2-03 NORTH	3-Comm, Hope & Washington Stations	
4	B2-04 CENT	4-Comm, Totowa, Totowa Sub, Netcong Stations	
5	B2-05 SOUTH	5-Comm, Perryville & Somerville Stations	
6	B2-06 MARINE	Point Pleasant Area Marine Coverage	
7	B2-07 OPS	Car to Car for 2, 3, 4 & 5 comm units	
8	B2-08 COM PST	Command Post for large incidents	
9	B2-09 INTOPS	Interops, usually simulcast with SPEN 1 (Also Parkway car to car)	
10	B2-10 MARINE	Newark Area Marine Coverage	
11	B2-11 EPB	Executive Protection Bureau (Governor Detail)	
12	B2-12 ACE	Meadowlands Sports Complex	
13	B2-13 CAR	Turnpike Car to Car	
14	B2-14 TPKE	Turnpike Dispatch	
15	B2-15 PKWY	Parkway Dispatch	
16	B2-15 FLTWD	Fleetwide Coverage	

TROOP C

Control Channels: 860.7125, 859.7125, 858.7125, & 857.7125
System ID - B11E; Size code - O or S13; Fleet ID - 000

Talkgroup		Display	Coverage
1	C3-01 CALL	Division Call to other stations	
2	C3-02 TRP HQ	2-Comm, Specialized Units	
3	C3-03 SOUTH	3-Comm, Ft Dix & Red Lion Stations	
4	C3-04 WEST	4-Comm, Bordentown & Wilburtha Stations	
5	C3-05 EAST	5-Comm, Allenwood, Hightstown & Flemington	
6	C3-06 MARINE	Point Pleasant Area Marine Coverage	
7	C3-07 OPS	Car to Car for 2, 3, 4 & 5 comm units	
8	C3-08 COM PST	Command Post for large incidents	
9	C3-09 INTOPS	Interops, usually simulcast with SPEN 1 (Also Parkway car to car)	
10	C3-10 MARINE	Burlington County Area Marine Coverage	
11	C3-11 EPB	Executive Protection Bureau (Governor Detail)	
12	C3-12 STHSE	NJ Statehouse (Trenton)	
13	C3-13 CAR	Turnpike Car to Car	
14	C3-14 TPKE	Turnpike Dispatch	
15	C3-15 PKWY	Parkway Dispatch	
16	C3-15 FLTWD	Fleetwide Coverage	

TYPE II TALKGROUPS

The following are Type II talkgroups heard on *all* systems that are active:

Coverage	Decimal ID	Hex ID
Northstar Medevac	26832	68D
Southstar Medevac	26800	68B
Aviation (tactical and admin)	26864	68F
OEM 1	27376	6AF
Statewide MICU Network	27408	6B1
Statewide Trauma Network	27600	6BD
USAR (Urban Search and Rescue)	58288	E3B

CONVENTIONAL SYSTEM

Frequency	Display	PL
866.3125	09-TA CONV	192.8
866.3125 R	10-RP CONV	192.8
851.3375	11-TA STHSE	192.8
851.3375 R	12-RP STHSE	192.8
866.0125	13-TA CALL	156.7
866.0125 R	14-RP CALL	156.7
866.5125	15-TA TAC 1	156.7
866.5125 R	16-RP TAC 1	156.7
867.0125	17-TA TAC 2	156.7
867.0125 R	18-RP TAC 2	156.7
867.5125	19-TA TAC 3	156.7
867.5125 R	20-RP TAC 3	156.7
868.0125	21-TA TAC 4	156.7
868.0125 R	22-RP TAC 4	156.7

Notes:

1. TA = Talk Around and RP = Repeater. This is transitioned from old Type I Motorola STX portable radios which only had a limited display ID.
2. Channels 9, 11, 13 are commonly used when several troopers are working a detail and need to communicate off the trunked system. Example: DWI details, Governor detail, or multi-unit events.
3. ITAC channels (conventional system above) are nationwide interagency tactical channels, intended to provide nationwide interoperability and mutual aid. The system was designed to work the same as the SPEN system mentioned earlier.
4. For more information on talkgroups listed on the NJSP system, log onto **http://www.trunkedradio.net** or **http://www.n2nov.net**. Both of these have comprehensive layouts of the NJSP systems.

Listening to America from "Down Under"

The American radio scene as heard more than 50 years go

By Dr Adrian M. Peterson
DX Editor, Adventist World Radio

It was back in the late 1930s that my favorite uncle came and stayed with us in our home in a small country town in South Australia. He was in between employment assignments, moving from his old job on a large sheep station (ranch) up towards the center of Australia to new work on a farm near the southern coast.

While he stayed with us, he introduced me to "listening on the radio." He used to build his own radio receivers and he showed me how to make a simple receiver, using the old (new, in those days!) Cossor valve (tube) from England. The workings of the radio were built onto a "breadboard" and the controls were installed behind the front panel. We would wind our own tuning coils by breaking off the glass from a burned out valve and drilling the base to take the windings. The set was totally un-calibrated and could be tuned partly by hand capacitance, depending on just how close you were to the radio itself.

The family radio was a large and ornate console made by Healing, the "Golden Voice" model, with just two valves and only the one mediumwave band. For my benefit, my father erected a long inverted L antenna, using two large poles out in our back yard. My brother and I played a ball game between these poles, with a high strung net and an elongated "Aussie Rules" football. We were not aware at the time that we had invented our own game of volley ball.

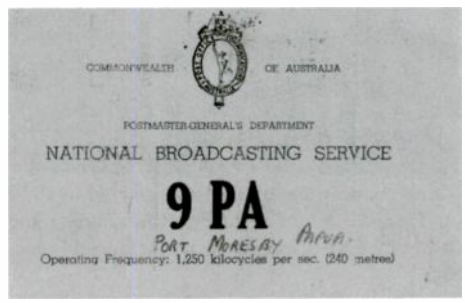
Yet, with this simple equipment, the commercially made mediumwave receiver and the home brew receiver that would tune with whatever coil was plugged in, I heard many and varied radio stations in many parts of the world. I could listen to every radio station on the air in Australia (all 98 of them!), most stations in New Zealand (the stations with the prefix 4 were the most difficult), and a host of stations in the Pacific, Asia and North America.

During the Pacific War, I became acquainted with Ern Suffolk who was one of the founding members of the old South Australian branch of the Australian DX Radio Club. His work in the local woolen mills was classified as essential and he was not permitted to join the armed forces and serve overseas. He had a commercially made shortwave receiver and a bevy of antennas installed at his country home, just a three mile bicycle ride from my home. Ern later became the first script writer for *DXers Calling*, the DX program launched from Radio Australia soon after the cessation of hostilities at the end of the Pacific War.

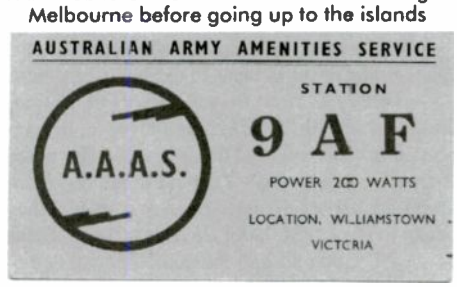
In those days, there were only two mediumwave stations on the air late at night. One was 2UW in Sydney, a 1 kW commercial station on 1110 kHz which became Australia's first 24 hour station. The other was 3AK which was licensed to broadcast only at night, with 200 watts on 1500 kHz. After about 10 pm, the mediumwave band was then wide open for listening to radio stations from distant lands.

Some of the stations of note in our areas that were logged and verified in those days were, for example:

9PA in Port Moresby New Guinea with 250 watts on 1250 kHz



9AF mobile station with 200 watts testing in Melbourne before going up to the islands

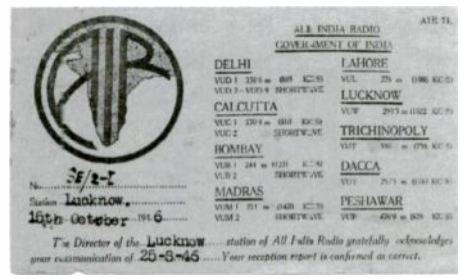


VKC Melbourne police with 500 watts on 1630 kHz
VKN8 Melbourne Fire Brigade with 400 watts on 1665 kHz
VL5CR Troubridge Lighthouse with 50 watts on 1600 kHz
VIM Melbourne maritime station with 150 watts on 2100 kHz
2YA in Wellington New Zealand with 60 kW on 570 kHz
1ZM Auckland was taken over as an American AFRS station during the year 1944
ZLT7 Wellington New Zealand with 7.5 kW on 6715 kHz

It should be noted that station 2YA in Wellington New Zealand could be heard quite readily on a car radio in the center of the Australian continent. Station 9PA in Port Moresby was operated by both the Australian and American armies as an entertainment station for forces in New Guinea; and station VIM was verified during a conversation with the British passenger liner, RMS *Orion*. The New Zealand shortwave station, ZLT7, was in reality a communication transmitter that was on the air for just 15 minutes a day with a bulletin of news for New Zealand forces "up north."

Further afield, some of the trophies were:

BMA British Military Administration in Singapore with 7.5 kW on 11860 kHz
XGOY in a cave at Chungking, American RCA transmitter with 50 kW on 11913 kHz
VUW Lucknow India with 5 kW on 1022 kHz



DZPI Manila Philippines with 10 kW on 800 kHz
KZFM Manila Philippines with 50 kW on 710 kHz

VUC2 Calcutta India with 10 kW on 4840 kHz
SEAC Colombo Ceylon with 100 kW on 6075 kHz

CR7BV Mozambique with 600 watts on 4900 kHz
VUY Dacca India with 5 kW on 1167 kHz

It should be noted that the Manila stations were heard both before and after the changeover from the American "K" prefix to the Philippine "D" prefix. Station VUY in Dacca was later redesignated as APD when this Bengali area became East Pakistan.

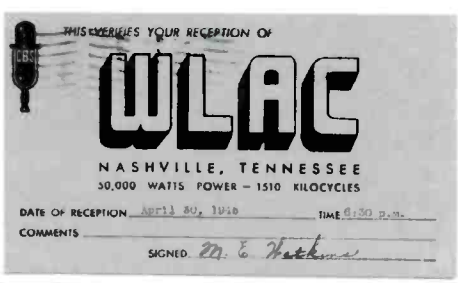
Tuning the Americans on Mediumwave

Among the highlights of late night listening in South Australia back in that era was the possibility of hearing many of the stations in Hawaii, such as the well known KGMB, and also KGU, KULA, and KPOA. It was possible for those in Australia and New Zealand who possessed a good receiver and a good antenna system to log and verify every mediumwave station in Hawaii.

We also used to listen to mediumwave stations located on the American mainland. At certain times of the year, usually autumn and spring, we would tune in to these stations around sunset for programming content. In those days, the mediumwave band in Australia ended at 1500 kHz and this gave 10 clear channels for American stations, up to 1600 kHz. There were many occasions when an American station below 1500 kHz would overpower an Australian station on the same channel.

Among the American mediumwave stations I logged and verified on the modest family radio were the following:

WCFL	Chicago, IL	5 kW	1000 kHz
KGER	Long beach, CA	5 kW	1390 kHz
WFBL	Buffalo, NY	5 kW	1390 kHz
WLAC	Nashville, TN	50 kW	1510 kHz



KOMA Oklahoma City, OK 50 kW 1520 kHz

KFBK Sacramento, CA 10 kW 1530 kHz

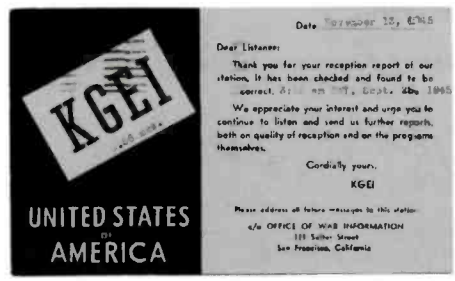
KXEL Waterloo, IA 50 kW 1540 kHz

During the Pacific War, a series of networks were established by AFRS, the American Forces Radio Network. In Australia, we could hear almost all of these stations after the Australian stations signed off for the night. Some of these stations did issue verification letters and sometimes they signed prepared QSL cards.

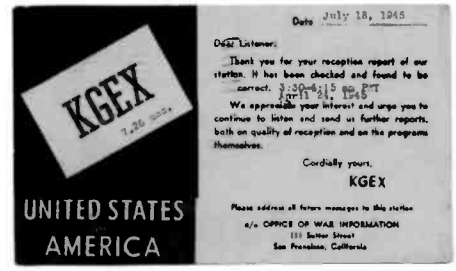
These American stations in the Pacific were given American callsigns and were divided into three networks. The stations in the Mosquito Network, made up of half a dozen units, were located on the islands in the South Pacific. The Jungle Network was made up of AFRS stations in New Guinea, and the Pacific Ocean Network was made up of stations in the central and western Pacific. All of these stations were low-powered with no more than a rated power of 1 kW. Many were quite small – and sometimes quite unofficial – with just 10 watts output, yet they were heard in both Australia and New Zealand.

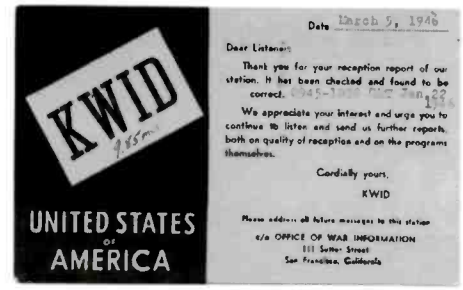
US Expands Its Global Reach

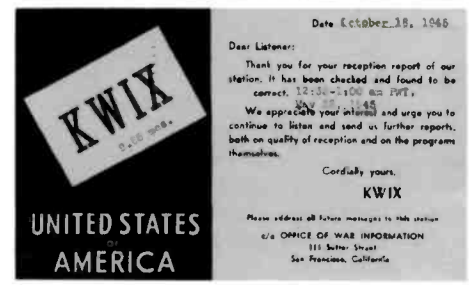
Soon after the horrific events at Pearl Harbor, the United States government entered the arena of international shortwave broadcasting, under the Office of War Information, OWI. The stations that were quickly taken into the twin networks of AFRS and VOA programming were located mainly on the East Coast; the only active shortwave station on the air in California at the time was the famous KGEI. This was a comparatively new station that was erected in 1939 on Treasure Island, San Francisco, under the callsign W6XBE, as a showcase for General Electric.



Quite quickly, additional shortwave stations in California began to appear on the shortwave dial. It was quite a fascinating experience to follow – week by week, it seemed to us – the changes and developments in the American shortwave scene. At first, these OWI-VOA stations on the air in California ignored all reception reports. Soon afterwards, though, when the noted Arthur Cushen in New Zealand made representation on behalf of listeners down under, they began to issue QSL letters and then cards. These new QSL cards all had the same appearance of







red, white, and blue, the only difference being the callsign itself. We used to look upon these cards as quite monotonous, though today they are now considered to be quite exotic collector's items.

Station KGEI in San Francisco installed an additional 100 kW transmitter under the callsign KGEX. Station KWID, also in San Francisco, was another 100 kW unit; its sister transmitter was 50 kW unit KWIX. Station KROJ in San Francisco was rated at 50 kW and soon afterwards a sister unit KROU was installed. Among the already available utility communication transmitters that were pressed into OWI-VOA broadcast service were KWU, KWV and KWY, all of which were verified from San Francisco with the same style card.

One of these utility locations, RCA at Dixon, installed another transmitter, probably rated at 50 kW, under the callsign KRCA. Two other utility transmitters in California that also carried VOA programming and for which QSL cards were issued were KES2 and KES3. These now valuable and historic QSL cards were all issued from the OWI office at their famous office location, 111 Sutter Street in San Francisco.

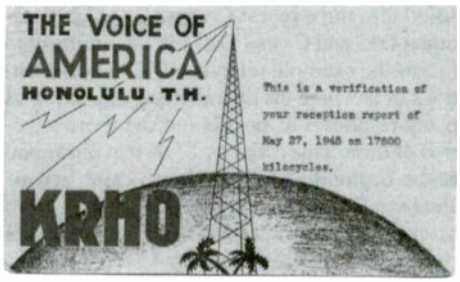
Several floors in two hotels in San Francisco were taken over for use as OWI-VOA studios and offices. Station KGEI and its network of relay stations were on the air from the Fairmount Hotel right on the coast at Nob Hill and station KWID and its network of relay stations were on the air from the Mark Hopkins Hotel also at Nob Hill. However, there were many occasions when both networks took the same programming.

When the VOA station at Dixon was in-

augurated in 1945, OWI cards were issued for these transmitters with calls in the series beginning with KNBA. Soon afterwards, however, the supply of printed QSL cards was exhausted and blank cards in the red white and blue style were hastily prepared and the callsign was then inserted with a typewriter.

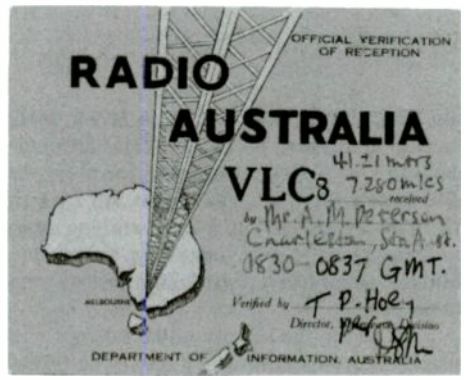
East Coast stations, and also the WLW shortwave transmitter complex near Cincinnati in Ohio, were also heard quite frequently in Australia. The QSL cards for the NBC-RCA stations were issued from New York verifying callsigns such as WNBI, WRCA and WNRI. These cards, at first in blue and later in red, showed the RCA Building in New York City. Interestingly, QSL cards in the RCA style were issued from New York for some of the California "K" stations.

Towards the end of the Pacific War – on Christmas Day 1944, actually – a new 100 kW station was inaugurated in Hawaii. This



new facility was located at Maili, on the coast northwest from Honolulu. QSL cards from this new KRHO were issued from both California and and Honolulu. On one occasion, I heard the brief sign-off routine from KRHO and I sent reception reports to both locations. In response, I received the regular red, white and blue card from California and the new map card from Honolulu.

It should be remembered that the first shortwave transmitter for Radio Australia was also an American unit. Transmitter VLC



at Shepparton in Victoria was a lendlease 50 kW RCA transmitter from the United States, inaugurated on May 1, 1944. Australia was granted the use of this transmitter in exchange for a daily relay from the Voice of America lasting one and a half hours. Many listeners in the South Pacific and in North America received QSL cards from *Australia Calling* that verified the American broadcast from the American transmitter located in Australia, though in those days this was not indicated on the card.

Thanks for the Memories – and the QSLs

Ah, those were the days! And the only way to prove to you that we really did hear all of those exotic American stations on mediumwave and shortwave way back more than half a century ago is to check the QSL cards displayed in my several large QSL albums. You'll have to see them in person, though; I think each album outweighs a car battery!

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

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

Ken Reitz, KS4ZR
kenreitz@monitoringtimes.com

Getting Started in Ham Radio DX

Not long ago while listening to a local 2 meter repeater I heard a recently upgraded General Class licensee talking about his first DX* contact on the HF bands. He said he was disappointed. "I had been calling the station for about 10 minutes and when he finally acknowledged my call sign he said '59 QRZ?' and I didn't even get a chance to give him my name or location."

Amateur radio license study guides do a great job preparing prospective hams for the license exam but they don't do much in the way of preparing the newly licensed ham for day to day operating practices on the HF bands. With that in mind here's a brief tutorial of what you can expect when you first hit the HF bands in search of DX.

❖ Working DX Part 1: Pile-Ups

Tune across the 20, 15 or 10 meter bands and you'll run across a frequency on which it seems that every ham in the world is shouting his or her call sign. It's called a DX *pile-up* and it indicates that somewhere in the din a ham with a DX call sign is trying to work the rest of the world. See if you can figure out which is the DX station.

The first thing any ham will do when that precious General Class ticket is issued is to start working DX stations. And it's very tempting. With their typically booming signals and exotic call signs, we just can't wait to jump into the pile-up when we hear one calling CQ. But, the first thing you *should* do is listen. There are many ways in which a DX station may operate so you need to hang around the frequency and find out which method this particular DX station is using.

Some DX operators simply set up on a frequency and start calling CQ on a first come, first answered basis. Others will ask only stations from "stateside," "the Far East," or "South America" to call. After a number of stations are worked they'll ask for another region. Others may ask for stations by number, e.g. "Only stations with the number 1 in the call come now." Despite stating the conditions under which they're operating you'll be surprised at how many people are not paying attention.

But the greatest opportunity for total chaos and confusion happens when the DX station decides to operate *split*. This means that the DX operator will be transmitting on one frequency and listening on another. Typically the DX station will say "calling CQ and listening 5 up." If he's transmitting on 21.240 MHz he will be listening on 21.245 MHz. Theoretically this is to make it possible for everyone else to hear the DX station better. All modern HF transceivers are capable of working split, and you'll have to read your owner's manual to find out exactly how to set your transceiver up to do this.

To add to the hilarity, some DX ops will specify a sub-band in which they'll be listening, i.e., calling on 21.240 and listening from 21.245-55. Again, this is an effort to make it so that the DX station can be heard clearly and it spreads out the stations calling in so the DX operator can identify them better.

The problem with working split is that invariably many stations aren't paying attention and they'll start calling the DX station on his transmit frequency. Of course, he's not listening there so they call and call and never get a response. But, before long here come the *frequency police*. These are the hams, usually stateside operators, who take it upon themselves to direct DX traffic. "He's listening 5 up, you idiot!" they usually say. Which of course requires an equally caustic response, and before you know it both hams are QRMing (causing interference) on the frequency, making it hard for those trying to work the DX station to hear it, thus defeating the whole purpose for working split to begin with!

Working split is particularly hard on the very small WARC bands, notably 17 and 12 meters, where space is already at a premium and where two DX stations working split can actually occupy most of the band.

❖ Working DX Part 2: Courtesy

Occasionally I've called CQ DX and had a fairly rare DX station reply, only to have dozens of fellow stateside operators rush in to work the DX. Typically, in that situation, the DX contact will say politely that he will move up or down 5 kHz. This is the kind of courtesy you should expect to hear on the bands.

When trying to contact DX in a pile-up you simply have to be patient. When the DX station asks "QRZ?" you'll hear all types of hopeful responses. Some will repeat their calls so many times that the DX has already called someone else by the time they've let up on the mike switch. Others try to sneak in by shouting their call sign while the station called is giving their signal report. This usually just makes the DX station mad. By listening you'll determine how the DX wants to hear calls. Some want only the last two letters of your call said phonetically (ITU phonetics, not some cutesy phonetics your 80 meter rag chew buddies find amusing).

I've found that DX operators can be classified into three types: Contest DX, Conversational DX, and Casual DX. It's DX courtesy to follow the example set by the DX station. Contest DX is where the operator is trying to log as many responses as possible in the shortest period of time. This is the type DX that our friend at the beginning of this column came across. Here the DX stations are simply trying to give as many hams around the world as possible a chance to work them and to add them to their DXCC list. Typically, they are using a computer logging program which allows them to work stations about as fast as they can enter call signs into the computer. These stations are usually fairly rare DX and are not interested in engaging in conversation. Often their knowledge of English is for DX purposes only and they will simply not understand additional comments or questions.

Conversational DX is where the DX operator is working at a much slower pace and is happy to exchange information about weather, station equipment and usually concludes with extended best wishes to everyone in each other's families. Typically these exchanges will last two or three "overs" before the DX station wants to move on. Don't abuse the conversational mode by extending it to inquiries about rental properties at the DX location or about old friends you used to know who once had a friend who lived near the DX station's country. Be happy you got more than a "59 QRZ" from the DX station and hope that you'll actually get a QSL card!

Personally, I think Casual DX is the most fun in ham radio. It's where band conditions

permit a long extended conversation on a wide range of topics which results in an actual on-air friendship developing in which you look forward to talking with this person again. If you stick around ham radio long enough you'll have many such QSOs.

Remember, too, that everyone is someone else's DX. If you have trouble breaking through the DX pile-ups, try being the DX yourself. It's not that hard. If you hang around a frequency where a DX station is operating you'll hear dozens of DX call signs with very nice signal strength. You can work those stations simply by camping out 10 kHz away and calling CQ DX. After they've worked the DX station they'll often respond to other stations calling CQ nearby. The key is that it takes a lot of patience. Depending on band conditions you may have to call CQ DX for ten minutes in between contacts.

Several times I've tuned around an apparently dead band, called CQ and had a dozen great DX contacts all saying I was the only signal on the band. This with 100 watts and a wire antenna. Sometimes it's just a case where everyone else is listening.

❖ QSLing Those DX Contacts

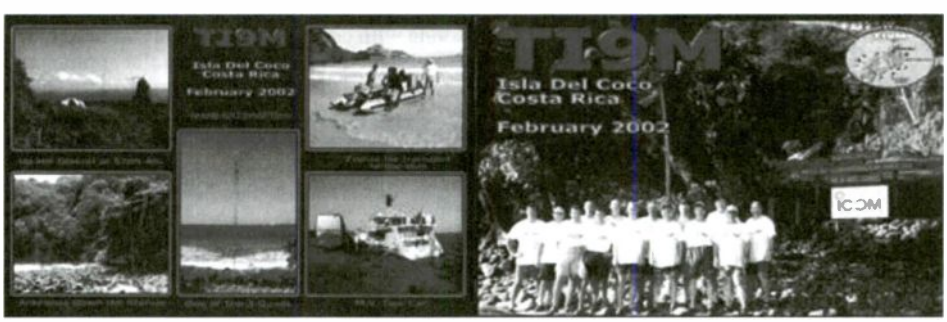
When you make a DX contact and wish to QSL, pay attention to the QSL route the DX station prefers. Some will say, "QSL via QRZ.COM" which means that if you look up their call on **http://www.qrz.com** there will be information posted at their call sign about QSLing. Often the DX station will request that a self-addressed envelopes with one or two International Reply Coupons (IRCs) be enclosed. Others request one or two "Green Stamps" (U.S. $1 bills). If there is no information it means they want to QSL direct to the address listed. Some will say "QSL via my manager (another call sign)." This means that they have designated the named ham to handle their QSL correspondence. One way this is done is that the manager collects all the QSL cards sent in and forwards them periodically to the DX station for verification. The manager's address is also found on QRZ.COM.

All of us like to receive DX QSL cards, but, if you've looked at the cost of postage lately (70 cents international postcard rate and 80 cents for a first class international envelope), you'll want to consider alternatives. And, if you thought QSL costs were steep for you, consider the DX station whose annual income may be a tenth your own and whose 1,000 DX contacts a year would be considered a heavy financial burden by most.

While some send QSLs via e-mail there's still no substitute for the real thing. That's where the ARRL outgoing QSL bureau comes in. The up-shot is that you can send up to 10 QSL cards for just $1.00 through the bureau. For incoming DX cards you pay only for the cost of a 6 x 9" SASE envelope. You do not need to be an ARRL member to use the service. There are many rules for using the service (10 pages of information on the bureau can be found on the ARRL website, see chart #2) and you'll benefit from reading them all.

Finally, remember that whether using the bureau, a QSL manager or going direct, everything takes time. It may take six months to receive a QSL card via any of the above methods, depending on the speed of the local postal services and the promptness of the individual ham.

* "DX" is ham shorthand for *distant transmissions* and usually refers to hams transmitting from a country other than your own.



HF DX WINDOW & BEACONS

Band		Frequency (MHz) Notes
160		1.830-1.840 DX CW Window
		1.840-1.850 DX Phone Window
80		3.500-3.510 DX CW Window
		3.775-3.800 DX Phone Window
40	*	Look for DX CW 7.000-7.035
		At night look for DX Phone in between
		International Broadcasters 7.150-7.300
30	*+	10.100-10.150 CW only 200 watts maximum
20	*	Look for CW DX 14.000-14.070
		Look for Phone DX 14.150-14.200
		NCDXF Beacons 14.0995-14.1005
17	*+	18.068-18.168
		NCDXF Beacons 18.1095-18.1105
15	*	Look for CW DX 21.000-21.070
		Look for Phone DX 21.200-21.300
		NCDXF Beacons 21.1495-21.1505
12	*+	24.890-24.990
		NCDXF 24.929524.9305
10	*	Look for CW DX 28.000-28.050
		Look for Phone DX 28.400-28.500
		NCDXF Beacons 28.1995-28.2005
		World Wide Beacon Network 28.1895-28.1905
		28.200.5-28.225 other CW beacons

*No specific DX window
+Band is so small DX may be anywhere
NCDXF=Northern California DX Foundation

HF DX Quick Reference

ARRL QSL Bureau (details how to send and receive QSL cards from your DX contacts without the expense of first class mail) **http://www.arrl.org/qsl/qslin.html**

IARU Region II Band Plan (details International Amateur Radio Union frequency assignments) **http://www.iaru-r2-org/hf_e.htm**

International Call Sign Allocations (lists all amateur radio call sign prefixes) **http://life.itu.ch/radioclub/rr/ap42.htm**

All topics on Amateur Radio DX **http://www.dxzone.com**

QSLs courtesy Larry Van Horn

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

More On Audio Impedance Matching

In our February column, we addressed Richard Dailey's question about using low impedance speakers on high impedance audio outputs, and vice versa. Bioacuoustical engineer Doug Robertson wrote to remind us of two additional considerations with impedance mismatch.

Substantial impedance mismatch not only changes the audio characteristics by acting like a filter, but the inefficient power transfer also reduces the volume.

Q. *I have a simple up-converter that allows me to listen to the 0-500 kHz VLF band on my 3.5-4.0 MHz receiver. Is there any way I can tune closer to 3.5 MHz (0 kHz) without hearing the huge 3.5 MHz oscillator signal? (Ron Blocker, K9JON, Glenwood, IL)*

A. In a word, no. Even if you tune downward from 3.5 to 3.0 MHz to hear the reverse image, 0 kHz still corresponds to 3.5 MHz.

The problem is the selectivity of your (and anyone's) receiver; it needs to have an enormous rejection of the 3.5000 MHz feedthrough, while passing everything above, say, 3.5001 MHz (100 Hz and higher). Conventional superheterodyne circuitry and its attendant RF filtering simply can't do that.

The implementation of quadrature phase-canceling, double-balanced mixers, and digital signal processing (DSP) would help, but we're talking about attenuation of the oscillator feed-through on the order of 100 dB or more. Any remaining residual carrier will block weak sferics signals.

Such steep filters don't exist in the affordable world; that's why VLF experimenters and hobby manufacturers alike use simple, high-gain, audio amplifiers with audio filtering; after all, you're looking for signals in the human hearing range.

Q. *Is it safe to use a car battery indoors as an emergency power source?*

A. Generally speaking, yes, but there is always the hazard of explosive hydrogen gas being generated during the charging period, especially if the battery is low and the charge rate is high. With good ventilation, this is rarely a problem, but an electric spark next to the vent holes in a refillable battery can create a dangerous situation.

After experiencing the long power outage caused by last December's ice storm, Deron Lundy, K8OSU, a member of the Amateur Radio Emergency Service (ARES) in Carrboro, NC, recommends sealed lead-acid batteries, available in a variety of shapes, sizes, and ampere-hour capacities up to 100 AH or so. His team reported excellent success with these batteries.

Commonly available from many electronics outlets as well as hamfests, and typically used for computer battery backups (uninterruptible power supplies), these batteries are natural for such applications – without the danger.

Q. *I have several laptop computers in my radio shack, and some of their power supplies cause electrical interference on my radios. What can be done reduce this? (J. Konen, email)*

A. The RFI is probably coming from switching power supplies; they are known for this. One way to eliminate it is, of course, to replace the power supplies with standard transformer types. You might also try using ferrite RFI chokes available from Radio Shack (old stock probably; I believe these were discontinued). You simply wrap the cord several turns around one of these, or some models simply snap on the cord. You might also try an old ferrite antenna rod out of a junk AM portable radio; simply wrap the cord spirally along the entire length of the rod and tape in place.

Whichever ferrite device you try, mount it on the cord as close to the power supply as you can.

Q. *How far can a bat use its radar to detect things, and at what frequency? Can they be tuned in on a radio? Are there other life forms that transmit electrical or electromagnetic signals? (Donald Michael Choleva, Euclid, OH)*

A. Bats transmit high-pitched sound (20-100 kHz), not radio signals, so they cannot be heard on a radio. They can be monitored by using parabolic dish reflectors with ultrasonic microphones connected to circuitry which converts this high pitch down to audible frequencies to be heard by humans.

The bats' echolocation ability allows them to detect moving or stationary objects up to 30 feet away. They send out swept-frequency bursts so that tiny, close objects (insects for food) can be detected by the higher frequency, shorter wavelengths, but more distant, large obstacles (trees, buildings) can be detected by the lower frequency, longer wavelengths.

Some fish transmit weak electrical signals in the 100-10,000 Hz range for communications, while the electric eel can discharge a paralyzing electrical burst of 600 VDC which it uses for navigation and defense.

Q. *How can I improve AM (medium wave) broadcast reception on my GE Superadio? (Mike, email)*

A. There are several ways to improve AM reception on your Superadio:

(1) Attach a random-length wire about 50 feet or so in length to the antenna screw, running it out a window and as high and far from the house as practical;
(2) Use the Grove ANT-2 Skywire with a length of coaxial cable to your radio's antenna and ground terminals;
(3) Suspend a 50-75 foot wire antenna as high an distant as practical, away from power lines, and connect a coax cable to it to run to your radio;
(4) Connect the H800 Sky Match active antenna to the terminals;
(5) Use the Select-A-Tenna next to the radio, focusing the signal into the radio's internal rod antenna;
(6) Physically connect the Select-A-Tenna to the radio's AM antenna and ground terminals.

Any of these will improve AM reception, but the advantage to a high outdoor antenna with coax lead-in is that it reduces electrical interference from residential appliances.

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

Gary Webbenhurst
P. O. Box 344, Colbert, WA 99005-0344
garywebbenhurst@monitoringtimes.com

54 No July column would be complete without the usual reminder about the 4th. I hate to state the obvious, but the July 4th weekend is a *great time* for monitoring the local public safety frequencies. The combination of water sports, camping, fireworks, illegal campfires, and alcohol consumption translate into a very busy time for first responders. Fire departments, and park rangers in particular are very busy. The action carries on into the wee hours on both the 3rd and 4th. Start looking up those ranger frequencies!

55 You gotta get one of these! The latest marriage of technologies is a single hand held device that does two-way radio for FRS/GMRS *and* GPS. You can use it like a regular FRS/GMRS radio or as a GPS unit to locate a landmark, your present location, elevation, or have the device select a trip route for you.

Are you ready for this? This unit can *send* its exact location to other similar radios. You can keep in contact with your family, friends etc., via radio, or just look at their present position on your electronic GPS map display.

This is essentially the Automatic Position Reporting System (APRS) used by ham radio operators, only this is for the masses and requires no special license, skills, or other equipment. Applications include Search and Rescue (SAR), parades, keeping track of the family members, fellow campers, or hikers. Nobody can get lost with this system. Call in the coordinates for a Medevac helicopter, etc.

Here in Spokane, the sheriff is modifying some of the department's mobile radios so dispatch and the watch commander can see exactly where all the officers are. I wonder if those signals can be.....well never mind.

The Garmin™ Rino 120 carries a street price of around $250. Its smaller brother, the Rhino110 model, is about $150. In addition to the usual features, it also has a voice scrambler and vibration alert mode. Note that the early production model muffled speech problem has been corrected. Make certain you get a "new" version manufactured after May 1st.

The Rino 120 unit has a built in database of roads, and highway maps, plus 8 megabytes of additional memory to download additional database information. Visit **http://www.garmin.com**. As always, use the web to compare features, price etc., but always go with a dealer that has a proven track record. Local dealers are very competitive on this item.

56 **Geocaching** is a hot new hobby for those using GPS devices. People create a small "cache" and hide it. Then they list its location on the internet for others to find. Sort of a hide and seek, or Easter egg hunt. The "designated radio channel" for these activities is FRS CH 2 and CH 12 as an alternate. Check it out **http://www.geocaching.com/.** Be sure to read the Frequently Asked Questions.

57 When monitoring the police, I often hear them using code numbers for their state's criminal and vehicle codes. After living in California most of my life, I had the basics of the California Penal Code and Vehicle Code pretty well memorized for the most commonly-used sections. (Note that Hollywood movies always use the California codes no matter where the movie is set.)

Well, since I now live in the State of Washington, I decided I needed its codes. I found a copy at the local police supply store. You might also find the ***Pocket Reference Guide for Peace Officers*** by searching the internet for your state. Interestingly enough, the Internet also showed many pocket references, including one for "Peaceful Public Protestors." The ***Police Call*** book also lists some of these code numbers for many major metro agencies.

58 A couple of new products are on the shelves at Radio Shack. A new tiny cube plugs directly into an AC outlet, and has a 12volt output with female receptacle. (RS#22-505) Output is 12 volts at 1000mA. It will run just about anything with a male 12volt plug.

The next product is essentially the reverse of the first. It's a power converter that plugs into a female cigarette lighter style outlet, and will produce up to 60 watts of AC. Actually 75 watts for five minutes, then 60 watts continuously. I suppose you could plug in a power strip to power several low wattage electronic devices. Yes, they even have little green LEDs.

The third new product is a very small AC wall plug that can be purchased in 12, 9, or 6 volt configurations with a power cord terminating in an adaptaplug. Unlike your typical wall wart, these are very light and small, not much bigger than my thumb. These are especially good for the "grab and go bag," or other traveling situations. (RS#273-1772)

59 I own over 30 amateur transceivers and receivers, both handheld and mobiles. I signed up for a free email service that delivers updates to the modifications and tips for such radios. After such an alert, I decided to go to **http://www.mods.dk** and see if there was any new information on any of my many models. Boy, was I surprised. There were many updates, with discoveries of "hidden menus" and other user-discovered features. It makes for the ideal surfing project.

60 I read *MT* and all my other magazines very carefully. When I find a really interesting article or useful information, I want to save that gem. You can always make a photocopy. If you keep your back issues, you can write on the front cover the page number of that special information. If I know I am going to discard the magazine, I can tear the page out. Even better, I can pass the magazine on to a deserving hobby friend.

61 A couple of years back, I reviewed a couple of photographer's vests for use in the monitoring hobby. They offered many pockets and useful features. Well, I just stumbled upon two new ones. They are available from HQ at 1-800-888-3006 or **http://www.sportsmanguide.com**. There are two available models, the first is a basic military jungle vest. Available only in drab green for $10. The tactical duty vest is the better one at only $20 in khaki, olive green or black. Get one!

62 If you are an ARRL member and buy their books, look in the back of the book for coupons good for 10% off your next purchase. Some newer books do not have this feature, but I went through my old books, and found about $30 worth of coupons good toward future purchases. Hey, it's thirty bucks!

For those hot sunny summer days, nothing beats retreating to a cool dark room listening to the radio. See you next month.

Robert Wyman
robertwyman@monitoringtimes.com

Confirmed Frequencies for Arizona Monitors

"Arizona Repeaters on 6, 2, & 1.25 Meters, and 70, 33, & 23 Centimeter Bands...Featuring Location Maps! Also Featuring Verified Scanner Frequencies in Arizona!"

Such is the headline of a new website for radio hobbyists of the Southwest. "Thom and I have been working on our radio-related web page, and we recently made some improvements," writes Robert Homuth of Arizona. "Hope you enjoy it." Thomas Kelley continued, "Over 100 Hams have contributed info to help make this web site timely and useful to the greater Arizona Ham and scanners community. And, it's been a lot of fun, too...and I've met a lot of terrific people because of it."

"Thank you for checking out my verified scanner frequencies...(we) have traveled around listening for ham radio and public safety frequencies, and have included only what we have monitored," Robert continued. "I'm using a PRO 2056 Radio Shack scanner for general monitoring, and an Alinco DJ460 ham radio handi-talkie for 410-470 MHz snooping."

"Pre-programmed with over 2,000 FCC allocated public safety channels, the PRO 2056 allows us to quickly identify common public safety channels, and then lock them out to search for rarely used frequencies. My DJ460 HT has much more sensitivity in the 410-470 MHz range, and I use this rig for finding business, federal and public safety channels the PRO 2056 does not hear. Thom uses both a Bearcat 2500XLT and a Radio Shack PRO-39. His Icom W32a handie-talkie is also a wideband VHF/UHF receiver. However, his principle tools are a Scout and an Interceptor, along with various antennas and an RDF antenna."

Robert and Thom's outstanding effort may be seen at **http://www.azrepeaters.net**, and their frequency list follows at the end of this column.

❖ More Gigahertz-range Information

As another follow-up to our recent series about new allocations in the Gigahertz range, the FCC recently announced an amendment: "Adopted and Amended rules in this proceeding by providing access to 5 channels in or near the 5250-5400 kHz on a secondary basis for the amateur service, and upgrading the existing secondary amateur service allocation to primary status in the 2400-2402 MHz (range)"

The complete ruling may be seen at **http://hraunfoss.fcc.gov/edocs_puhlic/attachmatch/FCC-03-105A1.doc**.

❖ On-Scene Commander

Eagles Concert

An anonymous contributor and Eagles Concert fan sent this list from the Office Depot Center in Sunrise, Florida (Fort Lauderdale area). His primary tool was the often-mentioned OptoElectronics Scout, and he included the number of Scout "hits" recorded as he attended the event. Frequencies listed are exact Scout readouts; actual FCC-allocated frequencies are generally at the nearest 12.5 kHz increment.

Business band channels can be attributed to event management staff, facility housekeeping, vendors, security and related functions. The 400 MHz channel is curious and worthy of further research. It's in the Federal Government band. The 2-meter frequency may have been used for the event or an amateur antenna may be mounted on the roof of the arena. We'll be discussing the Scout, Digital Scout, and new "X Sweeper" device in a future column.

451.488 - 41 hits
451.466 - 17 hits
467.805 - 14 hits
400.237 - 11 hits
146.040 - 11 hits
452.773 - 9 hits
452.410 - 5 hits
469.438 - 4 hits
464.436 - 3 hits
452.399 - 3 hits

The Masters Golf Tournament

Next, from a recent message by Chris Parris, our traveling On-Scene Commander and Broadcast Engineer: "In case I forgot to mention it, I'm up in Augusta, Georgia, doing The Masters golf for CBS...thought I would pass this info along..."

Augusta National Golf Club

WPUI781, LTR Trunked System
461.5375 461.7875 462.0375 463.2125
463.4875 463.7875

Talk Groups:
003001 Groundskeepers
003003 Unknown
003005 Facilities Maintenance
003007 Gate Security Units
003009 Housekeeping
003011 Unknown - Chit Chat
003100 Weather Announcements
003103 Game / Course Operations
003105 Unknown
003106 Player Security
003107 Unknown
003108 Scoring
003114 Unknown
003118 Course Announcements
003119 First Aid Units

Here's what I've been finding as far as media stuff:

154.5400 Unknown
450.2375 CBS TV
450.3875 CBS TV
450.4375 CBS TV
450.4750 Japanese TV Production
450.4875 CBS TV
450.5375 CBS TV
450.6375 CBS TV
450.6875 CBS TV
450.7250 CBS TV
450.7875 CBS TV
450.8375 Japanese TV Production
450.8875 CBS TV Production
461.0625 Augusta Golf Course
461.2125 PGA Tour KD52446
461.4125 Unknown - LTR Trunking?
461.5375 PGA Tour KD52446 / Used by Augusta Nat'l
462.0125 Unknown
462.8875 PGA Tour KD52446
462.9375 TV Crew, Mentioned Camera Covers
463.0875 Fiber Crew, Mentioned Cobras
463.3375 PGA Tour KD52446
463.3875 PGA Tour KD52446 / Possible CBS / Fiber Freq
463.4875 PGA Tour KD52446 / Used By Augusta Nat'l
463.8875 PGA Tour KD52446
463.9375 PGA Tour KD52446
464.0750 Possible Augusta National Golf Club Rptr
464.0750 Unknown Repeater
464.0875 PGA Tour KD52446
464.5000 TV Crew - Audio Talkaround
464.5000 Unknown - Player Interviews Mentioned
464.8125 PGA Tour KD52446
466.2125 PGA Tour KD52446
466.5375 PGA Tour KD52446
467.2500 Unknown
467.8750 Unknown
467.8875 PGA Tour KD52446
468.3375 PGA Tour KD52446
468.3875 PGA Tour KD52446
468.4875 PGA Tour KD52446
468.8875 PGA Tour KD52446
468.9375 PGA Tour KD52446
469.0875 PGA Tour KD52446
469.8125 PGA Tour KD52446

Qualcomm Stadium

Chris next traveled to San Diego to cover the Billy Graham Evangelistic Association (BGEA) event at Qualcomm Stadium. Again, these channels represent a variety of event man-

agement, facility management, security and media production uses:

460.2375 461.2875 461.6125 461.6375
463.2125 464.5000 464.5500 464.9750
465.7375 466.2375 466.2875 466.6125
467.4125 469.4625 469.5500 469.7000

Qualcomm Stadium Operations

461.1250 464.4250
466.1250 469.4250

◆ Houston Update

Finally, Robert Hinz reports some corrections to *Police Call*, Volume 7, and specifically to page 434: "Holiday Inn Crowne Plaza Houston, 464.9875, is no longer correct. The hotel closed for renovations and re-opened in April 2002 as the Intercontinental-Houston, still owned by the same company."

"They went overboard on new radios and are using seven (7) repeater frequencies...the only hotel in Houston that has this. Here are the confirmed frequencies:"

Intercontinental-Houston

CH. 1 451.850 Food & Beverages
CH. 2 461.200 M.I.S.
CH. 3 461.800 Housekeeping
CH. 4 462.350 Misc & Special Events
CH. 5 463.350 Security/Engineering/PBX
CH. 6 463.900 Misc & Special Events
CH: 7 464.275 All Call (Activates all repeaters simultaneously)
462.575 Towne Park Valet at the Hotel
469.500 PSI Audio Visual on Property

Robert provided more confirmed information for the Houston area:

Sheraton Suites Galleria

CH. 1 467.800
CH. 2 467.925
CH. 1 463.4625 Galleria Mall Security
CH. 1 462.550 Houstonian Hotel

Thanks, Robert, for this fine update. Summertime vacation scanning often brings new monitoring opportunities, such as hotels, malls, and special events. Remember, *everyone* uses radios! Please send us *your* vacation scanning adventure stories, too!

Table One: The http://www.azrepeaters.net Frequency List

154.3250 Apache Junction Fire Department Dispatch/Operations
155.6250 Apache Junction Police Department Dispatch
460.2500 Avondale Police Department Car-to-Car
460.4500 Avondale Police Department Dispatch/Operations
460.0250 Casa Grande Highway Patrol Dist #7
154.4300 Chandler Fire Department Dispatch
155.9550 Chandler Fire Department Fireground Repeater
49.8300 Fountain Hills, Out of Africa Wildlife Park, Wireless Microphones
49.8900 Fountain Hills, Out of Africa Wildlife Park, Wireless Microphones
155.9550 Fountain Hills, Out of Africa Wildlife Park, Operations
453.9750 Gila River Tribal Fire Department - Dispotch/Operations
154.2800 Intersystem, All Arizona Fire Departments
155.4750 Intersystem, Police/Fire/Sheriff Special Events
155.3550 Litchfield Park Emergency Services Dispotch/Operations
155.3850 Litchfield Park Fire Department Rural Metro
159.0900 Maricopa County Sheriff Search/Rescue
853.9875 Maricopa County Sheriff Sun City
154.2350 Mesa Fire Department Fireground Repeoter
154.3400 Mesa Fire Department Dispatch Operations
154.8150 Mesa Police Deportment Car-to-Car
154.9500 Mesa Police Department Dispotch Operations
155.1300 Mesa Police Department Chase
155.5350 Mesa Police Department Car-to-Car/SWAT
155.8200 Mesa Road Repair Maintenance
155.8900 Mesa Police Department Wide Area Patrol
156.0150 Meso Police Deportment Information
156.1650 Mesa Roads - Tronsportotion
453.0000 Mesa Mesa Tribune - Deliveries
453.3500 Mesa Utilities Sanitotion
453.4750 Mesa Utilities Natural Gas
857.9625 Poradise Volley Police Dispatch
453.6500 Peoria Police Department Dispatch/Operations
460.3500 Peoria Police Department Car-To-Car and Detectives
460.6000 Peoria Police Department Tactical Info
462.3500 Peoria Rural Metro - Ambulance
47.4200 Phoenix Red Cross - Dispatch/OPS
150.9950 Phoenix Capitol Police Department Dispatch/Operations
151.2800 Phoenix Park Rangers Dispatch/Operations
151.7450 Phoenix Zoo Main
151.9250 Phoenix Zoo Special Events
153.7700 Phoenix Fire Department Tactical S. Phoenix
153.8300 Phoenix Fire Department Tactical Central Phoenix
154.0700 Phoenix Fire Department Resource
154.1900 Phoenix Fire Department Alarms/Dispatch
154.2500 Phoenix Fire Department Violent Incidents
154.3100 Phoenix Fire Department Northwest Volley
154.5150 Phoenix Phx Baptist Hospital Security and Phone Patch
154.7550 Phoenix Police Department Chase #2 Tactical
154.8900 Phoenix Police Department - Chase #1 North
155.0700 Phoenix Police Department - #500-Central
155.3250 Phoenix Air Evac Dispatch Operations
155.3700 Phoenix Police Deportment - #400-South Mountain
155.4300 Phoenix Police Department - #800-Maryvale
155.5200 Phoenix Police Department #700-Squow Peok
155.6100 Phoenix Police Department - Talk Around/Info #12
155.6400 Phoenix Police Department #600-Desert Horizon
155.6700 Phoenix Fire Department Tactical West Valley
155.7000 Phoenix Police Deportment - #900-Coctus Park
155.7600 Phoenix Police Department - Car-to-Car #10
155.7900 Phoenix Police Department - Chase #3 South
155.8350 Phoenix ASU West - Security
155.8650 Phoenix Capitol Police Department Car-to-Car
155.9700 Phoenix Phoenix College Security
156.0600 Phoenix Police Department Tactical #11
156.1800 Phoenix Sonitation Dept.
157.2900 Phoenix Sanitation Dept.
161.6700 Phoenix KSAZ TV10 SkyFox Helicoptor
410.2000 Phoenix Post Office Deliveries
418.3000 Phoenix Post Office Postal Inspector
450.1125 Phoenix KPNX TV12 Operotions
450.1875 Phoenix KTVK TV3 Operations
450.3500 Phoenix KSAZ TV10 Engineering
450.4500 Phoenix KSAZ TV10 Engineering
450.6500 Phoenix KFYI 550AM Remote News Link
450.6875 Phoenix KFYI 550AM Skyview Traffic
450.7125 Phoenix KFNN 1510AM Helicopter
450.7500 Phoenix KPHO TV5 Engineering
450.9500 Phoenix KFYI 550AM Remote News Link
452.6250 Phoenix VolleyMetro City Bus Ch #1
452.7250 Phoenix VolleyMetro City Bus Ch #2
452.8000 Phoenix ValleyMetro Dial-A-Ride
453.1000 Phoenix Police Department - Link to Chase 1 #450-1
453.2000 Phoenix Police Department GIB Investigations #450-2
453.2500 Phoenix State Fairground
453.4000 Phoenix Maricopa County Hospital Operotions
453.4500 Phoenix Police Department - Link to Chase 3 #450-3
453.5000 Phoenix Traffic Lights Signals One
453.5500 Phoenix ASU West - Maintenance
453.6000 Phoenix Police Department Organized Crime Bureau #450-4
453.6250 Phoenix Road Signs
453.6750 Phoenix Police Department SWAT
453.8000 Phoenix Police Deportment - SWAT
453.8750 Phoenix City of Phoenix Troffic Engineering/Streets
453.9500 Phoenix Traffic Lights Signals One
460.3000 Phoenix Highway Patrol Metro West
460.3250 Phoenix Highway Patrol Metro Central
460.4000 Phoenix Highway Patrol Metro East
460.5500 Phoenix Southwest Ambulance Response and Post
460.5750 Phoenix Fire Deportment Special Event/Training
461.8750 Phoenix Ambulance Southwest/RuralMetro
462.9500 Phoenix Hospital to Paromedics Med#12 Dispatch
462.9750 Phoenix Hospital to Paramedics Med#11 Dispatch
464.4750 Phoenix Colonade Mall Security
464.4750 Phoenix Metro Center Mall Security
464.8750 Phoenix Arizona Center Mall Security
464.8750 Phoenix Christown Mall Security
154.6950 Phoenix/Buckeye AZ Livestock Comm. Operations
453.7250 Reservation - Police Department Gila/Salt River
154.3700 Scottsdale Fire - Rural Metro Dispatch
154.3850 Scottsdale Fire - Rural Metro Simplex
154.4000 Scottsdale Fire - Rural Metro Fireground
155.2350 Scottsdale Ambulance Rural Metro/Southwest
155.2650 Scottsdale Ambulance Scottsdale Memorial
460.3500 Scottsdale Hotel Network Direct PD links to 800MHz
461.8750 Scottsdale Ambulance Rural Metro/Southwest
148.1500 Statewide Civil Air Potrol Air to Air
148.3250 Statewide AZ National Guard Broodway Consumer
151.4600 Statewide Fish and Game Statewide Repeaters
155.8500 Statewide Prisons Tronsportation
160.6500 Statewide Railroad - BNSF/Ch. 1
160.7850 Statewide Railroad - Union Pacific
160.8600 Statewide Railroad - BNSF
160.8900 Statewide Railroad - BNSF/Phone Potch
160.9800 Statewide Railroad - Union Pacific
160.9350 Statewide Railroad - Union Pacific/Phoenix Yard
161.3700 Statewide Railroad - BNSF/Ch. 4
460.2250 Statewide Highway PatrolCar-To-Car
460.2750 Statewide Highway PotrolInvestigations
460.5000 Statewide Highway Patrol - Investigations
462.6750 Statewide REACT - Traveler's Assistance
463.0000 Statewide Hospitol to Paramedics - Med#1
463.0250 Statewide Hospital to Paramedics - Med#2
463.0500 Statewide Hospital to Poramedics - Med#3
463.0750 Statewide Hospital to Paramedics - Med#4
463.1000 Statewide Hospital to Paramedics - Med#5
463.1250 Statewide Hospital to Paramedics - Med#6
463.1500 Statewide Hospital to Paramedics - Med#7
154.1450 Tempe Fire Department Tactical
155.0250 Tempe ASU Parking/Transit
155.4900 Tempe ASU Events
155.6850 Tempe ASU Traffic Control
156.1500 Tempe ASU Campus PD Dispatch

Scanning Canada

John David Corby, VA3KOT
johncorby@monitoringtimes.com

What's Left to Scan, Eh?

Last month we took a hasty peek at the new digital radio systems that are quickly sweeping away all the old traditional systems from Canada's emergency services. Monitoring our local fire, police and ambulance services used to be a consuming pastime for many of us. As we saw, for now at least, the change to digital radio systems looks set to take a huge bite out of our hobby. Unless we are willing to dig deep into our pockets we may not be able to afford the new, expensive digital scanners that are now on the market in Canada's radio stores.

Even if we have the budget, the federal government has legislated restrictions on the sale of digital scanners that will leave many of us out in the cold. Recapping what this column revealed last month, you will need an amateur radio licence or a special commercial license just to be granted permission to buy a digital scanner in Canada.

Many of us are still wondering if the never-ending outlays of hard-earned cash necessary to keep up with our hobby will ever end. It seems like only yesterday that we were shelling out large amounts of money to buy the new trunk tracking scanners. Hobbyists all over the country still have a drawer full of old non-trunk tracking analog scanners. We are all becoming increasingly concerned about what we should do with these obsolete radios. Should we turn them in at the local pawn shop, or is there something that we can still do with them?

Well yours truly, *ScanCan*, is a self-confessed hoarder. Nothing electrical or mechanical ever hits the curb on garbage day at this household. OK, I did sell one of my old handheld analog scanners to a friend in need a few months ago, but I still have at least a couple of others. That's not including my growing collection of ham radios, most of which have wideband scanning modes on the receive side.

Here are some suggestions for Canada's scanner owners who are willing to untie the bonds to emergency services traffic and seek other targets.

◆ Keeping Track of Transportation

Canadians move about the country by road, rail, air and water. Fortunately you can still monitor all of these transportation systems using good old fashioned analog scanners. *Scanning Canada* has touched on all of these monitoring targets over the last couple of years.

This column has swept across the nation's airports from the Pacific coast to the Atlantic coast to the Arctic coast. For this scanning hobbyist, monitoring air traffic control at major airports is an exciting and sometimes bizarre pastime. Routine loggings from Toronto's Lester B. Pearson airport are peppered with appearances by dignitaries including the Prime Minister, the Pope, and the Queen. A common log entry a couple of years ago was Concorde. There was always an air of superiority in the radio traffic accompanying the approach of that particular "Speedbird" (the callsign used by British Airways).

The bizarre aspect of the hobby has come with the occasional diversion from the usual straight-laced exchange between pilots and controllers. Canadians are not allowed to divulge what they hear on the air, and with that proviso we enjoy fairly wide-open monitoring privileges. Therefore, I will leave it to readers to accumulate their own humorous anecdotes from the tower.

Occasionally the pressure on runway operations leads to airplanes squeezing just a little too close together during take-offs and landings. I have seen many examples of aborted landings caused by a preceding aircraft lingering too long on the runway. What seems like an impending disaster to the casual observer is handled with aplomb and perfect calm by the pilot and controller. So, when it came my turn to be in an aircraft approaching Pearson airport and I heard the engines dramatically increase power, the flaps retract and the aircraft suddenly soar back into the sky, I sat back with satisfaction knowing all was well. My fellow passengers, on the other hand, were somewhat less self-assured.

The summer season brings airshows with their own brand of excitement. I usually know when the Snowbirds are approaching long before the rest of the crowd. In fact, long before most other scanner owners at the show, because most common scanners do not cover the military airband. Although, once again, I cannot reveal the exact dialog that I heard, I feel safe in disclosing that one airshow log contained an exchange between an Air Boss and a European fighter aircraft that I will never forget. The radio traffic gave me cause to consider immediate departure from the show in light of the display threatened by said aircraft.

Moving on to road transportation, we can also find some very interesting monitoring targets. My all-time favorite is school buses. The big yellow, road-blocking monsters that crawl from driveway to driveway in rural areas are piloted by an army of drivers with a whole different outlook on radio etiquette. Much of Canada enjoys challenging winters and many rural school bus routes take these unwieldy yellow monsters along country lanes that, shall we say, are inadequately maintained in the snowy season. Monitoring school buses provides a "down to earth" picture of the state of winter roads. School buses start very early and there are no better, or more interesting, reporters of driving conditions than these stalwarts of the rural routes.

Next month *Scanning Canada* takes a trip down east to the Maritimes. Until then, keep the hobby alive!

◆ School Bus Lookout

Look for school buses on these frequencies (active frequencies vary by region):

47.2000	138.6750	140.1000	140.3400
141.0300	141.2250	142.3350	148.0300
152.3000	153.0200	156.8850	157.7400
158.5050	158.6550	158.8800	162.4350
164.1900	164.5200	164.6850	165.5400
166.5900	166.5900	167.0100	167.9850
168.9000	168.9000	171.0750	171.4800
172.6500	173.0700	461.4125	466.4125

Canadian school bus picks up passengers

GREAT SCANNER DEALS

UNIDEN

BC780XLT	SCN 49	$299.95
BC245XLT	SCN 35	$199.95
BC895XLT	SCN 9	$194.95
BC250D	SCN40	$369.95
BC785D	SCN 41	$369.95
BCi25 digital board for BC250D & BC780D	ACC 4	$299.95

ICOM

R10	SCN 4	$349.95**
R2	SCN 5	$189.95**
R3	SCN 7	$449.95**
R5	SCN 2	$199.95**

ALINCO

DJ-X3T	SCN 11	$209.95
DJ-X10T	SCN 1	$319.95
DJ-X2000T	SCN10	$499.95

AOR

AR8200IIIB	SCN51	$539.95

YAESU

VR-500	SCN 6	$324.95

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Shipping/ Handling Charges

Total Order	Shipping Charges
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$50-$99.99	$8.95
$100-$399.99	$12.95
$400-$899.99	$16.95
$900-$1499.99	$20.95
$1500-$1999.99	$24.95
$2000-$2499.99	$28.95
$2500+	$32.95

ANTENNAS & CABLES

Austin Condor	ANT 14	$29.95
Grove Scanner Beam II	ANT 18	$74.95*
800 MHz for handhelds	ANT 22	$29.95
800 MHz base w/ right-angle conn.	ANT 23	$34.95
OMNI II Scanner	ANT 5	$29.95*
Professional Wideband Discone	ANT 9	$99.95*
Scantenna + 50' coax	ANT 7	$54.95*
Stealth Mobile Monitoring	ANT 30	$34.95
H800 Skymatch Active	ANT 15	$129.95*
Select-A-Tenna	ANT 21	$59.95
Super Select-A-Tenna	ANT 40	$189.95
AOR DA3000 Aerial Discone	ANT 11	$129.00
AOR MA500 Wide Range	ANT 12	$99.00
AOR SA7000 super-wide receiving	ANT 39	$199.95
Range Extending Mobile Mag Mount	ANT 3	$24.95
WiNRADiO AX-31B Active UHF Ant.	ANT 4	$119.95
Grove Universal Telescoping Whip	ANT 6	$14.95
Nil-Jon Super-M Superior Mobile Ant.	ANT 10	$79.95
Create CLP51301N Log-Periodic Ant.	ANT 16	$429.95
Create CLP51302N Log-Periodic An.	ANT 17	$299.95
50' of RG-6U cable	CBL 50	$19.95*
100' of RG-6U cable	CBL 100	$24.95*

MISCELLANEOUS ACCESSORIES

Universal Cigarette Adaptor	DCC 3	$12.95
Ramsey Broadband Preamp	PRE 2	$59.95
Scancat Gold for Windows	SFT 2W	$99.95
Scancat Gold for Windows SE Upgrade	SFT 2SE	$59.95
PAR VHF Intermod Filter 152MHz	FTR 152DS	$69.95
PAR VHF Intermod Filter 158MHZ	FTR 158DS	$69.95
PAR VHF Intermod Filter 462MHz	FTR 462DS	$69.95
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Hugh Stegman
hughstegman@monitoringtimes.com
www.ominous-valve.com/uteworld.html

Old "German Numbers" Broadcast Resumes

The Northern Hemisphere spring brought a return of balmy weather, blooming flowers, and – German-speaking numbers? Yup. Years after German unification caused a huge decline in these transmissions, a weird, machine-edited, male voice was heard speaking German on 5315 kilohertz (kHz). Something similar was heard on another frequency.

On 5315, the initial callup was "Sieben Drei Zwo," "732" in German, being repeated mechanically. This was followed by several repetitions of "964," and finally a message in 5-number groups.

The particular human voice being assembled by machine into the transmission was unfamiliar to veteran "numbers" listeners. Also, upper sideband (USB) was being used instead of the former amplitude modulation (AM). Everything else, though, suggested the return of a station not heard since late 1995. Among other things, there was the same distinctive hum in the audio, as if the same circuits had been put back into use, and the same use of "Null" for "zero."

Both of these suggest the old "German Man" transmission from Russian intelligence. The recordings reveal a great similarity to the same agency's ultra-loud transmission to the United States. This one substitutes a voice in English, but the format is otherwise very close.

Once again, we see a good reason never to take old "numbers" stations off the lists.

❖ FCC Experimental Licenses

The United States Federal Communications Commission has long granted special licenses with callsigns that look amateur. However, they're from the specially reserved "X" block. The first letter of the callsign suffix, immediately after the number, is always an X, for experimental. It's assumed that some new type of device or application is being studied for research or the development of new technology.

Some pretty ambitious commercial operations have started out with these amateur-style calls. When WLW in Cincinnati wanted to build a 500,000-watt AM broadcasting station, they first tested it as W8XO. In New York City, WQXR started out as W2XR ("Experimental Radio"), when FM broadcasting really was experimental. One Los Angeles TV station began as W6XAO, broadcasting snowy test patterns to a handful of experimental receivers.

Today, however, the experimental calls all seem to come from the "2" area, and ordinary amateurs have been given X calls with the other numbers. In the last year or so, some rather interesting test licenses have been granted by the FCC. These promise more funny noises ahead on the high-frequency (HF) band.

Right up there in the noise department would be WD2XAX, with transmitters in Florida, and licensed to the Department of Marine Science at the University of North Carolina, Chapel Hill. The operation's purpose is not immediately evident from the FCC's sketchy description, but a quick look at the frequencies gives it away fast. These authorized frequencies are 4470, 4550, 4800, and 4900 kHz.

This frequency range is one of three commonly used by HF coastal radar stations for basic research and development. Maybe you've heard the dweep, dweep, dweep sound, as their pulsed carriers make an upward sweep of 50 to 100 kHz from the assigned frequency, once or twice per second. Sure enough, a quick trip to the university's web site turns up a research contract for development of HF sea surface radar in Florida and North Carolina, both for surveillance and current mapping.

The technical parameters sound like the SeaSonde system, made by Codar Ocean Sensors. This company was started by the original developers of Codar (Coastal Ocean Dynamics Applications Radar), who left the US weather service to market it commercially. It's not a major interference machine, with its small transmitters and simple antennas. But if reception gets dweepy on these frequencies, again, here's one guess who's doing it. (More on p.35)

CODAR
OCEAN SENSORS

Another experimental license in the North Carolina area is WD2XBI, granted to Thales Mackay Radio. Frequencies are listed as 2142.4, 4916.5, 7422, 9973, 10423, 13423, 15711.5, 18178.5, 23007, and 27547 kHz. The purpose is for "test and development of communications technology."

Thales, a wholly-owned subsidiary of Thomson-CSF in France, supplies a lot of the transmitters and receivers used by the US Navy. They are typically remote-controlled rack units, with sophisticated user interfaces and Automated Link Establishment (ALE) operation. They are also rated for Link-11, the multitone, HF, tactical data link which allows participating military units to exchange target tracking data.

The only really ominous test license, though, is to WC2XXK, Ameren Energy Communications, Inc., for operation *ANYWHERE* from 1705 kilohertz to 30 megahertz – the *WHOLE* band! This is another of those new schemes for sending high-speed data through power lines, presumably getting our newly deregulated electric companies right into the broadband communications business. In April, the FCC issued a Notice of Inquiry soliciting comments on the effects of these systems on radio users.

FCC has gotten a real earful. According to ham radio organizations which have examined the technical data, there is no way such a system could be deployed throughout the entire power grid without radio waves leaking out and buzzing HF from one end to the other. The American Radio Relay league's technical expert predicts "a significant increase in noise levels." This one is really worth watching, as it could be yet another of those seemingly yearly threats to the whole radio hobby.

❖ New York VOLMET Returns

As mysteriously as it had vanished, New York VOLMET suddenly came back onto the air several weeks later, with a very nice signal on 3485, 6604, 10051, and 13270 kHz USB. It had been down to very low power, or no transmissions at all, for at least a month.

VOLMET means "flying weather," and it's one of those repeating broadcasts of weather observations and forecasts for airports in a particular region. Pilots had been heard asking about the disappearance, indicating that, even with all today's fancy data systems, someone's still using these.

The schedule stays the same, with 20-minute broadcasts on the hour and half hour. The two other ten-minute periods, at 20 and 50 minutes after the hour, are used by Gander Radio in Newfoundland, Canada.

We'll come back, too, next month.

Utility World

Utility Logs

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

ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	Automated Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
ARQ-E3	French ARQ teleprinting system
CAMSLANT	Communication Area Master Station, Atlantic
CAMSPAC	Communication Area Master Station, Pacific
Coq-8	Coquelet; French/Algerian 8-tone printing mode
CW	Morse code telegraphy ("Continuous Wave")
DEA	Drug Enforcement Administration
E10	Israeli phonetic English female numbers
E10a	Israeli phonetic numbers, callup-only or abnormal
EAM	Emergency Action Message
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
FGS	Federal German Ship
HF-GCS	High-Frequency Global Communications System
JSTARS	Joint Surveillance Target Attack Radar System
LSB	Lower Sideband
M22	Israeli CW "numbers," identifies 4XZ
M8	Cuban CW, "cut numbers" ANDUWRIGMT
M8a	Three-message case of above
MARS	Military Affiliate Radio System
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
MXC	Russian CW "cluster beacon" markers
PACTOR	Packet Teleprinting Over Radio
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SAM	Special Air Mission (Distinguished Visitors)
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	Simplex Teleprinting Over Radio, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United States
V2	Cuban Spanish female, "Atencion!" callup
V2a	Three-equal-message case of above
VOLMET	Flying Weather (loosely from French)

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations (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.

68.0 Unid-UK, Northwood, with a long RTTY exercise broadcast, at 0524. (Ary Boender-Netherlands) GBY20-UK Royal Navy, London, RTTY exercise broadcast to Swedish submarine *Uppland*, at 1530. (Day Watson-UK)

2680.0 4XZ-Israel Navy, Haifa (M22), with a CW marker at 2153. (Watson-UK)

4149.0 WPE-Jacksonville, FL tugboat base, working boats with information for "Greyhound," at 0520. (Allan Stern-FL)

4440.0 VDF Sparks 3PS-Virginia Defense Force-4 Net, working Wing Commander at 0115. (Ron Perron-MD)

4474.0 IDR-Italian Navy, Rome, calling IDF *[Messina Radio -Hugh]*, at 2345. (Perron-MD)

4530.0 FUE-French Navy Brest, with RTTY marker at 2026. (Watson-UK)

4650.0 JADE-Mexican Army, ALE with RM12 (Military Region 12), at 0251. (Perron-MD)

5153.7 "D"-Russian Navy, Odessa, single-letter CW beacon (MXC), simulcast on 7038.7, 8494.7, 10871.7, 13527.7, and 16331.7, at 1954. (Boender-Netherlands)

5153.9 "S"-Russian Navy, Arkhangelsk, single-letter CW beacon (MXC), simulcast on 7038.9, 8494.9, 10871.9, 13527.9, and 16331.9, at 1954. (Boender-Netherlands)

5154.0 "C"-Russian Navy, Moscow, single-letter CW beacon (MXC), simulcast on 7039.0, 8495.0, 10872.0, 13528.0, and 16332.0, at 1954. (Boender-Netherlands)

5422.5 Auxiliary Radio Media-US Coast Guard Auxiliary net, working Auxiliary Radio-Choptank, at 0036. (Perron-MD)

5598.0 BAW246-British Airways 777, working Santa Maria at 0533. (Patrice Privat-France)

5696.0 Coast Guard 1502-US Coast Guard HC-130, patching Atlantic Area Command via CAMSLANT Chesapeake, VA, reporting no radar contact on an emergency beacon source, which news later reported was an accidental activation by a turtle, at 0058. (Mark Cleary-SC) CG Rescue 1502, patching LANT area command again, same search, at 0244. (Stern-FL)

5705.0 Blue Eyes-US military, with a 28-character EAM, simulcast on 6697, 8992, and 11244, at 0535. (Jeff Haverlah-TX)

5708.0 Hilda East-US Air Force, Scott AFB, IL, working an unheard aircraft in an ALE-initiated voice contact, at 0049. (Perron-MD) Reach 8051-US Air Force transport, ALE-initiated patch to Charleston AFB Meteo, at 0054. Reach 5205, ALE-initiated patch to Hilda East, at 2344. (Cleary-SC)

5732.0 Coast Guard 6001-US Coast Guard helicopter, in radio check with CAMSLANT, at 0021. (Cleary-SC)

5759.0 Cuban "Atencion" (V2a), AM numbers callup in 3-message format, at 0403. (Camillo Castillo-Panama)

6604.0 New York-New York VOLMET, transmitter in New Jersey, back on the air with aviation weather and a good signal, at 0330. (Hugh Stegman-CA)

6622.0 Gander-North Atlantic air traffic control, taking position report from KLM 672, at 0228. (Stern-FL)

6779.0 DHJ59-German Navy, Wilhelmshaven, calling DRAO, FGS *Luebeck*, no joy, at 2311. (Perron-MD)

6797.0 Cuban "Cut Number" station (M8a), CW 3-message format, twice at 1202. (Castillo-Panama)

6912.0 MIW2-Transmitter keying noises at 0055, then Israeli intelligence AM callup (E10a) at 0315. VLB2-Israeli intelligence (E10a), AM callup in progress with fast CW in background, which went away same time as the station, at 0350. MIW2, E10a, AM callup in progress at 0435. (Barry Williams-AL)

6933.0 Cuban "Cut Number" station (M8a), CW callup in 3-message format, twice at 1203. (Castillo-Panama)

6987.0 ART-Israeli intelligence (E10), AM callup and "Group 41," then message, began at 0430. (Williams-AL)

7508.4 ZSJ-South African Navy, Silvermine, with an RTTY gale warning from Pretoria Meteo, at 1030. (Bob Hall-RSA)

7657.0 Panther 400-US DEA, Bahamas, drug interdiction with 63A, at 0107. Atlas (DEA/Rockwell-Collins contract comm center, IA), working unknown aircraft at 2343. (Cleary-SC)

7777.0 DIAMANTE-Mexican Army, working JADE, in ALE at 0122 (Perron-MD)

7889.0 Cuban "Cut Number" station (M8a), CW 3-message format, twice at 1302. (Castillo-Panama)

8047.0 HQ3NGB-US National Guard Readiness Center, Andrews AFB, MD, working CUBNGB, National Guard, SC, at 2133. (Perron-MD)

8050.0 LOBITO-Mexican Army, working 123 in ALE, at 0202. (Perron-MD)

8126.4 CGD9-US Coast Guard District 9, Cleveland, OH, working NRLX (Cutter *Katmai Bay*), in ALE, at 2030. (Perron-MD)

8281.6 MARTE-Mexican Army, ALE with TIERRA, at 0136. (Perron-MD)

8335.3 DHJ59-German Navy, Wilhelmshaven, working DRAN, FGS *Augsburg*, in English and German, at 2105. (Perron-MD)

8449.0 "V-5-J"-Probable US Coast Guard, testing in SITOR-A at 0227. (Cleary-SC)

8764.0 "V-5-J"-Probable US Coast Guard, discussing SITOR problems with CAMSLANT, at 0225. (Cleary-SC)

8825.0 New York Oceanic-North Atlantic air traffic control, taking position report from Corsair 868, gave 6628 as secondary frequency, at 0220. (Stern-FL)

8837.0 Ben Gurion Airport-Israeli ground station working an unknown aircraft in Hebrew, at 2206. (Perron-MD)

8846.0 NAF 49-Dutch Air Force tanker, inbound to FL with 9 Dutch F-16s, working New York at 1401. (Stern-FL)

8906.0 Air France 656-Flight passing position to Shanwick, Ireland, at 1637. (Privat-France)
8912.0 CG 6034-US Coast Guard helicopter, working CAMSLANT at 0118. (Cleary-SC)
8918.0 Aero Mexico-possible company dispatch, working aircraft at 0124. (Perron-MD)
8968.0 E31605DAT-US Air Force E-3B, making secure data injection through ICZSPR, Sigonella, Italy, at 2238. (Perron-MD)
8971.0 Trident 71C-US Navy, working Fiddle (Jacksonville, FL), clear and secure, at 2103 Trident 45, working Golden Hawk (Brunswick, ME), at 2141. Bluestar-US Navy, PR, working Bat 01, at 2311. (Cleary-SC)
8980.0 Coast Guard 1790-US Coast Guard, patching Clearwater Air via CAMSLANT, at 0107. CG 1790, different search, patching Miami Ops at 2017. (Cleary-SC)
8983.0 CAMSLANT-US Coast Guard, VA, working Army 26552 at 2130. (Cleary-SC)
8992.0 Reach 93J- US Air Force transport, in patch to Hilda East via Andrews HF-GCS, at 0143. Reach 3082, patch to McGuire AFB via Sigonella, at 0156. Reach 6174, patch to Mildenhall and Hilda Meteo, at 0339. (Cleary-SC) Teal 81-US Air Force Reserve weather recon aircraft, calling Mainsail (any station), no joy, at 1820. (Haverlah-TX) *[This day had disastrous tornadoes in Kansas. Related? -Hugh]*
9007.0 Canforce 4167-Canadian Forces, working Trenton Military at 0141. (Cleary-SC)
9016.0 Days End-US military, with an EAM simulcast on 6697 and 15155, at 0500. Knowledge-US military, with a 28-character EAM, simulcast on 6697, 8992, and 11244, at 0507. (Haverlah-TX)
9025.0 KMN93-US State Department, as self-identified when calling Offutt AFB, 3 attempts with no joy, at 0735. (Don Storck-MI) *[State Department has a whole series of these KMN9x calls. Also heard on 6904 and 11217 ALE. Nice catch - Hugh]*
9060.0 ESPANA-Mexican Army, ALE with ISRAEL, at 0001. *[The "country names" net -Hugh]* JADE, Mexican Army, ALE with RM1 (Military Region 1), at 0152. (Perron-MD)
9085.0 1001-Italian Guardia di Finanza, sounding in LSB ALE at 1759, 1819, 1840, and 1910. (Watson-UK)
9145.0 Angspringfield-US Air National Guard, Springfield, OH, ALE sounding at 1922. (Perron-MD)
9165.0 Unid-Offline encrypted CW traffic in repeated 5-figure groups, at 1445. (Watson-UK)
10135.0 MARTE-Mexican Army, ALE with TIERRA TAI, at 0213. (Perron-MD)
10444.0 MARTE-Mexican Army, ALE with TIERRA TQV, at 1215. (Perron-MD)
10486.0 ZOW-Romanian Embassy, working CEN, another embassy, in ALE at 0507. (Perron-MD)
10611.2 Unid-Moscow Meteo, with FAX weather charts, parallel 13886.3, at 1637. (Hall-RSA)
10780.0 Ascension Radio-US Air Force, Eastern Test Range, Ascension Island, working Air Transport 300, a contract DC-8, at 2226. (Stern-FL)
11039.0 DDH9-Hamburg Meteo, Germany, with RTTY weather in German, at 1536. (Watson-UK)
11090.0 KVM70-Honolulu Meteo, FAX satellite picture at 1250. (Hall-RSA)
11175.0 Air Evac 713-US Air Force medical flight with 51 patients, patching command and meteo via Andrews HF-GCS, at 0039. (Cleary-SC)
11220.0 Andrews-US Air Force, calling SAM 5864 at 2034. (Cleary-SC)
11232.0 Razor 93-US Air Force E-8 JTARS, patch via Trenton to Peachtree (Robins AFB, GA), at 2109. (Cleary-SC)
11244.0 Main Road-US military, calling Mainsail (any station) at 0655, no joy, went to 11175 at 0656, where Offutt sent them back to 11244, for a series of attempted patches at 0658. First use of 11244 as a phone patch discrete in years. (Haverlah-TX)
11291.0 Canaries-Canary Islands oceanic air traffic control net, at 0150. (Williams-AL)
11410.0 Skywatch-US Army Flight Service, Honduras, taking position from unknown aircraft at 2245. (Perron-MD)
12180.0 Cuban "Atencion" (V2), 5-number groups in AM, in progress at 0210. (Stern-FL)
12890.0 GYA-UK Royal Navy, Northwood, Middle East Service, with FAX weather charts at 1406. (Watson-UK)
13200.0 Puerto Rico-US Air Force HF-GCS, working CW 140, a US Navy C-130T, at 2301. (Stern-FL) CW 140, patch via Andrews HF-GCS, at 2355. (Cleary-SC)
13257.0 Vampire 5-Canadian Forces, patch to Northern Headquarters via Trenton, at 0104. (Cleary-SC)
13927.0 AFA1RE-US Air Force MARS, Maine, setting up a patch for Thunder 23, US military aircraft over Saudi Arabia, at 1848. AFA2CU, FL, working Thunder 29, also over Saudi Arabia, for a patch at 1945. AFA1YD, OH, patch with Python 66, over Kuwait, at 2005. AFA1YV, NY, patches for Thunder 52 and Jumbo 62, different people on the same aircraft over the Middle East, at 2135. (Stern-FL) Dixie 39-US Air Force/Air National Guard tanker in the Middle East, morale patches via AFA1LJ at 2222. (Cleary-SC)
14408.0 AFN2AC-US Air Force MARS, running two patches for C-130 "Sumit 10," returning to base with mechanical problems, at 2252. (Stern-FL)
15328.0 "C"-Russian Navy, Moscow, CW beacon (MXC), with an abnormal transmission repeating "CK" and "TNK" every minute, at 0648 to 0657. (Boender-Netherlands)
15895.7 RFVINS-French Navy frigate *Nivose*, with exercise traffic in French to RFVIMB, in ARQ-E3 at 1037. (Hall-RSA)
15920.0 CFH-Canadian Forces, Halifax, NS, running RTTY markers at 1557. (Watson-UK)
16014.2 RFFBBC-French Army Central Logistic Command, Paris, with ARQ-E3 traffic to RFQPT, French Forces, Djibouti, on RUN circuit, at 1505. RFFA-French Ministry of Defense, Paris, with a long Arq-E3 message to RFQPT, Djibouti on RUN circuit, in 5-letter code groups, at 1512. (Hall-RSA)
16213.7 Unid-Egyptian MFA, Cairo, with SITOR-A traffic in Arabic, at 1339. (Watson-UK)
16318.7 Unid-Egyptian MFA, Cairo, with SITOR-A traffic in Arabic, signing off at 1534. (Watson-UK)
16421.5 RFTJ-French Forces, Dakar, Senegal, Arq-E3 test message on TJF circuit, at 0752. (Hall-RSA)
16710.5 UHFD-Russian vessel *Molemenskoe*, working Kaliningrad Radio in 3rd-shift Cyrillic SITOR-A, at 1403. (Watson-UK)
18042.7 RFTJD-French Forces, Libreville, Gabon, calling RFTYJ in ARQ-E3, at 1302. (Watson-UK)
18060.2 VMW-Wiluna Meteo, Australia, FAX wind chart at 1025. (Hall-RSA)
18183.4 7RQ20-MAE Algiers (Algerian MFA), with a Coq-8 message in French for Kampala, Uganda, at 0945. 7RQ20, Coq-8 to Air Algerie, Cairo, at 1040. 7RQ20, Coq-8 message in French to several embassies, at 1510. 7RQ20, Coq-8 message in French to Pretoria (RSA) and New York, regarding peace talks in the Congo, at 1618. (Hall-RSA)
18203.7 Unid-Egyptian MFA, Cairo, with SITOR-A traffic in Arabic, signing off at 1325. (Watson-UK)
18261.0 GYA-UK Royal Navy, Northwood, Middle East Service, with FAX weather charts at 1348. (Watson-UK)
18370.3 WPC-SeaWave *[transmitter in New Jersey -Hugh]*, running PACTOR-type data bursts, identified in CW every 3 minutes, beginning at 1235. (Watson-UK)
18480.0 OLZ69-Czech Republic embassy, possibly Cairo, sounding in ALE at 1148 and 1349. OLZ88-Czech MFA, Prague, sounding at 1432, 1532, and 1838. (Watson-UK)
18529.4 Unid-Probable Algerian diplomatic, with Coq-8 chatter in French, at 1415. (Watson-UK)
19036.5 Ambalg Dakar-Algerian embassy, Dakar, Senegal, with Coq-8 traffic in French to "ccd Cr," at 1333. (Hall-RSA)
20133.7 ATV036-Polish military, probably Iraq, calling LCR155 in ALE, at 1807. (Watson-UK)
20221.7 Unid-Egyptian embassy, Abuja, with Arabic and encrypted SITOR-A traffic, at 1554, signed at 1602. (Watson-UK)
20633.7 RFVI-French Forces, Le Port, markers in ARQ-E3 at 0755. (Watson-UK)
23523.0 JMJ6-Tokyo Meteo, weather FAX at 1256. (Hall-RSA)

Mike Chace
mikechace@monitoringtimes.com

All at Sea with CODAR

This month we focus on CODAR or Coastal Ocean Detection And Ranging, a form of radar that is appearing increasingly on HF frequencies throughout the world. We also check in with a mysterious PacTOR network that has so far eluded identification.

❖ CODAR

Back in the late 1960s a scientist named Donald E. Barrick pioneered much of the theory behind the use of HF radio for the purposes of measuring and monitoring ocean currents. While at NOAA (the National Oceanic and Atmospheric Administration), Barrick and others in the Wave Propagation Laboratory successfully developed HF-based radar theory and systems to measure sea wave height, period and flow.

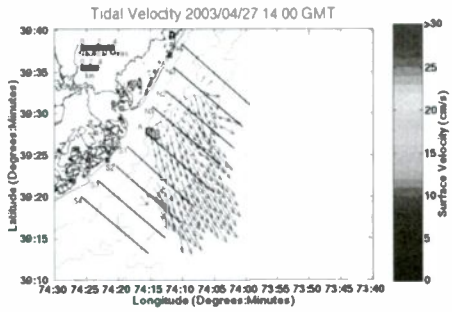
CODARs make use of a phenomenon called Bragg scattering, something that happens to any electromagnetic radiation (radio signals or light) when the wave encounters fluctuations or turbulence which are small compared to the wavelength of the signal. To an HF radio signal, any sea is a turbulent surface with waves of many different heights and periods (the distance between peaks of waves), and when the signal falls on that sea, it scatters in many directions.

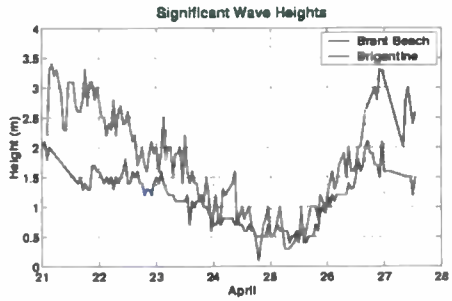
According to Bragg, the radar signal will return directly to its source only when it scatters off a wave that is exactly half the transmitted signal wavelength, *and* that wave is traveling in a path directly away from or directly towards the radar. In this case, the scattered radar signals add together and produce a strong returning "echo" at a very precise wavelength. You can read more about the theory of CODAR at the website of the firm that Barrick started after leaving NOAA, and which supplies the majority of CODAR systems, Codar Ocean Sensors.

Most modern CODARs use a variety of HF frequencies from 3-50 MHz to do their work and can therefore use a variety of sea waves for scattering:

25 MHz radar = 12m radio wave can observe 6m ocean waves
10 MHz radar = 25m radio wave can observe 15m ocean waves
4 MHz radar = 75m radio wave can observe 37.5m ocean waves

Suffice to say, with these basic facts and a lot of sophisticated signal processing, today's CODARs are able to measure sea wave length, period, travel direction and speed. And, by using two or more transmitting stations aimed at the same area of water, their reflected signals can be combined to produce information about the overall surface current direction. Figures 1 and 2 shows some typical output (surface flow and wave height) from Rutgers University's CODAR on the New Jersey coast.

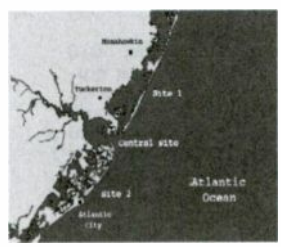




Listening in on CODAR

The best time for hearing these radars is at nighttime, when many drop to their lower frequencies. At Digital Towers here in the northeastern US, we are able to hear several CODARs during any evening as we slowly tune the receiver from 4 to 5 MHz. There are also regular daytime signals in the band 13400 to 13600 kHz and 23000 to 25000 kHz.

The signals have an unmistakable metallic "schwip, schwip, schwip..." as the radar signal is swept across a narrow range of frequencies, typically about 20 or 50 kHz. By the time you read this article, there should be a clip of CODAR audio available from Leif Dehio's excellent website (see Resources). In our case, it's quite likely that we're hearing the established set-up of the University of Rutgers Institute of Marine and Coastal Science's project COOL, operating from its sites in New Jersey and Florida. Here are the data from the FCC website. Figure 3 shows the sites for WA2XXF.



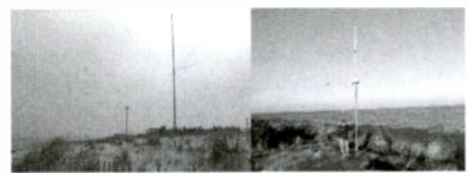
Experimental license WA2XXF :
Short-range CODAR (70 miles): Brigantine, Brant Beach, Tuckerton, NJ
Long-range CODAR (200 miles): Wildwood, Loveladies, NJ
Frequency Bands: 4800 to 4900 kHz (50kHz sweep)
24700 to 25900kHz (150kHz sweep)

Experimental license WD2XAP monitors the ocean off the West Florida shelf:

Short-range CODAR (70 miles): Venice, FL
Frequency Bands: 4400 to 4900 kHz (50kHz sweep)

The Rutgers project will soon be running a new CODAR based in Nantucket, MA.

With today's sophisticated digital signal processing (DSP), most CODAR systems use relatively modest levels of power from about 50W to maybe 1kW. The transmit and receive antenna systems are also small as Figures 4 and 5 show.



For those listeners on the West Coast of the US, Scripps Institute of Oceanography at UCSD San Diego operates CODARs from Point Loma, Imperial Beach, and La Jolla under callsign WC2XYM. Similar to the Rutgers systems, the frequency ranges are quoted at 25000 to 25700 kHz but with a larger 500 kHz sweep. Scripps also provide a video camera controllable from the Internet, that looks out over the wonderful stretch of California coastline monitored by this CODAR.

❖ Mystery PacTOR networks

For over a year we've been hearing a network of very weak PacTOR stations on two frequencies: 7987.75 and 8016.15. To date there have been no reports of traffic between the many stations involved, only selcals take place. Some reports have guessed that the networks may be connected to missionary work in southern Venezuela and the Amazonian interior of Brazil. Here are the selcals used:

7987.75:
BRR, DMT, JMX, MAR, MUT, PAR, PJJ, SML, WAR, YANOMA, YAW
8016.15:
COSH, JAL, JANK, MMG, VEN, YAJA

Until next month, enjoy your listening.

Resources:

Codar Ocean Sensors	http://www.codaros.com
Rutgers Project COOL	http://www.marine.rutgers.edu/mrs
Scripps Project SDCOOS	http://www.sdcoos.ucsd.edu/index.html
CODAR Clip	http://www.rover.vistecprivat.de/~signals/

Global Forum

Shortwave Broadcasting

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

"Monitoring" Shortwave People

STEVE ANDERSON - A trial date has been set for the white supremacist SW radio operator [United Patriot Radio, Kentucky State Militia Radio] who allegedly shot up a Bell County deputy sheriff's cruiser and then eluded authorities for over a year — July 28 in US District Court in London KY. U.S. Judge Danny Reeve will hear the case, while Assistant United States Attorney Martin Hatfield will prosecute. Somerset attorney David Tapp is representing Anderson. A federal grand jury handed down an indictment of 18 weapons-related charges against Anderson last November. If convicted, the maximum potential penalties are life imprisonment, a $250,000 fine and supervised release for a period of three and not more than five years for forfeiture of the listed firearms, according to Jeff Neal, in the Somerset KY *Commonwealth-Journal.*

HARRY KLIPHUIS - Andy Sennitt writes in *Media Network*: Many of my colleagues from the English department attended the funeral of a much-loved former employee of Radio Netherlands. Harry Kliphuis, who for many years was a familiar voice on our English language service, passed away April 21 at the age of 65. Although Harry had retired by the time I came to work here, I met him on a number of occasions when I came to record contributions for the *Media Network* radio show, and he was always full of good humor. His passing is a great loss to the Radio Netherlands family.

RICHARD KOTEY - member of the VOA English to Africa family, died May 10 from complications of a stroke he suffered six weeks before. Originally from Ghana, Richard was known to many as "King Kotey" and "The Gallant Ghanaian." He had been with VOA as a host and reporter since 1992. Prior to that, he had a distinguished career with the Ghana Broadcasting Corporation. With always a kind word and a hearty laugh, the King brought joy and a sense of honor wherever he went, says a notice to VOA employees, and a website full of tributes from his colleagues, via Kim Elliott.

RKI Jem Cullen - writes in the ARDXC group: Awful nice people in Seoul. Constantly sending little presents, etc. They sent me a "Listeners Survey." To make sure that I filled it out they even supplied a pen and 2 IRCs. I think this is the first time a broadcaster has ever sent me IRCs! It's good that at least one broadcaster is interested in its SWL audience; these days with decreased broadcasts and "No QSL" policies, sometimes I think they don't want to know us. I make a point of listening to RKI because they are interested in us.

ARGENTINA R. Continental, Buenos Aires on 10490.00 at 0000-0100 with *Servicio Informativo Continental* newscast (Björn Malm, Quito, Ecuador, *SW Bulletin*) USB or LSB?

BAHRAIN R. Bahrain, 9745 USB+carrier: althaugh 9745 is relatively clear between 2030-2130 for us in Narth America, there's no avoiding QRM from 9750 since LSB is suppressed. At 2100 time pips, ID *"Idha'at mamlakat al Bahrain,"* news with music bridges between items (George Maroti, NY, *Cumbredx*) 6010 suppressed LSB is 2nd Program *[barnamaj al-thani]*, though it may be in parallel with the General Program on 9745 for certain news bulletins. IDs for both at **http://www.intervalsignals.net** (Dave Kernick, *DX Listening Digest*)

CHINA The first Chinese [language] DX program started April 26, Sats 0730-0830 on 6185 from China Huayi Broadcasting Company, nomed "Sky of BCL." Many gifts include new memorial QSL card, station pennant and stickers. Well-prepared with call-in interviews to Chinese and foreign listeners. Phone 0086 591 3791539 or email chrisyuanjia@sohu.com (Qiao Xiaoli, SuZhou, *dxing.info*) Unfortunately before sunset so nor propagating far

COLOMBIA R. Caracol reactivated on SW from May 1, heard at 2120 with sports on 5958, neutralized at 2300 by RCI 5960. Seems to be on only for sports (Adán González, Venezuela, *DXLD*) On 5958.10, LV de los Centauros, Villavicencio in Spanish with full ID at 1059 then CARACOL ID as they joined network news at 1100. Last heard about 5 years ago on 5955v. Very good signal here in Florida (Phil Morshall, *DX Listening Digest*)

Russell Martin Stendal, manager of La Voz de tu Conciencia, 6010 from Lomalinda, Meto, writes in an early May e-mail: "We are proceeding with paperwork to license 5910 as our alternate SW frequency. I expect to be conducting a test for 48 or 72 hours on 5910 in a month or so." This will be used for programming in English to North America during nighttime (Henrik Klemetz, *DX Listening Digest*) Dare we hope for anything secular, like a comprehensive objective newscast about Latin America, in the absence of HCJB? I believe we already have enough evangelism (gh) Same station, a.k.a. Alcaraván Radio, Puerto Lleras on 6009.72 at 1045 with *Despertar campesino* (Björn Malm, Quito, Ecuador, *SW Bulletin*)

CONGO DR RTNC-Bunia noted sporadically on steady 6828.37, mainly between 1600 and 1800; seems to s/off normally sometime after 1800, but one night extended past 2100 with soccer match and political analyses at half-time; also at 0450-0510 fadeout. Whenever I listen it is in French. At least 1 kW, possibly more (Vaclav Korinek, RSA, *DX-plorer*)

COSTA RICA After two months' absence, RFPI's 15039 returned at the beginning of May, audiblizing the station again in daytime, and often better at night than 7445 (Glenn Hauser, OK, *DX Listening Digest*)

CROATIA [non] Revised schedule fram DTK Germany showed HRT = Croatian Radia relays effective May 1: 2300-0400 UTC an 9925 kHz, 0500-0700 9470 9925, 0600-0700 & 0900-1000 13820 (via Alokesh Gupta, India, *DXLD*) *Croatia Today*, expanded English at 0200-0220 ar 0225 on 9925 via Germany. Not sure if it runs every two hours (Joe Hanlon, PA, *DX Listening Digest*) After a music break, started Spanish at 0230 (Glenn Hauser, OK, *DXLD*)

CUBA English on 9505 at 2115 turned out to be Havana, judging by interval signal, followed by French (Chuck Bolland, FL, *DX Listening Digest*) So that's where RHC went – at least that day; 2030-2130 English had been on 11760. Using 9 MHz at this time to Europe in summer is obsurd; by mid-May back on 11760 (gh)

CYPRUS TURKISH R. Bayrak, Yeni Iskele, on 6150 at 0230-0310, British pop songs, ID in English: "Bayrak International on Shortwave and 105 FM." It was fighting heavily with Singapore and University Network, Costa Rica (// 5029) both also in English. Result: Gene Scott said "Listen to what the Prophet said" and in the background hard rock from Bayrak and The Beatles from Singapore! (Anker Petersen, Denmark, DSWCI *DX Window*) Also heard at 0329-0357, *Breakfast Show*. Audio only mediocre, in the clear that morning because Scott was off. Wiped out as soon as ORF appeared on 6155 at *0357 (Martien Groot, Netherlands, *ibid.*)

DENMARK [and non] R. Denmark was heard at 0630-0655 on a Sat with the domestic 'Special Program' of 5 minute news broadcasts in English, Arabic, Urdu, Turkish & Somali; ceased at 0655 before the start of Serbo-Croatian. Very good on 7180 and 11615. Same heard again ot 0730 on 9590 and 11615 (Noel R. Green UK, *Cumbre DX*)

R. Denmark is considering ceasing all SW broadcasts by the end of 2003 when the present contract with Norkring terminates. I know that reception of the broadcasts from Norway is good at specific hours throughout the world and many Danes on travel highly appreciate the news broadcasts twice daily from Denmark. In an attempt to avoid closure of the SW service, a letter of protest was sent from the DSWCI to the Minister of Culture in Copenhagen. After only a week Minister of Culture Brian Mikkelsen personally answered, confirming that R. Denmark has a public service obligation to serve Danes abroad with programs ond information. He wrote that this can be done by SW broadcasts, satellite relays of domestic radio and TV programs from Danmarks Radio, on-line broadcasts through the Internet ond by a special news service on telephone. The SW service will as a minimum continue throughout 2003. It has not yet come to a decision as to how long thereafter it will continue (Anker Petersen, DSWCI *DX Window*) see also ICELAND

*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*

ECUADOR [and non] I hate to see any SW broadcaster going away, especially one with the history of HCJB and that broadcasts in English. They were the first SW station I ever logged in 1992. However, I believe their programming has been going downhill for nearly a year. I appreciated the HCJB of a year and more ago, where I could get an hour of *Ham Radio Today* and *Saludos Amigos* on weeknights intermixed with great Christian messages. My wife and I would relax with HCJB's strong signal booming in. Then, for some reason, all the "non-religious" programming was shifted to the weekend. Lengths of programs were shortened. And any time during the week I'd tune in, I'd get fire and brimstone. I couldn't tell sometimes the difference between Dr. Gene Scott and HCJB. Please don't go, HCJB, but if you are just going to give us more of the same, I'd have to say you'll miss me. Ever since the above-mentioned programs were stomped on, schedules changed, you only have a token place on the memory of my radio. Thanks for the QSL cards, the new defunct Andex DXers club. Your friend in Christ, (Adam Christian Smith, *EDXP*)

Shortly after HCJB announced it would be terminating English broadcasts, *Electronic DX Press* launched a public-access forum for people to express their reaction, and HCJB management promised it would read the messages at **http://hcjb.edxp.org** (Bob Padula)

HCJB's 'soft-sell' approach to evangelism was tremendously more effective than the 'fire and brimstone' preaching all the other SW religious broadcasters use. Rather ironic that the effective style goes away, and the ineffective approach will be with us for the forseeable future. And did you notice that, except for a couple of stamps when writing for a QSL, HCJB never asked you for a dime? I wonder if HCJB President Dave Johnson really knows what he's done? (Ben Loveless, WB9FJO, MI, *DX Listening Digest*)

I am sure that many of you developed your interest in SW radio from HCJB, the "Call of the Andes from Quito, Ecuador, South America." Good things never last forever, and it seems that HCJB World Radio, like many other international broadcasters, no longer views the HF medium as the optimum platform to deliver messages across the English speaking world. Many DX programs have closed down and more will follow. International broadcasting is highly competitive, and many broadcasters believe that their own interests are compromised by release of news and information about how their competitors may be heard. Indeed, they want themselves to be heard! I feel sad about HCJB's decision, mainly because of my very long continued association with the station, both as a listener, technical monitor, and producer of news features over *DX Partyline*. I am in discussions with HCJB-Australia here in Melbourne about a regular DX news/information segment following the planned termination of *DXPL* at the end of May. The new feature would be produced under the *EDXP* banner (Bob Padula, *World Broadcast Magazine*)

We are not shutting down the possibility of restarting some English to North America in future. But at this time that is not what we will be doing. In years to come we have high hopes for digital, and what that will do for SW radio, and that may be the single thing that will resurrect our English language service to parts of the world that we are now cutting. It's not just Quito anymore; we're just a part of the HCJB picture. Most English will come from elsewhere (Curt Cole, HCJB *DX Partyline*)

I am again paying more attention to La Voz de los Andes, since Spanish to NAm will continue. *Música del Ecuador* was confirmed UT Sun at 0430-0500 on 9525. At least I assume that was the program, since there were no announcements whatsoever during the half hour, not even a title, but certainly Ecuadorian music was played, much of it with harmonica, very nice. After ID break at hourtop, the martial Ecuadorian national anthem (Glenn Hauser, OK, *DX Listening Digest*)

EL SALVADOR R. Imperial, 17835.3, does not have E-mail, but there is a good chance they will reply to postal reports by fax if you give them your number; or fax them. Their number is +(503) 4500189. If you fax when rates are lowest, this can cost less than a letter (Humberto Molina, San Salvador, *DX Listening Digest*)

ERITREA [non] The Canadian-based Christian organization Voice of the Martyrs **http://www.persecution.net** says that, starting this summer, it will be broadcasting a radio program into Eritrea specifically to encourage persecuted Christians there. Plans are for half the program to consist of dramatic readings from VOM's best-selling book, "Jesus Freaks" in the Tigringa language. The Voice of the Martyrs was founded in the mid-1960's by Pastor Richard Wurmbrand, who was imprisoned and tortured by Communist authorities in his native Romania for fourteen years (© Radio Netherlands *Media Network*)

GERMANY On 1 May 2003, Sender Freies Berlin ceased to exist after almost half a century. The station, which began broadcasting western programs into the GDR in 1954, is merging with Ostdeutscher Rundfunk Brandenburg to form a new broadcasting organization called Rundfunk Berlin-Brandenburg (RBB). In the short term, nothing much will change apart from the name and logos of the two stations. But full integration is planned for further down the line, and that could lead to significant job losses (© Radio Netherlands *Media Network*)

RBB will be on SW, as Rohrdorf 7265 carries SWR Cont.Ra, the new mediumwave network of SWR. This results in a relay of RBB on SW because SWR Cont.Ra relays Inforadio from Berlin every night between 2000 and 0400. See **http://www.swr.de/contra/index.html** So the Siemens shortwave transmitter at Rohrdorf now again carries programming produced at Masurenallee in Berlin. This is the very same transmitter that was once operated by Radio Bremen on 6190, and Radio Bremen extensively relayed SFB programming on shortwave until 10 years ago (Kai Ludwig, Germany, *DX Listening Digest*)

There are projects to establish local low power DRM stations in the southeast of Germany. In Nürnberg 26000 kHz tested on Feb 27th with ten watts by the university of applied sciences. The 2nd project **http://www.bitexpress.de/** plans to broadcast regionally on 15822 for Nürnberg and Erlangen. DLF reported plans to link the project with other campus radios (Thorsten Hallmann, Germany, *Listening Digest*)

On 27 June, Deutsche Welle will mark its 50th birthday with festivities at the Plenarsaal in Bonn. Federal President Johannes Rau will be the guest of honor and keynote speaker. DW will also be celebrating the official opening of its new broadcasting house, for DW's anniversary year of 2003 is also the year that the headquarters of the German international broadcaster move from Cologne to Bonn. The building, designed by Prof. Joachim Schurmann and situated in Bonn's former government quarter, is one of Europe's most modern broadcasting centers (DW Press release) New address will be: Deutsche Welle, Kurt-Schumacher-Str. 3, D-53113 Bonn, Germany. Tel.: +49/228/429-0. Technical Advisory Service can be contacted via +49/228/429-3208(T) or +49/228/429-3220(F); e-mail: tb@dw-world.de (Peter Kruse, May BDXC-UK Communication)

ICELAND [and non] AFRTS heard around 1000-1600 on new 13858 USB (Dan Goldfarb, Brentwood, England, *DX Listening Digest*) 13855 USB heard carrying American commercial shows and news at 1600, strong and 5 kHz from BFBS 13860 (Noel R. Green, UK, *Cumbredx*) Usual AFN stuff. BFBS 13860 signed off around 1800 and then no splatter. But at 1803 a ute-station came on 13855 with "CQ DE OXT" and facsimile broadcast (Jari Savolainen, Kuusankoski, Finland, *ibid.*)

OXT is Denmark's coastal station Skamlebaek Radio, which has been on 13855 and other frequencies from long before they became shared with broadcasting; fax broadcasts of ice charts for southern Greenland are on 13855 at 1218-1240, 1308-1330, 1803-1825; also uses 5850, 9360, 17510 at other times (Erik Køie, Copenhagen, Denmark, *DX Listening Digest*)

Wilhelm Herbst in Northern Denmark has 20 Beverage antennas at his disposal on a North Sea beach: he narrowed the azimuth to 300 degrees from there (Wolfgang Büschel, *DX Listening Digest*) Might be a reactivation of the Keflavik station (Martin Elbe, Germany, *dxing.info*) Trish Huizinga, Officer-in-Charge, Naval Media Center, Keflavik, confirmed by e-mail that 13855 is from there; some local spots and IDs are inserted into the feed from California. While AFN was on 13855, ISBS was heard on 13865-USB plus carrier, 1800 *ID "Utvarp Reykjavik,"* news (Jari Savolainen, Kuusankoski, Finland, *DX Listening Digest*)

New services have been coördinated in the HFCC for the A03 season: To the North Atlantic with 20 kW beamed 200 degrees on 7590 at 2100-0800, 13855 at 0500-1830 and 15620 at 0700-1800. The transmitter location is listed as "Reykjavik," but both the actual location and power are subject to confirmation. Earlier tests with AFRTS were reported to have originated from the Grindavik US Navy site in the SW of the country. Since a couple of years, Icelandic PTT authorities have been using the services of a foreign consultant [Bernd Friedewald] to coordinate the Icelandic SW frequencies at the HFCC, and in A03 this consult has requested the data to be excluded from the public version. Therefore, no Icelandic frequencies (neither RUV nor the "new services") are shown in the public version of the A03 HFCC schedule. The AFRTS shortwave transmitters are carrying AFN's so-called "Interruptible Voice Channel (IVC)". Frequency info (without the new Iceland frequencies so far) and program schedule can be found at: **http://myafn.dodmedia.osd.mil/radio/shortwave** (Bernd Trutenau, DSWCI *DX Window*) 13855 USB serves U.S. ships in the North Atlantic waters. Aside from hosting an important fish processing center, Grindavik is also home to a U.S. military base including a Naval Radio Transmitter Facility (NRTF), located some 20 km from a NATO base in Keflavik (*DXing.info*)

INDONESIA RRI Wamena, 4870 at 1052 thru 1210. Pop music, with English songs 3 to 1 over Indonesian tunes from the likes of C. Dion, B. Joel etc. IDs at the hourtop did not mention site but the IDs during programming did mention Wamena and one even mentioned Irian Jaya (not Papua). The canned IDs had a slight echo effect. Mentions of frequencies including "FM Stereo." Signal was super with "HiFi" quality sound (Mick Delmage, AB, *DX Listening Digest*) RRI Wamena appears on 4869.92 irregularly, off one day, on the next (Don Nelson, OR) 4869.93, RRI Wamena, presumed at 1035 with music popping out of the noise, better at 1044 (Chuck Bolland, Clewiston, Florida, *DX Listening Digest*)

IRAQ V. of the Liberation of Iraq on 4025 used to sign on at 1730 but not heard since April 23. Information Radio missing from 4500 on April 25, returned April 26 with poorer signal (Tarek Zeidan, Cairo, Egypt, *DX Listening Digest*)

Radio al Maulumat, "Information radio" heard every day at 1830 on 4500, sometimes disturbed by Russian SSB-traffic. This is transmitted from an airplane, a modified Hercules; on board you will find among others a 10 kW SW-transmitter from a very well known radio company in the USA. I can measure the Doppler effect when the plane moves. The shift is about 4 Hz which indicates a speed of just above 500 km/h. At first she flew over a small limited area but later almost 20 minutes on a steady course. The flight area exponded as the underlying terrain was secured. As a comparison, the station earlier on 8700 [for Afghanistan] never transmitted from an airplane even if some people still claim this (Stig Adolfsson, Sweden, *SW Bulletin*, who can measure kHz frequencies to 4 decimal places)

ISRAEL In Ha'aretz, April 28, they mention that, due to monetary concerns, the IBA will stop six radio networks which aren't supported by advertising or don't break even and lay off 500 people. Which means that they'd remove all of the IBA radio networks besides Reshet Bet (2nd network - news), Reshet Gimmel (3rd network - music), and 88FM. Cuts will start in September 2003. This includes the removal of Reshet Hey,

Reshet Alef and REKA which broadcast all of the foreign language transmissions. The networks wouldn't be available domestically or internationally. I was told that the cuts will include ALL shortwave broadcasting. This would include stopping the rebroadcasting of the Hebrew Reshet Bet network (Daniel Rosenzweig, *DX Listening Digest*)

Every year there is a threat to close Israel Radio's external service, but it always gets a reprieve at the last minute (BDXC-UK Moderator) I for one am getting a bit tired of the seemingly yearly threats to close down Kol Israel. Have they cried wolf maybe once too often? Every year the SWL community loudly protests, just like we did with RCI. What would happen if no one noticed? Is it just about playing politics in the Knesset? (Walt Salmaniw, BC, *hard-core-dx*)

This is part of the give-and-take with the license fees for car radios and television: The government said, "drop the license fees," and the IBA said, "OK, the programming has to be cut to balance the budget." (Richard Cuff, PA, *swprograms*) The threat is more serious this time (Rosenzweig)

LEBANON [non] *Sawt Lubnan Al-Houriya* at 1600-1700 in Arabic moved to 11645 (TDP via Silvain Domen, Belgium) a.k.a. Voice of Liberty, via Samara, Russia, 250 kW, 224 degrees, excellent, ex 11520 (Ivo and Angel! *Observer*, Bulgaria)

MÉXICO I like your programming very much, but I'm concerned that for more than two months the sound of your station has been very deficient. Previously only 11770 was defective, but now 9705 is too. It appears the fault is in the studio-transmitter link. This bothers me a lot since XERMX represents Mexico to the world, and should be maintained as carefully as IMER's AM and FM stations in the DF. I want you to correct these problems right away, and I wish you much success in broadcasting our culture and music to the world (Pepe González, Xalapa, Veracuz, open letter to R. México Internacional via *Conexión Digital*)

R. UNAM reactivated on its SW frequency XEYU 9600, actually heard better on 9599 but with very bad modulation, at 2100, simulcasting XEUN 860 (Héctor García Bojorge, DF, *Conexión Digital*)

NETHERLANDS Lots of raids in Holland. Dutch pirate stations keep low profile. Dutch Agency Telecom is trying to clean up the airwaves. They took out more than 60 pirates, including low-power FMs that were not on air at the time and it is a work in progress. AT were very rough as they pepper-sprayed people while confiscating equipment. Spokesman says they will not rest until they have taken out every single pirate. This action called Etherflits (etherflash) will go on for a year but if necessary, much longer. Dutch pirates are organizing an action called Tegenflits, freely translated as opposite-flash and a strike against Etherflits and AT in Den Haag at the city park Mallieveld. See our webpage **http://www.alfalima.net** for more (Alfred Zoer, Alfa Lima International, *DX Listening Digest*)

NEW ZEALAND RNZI is receiving an increase in baseline funding of $150,000 a year, bringing its total annual funding to $1.716 million, to offer more programming for Pacific audiences. The new money will enable RNZI to increase targeted programming fram four to ten hours each day. It will strengthen the service's ability to provide a comprehensive, reliable and independent source of Pacific regional and New Zealand information to a region which has been markedly more volatile in recent years. More Pacific language programming will enhance the respect and partnership that exists between RNZI and its listeners and boost New Zealand's standing in the Pacific. The goodwill that is generated by the broadcasts plays an important role in maintaining close relations between this country and its Pacific neighbors (Hon. Steve Maharey, Broadcasting Minister, speech to parliament via Paul Ormandy, NZ)

NIGERIA VON jumbled their previous language schedule. Until late April we could depend on hearing English from 0500 on 7255, and sometimes also 15120; but now 7255 is in French, announcing only 11770 where not heard, with English on 15120 when it is audible (Glenn Hauser, OK) VON heard on 11770, despite heavy interference including VOA after 1900, at 1728-1958* mostly in French, but a variety of African languages in 5-minute segments at 1735-1800 or later (Thorsten Hallmann, Germany)

PAKISTAN R. Pakistan at 0800-1104 World Service to West Europe [including English news at 0800 & 1100] shifted from 17835 to 17825 due to R. Farda until 0830 and Deutsche Welle in Chinese at 1030 using 17835. Parallel still 21465; but it is also propased to replace 21465, with 15095 (Noel Green, UK, *DX Listening Digest*)

PERÚ On 6895.34, La Nueva Radio Superior, San Miguel de El Faique, provincia de Huancabamba, departamento de Piura at 2200-2356*, nice strong signal, announcing it was their first test transmission and next day would be on until 0100. "Radio R.S.", "Radio la Superior", "La Súper Radio" plus some more jingle variants. It is quite clear that the transmitter is from the old R. San Miguel which had been logged on 6895.41.

Is something going on in Chiclayo? After 4389.92 being off air for a week, R. Imperio, Chiclayo, jumped up with good strength on 4757.32 kHz. It was there for three days but then back on its permanent frequency 4389.92. Until 0100 usual program. Then *La Vaz de la Salvación*.

Two Peruvian stations reactivated the same day, May 7! 4655.02, Radio Nuevo Amanecer, Celendín, provincia de Celendín, departamento de Cajamarca, at 0045-0058*. Had been off air for at least a year. The DJ said it was test transmission, "calidad de prueba". Maybe it means new equipment or new owner.

And on 4974.98, Pacifico Radio, Lima, at 0130. This station disappeared at the same time as the new Radio Macedonia was noted on 4890. Connection? Signal much better now than before so maybe new transmitter equipment? Most of the time religious but at 0132 a short feature with news (Björn Malm in Quito, Ecuador, translated by SWB editor Thomas Nilsson for *DX Listening Digest*)

R Unión, 6115 at 0915, good signal with no QRM. Beautiful Peruvian music with high paced announcers. Multiple IDs. Nice to hear them back on frequency with fine audio. This excellent domestic SW station make for enjoyable early morning listening (David Hodgson, TN, *DX Listening Digest*) Also excellent near Moscow at 0130 with religion (Artyom Prokhorav, *Cumbre DX*)

SA'UDI ARABIA [non] R. Al-islah 1800-2000 in Arabic on new 15705 (TDP via Silvain Domen, Belgium, *DX Listening Digest*)

SEYCHELLES [non] Counter QSL: FEBA UK for transmitters via Russia heard and reported on 15605: their reply: "FEBA no longer owns its transmission stations but uses a number of different service providers. For this reason we are no longer able to verify such reports or send out QSL cards. I'm sorry to disappoint you." (Zacharias Liangas, Greece, *World Of Radio*) Lame excuse; they just don't want to bother. You'd think evangelists would value listener contact. Will the Russian authorities verify such transmissions, and what would they be worth, anyway? (gh)

SRI LANKA After testing 7302.5 and 7300, SLBC dropped 7115 in favor of 7300 at 0020-0400 & 0800-1530 in Hindi, Tamil, Telegu, Malayalam & Kannada. 9770 continues in parallel. That leaves 7115 only for VOA Sri Lanka at 0100-0300 (Jose Jacob, VU2JOS, ATOJ, India, *DX Listening Digest*)

SWEDEN [non] IBRA, missionary station schedule at **http://www.ibra.se** includes English via Germany: 1400-1430 15715 SAs, 1530-1600 15715 ME, 1830-1845 15780 EAf (Eike Bierwirth, Germany, *hard-core-dx*)

SYRIA [non] The Arab Radio, clandestine heard on 7510 at *0330-0400*, Arab music and ID: *"Al Idha'at al Arabiyyah,"* choir, comments against Syria (Anker Petersen, Denmark, *DSWCI DX Windaw*)

TAIWAN Andrew Ryan af Radio Taipei narrates a 13 minute video on the various language services at: **http://www.cbs.org.tw/realaudio/special/aboutus/aboutusE01.ram** The video is only postage stamp size to save bandwidth (Daniel Say, BC, *DX Listening Digest*)

United Kingdom *Write On* shows in a new BBCWS schedule folder: UT Sat 0345, 0845, 1345, 2345, following *Pick of the World* at 0305, 0805, 1305, 2305, which has been expanded, minus news headlines interrupting on the half hour (Will Martin, MO *DX Listening Digest*) 1345 is on Am stream only

Don't you believe the BBCWS continuity announcer who says "caming up is a half an hour of John Peel." Thanks to bottom-of-the-haur headlines, Peel's WS show now runs 26 minutes. It makes me heart long for the days of old where programs would actually last 45 minutes, an hour, or, gasp, 90 minutes! Virtually all BBCWS shows are the $9.95 equivalent of 15 or 30 minutes now – Are we really expected to suffer headlines before and after just to hear an 11-minute or 26-minute program? (Mike Cooper, *DX Listening Digest*)

UNITED NATIONS [non] UN Radio has published the first issue of its quarterly newsletter *Frequency*, 5 pages in pdf on request from audiovisual@un.org (Bill Westenhaver, DXLD) UN Radio SW frequency schedule: **http://www.un.org/av/radio/frequencyschedule.htm**
UN News and link to audio of latest broadcast:
http://www.un.org/av/radio/news/latenews.htm
(*Frequency*, Spring 2003)

U S A I was in New Orleans over the Easter weekend and took a drive out to the WRNO transmitter site. At no time did I hear the station on during my three day visit. It was noted a number of weeks before using 7354v in the evenings. The old studio site was in Metairie but the transmitter site is on the West Bank (of the Mississippi) near Marrero on Barataria Blvd. The area is changing rapidly; new housing construction is taking place close by and it looks like one development is adjacent to the site. When the station was built, much of this area was simply used for fishing and hunting. There is a bit more graffiti sprayed on the brick transmitter building now and some small trees and brush appear to have grown up into the lower reaches of the antenna where it comes close to the ground. Other than that, the site looks the same as when I saw it about two years ago (Hans Johnson, *Cumbredx*)

WRNO is still around! A sad combination of Joseph Costello's untimely death, a disastrous fire at the transmitting plant, years of legal arguing between heirs, and finally about a year ago, sale and transfer of the station remains to a religious organization that is having difficulty, as are most religious organizations these days, in raising sufficient funds to purchase a 50 kW or 100 kW transmitter and repair and modernize the transmitter building, etc., has kept WRNO from returning full power to the air. The FCC has been very understanding and lenient, and has permitted WRNO to operate on 7355, 7395 and 15420 kHz under a "Special Temporary Authorization" (STA) with a low power 500 watt licensed auxiliary transmitter. All of this time, WRNO Management, old and new, have paid the required FCC Frequency and other fees. The new owners of WRNO, Good News World Outreach, have recently informed the FCC that they are in the final stages of purchasing a 50 kW transmitter which they plan to have installed and operating within a year. So, there is finally beginning to be some light at the end of a very long tunnel! (George Jacobs, P.E., via Stewart MacKenzie, *DXLD*)

[non] R. Africa International [Methodist from NYC], English at 1700-1900 on 13820 and 11735 ex-15265 (Adalberto Marques de Azevedo, Minas Gerais, *radioescutas*)

VENEZUELA [non] *Aló Presidente*, Chávez, via Cuba, Sundays from 1400, changed to 17750, 11670, and 13680 which comes in best here in Venezuela (Adán González, Catia La Mar, *DX Listening Digest*)

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

Gayle Van Horn
gaylevanhorn@monitoringtimes.com

0025 UTC on 15745
SRI LANKA: SLBC. Open carrier followed by drums at 0027. Group chorus to time pips at bottom af the hour followed by station ID and English announcements. Pop music standards with poor signal and deep fades. (Rich D'Angelo, PA/NASWA Flash Sheet) 15745, 1335-1400+ *Hits From Germany*. (John Wilkins, Wheat Ridge, CO)

0028 UTC on 6925
PIRATE: Radio Pigmeat Intl. Punk tunes including *Message in a Bottle*. Long version of *Rebel Yell* by Billy Idol. Station ID and last tune monitored was by Mojo Nixon. Pirates monitored; **WHYP** 6925, 0126-0137+ with great signal for IDs, rock music, email address, and report on 3rd Annual *James Brownyard* event.. Tentative on **Shadow Radio** 6950, 0130-0133 including Fibber McGee & Molly segment. (Joe Wood, Gray,TN) **Big Thunder Radio** 6950 USB, 0105. Ads for Hawaiian Punch & Meow Mix and noted reports to; **bigthunderradio@hotmail.com**. Scratchy audio that needs work. (Harold Frodge, Midland, MI) **Radio Spaceman** Euro pirate 6289.94, 2236 with address, telephone number. (Jerry Berg, MA/NASWA).

0030 UTC on 6955
PERU: La Voz del Campesino. Spanish ID far Huramarca, Peru, to regional time check into Criollo music. Anniversary and birthday greetings. Peruvian's monitored on subsequent sessions; 6115, **Radio Union** 0815; **Radio Oriente** 6188.1, 1030; **Radio Bambamarca** 4421.3, 1030; **Radio Huanta2000** on 4748, 1050; **La Reyna de la Selva** 5486.5, 1030; **Radio Luz y Sonido** 3235, 1000; **Radio Libertad** 5039, 1030; **Radio Virgen del Carmen** 4886.7, 1045; **La Voz de las Huaringas** 6819.7, 1100. (Fernando Garcia, Baltimore, MD)

0100 UTC on 9665
BRAZIL: China Radio Intl Brasilia relay. Spanish service with news into *Hoy en China*, industrial technology program closing at 0157. **Radio Brasil Central** from Goiania 4985, 0130; **Radio Aparecida** 6135//9630, 2300. (Garcia, MD) **Radio Difusora Roraima** 4875, 0254-0252 Portuguese programs. (D'Angelo, PA/NASWA). **Radio Nacional** 11780, 0020-0230. (Stewart MacKenzie, Huntington Beach, CA) **Radio Inconfidencia** 6010.2, 2357-0003+. (Frodge, MI)

0100 UTC on 11784.90
INDONESIA: Voice of Indo. Active in English // 9525 which sometimes is off the air. Announced freq 15150 was not audible. **RRI-Sorong** 4870.94, 0945-1005; **RRI Jambi** 4925, 1050; **RRI Bukittinggi** 3231.90, 1205-1415+. (Roland Schulze, DSWCI DX Window; Wilkins, CO)

0711 UTC on 5025
CUBA: Radio Rebelde. Spanish. Cuban jazz tunes amid poorly modulated signal. (Jilly Dybka, Kingston Springs, TN) **Radio Habana** 6195, 2311-2320 with Arnie Coro's *DXers Unlimited*. (Frodge, MI)

0720 UTC on 6010
MEXICO: Radio Mil. Great signal for Mexican pops to lady's identification. (Dybka, TN) Mexico's **La Candela** reactivated apparently via XEQM transmitter. Heard from 0842 with music, phone calls, and "Candela" ID. List shows their FM as 95.3 XHMH. (Berg, MA/NASWA)

0900 UTC on 9630
MALTA: Voice of the Mediterranean. Sign-on to Iraq news update, closing with station website address, **http://www.vomradio.com**. At 0958. (Garcia, MD)

0930 UTC on 4930
BOLIVIA: Radio San Miguel. Spanish ID/frequency quote. Regional time checks, cambas and pop music. Additional Bolivians monitored: **Radio Santa Cruz** 6134.8, 0930; **Radio Juan XXIII** 6054.4, 0945; **Radio Fides** 6155, 2330. (Garcia, MD) **Radio Santa Ana** 4649, 2301+; **Radio Yura** 4716.8, 2305+; **Radio Mallku** 4796.7. (Frodge, MI) **Radio Pio XII** 5952.5, 2351-0010; **Radio La Cruz del Sur** 4876.76, 0950+; **Radio San Miguel** 4930.48, 0900+; **Radio San Gabriel's** new freq 6080, 0910-0935; **Radio Fides** 9625, 1055-1115. (Arnaldo Slaen, Buenos Aires, ARG)

1230 UTC on 4606
INDONESIA: RRI Serui. Fair to good classic country & western tunes to mentions of "Republik Indonesia" and interval signal at 1300. Not a bad signal for listed 1kW. (Patrick Martin, Seaside, OR; Wilkins, CO)

1245 UTC on 11650
AUSTRALIA: Radio. *Late Night Live* interview with book author's biography of Samuel Pepys. (Bob Fraser, Cohasset, MA) **HCJB** Kununurra 15480, 1545-1620. Religious program to, "you are tuned to HCJB Australia...the voice of the great southland on 15480 kilohertz". (Sam Wright, Biloxi, MS) **VL8A Alice Springs** 2310, 1040. (Garcia, MD)

1339 UTC on 21605
UAE: Radio Dubai. Program segment on the history of Islam and the life of Mohammed. Signal faint but clear. (Wood, TN) 13675, 0320-0346*. (D'Angelo, PA/NASWA)

1650 UTC on 15140
OMAN: Radio. Arabic news, commentary and national music program. Brief news report ta signal close down in mid-sentence. Signal fair to poor quality. (Edward Kusalik, Canada/NASWA).

1732 UTC on 15660
FRANCE: Radio Jamahiriyah. English service including Afro and Libyan music. Iraq and Middle Eastern news update to "the great Jamahiriyah" at 1737 followed by French service. SIO 233. (Frodge, MI)

2030 UTC on 9535
THAILAND: Radio Thailand. Station ID on the hour closing French service. *World and Asia News* to 2149. (Garcia, MD)

2040 UTC on 9960
ARMENIA: Voice of. Interval signal, anthem to "this is Yerevan" identification. Time/frequency quote to *Cultural Panorama* program. (Kraig Krist KG4LAC, Annandale, VA)

2140 UTC on 4915
GHANA: GBC. Pops and choral music to drum/pips signal, local time check and station ID into news. Additional Africans monitored: **Radiodiffusion Nationale Chad** in Arabic 6165, 2225 to 2230*; **Radio Togo** in French 5047, 2245-2300; **Radio Burkina Faso** 5030, 2320-0000* fair signal; **RTV Malienne** 4835, 2355 including ID, freq and national anthem at -0002*. (Frank Hillton, Charleston, SC) **Ascension Island BBC** relay 12095, 2230 & 11765, 0023 in Spanish. (McKenzie, CA) **NBC Namibia** 3290, 0530. with BBC World Service news at 0600. (Garcia, MD) **Canary Island's** Gospel Church 6175 USB, 2215. (Dybka, TN)

2150 UTC on 9770
CANADA: Radio Canada Intl. Report on how vampire bats avoid toxic foods. **China Radio Intl's** Canadian relay 13680, 2315.. (Fraser, MA) **CKZN New Foundland** 6160, 2100 with news for Labrador area to local time check. CBC national and regional news to financial report. (Garcia, MD)

2200 UTC on 12000
TURKEY: Voice of. Sign-on ID, freqs and program schedule. News of Greek and Turkish Prime Ministers' desire to help rebuild Iraq. Segment on Turkish composers. (Wood, TN)

2346 UTC on 6536
PERU: Radio Huancabamba. Spanish ID to musical program, *La Ponderosa la Vozde la Frontera* to local time check at 2356. (Garcia, MD) Heard 0155 with ID and SIO 322. (Wood, TN) **Radio San Francisco** 4748, 2357-0008 (Barbour, NH/NASWA) **Radio Victoria** 6020.06, 0852+; **Radio Atlantida** 4790, 1000+; **Radio Oriente** 6188, 1015+; **Radio Tacna** 9504.76, 1055+; **Radio Cusco** 6192.97, 2313. (Slaen, ARG)

*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.*

The QSL Report

Gayle Van Horn
gaylevanhorn@monitoringtimes.com

Ready for Island Hopping?

Mark your DX calender! Here is a new slant to your QSL collecting: The amateur radio Islands on the Air (IOTA) contest is planned for July, and shortwave hobbyists are welcome to participate. The contest commences at 1200 UTC, on Saturday July 27, and closes Sunday July 28, at 1200 UTC. The aim of the contest is to promote contacts between stations in qualifying IOTA island groups and the rest of the world, and to encourage expeditions to IOTA islands. Contacts may be logged from 3.5, 7, 14, 21 and 28 MHz using Morse code and SSB traffic.

Electronic submission of logs by disc or email is encouraged, and, in fact, required for top scoring entrants and all who use a computer to log or prepare the logs. Email entries may be sent as a normal attachment to: **hf.contest@rsgb.org.uk**. Postal entries should be addressed to: RSGB IOTA Contest, P.O. Box 9, Potters Bar, Herts, EN6 3RH England. Postmarks must be postmarked by September 1, 2003. For additional rules and contest information, consult the SM3CER Contest Service site at **http://www.sk3bg.se/contest/rsgbiota.htm.**

ANTIGUA

Deutsche Welle relay, 9670 kHz. Full data card signed by Horst Scholz-Transmission Engineer, plus bulletin on English service revisions. Received in 30 days for an English report and one IRC. Station address: Raderbergguertel 50, D-50968 Cologne, Germany. (Ben Loveless, Bloomfield Hills, MI)

ARGENTINA

RAE, 11710 kHz. Full data RAE logo card unsigned. Received in 139 days for an email report to **camposrae@fibertel.com.ar**. Station address: Casilla de Correos 555, C1000WBC Buenos Aires, Argentina. (Kraig Krist KG4LAC, Annandale, VA)

AUSTRALIA

Voice Intl 13770 kHz. Full data letter signed by Richard Daniel-Corporate Relations Manager. Received in 18 days for an English report and two US dollars. Station address: P.O. Box 1104, Buderim 4556, Queensland, Australia. (Krist, VA)

CANADA

China Radio Intl relay, 9790 kHz. Full data unsigned QSL card plus program schedule and Chinese ornament. Received in 47 days for an English report and two US dollars. Station advises not to send currency for return postage. Station address: English Service, 16A Shijingshan Street, Beijing 100040, China. (Joe Squashic, Wake Forest, NC)

Voice of Vietnam relay, 6175 kHz. Full data unsigned QSL, plus program schedule. Received in 64 days for an English report. Station address: English Service, 58 Quan Su, Hanoi, Vietnam. (Squashic, NC)

CHILE

Radio Voz Cristiana, 17680 kHz. Full data card unsigned, plus station schedule. Received in ten days for an English report and one IRC. Station address: P.O. Box 2889, Miami, FL 33144 USA. (Joe Wood, Gray, TN)

ICELAND

Armed Forces Radio, 13855 kHz USB. Email QSL received in two days from Trish Huizinga-OIC. Note included mentions receiving many worldwide reports. Email address: **patricia.huizinga@naskef.navy.mil**. (Patrick Martin, Oceanside, OR)

MEDIUM WAVE

KHPY, 1670 kHz AM. Full data handwritten verification on station letterhead, signed by D.L. Van Voorhis. Received in 21 days for an AM report. Station address: 24490 Sunnymead Blvd., Suite 215, Monreno Valley, CA 92553. (Patrick Griffith, Westminster, CO)

KYOS, 1480 kHz AM. Partial date letter Radio Merced stationary signed by Virginia Yee, plus sticker and Sacramento Kings season schedule. Received in 32 days for an AM report. Station address: 1020 W. Main St., Merced, CA 95340. (Griffith, CO)

NETHERLANDS ANTILLES

Radio Vlaanderen Intl relay, 11985 kHz. Partial data scenery card of Antwerp, plus program transcript of my letter on *Flanders Today*. Received in 14 days for an English report. Station address: B-1043 Brussels, Belgium. (Stephen Zolvinski, Columbus, OH)

PIRATE RADIO

Undercover Radio, 6950 kHz. Full data *Eyes* card signed by Dr. Benway, plus info sheet and a CD. Received in 25 days for a pirate report and one US dollar. Pirate maildrop: Box 293, Merlin, Ontario, Canada N0P 1W0 (Frederick, MD postmark). (Bill Wilkins, Springfield, MO) Station email; **undercoverradio@mail.com**. - *ed.*

RWANDA

Deutsche Welle relay, 15410 kHz. Partial data 50th Anniversary QSL card, signed by Horst Scholz-Transmission Engineer. Received in 45 days for an email report to; **tb@dw-world.de**. (George (Cahelo III, Knoxville, TN)

UNITED KINGDOM

British Forces Broadcasting Service, 6136 kHz. Partial data card with illegible signature. Received in 34 days for an English report. Station address: BFBS, P.O. Box 903, Gerrards Cross, SL9 8TN, United Kingdom. (Wood, TN)

USA

KENC, 102.9 FM. Hand written confirmation on station letterhead, signed by Will Sims. Letter stated they do not have any QSL cards yet, but this confirmation noted I was the station's first listener, on the first day of broadcast and the first QSL! Received in two days for an FM report. Station address: 551-C Cordova Road, Sante Fe, NM 87505. Website: **http://www.enchantmentfm.com**. (George L. Glotzbach, Sante Fe, NM)

WBOH, 5920 kHz. Full data WTJC/WBOH verification card signed by A. Robinson, plus program schedule. Received in ten day for an English test transmission broadcast report and a self-addressed-envelope. Station address: FBN, 520 Roberts Road, Newport, NC 28570. (Loveless, MI) Full data Lighthouse card 5920 kHz in 13 days for mint postage. (Mike Brooker, Toronto, Ontario, Canada/HCDX; Martin, OR) Received in nine days for one US dollar. (Wilkins, MO)

WINB, 12160 kHz. Partial data card signed by Fred Wise. Received in three months for an English report. Station address: P.O. Box 88, Red Lion, PA 17356-0088. (Wood, TN)

WTJC, 9370 kHz. Full data lighthouse card signed by A. Robinson, plus program guide and bumper sticker. Received in ten days for an English report and one US dollar. Station address (see WBOH). (Wilkins, MO)

UZBEKISTAN

Radio Tashkent, 11905 kHz. Full data card unsigned, plus schedule, personal letter and station literature. Received in 57 days for an English report and one IRC. Station address: Mrs. Alfia Ruzmatove, Head of Correspondence Section, 49 Khoranzn Street, 70047 Tashkent, Uzebekistan. (Wood, TN)

ZAMBIA

NBC, 6265 kHz. Full data QSL signed by Patrick Nkula for Director of Engineering. Received in 40 days for a cassette recording and one IRC. Station address: P.O. Box 50015, Lusaka, Zambia. (Loveless, MI)

John Figliozzi
johnfigliozzi@monitoringtimes.com

A Little Rest

Summertime Easy Listening

Close your eyes and imagine this. (On second thought, I guess you'll have to read this first and then imagine it again from memory.)

How about a warm, breezy moonlit evening. The windows and shades are thrown wide open. The room is dark but for the green pulsating circle of the tuning eye and soft orange glow reflecting off the dial of that old Grundig-Majestic tube table model with the rich, deep audio. (It could be *your* favorite portable, but this is *my* dream sequence, thank you.)

You're stretched out on the couch (or the rug, or the recliner, on the screen porch – whatever!) That grand radio is playing a familiar classical piece; or is it a string of hits from the '60s? (It could be either or both.) The sound is steady, even strong; but with a hint of air in the signal telling you that it's coming from quite a ways away.

This is how a lot of midweek summer evenings are spent at my house. The station is **Radio New Zealand International**, which historically has come in very solidly and quite reliably on 17675 kHz during the high summer months, even here in upstate New York. The programming originates from *National Radio*, the primary domestic network. It's midafternoon in New Zealand; but just after sunset the previous (?!) evening where I'm listening. Midwinter there; midsummer here. Regardless, it works seamlessly in both places.

After the "1:00 news" *(0100 UT)* and nationwide weather report, it's ***Cadenza***. ***Cadenza***, an hour of shorter classical music pieces – spanning the spectrum but mostly mainstream – offering a thoughtful, pleasant background for your nighttime musings. It's produced and presented by Peter Fry, who serves as a friendly but unintrusive guide.

Following the news and weather "at 2" *(0200 UT)*, the pace changes some with ***Wayne's Music***, the first hour of ***In Touch with New Zealand***. Wayne is Wayne Mowat, National Radio's afternoon host, and there isn't a more relaxed and relaxing host than the warm-voiced Mowat. The National Radio online guide says it best, "Wayne aims to settle you into cruise mode right away with an oasis of nostalgia, ***Wayne's Music***....This is a delightful part of the day, whether you're thirty-something or eighty-wards inclined – a chance to reacquaint yourself with the hits of your era, from the 1920s to the 1970s, and everything in between. Each week Wayne takes us back to a different decade to reawaken some of those sleeping memories. From Fats Waller to Abba, Doris Day to the Beatles, Alberta Hunter to Dean Martin, Duke Ellington to Supertramp..."

In my opinion, this is the most refreshing and relaxing two hour block on shortwave radio. After a hard day at the office, I find myself looking forward to two hours with RNZI. I only wish reception was as good in our winter months as it is in the summer. But then again it's that "limited time only" availability that makes it all the more special.

Tune in *Monday-Friday 0100-0300* on 17675 kHz.

❖ A Little Laughter

Laughter may be the best medicine, but comedy has hurdles in an international environment. Because it requires a common context, what Brits, Kiwis or Canadians find funny, Americans sometimes don't, and vice-versa. Furthermore, comedy relies on language – a turn of a phrase, a double entendre, a play on words. Slang and meanings differ from place to place. Is there any wonder that there's so little comedy on international shortwave?

There is some, nonetheless, and most SWLs are savvy enough to learn the context and get the joke. Here's the shortlist:

BBC World Service *(Mon. 1532, Tue. 0132, Sun. 2332)* – The **BBC** still carries a bloc of "light entertainment" programming rotating several series – both new and recurring. The most popular of these are the panel games that have long been a staple of the **BBC** domestic services and which have found an enthusiastic audience on the **World Service**, as well. Two have been taking turns on the schedule this season:

Quote Unquote is Nigel Rees's quiz that relies on the curiosity of the listener as to who said what when. A wide variety of guests from British broadcasting, its press and theatre ponder over all kinds of quotes, whether from a great novel, a line from a film, a song title or a catchphrase. It's the ensuing and inevitable play on words that provides the humor and entertainment.

Just A Minute is one of my favorites. It relies on the seemingly simple task, set to the four celebrity contestants, of speaking for one minute on unlikely subjects without hesitation, deviation or repetition. It's much harder than it sounds and prompts a bevy of challenges, counter-challenges and friendly harrassment that often provoke deep belly laughs.

These two undoubtedly will return in the coming months; but for the next six weeks from June 30, broadcaster Simon Fanshawe (according to *BBC On-Air*) "will bring a cornucopia of comedy, quotations, literature and laughter" in ***Fanshawe Gets to the Bottom of...*** (presumably all sorts of things!)

Radio Canada International – For some time, **RCI** has scheduled two programs from the **CBC Radio One** domestic network:

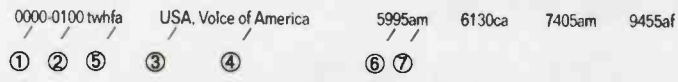
The first is ***Vinyl Cafe*** *(Sat. 1405)*, which will remind stateside listeners of *A Prairie Home Companion* to some extent. Humorist Stuart McLean presides over a fictional record store in a fictional Canadian small town with its own peculiar cast of fictional characters. McLean spins stories *a la* Keillor and features Canadian musicians.

The other is ***Madly Off in All Directions*** *(Sat. 2230)*, a satirical half-hour spearing Canadian politicians and regional foibles. During the summer, it's replaced by a program featuring Canadian stand-up acts and excerpts from various comedy shows.

Radio New Zealand International – ***The Saturday Comedy Zone*** *(Sat. 0130)* and ***Play It Again*** *(Sat. 0930)* originate from the domestic **National Radio** service. Both programs feature a random selection of humorous series and programs – the former usually of Kiwi vintage and the latter often old **BBC** chestnuts.

For frequencies, consult the *MT Shortwave Guide* and, until August, relax with 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

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

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

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

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

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

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

Choose a program or station you want to hear.

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

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

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

MT Monitoring Team

Gayle Van Horn
Frequency Manager
gaylevanhorn@monitoringtimes.com

John Figliozzi
Program Manager
johnfigliozzi@monitoringtimes.com

Mark Fine, VA
markfine@monitoringtimes.com

Program Highlights

John Figliozzi

AN RCI REVIVAL

Thankfully, listeners – both Canadian and international – have never given up on **Radio Canada International** even on the all-too-many occasions when its prospects looked bleak. That steadfast faith appears to be paying off as **RCI** slowly but steadily emerges from its most recent near-death experience with a roster of developing programs that demonstrate a sharper and more consistent focus than in recent years. One program (though no longer on the schedule) already has earned international accolades: Wojtek Gwiazda's documentary "Refugees," from his *Canada in the World* series, received special commendation from the Asia Pacific Broadcasting Union. (The audio file of the program remains available from **http://www.rcinet.ca**.)

RCI's in-house productions now bring a strong, welcome, and much-needed Canadian focus and perspective to major areas of interest to international listeners. After all, if **RCI** doesn't do it, who will? Current features on the schedule include *Business Sense* (Canadian products, businesses and practices), *Media Zone* (Canadian journalists' forum), *Sci-Tech File* (Canadian research and innovations), *Spotlight* (Canadian arts and culture), and *The Maple Leaf Mailbag*. The daily magazine *Canada Today* also appears in two editions, including a new live edition hosted by Gwiazda for the Americas and India.

Full details for RCI's service to the Americas in English are included in each month's *SWG*.

DRM LAUNCHES

From June 16, Digital Radio Mondiale (featured extensively in April's *MT*) has launched officially a regular schedule of daily transmissions with broadcasters like Deutsche Welle, Radio Netherlands, BBC World Service, Radio Sweden and RCI. There are sure to be others by the time you read this. Details on this and on how to receive these broadcasts may be found at **http://www.drm.org** and **http://www.rnw.nl/realradio/html/drm.html**. Consumer-grade standalone portable receivers are expected to be available within the next year.

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	11725no		
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		9625da	
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	a	Finland, Scandinavian Weekend R		5980va	11690va
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		5050no	5085na
			6890na			
0000	0100		USA, WYFR Okeechobee FL		6065na	9505na
			15130sa			
0000	0100	vl	Vonuatu, Radio	3945al	7260do	
0000	0100		Zambia, Christian Voice		4965do	
0000	0130		UAE, Gospel For Asia	6145as		
0015	0100		Japan, Radio	6145na		
0030	0100		Iran, VOIRI	9530na	11920na	
0030	0100		Lithuania, R Vilnius	9855al	11690na	
0030	0100	mtwhfa	Russia, Bible Voice BC	11975as		
0030	0100		Sri Lanka, SLBC	6005as	11905as	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		6200no	7345na
0100	0127		Vietnam, Voice of	6175na		
0100	0128		Hungary, Radio Budapest		9590no	
0100	0130	s	Germany, R Africa Intl	9435as		
0100	0130		Slovakia, R Slovakia Intl		5930na	6190ca
			9440sa			
0100	0130		UAE, Gospel For Asia	6145as		
0100	0130		Uzbekistan, Radio Tashkent		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		6070da	
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, Radio 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	a	Finland, Scandinavian Weekend R		5980va	11690va
0100	0200		Guyana, Voice of	3291do	5950do	
0100	0200		Indonesia, Voice of	9525va	11785as	
0100	0200		Iran, VOIRI	9530na	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	11905as	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		7505no	
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		9370no	
0100	0200		USA, WWCR Nashville TN		3210na	5070na
			5935no 7465na			
0100	0200		USA, WWRB Manchester TN		5050na	5085na
			6890na			
0100	0200		USA, WYFR Okeechobee FL		6065na	9505na
			15060as			
0100	0200	vl	Vonuatu, Radio	3945al	7260da	
0100	0200		Zambia, Christian Voice		4965da	
0105	0112		Croatia, Croatian Radio		9925na	
0130	0140		Libya, Voice of Africa	15435af	21695af	
0130	0200		Australia, Voice Internotional		17775as	
0130	0200		Iraq, Radio Iraq Intl	6175irr	9687irr	11787irr
0130	0200		Sweden, Radio	9435va	9495na	
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

SELECTED PROGRAMMING BEGINS ON PAGE 55

0140	0200		Vatican City, Vatican Radio	9650as	12055as
0145	0200		Albania, Radio Tirana Intl	6115na	7160eu

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

0200	0210		Bangladesh, Banglo Betar	4882as	
0200	0230	sm w fa	Belarus, Radio Belarus Intl	5970eu	7210eu
0200	0230		Iran, VOIRI 9530na 11920na		
0200	0230		UAE, Bible Voice 9610as		
0200	0230	a	UK, Wales Radio Intl 9795na		
0200	0230		USA, KJES Vodo NM 7555na		
0200	0256		North Korea, Voice of 4405as	9325os	11335as
0200	0256		Romania, R Romania Intl 15105as 17720as	9510na	11940na
0200	0256		South Korea, R Korea Intl 15575na	9560as	11810as
0200	0257		Canada, Radio Canada Intl	15510as	17860os
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 15415as 15515va 17580pa	12080va	15240pa 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 7375am 9725so 11870am	5030am	6150am 13750na
0200	0300		Cuba, Radio Havana 6000na	9820na	11705usb
0200	0300		Egypt, Radio Cairo 11780na		
0200	0300	a	Finland, Scandinavian Weekend R	5980va	
0200	0300		Guyana, Voice of 3291do	5950do	
0200	0300		Malaysia, Radio 7295do		
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 15270me	11885me	15120me
0200	0300	as	Russia, Bible Voice BC 17540as		
0200	0300		Russia, University Network	9940as	
0200	0300		Russia, Voice of 9665na 17595na	9725no	12000na
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	11905as	15745as
0200	0300		Taiwan, R Taipei Intl 5950na 15320as 15465as	9680na	11875as
0200	0300		UK, BBC World Service 9410eu 9750af 9825am 11955os 12095so 15280as 17790as	5975am 11835am	6195eu 11760me 15310as 15360os
0200	0300		USA, Armed Forces Network 4319usb 4993usb 6350usb 12579usb 12689usb	3903usb 6458usb 13362usb	4278usb 10320usb 13855usb
0200	0300		USA, KAIJ Dallas TX 5755va		
0200	0300		USA, KTBN Salt Lk City UT	7505na	
0200	0300		USA, KWHR Naalehu HI	17510as	
0200	0300		USA, Voice of America 7115os 11725os 11820as 13650os	9635os 17740as	11705os 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 5935na 7465na	3210na	5070na
0200	0300		USA, WWRB Manchester TN 6890na	5050na	5085na
0200	0300		USA, WYFR Okeechobee FL 9505na 11855sa 15255sa	5985sa	6065na
0200	0300		Zambia, Christian Voice	4965do	
0200	1215		Cambodia, National Radio Of	11940as	
0215	0220		Nepal, Radio 3230as 7164as	5005as	6100as
0230	0257		Vietnam, Voice of 6175na		
0230	0258		Hungary, Radio Budapest	9590na	
0230	0300		Albania, Radio Tirana Intl	6115na	7160eu
0230	0300		Sweden, Radio 9495na		
0238	0250		Croatia, Croatian Radio	9925na	
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 9660af	7305am	9605am
0300	0327		Czech Rep, Radio Prague Intl 9870na	7345na	7385na
0300	0329		Belgium, Radio Vlaanderen Intl	15565am	
0300	0330		Egypt, Radio Cairo 11780na		
0300	0330	s twhfa	Mexico, Radio Mexico Intl	9705am	11770am
0300	0330	as	Philippines, Radio Pilipinas 15270me	11885me	15120me
0300	0330		South Africa, Channel Africa	6035af	
0300	0330		Thailand, Radio 15395na		
0300	0330		USA, Voice of America 6080af 7340af 9575af 17895af	9885af	7105af 7290af 11835af 12080af
0300	0356		China, China Radio Intl	9690na	9790na
0300	0356		North Korea, Voice of 3560os 9345as	6195as	7140as
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 Crk	4910do	
0300	0400		Australia, Radio 9660pa 15415as 15515vo 17580po	12080va	15240pa 17750as 21725os
0300	0400	vl	Botswana, Radio 3356do	4820do	7255do
0300	0400		Canada, CBC Northern Service	9625do	
0300	0400		Canada, CFRX Toronto ON	6070do	
0300	0400		Canada, CFVP Calgary AB	6030do	
0300	0400		Canada, CKZN St John's NF	6160do	
0300	0400		Canada, CKZU Vancouver BC	6160do	
0300	0400		Costa Rica, R for Peace Intl	7445am	15038va
0300	0400		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am 13750no 17645os
0300	0400		Cuba, Radio Havana 6000na	9820na	11705usb
0300	0400	a	Finland, Scandinavian Weekend R	5980va	
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 15295au	9665as	9750as
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 12000na 17565na	11720na 17660na	11750no 17690no
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	11905as	15745os
0300	0400		Taiwan, R Taipei Intl 5950na 15320os	9680no	15215so
0300	0400		Turkey, Voice of 7270va	9650eu	11655va
0300	0400		Ugondo, Radio 4976do	5026do	7196do
0300	0400		UK, BBC World Service 6005af 6190af 9410eu 9750af 12035af 12095eu 15575me 17760os	6195eu 9825am 15280as 17790as	3255af 5975am 7120af 7160af 11760os 11835am 15310as 15360os 21660as 21830as
0300	0400		UK, British Forces BCS 7260me	15795me	
0300	0400		Ukraine, R Ukraine Intl 12040na		
0300	0400		USA, Armed Forces Network 4319usb 4993usb 6350usb 12579usb 12689usb	3903usb 6458usb 13362usb	4278usb 10320usb 13855usb
0300	0400		USA, KAIJ Dallas TX 5755va		
0300	0400		USA, KTBN Salt Lk City UT	7505na	
0300	0400		USA, KWHR Naalehu HI	17510as	
0300	0400		USA, 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 7385no		
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 5935na 7465na	3210na	5070na
0300	0400		USA, WWRB Manchester TN 6890na	5050na	5085na
0300	0400		USA, WYFR Okeechobee FL 11740sa	6065na	9505na
0300	0400		Zambia, Christian Voice	4965do	
0305	0312		Croatia, Croatian Radio	9925na	
0310	0330		Vatican City, Voticon Radio	9660af	
0330	0340		Libya, Voice of Africa 15435af	21695af	
0330	0350		UAE, Radio Dubai 12005no 17890na	13675na	15400na
0330	0357		Czech Rep, Radio Prague Intl	11600va	15620vo
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		Fronce Rodio France Intl		9550af	11700af
			11910af 13610af			
0400	0430	vl	Guatemala, Radio Cultural		5955do	
0400	0430	s twhfa	Mexico, Radio Mexico Intl		9705am	11770am
0400	0430		South Africa, Channel Africa		5955af	
0400	0430		Sri Lanka, SLBC	6005as	11905as	15745as
0400	0430		UK, Project Airwaves	21510as		
0400	0456		China, China Radio 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		5025do	
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		6070do	
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	a	Finland, Scandinavian Weekend R		5980va	
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	17650na	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	twhfo	USA, WBCQ Kennebunk, ME		9329no	
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		6065no	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		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	15570as	
0500	0530		Fronce Radio France Intl		11685as	15155af
			17800af			
0500	0530		Netherlands, Radio	6165na	9590na	
0500	0530		South Africa, AWR Africa		3215af	3345af
0500	0530		South Africa, Channel Africa		11710as	
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		5030al	6035do
0500	0600	vl	Botswana, Radio	3356do	4820do	7255do
0500	0600		Canada, CFRX Toronto ON		6070do	
0500	0600		Canada, CKZN St John's NF		6160do	
0500	0600		Canada, CKZU Vancouver BC		6160do	
0500	0600		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, Scandinavian Weekend R		5990va	11720va
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		6050do	
0500	0600		Nigeria, Radio/Kaduna		4770do	6090do
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, Radio 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	15360os
			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		11730at	
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		9660af	11625af
			15570af			
0525	0600	vl	Ghana, Ghana BC Corp		3366do	4915do
0530	0545	as	UK, BBC World Service		9875eu	
0530	0550		UAE, Radio Dubai	13675au	15435au	17830au

			21700au			
0530	0600		Georgia, Georgian Radio	11805eu		
0530	0600	mtwhf/vl	Italy, IRRS 13840va			
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	mtwhf/vl	Italy, IRRS 13840va			
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	9530na	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	15240pa	17580pa 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	a	Finland, Scandinavian Weekend R	5990va	11690va	
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 17870pa	11740as	13630na	21755pa
0600	0700		Kuwait, Radio 15110as			
0600	0700		Liberia, ELWA 4760do			
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	4990do		
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 4976da	5026da	7196do	
0600	0700		UK, BBC World Service 7120af 7160af 9410eu 11955as 12095eu 15310as 15565eu 15575as 21660as	6055af	6190af	11765af 11940af 15360as 15485eu 17640af 17760as 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	3903usb	4278usb	6458usb 10320usb 12689usb 13362usb 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	5890eu	11740eu 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 11940eu	9530na	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	11820pa		
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu	
0700	0729		Belgium, Radio Vlaanderen Intl	5985eu		
0700	0730		Slovakia, R Slavakia Intl 17550au	9440au	15460au	
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	15240va	17750as 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	a	Finland, Scandinavian Weekend R	5990va		
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 4760do			
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 Taipei Intl 5950na			
0700	0800	as	UK, BBC World Service	17885af		
0700	0800		UK, BBC World Service 11760me 11765af 11940af 15310as 15360as 15400af 15575eu 17640eu 17760as	6190af	7120af	11955as 12095eu 15485eu 15565eu 17790as 21660as
0700	0800		USA, Armed Forces Network 4319usb 4993usb 6350usb 12579usb	3903usb	4278usb	6458usb 10320usb 12689usb 13362usb 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 Okeechobee FL 13695af	7355eu	11530af	
0700	0800	vl	Vanuatu, Radio 3945al	4960do		
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		Pokistan, 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 15295ou	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 Kinobalu	5979do	
0800	0830		Myanmar, Radio 9730do		
0800	0900		Anguilla, Caribbean Beacon	6090am	
0800	0900		Australia, Radio 5995pa 11880as 12080va 15415as 17750as	9580va 15240va 21725as	9710po 15240va
0800	0900	as	Australia, Radio 17750as		
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 13750na	6150am 17645as
0800	0900		Ecuador, HCJB 11770po		
0800	0900		Eqt Guinea, Radio Africa	15184af	
0800	0900	a	Finland, Scandinavian Weekend R	5990va	
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	21560af
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	6190af 12095eu 15565eu 21470af	7120af 15310as 17640eu 21660as
0800	0900		USA, Armed Forces Network 4319usb 4993usb 12579usb	3903usb 6350usb 12689usb	4278usb 6458usb 13362usb
0800	0900		USA, KAIJ Dallas TX 5755va	13855usb	
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	21770af	
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	21745va	
0900	0930	as	Australia, Radio 17750as		
0900	0930		Austria, AWR Europe 17780af		
0900	0930		Guam, TWR/KTWR 15330as		
0900	0956		China, China Radio Intl	11730po	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 13750na	6150am 17645as
0900	1000		Eqt Guinea, Radio Africa	15184af	
0900	1000	a	Finland, Scandinavian Weekend R	5990va	
0900	1000		Germany, Deutsche Welle	6140eu	15440eu
0900	1000		Guyana, Voice of 3291do	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 15360as 17640eu 21470af
					11940af 15400af 17760as 21660as
0900	1000		USA, Armed Forces Network 4319usb 4993usb 12579usb	3903usb 6350usb 12689usb	4278usb 6458usb 13362usb
					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	osmwhf	Greece, Voice of 12105eu	15630eu	17900eu
0930	1000		Netherlands, Radio 9785po	12065as	13710as

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 9785po	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 9580va 17750as 21820as	11880as	15240as
1000	1100		Australia, Voice International	13685as	
1000	1100	as	Bhutan, Bhutan BC Service	5030al	6035do

1000	1100		Canada, CFRX Toronto ON	6070da		
1000	1100		Canada, CFVP Calgary AB	6030da		
1000	1100		Canada, CKZN St Jahn's NF	6160da		
1000	1100		Canada, CKZU Vancouver BC	6160do		
1000	1100		Costa Rica, R for Peace Intl	7445am	15038va	
1000	1100		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa 11870am	13750na	17645as	
1000	1100		Eqt Guinea, Radio Africa	15184af		
1000	1100	a	Finland, Scandinavian Weekend R	5990va		
1000	1100		Germany, Deutsche Welle	6140eu	15440eu	
1000	1100		Guyana, Voice of 3291do	5949do		
1000	1100		India, All India Radio 13695as	15020as	15260as	
			15410as 17510au 17800as	17895au		
1000	1100	as/vl	Italy, IRRS 13840va			
1000	1100		Japan, Radio 9695as	15590as	17585eu	
			21755po			
1000	1100		Liberia, R Liberia Intl 6100do			
1000	1100		Malaysia, Radio 7295do			
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		UK, BBC World Service	6190af	6195va	
			7120af 9740as 11760me	11940af	12095eu	
			15310as 15360as 15485eu	15565eu	15575as	
			17640eu 17760as 17790as	17885af	21470af	
1000	1100	as	UK, BBC World Service	15400af	17830af	
1000	1100		USA, Armed Forces Network	3903usb	4278usb	
			4319usb 4993usb 6350usb	6458usb	10320usb	
			12579usb 12689usb	13362usb	13855usb	
1000	1100		USA, KAIJ Dallas TX 5755va			
1000	1100		USA, KTBN Salt Lk City UT	7505na		
1000	1100		USA, Voice of America 5745am	7370am	9590am	
			9770as 13620as 15240as	15425as		
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	6095am	9455sa	
			11780as			
1000	1100		USA, WTJC Newport NC	9370na		
1000	1100		USA, WWCR Nashville TN	5070na	5935na	
			7560na 15825na			
1000	1100		USA, WYFR Okeechobee FL	5950na		
1015	1030		Israel, Kol Israel 15640va	17525va	17545va	
1015	1030		UK, BBC World Service	11680eu	15325eu	
			17695eu			
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, VOIRI15450as 15550as	15600as	21470as	
			21730os			
1030	1100		Netherlands, Radio 5965na	6045eu	9785au	
			9860eu 12065as 13710as			
1030	1100		UAE, Radio Dubai 13675eu	15395eu	17865eu	
			21605eu			
1030	1100	t	UAE, Radio UNMEE 21550af			
1030	1100		UK, BBC World Service	9605as	11945as	
			15285as 21660as			
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 5965na	6045eu	9785au	
			9860eu 12065as 13710as			
1100	1127		Vietnam, Voice of 11630as			
1100	1130	as	Bhutan, Bhutan BC Service	5030al	6035do	
1100	1130		Iran, VOIRI15450as 15550as	15600as	21470as	
			21730as			
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 5995pa	6020pa	9475as	
			9580va 11650va 11880as	12080va	15240va	
			21820os			
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	5030am	6150am	
			7375am 9725sa 11870am	13750na	17645as	
1100	1200		Ecuador, HCJB 11770pa	12005am	15115am	
			21455usb			
1100	1200	a	Finland, Scandinavian Weekend R	5990va		
1100	1200		Germany, Deutsche Welle	6140eu	15110as	
			17820eu			
1100	1200	as/vl	Italy, IRRS 13840va			
1100	1200		Japan, Radio 6120na	9695as	15590as	
1100	1200		Malaysia, Radio 7295do			
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 Taipei Intl 7445as	11985as		
1100	1200		UK, BBC World Service	6190af	6195va	
			7120af 9740as 11760me	11940af	12095eu	
			15190va 15310as 15485eu	15565eu	15575eu	
			17640eu 17760as 17790as	17830af	17885af	
			21470af			
1100	1200		Ukraine, R Ukraine Intl15415eu			
1100	1200		USA, Armed Forces Network	3903usb	4278usb	
			4319usb 4993usb 6350usb	6458usb	10320usb	
			12579usb 12689usb	13362usb	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 6160as	9645as	9760as	
			9770as 13610as 15240as	15425as		
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	5070na	5935na	
			7560na 15825na			
1100	1200		USA, WYFR Okeechobee FL	5850no	5950na	
			7335sa 11855sa			
1106	1200		New Zealand, Radio NZ Intl	9885pa		
1115	1145		Nepal, Radio 3230as	5005as	6100as	
			7164os			
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 Korea Intl	9650na		
1130	1200		Sweden, Radio 17505vo	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 12005am	15115am	21455usb	
1200	1230		France Radio Fronce Intl	17815af	21620af	
			25820af			
1200	1230		South Korea, R Korea Intl	9650na		
1200	1230		Uzbekistan, Radio Tashkent	7285as	9715os	
			15295as 17775as			
1200	1256		China, China Radio Intl	9730as	9760pa	
			11760pa 11980as 15415pa			
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 5995pa	6020pa	9475as	
			9580va 11650va 11880as	12080as	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	9515na	13655na	
			17800na			
1200	1300		China, Voice of Hope 13590os			
1200	1300		Costa Rica, R for Peace Intl	7445am	15038va	
1200	1300		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa 11870am	13750na	17645as	
1200	1300	a	Finland, Scandinavian Weekend R	5990va	11720va	
1200	1300		Germany, Deutsche Welle	6140eu	15440eu	
1200	1300	as/vl	Italy, IRRS 13840va			
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 Taipei 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		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 Noshville TN	7560na	12160na	
			13845na 155825no			
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 Betor	7185as	9550as	
1230	1300		Ecuador, HCJB 12005am	15115am	15480as	
			21455usb			
1230	1300		Sri Lanka, SLBC 6005as	11930as	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	6020pa	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 12005am	15115am	15480as	
			21455usb			
1300	1400	a	Finland, Scandinavian Weekend R	5990va	11720va	
1300	1400		Germany, Deutsche Welle	6140eu		
1300	1400		Germany, Overcomer Ministries	13810me		
1300	1400		Jordan, Radio 11690eu			
1300	1400		Malaysia, Radio 7295do			
1300	1400		Papua New Guinea, NBC	4890do	9675irr	
1300	1400		Russia, University Network	17765as		
1300	1400		Singapore, R Singapore Intl	6150as	9600as	
1300	1400	as	South Africa, Channel Africa	11780af	21620af	
			21760af			
1300	1400		South Korea, R Korea Intl	9570am	13670am	
1300	1400		Sri Lanka, SLBC 6005as	11930as	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		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	17494nc		
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, Radio Tashkent	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 12005am	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	11720va	
1400	1500		France Radio France Intl	11610as	17515as	
1400	1500		Germany, Deutsche Welle	6140eu		
1400	1500		Germany, Overcomer Ministries	13810me		
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		Taiwan, R Taipei 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	5040do	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	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	6070da		
1500	1600		Canada, CFVP Calgary AB	6030da		
1500	1600		Canada, CKZN St John's NF	6160do		
1500	1600		Canada, CKZU Vancouver BC	6160da		
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	a	Finland, Scandinavian Weekend R	5980va	11720va	
1500	1600		Germany, Deutsche Welle	6140eu		
1500	1600		Germany, Overcomer Ministries	13810me		
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	6095po		
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 15190vo	15310as	15400af	15485eu
			15565eu 17790os	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	17494no		
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	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	4930do		
1545	1600	s h	Bangladesh, Bangla Betar	4882as		

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

1600	1615		Pakistan, Radio	11570va	15065va	15725va
			17820va			
1600	1625		Netherlands, Radio	9890as	11835os	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		Sri Lanka, SLBC	6005as	11930as	15745as
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	acc	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 International	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	5980va	11720va	
1600	1700		France Radio France Intl	9730af	11615af	
			11995af 12015af	15160af	15605af	17605af
			17850af			
1600	1700		Germany, Deutsche Welle	6140eu	6170as	
			7225as 17595as			
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 Veritos	3230af		
1600	1700		South Korea, R Korea Intl	5975om	9515af	
			9870af			
1600	1700		Taiwan, R Taipei Intl	11550as		
1600	1700		UK, BBC World Service	3915os	5975as	
			6190eu 6195os	7120af	7160os	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	15590no		
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	15420af
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	9320na	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	1700		Egypt, Radio Cairo 15255af		
1630	1700		Guam, AWR/KSDA 11560as 15235as	11975as	15215as
1630	1700		Slovakia, R Slovakia Intl 7345eu	5920eu	6055eu
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	twfc	Russia, Bible Voice BC 7430af	13810af	
1700	1730		South Africa, Channel Africa	15265af	
1700	1746		UK, BBC World Service	6005af	9630af
1700	1750	mtwhf	New Zealand, Radio NZ Intl	6095pa	
1700	1756		China, China Radio Intl 11910af 11920af	9570af	9695af
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 9580va 9815pa 11880va	5995vc 6080pa	9475as
1700	1800		Australia, Voice International	11680as	
1700	1800		Canada, CBC Northern Service	9625do	
1700	1800		Canada, CFRX Toronto ON	6070do	
1700	1800		Canada, CFVP Colgary AB	6030do	
1700	1800		Canada, CKZN St John's NF	6160do	
1700	1800		Canada, CKZU Vancouver BC	6160do	
1700	1800		Costa Rica, R for Peace Intl	7445am	15038va
1700	1800		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am 13750na 17645as
1700	1800		Egypt, Radio Cairo 15255af		
1700	1800		Eqt Guinea, Radio Africa	7189af	15184al
1700	1800	a	Finland, Scandinavian Weekend R	6170va	11690va
1700	1800		Germany, Deutsche Welle	6140eu	
1700	1800		Germany, R Africa Intl 13820af	11735af	
1700	1800		Japan, Radio 9505no	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 Taipei Intl 11550as		
1700	1800		UK, BBC World Service 5975as 6190af 6195eu 9410eu 9510os 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	4278usb 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	13615no	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	15420af
1700	1800		USA, WSHB Cypress Creek SC	18910af	
1700	1800		USA, WTJC Newport NC	9370na	
1700	1800		USA, WWCR Nashville TN 13845na 15825na	9475na	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		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 Vlaanderen Intl 13710me	9925eu	13690eu
1730	1800		Bulgaria, Radio 9400eu	11900eu	
1730	1800		Georgia, Georgian Radio	11910eu	
1730	1800	s	Germany, Voice of Hope	15680me	
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	mtwhfo	Sweden, Radio 6065va		
1730	1800	s	Sweden, Radio 13580va		
1730	1800		Switzerland, Swiss R Intl 17870va	13750va	15515va
1730	1800		Voticon City, Vatican Radio 17515af	13765af	15570af
1735	1745	vl/th	Paraguay, Radio Nacional	9739so	
1745	1800		Bangladesh, Bangla Betar 15520eu	7185eu	9550eu
1745	1800		India, All India Radio 7410eu 11620eu 11935af 17670af	9445af 13605af	9950eu 15075af 15155af
1751	1800		New Zealand, Radio NZ Intl	11725pa	

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

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	1845		Germany, Voice of Hope	5970eu	
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 9580va 9815pa 11880va	6080pa	7240va 9475as
1800	1900		Australia, Voice International	11680as	
1800	1900		Bangladesh, Bangla Betar 15520eu	7185eu	9550eu
1800	1900		Canada, CBC Northern Service	9625do	
1800	1900		Canada, CFRX Toronto ON	6070do	
1800	1900		Canada, CFVP Calgary AB	6030do	
1800	1900		Canada, CKZN St John's NF	6160do	
1800	1900		Canada, CKZU Vancouver BC	6160do	
1800	1900		Costa Rica, R for Peace Intl	7445am	15038va
1800	1900		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am 13750na 17645as
1800	1900		Eqt Guinea, Radio Africa	7189af	15184al
1800	1900	a	Finland, Scandinavian Weekend R	6170va	11690va
1800	1900		Germany, Deutsche Welle	6140eu	
1800	1900		Germany, R Africa Intl 13820va	11735va	
1800	1900	s	Greece, Voice of 9420eu	15630eu	17705na
1800	1900		India, All Indio Radio 7410eu 11620eu 11935af 17670af	9445af 13605af	9950eu 15075af 15155af
1800	1900	s	Ireland, Reflections Europe 12255eu	3910eu	6295eu
1800	1900		Kuwait, Radio 11990va		
1800	1900	s	Latvia, Loser 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	9940os	
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 Taipei 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 15385no		
1800	1900		USA, KTBN Salt Lk City UT	15590no	
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 15825no		
1800	1900		USA, WWRB Manchester TN	9320na	12172no
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 15780af		
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		Slovakia, R Slovakia Intl	5920eu	6055eu
			7345eu		
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		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	13750no	17645as
1900	2000		Eqt Guinea, Radio Africa	7189af	15184al
1900	2000	a	Finland, Scandinavian Weekend R	6170va	11690va
1900	2000		Germany, Deutsche Welle	6180af	7225af
			11965af 13590af		
1900	2000		Germany, Overcomer Ministries	3965eu	
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do
1900	2000	as/vl	Italy, IRRS 5780va 6290al		
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, Radio 7295do		
1900	2000	smtwh a	Malta, VO Mediterraneon	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/Logos 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	9940os	
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	a	Sri Lanka, SLBC 6010eu		
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 For 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	15590no	
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	9370no	
1900	2000		USA, WWCR Nashville TN	9475na	12160na
			13845no 15825no		
1900	2000		USA, WWRB Manchester TN	9320na	12172no
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 Belarus Intl	7105eu	7210eu
1930	2000		Iran, VOIRI 9800eu 11670eu	11750eu	11860eu
1930	2000		Papua New Guinea, NBC	4890do	9675irr
1930	2000		Slovakia, AWR Europe 7130eu		
1930	2000		Sweden, Radio 6065va		
1930	2000		Switzerland, Swiss R Intl	11815va	13645va
			13795va 15220af		
1930	2000		UK, Solomaa Radio 13855af		
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, VOIRI 9800eu 11670eu	11750eu	11860eu
2000	2030	as/vl	Italy, IRRS 5780va 6290al		
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	9815pa
			11880va 12080va		
2000	2100	as	Australia, Radio 6080po	7240va	
2000	2100		Australia, Voice International	11680as	

Shortwave Guide

2000	2100	vl	Batswana, Radio	3356do	4820da	7255do
2000	2100		Canada, CBC Northern Service		9625da	
2000	2100		Canada, CFRX Toronto ON		6070do	
2000	2100		Canada, CFVP Calgary AB		6030do	
2000	2100		Canada, CKZN St John's NF		6160do	
2000	2100		Canada, CKZU Vancouver BC		6160do	
2000	2100		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	17645cs
2000	2100		Ecuador, HCJB	15185eu		
2000	2100		Eqt Guinea, Radio Africa		7189af	15184al
2000	2100	a	Finland, Scandinavian Weekend R		6170va	11690va
2000	2100		Germany, Deutsche Welle		9780af	15205af
			17810af			
2000	2100		Germany, Overcomer Ministries		3965eu	
2000	2100	vl	Ghana, Ghana BC Corp		3366do	4915dc
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		6050da	
2000	2100		Nigeria, Radio/Kaduna		4770da	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	9545da	
2000	2100		Syria, Radio Damascus		12085eu	13610eu
2000	2100		Uganda, Radio	4976do	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, WHRI Noblesville 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, Radio Tashkent		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 & Montenegro, 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, Radio	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		6160do	
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		6170va	11720va
2100	2200		Germany, Deutsche Welle		9440af	11865af
			15205af			
2100	2200	vl	Ghana, Ghana BC Corp		3366do	4915do
2100	2200		Guyana, Voice of	5949da		
2100	2200		India, All India Radio	7410eu	9445eu	9575au
			99 0au 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	7295do		
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		4890da	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	7260do	
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	2200		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 13665au		
2130	2200		Sweden, Radio 6065va	11650as	
2130	2200		Uzbekistan, Radio Tashkent 11905eu	5025eu	9545eu

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

2200	2215		New Zealand, Radio NZ Intl	15160pa	
2200	2227		Iran, VOIRI9870au 13665au		
2200	2230		Canada, Radio Canada Intl 13670am15170am 15455am	9590am 17880am	11920am
2200	2230		India, All India Radio 7410eu 9910au 9950eu 11620va	9445eu 11715au	9575au
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 America 9850af 15580af	11975af	13670af
2200	2245		Egypt, Radio Cairo 9990eu		
2200	2256		China, China Radio Intl	9880eu	
2200	2300		Anguilla, Caribbean Beacon	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	12080va 21740va	13620va
2200	2300		Canada, CBC Northern Service	9625do	
2200	2300		Canada, CFRX Toronto ON	6070do	
2200	2300		Canada, CFVP Calgary AB	6030do	
2200	2300		Canada, CKZN St John's NF	6160do	
2200	2300		Canada, CKZU Vancouver BC	6160do	
2200	2300		Costa Rica, R for Peace Intl	7445am	15038va
2200	2300		Costa Rica, University Network 7375am 9725sa 11870am	5030am 13750na	6150am 17645as
2200	2300		Eqt Guinea, Radio Africa	7189af	15184al
2200	2300	f	Finland, Scandinavian Weekend R	5980va	11720va
2200	2300		Germany, Deutsche Welle	9720as	15605as
2200	2300	vl	Ghana, Ghana 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	9940as	
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 Taipei Intl 15600eu		
2200	2300		Turkey, Voice of 9830va	12000va	
2200	2300		UK, BBC World Service 6195as 7105as 7120af 12095sa 15400af 17830af	5965as 9740as	5975am 11955as
2200	2300		USA, Armed Forces Network 4319usb 4993usb 6350usb 12579usb 12689usb	3903usb 6458usb 13362usb	4278usb 10320usb 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 Canada Intl 15455na	9590na	13670na
2230	2300		Cuba, Radio Havana 6195am	9550na	
2230	2300		Papua New Guinea, NBC	4890do	11880irr
2245	2300		India, All India Radio 9705as 13605as	9950as	11620as

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

2300	0000		Anguilla, Caribbean Beacon	6090am	
2300	0000		Australia, ABC NT Alice Springs	2310do	4835irr
2300	0000		Australia, ABC NT Katherine	5025do	
2300	0000		Australia, ABC NT Tennant Crk	4910do	
2300	0000		Australia, Radio 9660pa 13620as 15230as 21740va	11695as 15415as	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	f	Finland, Scandinavian Weekend R	5980va	11690va
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	11620as
2300	0000		Malaysia, Radio 7295do		
2300	0000		Namibia, NBC 3270af	3290af	6060af
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 Asia 6145as		
2300	0000		UK, BBC World Service 5975am 6195as 7120af 11955as 11955as 12095sa	3915as 9580as 15280as	5965as 9740as
2300	0000		USA, Armed Forces Network 4319usb 4993usb 6350usb 12579usb 12689usb	3903usb 6458usb 13362usb	4278usb 10320usb 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 7215as 7260as 9545as 11760as 13725as 13775as 15185as 15305as 17740as 17820as	7200as 11805as 15205as	7225as 11925as 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 9840os	12019as	

Headnotes:

1. This month's SWG features the reintroduction of **Deutsche Welle program listings** for transmissions to other regions that have provided credible reception in at least parts of North America. These are, in order of reliability, 2100, 0400, 1900 and 2000. Consult the frequency section of the SWG for where to tune.
2. At press time, there had been no announcement from **Austrian Radio** regarding specific plans for its revised English language service which was to commence July 1. Therefore, program listings for this station do not appear in this month's SWG.
3. **HCJB Ecuador no longer broadcasts to North America.** At press time, there were plans to continue the morning English service in some form on lower power transmitters for missionaries in Latin America. If this broadcast proves viable for at least some North American regions, program listings for the station will again appear in the SWG.
4. **BBCWS stream abbreviations: (am)**=Americas; **(eas)**=East Asia. These are the streams recommended by Bush House for North American listeners.
5. **Listings for the US-based independent shortwave broadcasters** are limited to general interest programming that deports from their primary formats of religious and political fare.

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

BBC WORLD SERVICE (am)
0000 D News; **0006** S The Ticket (arts performonces), M Everywoman, T/H Documentaries, W Masterpiece (artistic ideas), F Assignment, A Sports International; **0032** M Westway Omnibus, T Music Feature, W Top of the Pops, H Charlie Gillett (world music), F Music Biz, A John Peel (eclectic).

RADIO AUSTRALIA
0000 D News; **0005** S Go Zone (pop music), A Australian Express (magazine); **0010** M AWAYE! (Aboriginal culture), T The Science Show, W The National Interest (Australian politics), H Background Briefing (documentary), F Hindsight (Australian history).

RADIO EXTERIOR ESPANA
0000 S Visitors Book (travelers to Spain), M Window on Spain (culture), T-A News (international, Spain, Latin America); **0015** S/M Spanish history or culture series; **0025** S/M Rebroadcast of 0035 weekday programs, T-A Spanish pop music; **0030** T-A Press Review; **0035** S/T Radio Waves, W Chronicles (Spain & the US), H Entremeses (food & travel), F Africa Today, A Radio Club (letters); **0045** T-A A Language Without Bounds (Spanish lesson).

RADIO JAPAN - NHK WORLD
0000 D News; **0010** S Hello from Tokyo (listener contact), M Weekend Japanology, T-A Songs for Everyone; **0015** T-A 44 Minutes (magazine); 0054 M Sights & Sounds of Japan.

RADIO NETHERLANDS
0000 S/W Music 52-15 (international music), M Dutch Horizons, T Research File (science), H Documentary, F Aural Tapestry (culture), A A Good Life (development issues); **0030** S Amsterdam Forum (conversations), M Aural Tapestry, T EuroQuest (Europe in context), W A Good Life, H Dutch Horizons, F Research File, A Documentary.

RADIO NEW ZEALAND INT.
0000 S/A News; M-F Midday Report; **0012** S This Week in Parliament, A Focus on Politics; **0033** S Spectrum (life in NZ), A The Sampler (latest CDs).

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0000 S World of Radio, M Spiritual Awakening, T-A Freespeech Radio News (Pacifica Reporters Against Censorship daily newscast); **0030** S RFPI Mailbag, M World of Rodio, T/H/A Hightower Radio (commentary), W Counterspin (media analysis), F This Way Out (lesbian/gay magazine); **0035** T/H/A Earthwatch (ecology); **0040** T/H/A Earth & Sky (astronomy); **0045** T Tropical Conservation Newsbureau (rainforests), H World Citizen's Weekly Commentary, A Women (UN program).

RADIO PRAGUE
0000 D News; **0005** S Magazine (local color), M Letter from Prague, T-A Newsview; **0010** S Saturday Music (a mix), M Mailbox, T One on One (interview), W Witness (oral history), H ABC of Czech (language), F Economic Repart, A The Arts; **0020** M Readings from Czech Literature, W Talking Point (Czech issues), H Czechs in History or Spotlight (travelogue), A Away from Politics (poetry).

RADIO UKRAINE INTERNATIONAL
0000 D News; **0010** S Ukrainian Diary (weekly review), M Music from Ukraine, T-A Ukraine Today (magazine); **0015** S The Whole World on the Radio Dial (DX program); **0030** S Hello From Kiev (listener letters/music), M Roots (culture & education); **0045** T-A Closeup (current issues).

VOICE OF AMERICA (News Now)
0000 T-A News and Reports; **0015** T-A Focus (a topic in-depth); **0023** T-A Sports; **0030** T-A News Headlines; **0033** T-A Coast to Coost (Americon life); **0055** Government Editorial.

WBCQ, Maine
7415 kHz.: **0000** S A Different Kind of Oldies Show, M Radio New York International, W Good Morning Maine, A Allan Weiner Worldwide.

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

BBC WORLD SERVICE (am)
0100 D News; **0106** S Play of the Week, M Wright Around the World (musical variety), T Health Matters, W Go Digital, H Discovery (science), F One Planet (ecology), A Science in Action; **0132** T Fanshawe (humor), W Music Review, H/A Westway, F The Word (writing & writers) [exc. last F, World Book Club (discussion)]; **0145** H Heart & Soul (beliefs & values), A What's the Problem (advice).

CHINA RADIO INTERNATIONAL
0100 D News & Reports; **0110** S Report on Developing Countries; **0115** A Cutting Edge (sci/tech); **0120** S In the Spotlight (cultural magazine); **0130** M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

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

RADIO BUDAPEST
0100 D News; **0105** S Insight Central Europe; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gatepost (letters), T-A Hungary Today (current events magazine); **0120** A DX Corner.

RADIO CANADA INTERNATIONAL
0100 D News; **0105** S Business Sense, M Maple Leaf Mailbag (w/CIDX report bimonthly); **0110** T-A Canada Today (current events magazine); **0135** S/A Sci-Tech File, M/H Spotlight (arts & culture), T Media Zone (journalists discuss), W Maple Leaf Mailbag (w/ CIDX report bimonthly), F Business Sense.

RADIO HABANA CUBA
0100 D International News; **0110** M Weekly Review, T-S National News; **0115** T-S Viewpoint; **0130** M Reports & Music, T-S News Bulletin; **0135** T-A Time Out (sports); **0140** S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; **0150** M Breakthrough (science report)

RADIO NETHERLANDS
0100 S/M News, T-A Newsline; **0105** S Europe Unzipped, M Wide Angle (one issue focus).

RADIO NEW ZEALAND INTERNATIONAL
0100 D RNZ News; **0106** S At the Movies, M-F Cadenza (light classics), A Digital Life; **0130** S Bookmarks, A Saturday Comedy Zone.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0100 S Making Contact, M Radio Nation ("The Nation" magazine), T Disability Radio Worldwide, W World of Radio, H A Public Affair, F Far Right Radio Review, A Continent of Media; **0130** S Alternotive Radio (political/social analysis), T This Way Out (gay/lesbian magazine), W RFPI Mailbag, A World of Radio.

RADIO PRAGUE
0100 D News; **0105** S Insight Central Europe, M Letter from Prague, T-A Newsview; **0110** M Mailbox, T One on One (interview), W Witness (oral history), H ABC of Czech (language), F Economic Report, A The Arts; **0120** M Readings from Czech Literature, W Talking Point (Czech issues), H Czechs in History or Spotlight (travelogue), A Away from Politics (poetry).

RADIO SLOVAKIA INTERNATIONAL
0100 D News; **0105** S Front Page Review (Slovak press), M Weekly Newsreel T-A Topical Issue; **0110** S Various features, M Listeners' Tribune (letters, magazine, Slovak music), T Insight Central Europe, W Tourism News or Environmental Update, H Business News, F Culture News or Back Page News (the offbeat), A Education, Science and Regional News.

VOICE OF AMERICA (News Now)
0100 T-A News and Reports; **0123** T-A Sports; **0130** T-A News Headlines; **0133** T-F Business Report, A VOA News Review; **0145** T-F Dateline (news magazine); **0155** T-F Government Editorial.

VOICE OF RUSSIA
0100 D News; **0111** S News & Views, M Sunday Panorama, T-A Commonwealth Update; **0124** M Russia: People & Events; **0130** D News in Brief; **0132** S Moscow Yesterday & Today, M Timelines, T Folk Box, W Jazz Show, H Musical Portraits, F Music Around Us, A Christian Message from Moscow; **0146** F Music At Your Request; **0154** H Russia: People & Events.

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

WBCQ, Maine
7415 kHz.: **0100** S Marion's Attic (vintage recordings), M Radio New York International (cont'd), W Torah Talks, A Tasha Takes Control.

RTE, Ireland
0130 S Saturday View, M This Week with Gerald Barry, T-A 5-7 Live (top news of the day).

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

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

BBC WORLD SERVICE (am)
0200 D The World Today; **0232** S Global Business, M World Business Review, T-A World Business Report; **0245** M Instant Guide (background), T/W/F/A Analysis, H From Our Own Correspondent.

Shortwave Guide

RADIO AUSTRALIA
0200 D News; **0205** S Margaret Throsby (interviews and music), A Background Briefing (documentary); **0210** M-F The World Today (ABC Radio flagship news program); **0255** A Perspective (comment).
[**Special service: 0205** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO BULGARIA
0200 D News; **0210** S Views Behind the News, M Folk Studio (Bulgorian folk music), T-A Events and Developments; **0220** T Sports; **0225** W-S Timeout for Music; **0230** T Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places); **0235** T Answering Your Letters, W-M Keyword Bulgaria (Bulgaria and things Bulgarian); **0245** S Radio Bulgaria Calling (for radio hobbyists), W Magazine Economy, H Arts and Artists, F History Club, A The Way We Live.

RADIO HABANA CUBA
0200 D International News; **0210** M From Habana (Cuban musicians), T-S National News; **0215** T-S Reparts and music; **0230** M The Jazz Place or Top Tens, T-S News Bulletin; **0235** S World of Stamps, T-A Reports and music; **0250** S Cuban music.

RADIO KOREA INTERNATIONAL
0200 D News; **0210** S Worldwide Friendship (letters, DX news), M Korean Pop Interactive (requests), T-A News Commentary; **0215** T-A Seoul Calling (magazine); **0230** T Korea Today & Tomorrow (peninsular relations), W Korean Kaleidoscope (society), H Wonderful Korea (travelogue), F Seoul Report.

RADIO NEW ZEALAND INTERNATIONAL
0200 D RNZ News; **0205** S Feature, M-F In Touch with New Zealand (music, interviews, variety), A Eureka! (science)*; **0230** A Health Matters [or] Environment Matters.
[*may be preempted by live sport]

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0200 S Alternative Radio (cont'd.), M New Dimensions ("progressive" ideas), T University Forum (interviews), W Continent of Media, H WINGS (women's news), F Disability Radio Worldwide, A RFPI Mailbag; **0230** S Far Right Radio Review, T Honoring Mother Earth: Indigenous Voices, W A World of Possibilities, H Global Community Forum (interviews), F A Woman's Voice, A University Forum (interviews).

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

RADIO TAIPEI INTERNATIONAL
0200 D News; **0215** S Great Wall Forum (discussing the mainland), M Jade Bells & Bamboo Pipes (traditional music), T Culture Express, W Taiwan Today, H Discover Taiwon, F Toipei Magazine, A Groove Zone; **0230** S Mailbag Time, T Trends, W Confucius and Inspiration Beyond, H New Music Lounge, F People; **0245** M-F Let's Learn Chinese (M/W/F elementary, T/H intermediate), A Kaleidoscope (life in Taiwan).
[This schedule also airs at **0700 for western North America**.]

VOICE OF RUSSIA
0200 D News; **0211** S/M/H Moscow Mailbag, T/F Science & Engineering, W/A Newmarket (business); **0230** D News in Brief; **0232** S Songs from Russia, M This is Russia, T Kaleidoscope (Russian events), W Musical Portraits, H Moscow Yesterday & Today, F Russian by Radio, A Audio Book Club (Russian lit.); **0246** S You Write to Moscow; **0254** W Russia: People & Events.

WBCQ, Maine
7415 kHz.: **0200** S Pocket Calculator (about small electronic devices), M Radio New York International (cont'd).

WHRA, Maine
7580 kHz.: **0230** S DXing with Cumbre.

WHRI, Indiana
5745 kHz.: **0230** M DXing with Cumbre.

WWCR, Tennessee
5070 kHz.: **0230** S World of Radio.

RADIO BUDAPEST
0230 D News; **0235** S Insight Central Europe; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gatepost (letters), T-A Hungary Today (current events magazine); **0250** A DX Corner.

RADIO SWEDEN
0230 S Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); **0245** T Sports Scan, W Close Up (profiles of Swedes-1st/3rd), F Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

VOICE OF VIETNAM
0230 D News; **0235** D Current Affairs; **0240** Su Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; **0245** T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; **0250** S Music, A Literature and Arts.

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

BBC WORLD SERVICE (am)
0300 D News; **0306** S From Our Own Correspondent, M Talking Point, T-A Outlook (magazine); **0332** People & Politics; **0345** T-A Off the Shelf (book readings).

CHINA RADIO INTERNATIONAL
0300 D News & Reports; **0310** S Report on Developing Countries; **0315** A Cutting Edge (sci/tech); **0320** S In the Spotlight (cultural magazine); **0330** M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA
0300 D News; **0305** S Feedback (letters, station news, on communications), A Rural Reporter; **0310** M-F Regional Sports Report; **0320** M-F Life Matters (social issues); **0330** S Jazz Notes, A Australian Country Style; **0354** Heywire (young rural Australians).
[**Special service: 0305** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA
0300 D International News; **0310** M Weekly Review, T-S National News; **0315** T-S Viewpoint; **0330** M Reports & Music, T-S News Bulletin; **0335** T-A Time Out (sports); **0340** S/W DXers Unlimited, M Moilbag Show, T/H/F Caribbean Outlook, A Weekly Review; **0350** M Breakthrough (science report).

RADIO NEW ZEALAND INTERNATIONAL
0300 S/A* RNZ News, M-F Pacific Regional News; **0305** S Feature, A Home Grown (NZ music)*; **0310** M Tagata o te Moana (Pacific magazine), T Top 5, W Pacific Report, H Mailbox (letters & DX news) or RNZI Talk (station info), F Dateline Pacific; **0330** T New Releases, W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent, A Musical Chairs (artist spotlight).
[*may be preempted by live sport]

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0300 S Far Right Radio Review (cont'd), M Voices of Our World (Maryknoll program), T Honoring Mother Earth: Indigenous Voices (cont'd), W Living Enrichment Center, H Global Community Forum (cont'd), F A Woman's Voice (cont'd), A A World of Possibilities; **0330** S World Citizens Weekly Commentary, M Perspective (UN program), T In the Moment, W Peace Forum, H Scope (UN program), F Tropical Conservation Newshour (rainforests), A Newmaier Report; **0345** S/M Hightower Report (commentary), T-A UN Today; **0348** S/M Earthwatch (ecology); **0351** S/M Earth & Sky (astronomy); **0355** S/M World Opinion (on terrorism).

RADIO PRAGUE
0300 D News; **0305** S Magazine (local color), M Letter from Prague, T-A Newsview; **0310** S Saturday Music (a mix), M Mailbox, T One on One (interview), W Witness (oral history), H ABC of Czech (language), F Economic Report, A The Arts; **0320** M Readings from Czech Literature, W Talking Point (Czech issues), H Czechs in History or Spotlight (travelogue), A Away from Politics (poetry).

RADIO TAIPEI INTERNATIONAL
0300 D News; **0315** S Great Wall Forum (discussing the mainland), M Taiwan Economic Journal, T Jade Bells & Bamboo Pipes (traditional music), W New Music Lounge, H Taipei Magazine, F Taiwan Gourmet, A Kaleidoscope (life in Taiwan); **0330** S Asia Pacific (from Radio Australia), M People, W Confucius & Inspiration Beyond, H Life Unusual, F Discover Taiwan, A Mailbag Time; **0345** M-F Let's Learn Chinese (M/W/F elementary, T/H intermediate).

RADIO UKRAINE INTERNATIONAL
0300 D News; **0310** S Ukrainian Diary (weekly review), M Music from Ukraine, T-A Ukraine Today (magazine); **0315** S The Whole World on the Radio Dial (DX program); **0330** S Hello From Kiev (listener letters/music), M Roots (culture & education); **0345** T-A Closeup (current issues).

RVi, Belgium
0300 S Music from Flanders, M Radio World, T-A News; **0304** T-A Flanders Today (incl. press review); **0308** M Tourism in Flanders, **0313** T Focus on Europe, W Green Society (ecology), H/A Around the Arts, F Economics; **0314** M Brussels 1043 (letters); **0318** T Sports, H Around Town, F International Report, A Tourism in Flanders; **0324** M-A Soundbox (Flemish music).

VOICE OF AMERICA, Africa Service
0300 S/A News & Reports, **M-F** Daybreak Africa (morning newsmagazine); **0323** S/A Sports; **0330** D News Headlines; **0333** S Issues in the News, M-F Business Report, A Our World (ecology, science & technology); **0345** M-F Dateline (documentary); **0355** M-F Government Editorial.

VOICE OF RUSSIA
0300 D News; **0311** M Sunday Panorama, T-S News & Views; **0324** M Russia: People & Events; **0330** D News in Brief; **0332** S Kaleidoscope (Russian events), M Audio Book Club (Russian lit.), T/H/A 20th Century, W/F Russian history/culture.

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VOICE OF TURKEY
0300 D News; **0310** D Press Review; **0315** S Outlook, M Tunes Sponning Centuries, T Last Week, W Live From Turkey, H Review of the Foreign Media, F Big Powers & the Armenian Problem, A Archaeological Settlements in Turkey; **0320** S The Stream of Love or DX Carner, T Hues & Colors of Anatolia, H Letterbox; **2225** M/A Music, F In the Wake of a Contest; **0330** S/T Music; **0335** S Turkish Arts, M Turks in the Mirror of Centuries, T From Past to Present, H Turkey's Off the Beaten Track Sites, F The Culture Parade, A The Travel Itinerary of Anatolia.

KWHR, Hawaii
17510 kHz.: **0300** M DXing with Cumbre.

WBCQ, Maine
7415 kHz.: **0300** S You Are What You Think, M Radio New York International (cont'd).

WHRI, Indiana
7315 kHz.: **0330** M DXing with Cumbre.

WWCR Tennessee
3215 kHz.: **0305** A The Golden Age of Radio Theatre.
5070 kHz.: **0300** S Spectrum (communications discussion).

RADIO SWEDEN
0330 S Network Europe (Europe magazine-1st week)/ Sweden Today (2nd)/Spectrum (arts magazine-3rd)/ Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); **0345** T Sports Scan, W Close Up (profiles of Swedes-1st/3rd), F Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

VOICE OF VIETNAM
0330 D News; **0335** D Current Affairs; **0340** Su Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; **0345** T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; **0350** S Music, A Literature & Arts.

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

BBC WORLD SERVICE (am)
0400 D World Briefing; **0432** S World Business Review, M-F The World Today, A Reporting Religion; **0445** S The Instant Guide.

CHINA RADIO INTERNATIONAL
0400 D News & Reports; **0410** S Report on Developing Countries; **0415** A Cutting Edge (sci/tech); **0420** S In the Spotlight (cultural magazine); **0430** M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

DEUTSCHE WELLE
0400 D News; **0405** S Inside Europe, M Mailbag, T-A Newslink Africa; **0430** T Insight (internationol affairs), W World in Progress (development), H Money Tolks, F Man & Environment, A Spectrum (sci-tech); **0445** T Business German.

RADIO AUSTRALIA
0400 D News; **0405** S All in the Mind (the brain), A Business Report; **0410** M-F Margaret Throsby (interviews and music); **0430** S In Conversation, A Aussie Music Show (hits); **0455** Perspective (commentary).
[**Special service: 0405** S/A Grandstand (live sports action) an 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA
0400 D International News; **0410** M From Habana (Cuban musicians), T-S National News; **0415** T-S Reports and music; **0430** M The Jazz Place or Top Tens, T-S News Bulletin; **0435** S World of Stamps, T-A Reports and music; **0450** S Cuban music.

RADIO NETHERLANDS
0430 S/M News; T-A Newsline; **0435** S Europe Unzipped, M Sincerely Yours (letters); **0455** S Insight (commentary), M The Week Ahead (program previews).

RADIO NEW ZEALAND INTERNATIONAL
0400 D RNZ News*; **0405** S Sunday Drama* (radio plays), M-F In Touch with New Zealand (cont'd), A Home Grown (cont'd from 0305).
[*may be preempted by live sport].

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0400 S CounterSpin (media analysis), M A Public Affair, T-A Democracy Now!; **0430** S Freespeech Radio News (repeat of Fri. newscast).

RADIO ROMANIA INTERNATIONAL
0400 D Radio Newsreel; **0410** S The Week, M Focus, T-A Commentary; **0415** S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate) or The Romanian Next to You (interview), A Challenge for the Future or Terra 2001; **0420** S RRI Encyclopedia, T Political Flash, W European Horizons; **0425** S Roots (culture/traditions), M Romanian by Radio, T/H/A Business Update, W Tourist News, F Listeners' Letterbox; **0430** S Radio Pictures, M Romanian Itineraries, T Pulse of Transition, W Mother Nature (ecology), H Visit Romania, A Practical Guide; **0435** S Romanian Itineraries, M Listeners' Letterbox, T Performing Arts, W Youth Club, H Partners in a Changing World, A Cultural Survey; **0440** S, Bucharest Along the Centuries, T Pages of Romanian Literature, W/F Skylark (folk music), H Stage and Screen, A Spectator (voice of the people); **0445** S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Romanian Folk Music At Its Best; **0450** M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

VOICE OF AMERICA, Africa Service
0400 D News & Reports; **0415** M-F Focus (a topic in-depth); **0423** D Sports; **0430** S/A News Headlines, M-F Daybreak Africa (morning newsmagazine); **0433** S Main Street (about America, ***incl. Kim Elliott media report***), A Press Conference USA.

VOICE OF RUSSIA
0400 D News; **0411** S/M Musical Portraits, T/F Moscow Mailbag, W/A Science and Engineering, H Newmarket (business); **0430** D News in Brief; **0432** S/A Timelines, M Jazz Show, T Music Around Us, W Moscow Yesterday and Today, H Folk Box, F Audio Book Club (Russian lit.); **0447** T Music At Your Request.

WBCQ, Maine
7415 kHz.: **0400** S Tam & Darryl (electronic media), M-A Amos 'n Andy; **0415** M World of Radio, T-F EVM Jewish Radio Network; **0445** M Radio D.C.

WHRA, Maine
7580 kHz.: **0430** A DXing with Cumbre.

WWCR, Tennessee
5070 kHz.: **0400** S Cyber Line (digital communications).

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

CHANNEL AFRICA, South Africa
0500 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

CHINA RADIO INTERNATIONAL
0500 D News & Reports; **0510** S Report on Developing Countries; **0515** A Cutting Edge (sci/tech); **0520** S In the Spotlight (cultural magazine); **0530** M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden; **0545** S Health Bites.

RADIO AUSTRALIA
0500 D News; **0505** S The Europeans, A Ockham's Razor (science opinion); **0510** M-F Pacific Beat (Pacific islands magazine with regional sports report @ 0530); **0520** A Lingua Franca (about language) **0530** S The Ark (religious history), A Fine Music Australia (classical).
[**Special service: 0505** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA
0500 D International News; **0510** M Weekly Review, T-S National News; **0515** T-S Viewpoint; **0530** M Reports & Music, T-S News Bulletin; **0535** T-A Time Out (sports); **0540** S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; **0550** M Breakthrough (science report).

RADIO JAPAN - NHK WORLD
0500 D News; **0510** S Pop Joins the World, A Hello from Tokyo (listener contact); **0515** M-F 44 Minutes (magazine).

RADIO NETHERLANDS
0500 S Amsterdam Forum (conversations), M Dutch Horizons, T Research File (science), W Music 52-15 (international music), H Documentary, F Aural Tapestry (culture), A A Good Life (development issues).

RADIO NEW ZEALAND INTERNATIONAL
0500 S/A RNZ News, M-F Checkpoint (major domestic evening news magazine); **0510** S Religion feature or series, A Tagata O Te Moana (Pacific magazine); **0540** S Jazz Spotlight.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0500 S TUC Radio, M Neumaier Report, T Between the Lines, W A Woman's Voice, H Alternative Radio, F Making Contact, A Honoring Mother Earth: Indigenous Voices; **0515** M Living Enrichment Center; **0530** S Continent of Media, T TUC Radio, F Steppin' Out of Babylon.

VOICE OF AMERICA, Africa Service
0500 S News, M-A News & Reports; **0506** S Best of Talk to America; **0523** M-A Sports; **0530** D News Headlines; **0533** S Best of Talk to America, M-F Business Report, A VOA News Review; **0545** M-F Doteline (documentory); **0555** M-F Government Editorial.

VOICE OF NIGERIA
0500 S Reflections, M-F Wave Train (music), A African Safari (music); **0505** S Link-Up (music requests); **0530** S/A News, M-F VON Scope (news magazine).

WBCQ, Maine
7415 kHz.: **0500** S Juliet's Wild Kingdom, M Radio D.C. (cont'd), T-F EVM Jewish Radio Network (cont'd).

WHRI, Indiana
5745 kHz.: **0500** A DXing with Cumbre.
7315 kHz.: **0500** A DXing with Cumbre.

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

CHANNEL AFRICA, South Africa
0600 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

RADIO AUSTRALIA
0600 D News; **0605** S The Arts on RA, A Feedback (letters/station news/an communications); **0610** M-F Regional Sports Report; **0620** M Ockham's Razor (science opinion), T In Conversation, W Lingua Franca (about language), H The Ark (religious history), F The Makers (artists); **0630** S Blacktracker (contemporary Aboriginal music), A Oz Sounds (new releases); **0640** M Oz Music Show (rock), T Music Deli (diverse world/folk),W Blacktracker, H Australian Country Style, F Jazz Notes.
[**Special service: 0605** S/A Grondstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

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RADIO HABANA CUBA
0600 D International News; **0610** M From Habana (Cuban musicians), T-S National News; **0615** T-S Reports and music; **0630** M The Jazz Place or Top Tens, T-S News Bulletin; **0635** S World of Stamps, T-A Reports and music; **0650** S Cuban music.

RADIO JAPAN - NHK WORLD
0600 D News; **0610** S Weekend Square (Japanese life), M-F Songs for Everyone, A Pop Joins the World; **0615** M-F Asian Top News (headlines from region's radio); **0625** M Japan Music Treasure Box, T Basic Japanese for You, W Japan Musicscape, H Brush Up Your Japanese, F Music Beat; **0654** S Sights & Sounds of Japan.

RADIO NEW ZEALAND INTERNATIONAL
0600 D RNZ News; **0607** S Whenua (Maori magazine), M-F What's Going On? (arts & entertainment), A The Mix ('live' music acts); **0630** M-F Worldwatch (international news) **0645** M-F Pacific News.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0600 S World of Rodio, M Spiritual Awakening, T-A Freespeech Radio News (Pacifica Reporters Against Censorship daily newscast); **0630** S RFPI Mailbag, M World of Radio, T/H/A Hightower Radio (commentary), W Counterspin (media analysis), F This Way Out (lesbian/gay magazine); **0635** T/H/A Earthwatch (ecology); **0640** T/H/A Earth & Sky (astronomy); **0645** T Tropical Conservation Newsbureau (rainforests), H World Citizen's Weekly Commentary, A Women (UN program).

VOICE OF AMERICA, Africa Service
0600 S/A News & Reports, M-F Daybreak Africa (morning newsmagazine); **0623** S/A Sports; **0630** S/A News Headlines; **0633** S Main Street (about America, incl. Kim Elliott media report), A On the Line (US foreign policy).

VOICE OF NIGERIA
0600 S This Week on VON, M Across the Ages, T Agenda for Peace, W Nigerian Newsletter, H West African Scene, F African Writers, A From the Racks; **0615** S Listeners' Letters, M Nigeria & Politics, T Nigerian Scene, W Wheel of Progress, H World of the Arts, F Images of Nigeria, A Issues of the Moment; **0630** S/A Weekly Analysis, M-F World News; **0640** M-F Commentary & Press Review; **0645** M-F News about Nigeria.

KWHR, Hawaii
17780 kHz.: **0600** A DXing with Cumbre.

1000 UTC/6am E/3am P - Page 48 Freqs

BBC WORLD SERVICE (am)(eas)
1000 S/A News, M-F World Briefing; **1006** S From Our Own Correspondent, A Assignment; **1032** S Reporting Religion, M-F World Business Report, A The Interview; **1045** M-H Sports Roundup, F Football Extra.

RADIO AUSTRALIA
1000 D News; **1005** S Go Zone (pop music), M-F Asia Pacific (regional current affairs), A Australian Express (magazine); **1030** M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor.

RADIO NETHERLANDS
1030 S/A News, M-F Newsline; **1035** S Wide Angle (week in review), A Europe Unzipped; **1055** S The Week Ahead (program previews), A Insight (commentory).

RADIO NEW ZEALAND INTERNATIONAL
1000 D News; **1005** S Mediawatch, M-F Late Edition (the day's news), A Deep Purple (relaxing music/nostalgia); **1035** S Sunday Supplement.

VOICE OF AMERICA (News Now)
1000 D News and Reports; **1023** D Sports; **1030** D News Headlines; **1033** S-H Main Street (life in the US), F/A On the Line (US foreign policy); **1055** A Government Editorial.

KWHR, Hawaii
11565 kHz.: **1000** A DXing with Cumbre.

WWCR, Tennessee
5070 kHz.: **1000** A Left Behind; **1010** S A View from Europe.
15825 kHz.: **1015** S Ask WWCR (letters).

1100 UTC/ 7am E/4am P - Page 48 Freqs

BBC WORLD SERVICE (am)
1100 D World Briefing; **1105** M-F Caribbean Morning Report; **1110** M-F Sports Caribbean; **1115** M-F Caribbean Magazine; **1120** D British News; **1132** S Letter from America, M Instant Guide (background), T/W/F Analysis, H From Our Own Correspondent, A World Football; **1145** S-F Sports Roundup.

BBC WORLD SERVICE (eas)
1100 S World Briefing, M-F News; **1106** M-F Outlook (magazine), A The Ticket (arts performances); **1120** S British News; **1132** S Play of the Week; **1145** M-F Off the Shelf (book readings).

RADIO AUSTRALIA
1100 D News; **1105** S Correspondents' Report, M-A Asia Pacific (regional current affairs); **1130** S The Arts on RA, M-F Bush Telegraph (rural life), A The Europeans.

RADIO JAPAN - NHK WORLD
1100 D News; **1110** S Hello from Tokyo (listener contact), M-F Songs for Everyone, A Pop Joins the World; **1115** M-F Asian Top News (headlines from region's radio); **1125** M Japan Music Treasure Box, T Basic Japanese for You, W Japan Musicscape, H Brush Up Your Japanese, F Music Beat.

RADIO KOREA INTERNATIONAL
1130 D News; **1140** S Korean Pop Interactive (requests), M-F News Commentary, A Worldwide Friendship (letters, DX news); **1145** M-F Seoul Calling (magazine).

RADIO NETHERLANDS
1100 S Aural Tapestry (culture), M EuroQuest (Europe in context), T A Good Life (development issues), W Dutch Horizons, H Research File (science), F Documentary, A Amsterdam Forum (conversations); **1130** S Dutch Horizons, M Research File, T/A Music 52-15 (international music), W Documentary, H Aural Tapestry, F A Good Life.

RADIO NEW ZEALAND INTERNATIONAL
1100 D RNZ News; **1105** S/A Forces Programme (for NZ personnel serving in PNG & E. Timor), M-H Nine to Noon (current affairs), F Sports Story; **1130** F Top 5.

RADIO SWEDEN
1130 S In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topicol discussion-4th); **1145** M Sports Scan, T Close Up (profiles of Swedes-1st/3rd), H Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

WWCR, Tennessee
5070 kHz.: **1100** S Profiles; **1105** A Rock the Universe (Christian rock music).
15825 kHz.: **1110** A A View from Europe.

1200 UTC/ 8am E/5am P - Page 48 Freqs

BBC WORLD SERVICE (am)
1200 D Newshour; **1205** M-F Caribbean Business; **1210** M-F Caribbean Morning Report 2nd Edition; **1215** M-F Newshour (cont'd.).

BBC WORLD SERVICE (eas)
1200 S Play of the Week (cont'd. from 1130), M-A News; **1206** M/W Documentaries, T Masterpiece (arts ideas), H Assignment, F Sports International, A In Concert; **1232** S Reporting Religion, M The Music Feature, T Top of the Pops, W Charlie Gillett (world music), H The Music Biz, F John Peel (eclectic music).

RADIO AUSTRALIA
1200 D News; **1205** S The Spirit of Things (spiritual matters), M-H Late Night Live (discussion and interviews), F Sound Quality (innovative music), A The Music Show; **1255** S The Pulse (Aussie music now).

RADIO CANADA INTERNATIONAL
1200 M-F News; **1205** M-F The Current (current affairs-joined in progress).

RADIO KOREA INTERNATIONAL
1200 S Korean Pop Interactive (cont'd), M-F Seoul Calling (cont'd), A Worldwide Friendship (cont'd); **1215** M Korea Today & Tomorrow (peninsula issues), T Koreon Kaleidoscope (Korean society), W Wonderful Korea (tourism), H Seoul Report (interviews).

RADIO NETHERLANDS
1200 S/A News, M-F Newsline; **1205** S Sincerely Yours (letters), A Europe Unzipped.

RADIO NEW ZEALAND INTERNATIONAL
1200 S-F RNZ News, A Forces Programme (cont'd.); **1205** S Sportsworld (recap magazine), M-F Late Edition.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1200 S World of Radio, M Spirituol Awakening, T-A Freespeech Radio News (Pacifica Reporters Against Censorship daily newscast); **1230** S RFPI Mailbag, M World of Radio, T/H/A Hightower Radio (commentary), W Counterspin (media analysis), F This Way Out (lesbian/gay magazine); **1235** T/H/A Earthwatch (ecology); **1240** T/H/A Earth & Sky (astronomy); **1245** T Tropical Conservation Newsbureau (rainforests), H World Citizen's Weekly Commentary, A Women (UN program).

RADIO SWEDEN
1230 S In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1245** M Sports Scan, T Close Up (profiles of Swedes-1st/3rd), H Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

WHRI, Indiana
9840 kHz.: **1200** A DXing with Cumbre.
15105 kHz.: **1230** A DXing with Cumbre.

WWCR, Tennessee
5070 kHz.: **1205** S Rock the Universe (Christian rock music).
15825 kHz.: **1230** T Musical Memories.

1300 UTC/ 9am E/6am P - Page 49 Freqs

BBC WORLD SERVICE (am)
1300 D News; **1306** S The Ticket (arts performances), M-F Outlook (magazine), A Pick of the World (BBC's best); **1345** M-F Off the Shelf (book readings), A Write On (letters).

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BBC WORLD SERVICE (eas)
1300 D Newshour.

CHANNEL AFRICA, South Africa
1300 S/A Channel Africa Extra (weekend variety magazine).

CHINA RADIO INTERNATIONAL
1300 D News & Reports; **1310** S Report on Developing Countries; **1315** A Cutting Edge (sci/tech); **1320** S In the Spotlight (cultural mogazine); **1330** M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA
1300 D News; **1305** S The Science Show, M-F The Planet (diverse music from around the world), A The Music Show (cont'd); **1355** S Perspective (commentary).

RADIO CANADA INTERNATIONAL
1300 D News; **1305** S The Sunday Edition, M-F Sounds Like Canada (Canadian magozine); A The House (Canadian politics).

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1300 S Making Contact, M RadioNation ("The Nation" magazine), T Disability Radio Worldwide, W World of Radio, H A Public Affair, F Far Right Radio Review, A Continent of Media; **1330** S Alternative Radio (political/social analysis), T This Way Out (lesbian/gay magazine), W RFPI Mailbag, A World of Radio.

WWCR, Tennessee
15825 kHz.: **1300** M-F World Wide Country Radio (country music), **1330** S The Old Record Shop (vintage recordings).

RADIO SWEDEN
1330 S In Touch with Stockholm (listener contact-1st)/ Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/ Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1345** M Sports Scan, T Close Up (profiles of Swedes-1st/3rd), H Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

1400 UTC/ 10am E/7am P - Page 49 Freqs

BBC WORLD SERVICE (am)
1400 D News; **1406** S Talking Point (global phone-in), M/W Documentaries, T Masterpiece (arts ideas), H Assignment, F Sports International, A Sportsworld (live action); **1432** M Music Feature, T Top of the Pops, W Charlie Gillett (world music), H Music Biz, F John Peel (eclectic).

BBC WORLD SERVICE (eas)
1400 S/A News, M-F East Asia Today; **1405** S Talking Point (global phone-in), A Sportsworld (live action); **1430** M-F British News; **1445** M-H Sports Roundup, F Football Extra.

CHANNEL AFRICA, South Africa
1400 S/A Chonnel Africa Extra (cont'd from 1300).

CHINA RADIO INTERNATIONAL
1400 D News & Reports; **1410** S Report on Developing Countries; **1415** A Cutting Edge (sci/tech); **1420** S In the Spotlight (cultural magazine); **1430** M People in the Know (China's leading personalities), T Biz China, W China Horizons (Chino outside Beijing), H Voices from Other Londs, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA
1400 D News; **1405** S Books & Writing, M-F Margaret Throsby (interview/music), A New Dimensions ("progressive" ideas).

RADIO CANADA INTERNATIONAL
1400 D News; **1405** S The Sunday Edition (cont'd.), M-F Sounds Like Canada (cont'd., including ***1430 F*** C'est La Vie (life in French Canada), ***1445 T-F*** Out Front (first person views of life)), A Vinyl Cafe.

RADIO JAPAN - NHK WORLD
1400 D News; **1410** S Pop Joins the World, A Weekend Japanology; **1415** M-F 44 Minutes (feature magazine); **1454** A Sights & Sounds of Japan.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1400 S Alternative Radio (cont'd), M New Dimensions ("progressive" ideas), T University Forum (interviews), W Continent of Medio, H WINGS (women's news), F Disability Radio Worldwide, A RFPI Moilbag; **1430** S Far Right Radio Review, T Honoring Mother Earth: Indigenous Voices, W A World of Possibilities, H Global Community Forum (interviews), F A Woman's Voice, A University Forum (interviews).

RADIO NETHERLANDS
1430 S/A News, M-F Newsline; **1435** S Sincerely Yours (letters), A Europe Unzipped; **1455** S The Week Ahead (program previews), A Insight (commentary).

RADIO SWEDEN
1430 S In Touch with Stockholm (listener contact-1st)/ Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/ Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1445** M Sports Scan, T Close Up (profiles of Swedes-1st/3rd), H Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

1500 UTC/ 11am E/8am P - Page 50 Freqs

BBC WORLD SERVICE (am)
1500 D News; **1506** S Assignment, M Health Matters, T Go Digital, W Discovery (science), H One Planet (ecology), F Science in Action, A Sportsworld (live action from 1406); **1532** S People & Politics, M Fanshawe (humor), T Music Review, W/F Westway (drama serial), H The Word (writers & writing) [exc. lost H, World Book Club (discussion)]; **1545** W Heart & Soul (beliefs & values), F What's the Problem? (advice).

BBC WORLD SERVICE (eas)
1500 D News; **1506** S In Concert, M Health Matters, T Go Digital, W Discovery (research), H One Planet (ecology), F Science in Action, A Sportsworld (live action); **1532** M Fanshawe (humor), T Music Review, W/F Westway, H The Word (writers & writings) [exc. last H, World Book Club (discussion)]; **1545** W Heart & Soul (beliefs & values), F What's the Problem? (advice).

CHINA RADIO INTERNATIONAL
1500 D News & Reports; **1510** S Report on Developing Countries; **1515** A Cutting Edge (sci/tech); **1520** S In the Spotlight (cultural magazine); **1530** M People in the Know (Chino's leading personalities), T Biz Chino, W Chino Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA
1500 D News; **1505** S Encounter (religion in Australia), M-F Asia Pocific (regional current affairs), A Nocturne (night music); **1530** M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor; **1555** S The Pulse (Aussie new music), A Business Weekend.

RADIO JAPAN
1500 D News, **1505** S Hello from Tokyo (letters), M-F Songs for Everyone, A Pop Joins the World; **1515** M-F Asian Top News (reports from region's radio); **1525** M Japan Music Treasure Box, T Bosic Japanese for You, W Japon Musicscape, H Brush Up Your Japanese, F Music Beat.

RADIO NETHERLANDS
1500 S Dutch Horizons, M Research File (science), T/A Music 52-15 (international music), W Documentary, H Aural Tapestry (culture), F A Good Life (development issues); **1530** S Aural Tapestry , M EuroQuest (Europe in context), T A Good Life, W Dutch Horizons, H Research File, F Documentary, A Amsterdom Forum (conversations).

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1500 S Far Right Radio Review (cont'd), M Voices of Our World (Maryknoll program), T Honoring Mother Earth: Indigenous Voices (cont'd), W Living Enrichment Center, H Global Community Forum (cont'd), F A Woman's Voice (cont'd), A A World of Possibilities; **1530** S World Citizens Weekly Commentary, M Perspective (UN progrom), T In the Moment, W Peace Forum, H Scope (UN program), F Tropical Conservation Newshour (roinforests), A Newmaier Report; **1545** S/M Hightower Report (commentary), T-A UN Today; **1548** S/M Earthwotch (ecology); **1551** S/M Eorth & Sky (astronomy); **1555** S/M World Opinion (on terrorism).

WHRI, Indiana
13760 kHz.: **1500** A DXing with Cumbre.

WWCR, Tennessee
12160 kHz.: **1505** S Americo's Greatest Heroes.

1600 UTC/ 12pm E/9am P - Page 50 Freqs

BBC WORLD SERVICE (am)
1600 S/A News, M-F Europe Todoy; **1606** S/A Sportsworld (live action).

RADIO AUSTRALIA
1600 D News; **1605** S The National Interest (Australian politics), M-F Bush Telegraph (rural/outbock Australia), A Nocturne (cont'd.).

RADIO CANADA INTERNATIONAL
1600 S/A News; **1605** S The Sunday Edition (cont'd.), A Quirks ond Quarks (science).

RADIO NETHERLANDS
1600 S/A News, M-F Newsline; **1605** S Sincerely Yours, A Europe Unzipped.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1600 S A Public Affair, M-F Democracy Now!, A CounterSpin (media analysis); **1630** A Freespeech Rodio News (repeat of Fri. newscast).

VOICE OF AMERICA, Africa Service
1600 S/A Nightline Africa (weekend newsmagazine), M-F News & Reports; **1615** M-F Focus (a topic in-depth); **1623** M-F Sports; **1630** M-F Africa World Tonight.

KWHR, Hawaii
9930 kHz.: **1600** A DXing with Cumbre.

WWCR, Tennessee
12160 kHz.: **1630** A Ken's Country Classics (country music).

1700 UTC/ 1pm E/10am P - Page 51 Freqs

CHANNEL AFRICA, South Africa
1700 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

RADIO AUSTRALIA
1700 D News; **1705** S New Dimensions ("progressive" ideos), M-F Australia Talks Back (phone-in), A The Spirit of Things (spiritual matters); **1755** M-F Perspective (commentary), A The Pulse (Aussie new music).

RADIO JAPAN - NHK WORLD
1700 D News; **1710** S Pop Joins the World, M-F Songs for Everyone, A Hello from Tokyo (listener contact); **1715** M-F 44 Minutes (feature magazine).

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RADIO FOR PEACE INTERNATIONAL, Costa Rica
1700 S Neumaier Report, M Between the Lines, T A Woman's Voice, W Alternative Radio, H Making Contact, F Honoring Mother Earth: Indigenous Voices, A TUC Radio; **1715** S Living Enrichment Center; **1730** M TUC Radio, H Steppin' Out of Babylon, A Continent of Media.

VOICE OF AMERICA, Africa Service
1700 S Reporters' Roundtable, M-A News; **1706** M-F Talk to America (global phone-in), A Best of Talk to America; **1730** S Music Time in Africa; **1755** A Government Editorial.

VOICE OF GREECE
1700 A All Greek to Me (Greek popular & traditional music)

SWISS RADIO INT.
1730 S/A Swiss Scene, M-F Newsnet; **1735** A Take 2; 1740 S Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); **1745** F Business Spotlight.

ALL INDIA RADIO
1745 M Light Music, T Karnatak Instrumental Music, W Folk Songs, H-S Devotional Music.

WWCR, Tennessee
12160 kHz.: **1715** W Ask WWCR (exc. 2nd/3rd W).
15825 kHz.: **1730** S Ask WWCR, T Dialogue.

1800 UTC/ 2pm E/11am P - Page 51 Freqs

ALL INDIA RADIO
1800 D News; **1810** D Commentary; **1815** W Instrumental Music – Old Masters, H-T Hindustani Classical Vocal Music; **1830** S Sports Roundup (1st wk)/ Feature (2nd)/Film Story (3rd)/Discussion (4th), M Faithfully Yours (letters), T Culturol Talk, W Book Review (1st)/Window on Science (2nd/4th)/Times & Lives (biography-3rd), H General Talk, F Focus (magazine-1st)/Horizon (literature-2nd/4th)/Music (3rd), A For Youth (1st)/Indian Classics (books-2nd)/From the Archives (3rd)/Quiz Time (4th); **1840** M DXers Corner (2nd/4th), T Film Songs of Yesteryears, W Hits from Films, H Light Karnatak Music, F Light Instrumental Music; **1850** M Film Songs, F Light Music.

CHANNEL AFRICA, South Africa
1800 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

RADIO AUSTRALIA
1800 D News; **1805** S-H Pocific Beat (Pacific islands magazine), F Pacific Review, A Best of 'Late Night Live' (interviews); **1830** F Country Breokfast (rural life).

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1800 S Spiritual Awakening, M Steppin' Out of Babylon, T RadioNation ('The Nation' magozine), W Voices of Our World (Maryknoll program), H Between the Lines, F WINGS (women's news), A World of Radio; **1830** S World of Radio, M/W/F Hightower Radio (commentary), T Counterspin (media analysis), H This Way Out (lesbian/gay magazine), A RFPI Mailbag; **1835** M/W/F Earthwatch (ecology); **1840** M/W/F Earth & Sky (astronomy); **1845** M Tropical Conservation Newsbureau (rainforests), W World Citizen's Weekly Commentary, F Women (UN program).

RTE, Ireland
1830 S Saturday View, M This Week with Gerald Barry, T-A 5-7 Live (top news of the doy).

VOICE OF AMERICA, Africa Service
1800 S/A News & Reports, M-F Africa World Tonight; **1823** S/A Sports; **1830** S/A News Headlines, W Straight Talk Africa (continental phone-in); **1833** S/A On the Line (US foreign policy); **1855** S/A Government Editorial.

WHRI, Indiana
13760 kHz.: **1800** A DXing with Cumbre.

WWCR, Tennessee
12160 kHz.: **1800** A Musical Memories.

1900 UTC/ 3pm E/12pm P - Page 52 Freqs

ALL INDIA RADIO
1900 D News; **1905** D Press Review; **1910** S Women's World, M/W/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interviews-2nd/4th), H Panorama of Progress, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); **1920** S/M/W/F Film Songs, T Light Clossical Music, H Light Instrumental Music, A Karnatok Classical Music; **1930** D Commentary; **1935** S/H/F Film Songs, M Karnatak Vocal Music, T Folk Songs, W/A Light Music.

DEUTSCHE WELLE
1900 D news; **1905** S Hard to Beat (sport), M-F Newslink Africa, A Religion & Society; **1915** S Inspired Minds, A German by Radio; **1930** S Hits in Germany or Melody Time, M World Music Live, T Arts on the Air, W Living in Germany, H Cool (youth culture), F Focus on Folk; **1945** W Europe on Stage.

RADIO AUSTRALIA
1900 D News; **1905** F Rural Reporter, A Earthbeat (ecology); 1910 S-H Pacific Beat (regional magazine w/Sport @ 1929); **1930** F Australian Country Style (music), A Business Report.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1900 S RadioNation ("The Nationj" magazine), M Disability Rodio Worldwide, T World of Radio, W A Public Affair, H Far Right Radio Review, F Continent of Media, A Making Contact; **1930** M This Way Out (lesbian/gay magazine), T RFPI Mailbag, F World of Radio, A Alternative Radio (political/social analysis).

VOICE OF AMERICA, Africa Service
1900 S News & Reports, M-F News, A Hip Hop Connections (music); **1906** M-F Border Crossings (music – exc. *W Straight Talk Africa* cont'd.); **1923** S Sports; **1930** S Music Time in Africa (part 2), M-F World of Music, A News Headlines; **1933** A Our World (ecology, science & technology).

VOICE OF NIGERIA
1900 S Youth Forum, M Our Cities, T Our Environment, W Who Are the Nigerions?, H Listeners' Letters, F Nigerian Scene, A Folktales; **1915** H Wheel of Progress, F Business Weekly, A Nigerian Newsletter; **1930** S Window on Abuja, M Perspectives, T African Monarchy, W Theatre on the Air, H Women and Development, F Weekend Magazine, A Time for Highlife; **1945** S From the Bookshelf, T Listeners' Letters.

SWISS RADIO INT.
1930 S/A Swiss Scene, M-F Newsnet; **1935** A Take 2; 1740 S Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); **1945** F Business Spotlight.

WHRI, Indiana
9495 kHz.: **1930** A DXing with Cumbre.

WWCR, Tennessee
12160 kHz.: **1900** A World Wide Country Radio (country music).

2000 UTC/ 4pm E/1pm P - Page 52 Freqs

DEUTSCHE WELLE
2000 D News; **2005** S Mailbag, M-F Newslink Africa, A Inside Europe; **2030** M Insight (international affairs), T World in Progress (development), W Money Talks, H Man & Environment, F Spectrum (sci-tech); **2045** M Business German.

RADIO AUSTRALIA
2000 D News; **2005** F Pacific Review, A Australia All Over; **2010** S-H Pacific Beat (regional magazine w/ Sport @2029), **2030** F The Buzz (technology).

RADIO FOR PEACE INTERNATIONAL, Costa Rica
2000 S New Dimensions ("progressive" ideas), M University Forum (interviews), T Continent of Media, W WINGS (women's news), H Disability Radio Worldwide, F RFPI Mailbag, A Alternative Radio (cont'd); **2030** M Honoring Mother Earth: Indigenous Voices, T A World of Possibilities, W Global Community Forum (interviews), H A Woman's Voice, F University Forum (interviews), A Far Right Radio Review.

SWISS RADIO INT.
2000 S/A Swiss Scene, M-F Newsnet; **2005** A Take 2; 1740 S Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); **2015** F Business Spotlight.

VOICE OF NIGERIA
2000 S News Bulletin, M-F Sixty Minutes, A African Hour; **2015** S Sports Roundup; **2030** S In the News.

VOICE OF AMERICA, Africa Service
2000 S/A Nightline Africa (weekend magazine), M-F Africa World Tonight.

ALL INDIA RADIO
2045 D Press Review; **2050** S/T Instrumental Music, M/F Folk Songs, W Light Music, H Classical Indian Vocal Music, A Regional Indian Devotional Music.

WBCQ, Maine
7415 kHz.: **2000** H-S Radio Caroline (the original Europirate radio stotion).

WWCR, Tennessee
15825 kHz.: **2030** T Left Behind, H World of Radio, F Ask WWCR, A Presidentiol Radio Address/Democratic Response.

2100 UTC/ 5pm E/2pm P - Page 53 Freqs

ALL INDIA RADIO
2100 D News; **2105** D Commentary; **2111** S Regional Film Songs, M/A Classical Indian Vocal Music, T Karnatak Vocal Music, W/H Instrumental Music, F Orchestral Music; **2120** S Sports Roundup (1st wk)/ Feature (2nd)/Film Story (3rd)/Discussion (4th), M Faithfully Yours (letters), T Cultural Talk, W Radio Newsreel, H Panoroma of Progress, F Focus (magazine-1st wk)/Horizon (literature-2nd/4th)/Indion Music (3rd), For Youth (1st)/Indian Classics (books-2nd)/From the Archives (3rd)/Quiz Time (4th); **2130** M DXers Corner (2nd/4th), T/W Film Songs, H Classical Half-Hour, A Old Film Songs; **2140** F Film Songs; **2145** M Film Songs; **2150** S Karnatak Vocal Music.

BBC WORLD SERVICE (am)
2100 D News; **2106** S Documentaries, M Health Matters, T Go Digitol, W Discovery, H One Planet, F Science in Action, A Play of the Week; ***2115** M-F Caribbean Report; **2132** M Fanshawe (humor), T Music Review, W/F Westway (droma serial), H The Word (writers & writings) [exc. last H, World Book Club (discussion)]; 2145 W Heart & Soul (beliefs & values), F What's the Problem? (advice).
[***Special service to the Caribbean** on *5975, 11675, 15390 kHz.*: **2105** M-F Caribbean Report. **Special service to the Falklands** on *11680 kHz.*: **2130** T/F Calling the Falklands.]

DEUTSCHE WELLE
2100 News; **2105** S Hard to Beat (sport), M-F Newslink Africa, A Religion & Society; **2115** S Inspired Minds, A German by Radio; **2130** S Hits in Germany [or] Melody Time, M World Music Live, T Arts on the Air, W Living in Germany, H Cool (youth culture), F Focus on Folk, A Africa This Week; **2145** W Europe on Stage.

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RADIO AUSTRALIA
2100 D News; **2105** F Feedback (letters, station news, on communications), A Australia All Over (cont'd); **2110** S-H AM (morning news magazine); **2130** S Country Breakfast (rural life), M Earthbeat (ecology), T Innovations (new products), W Australia Now, H All in the Mind (the brain), F Oz Sounds (new music releases); **2145** A Asia Sunday.

RADIO JAPAN - NHK WORLD
2100 D News; **2110** S Pop Joins the World, M-F Songs for Everyone, A Weekend Japanology; **2115** M-F Asian Top News (headlines from region's radio); **2125** M Japan Music Treasure Box, T Basic Japanese for You, W Japan Musicscape, H Brush Up Your Japanese, F Music Beat; **2154** A Sights & Sounds of Japan.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
2100 S Voices of Our World (Maryknoll program), M Honoring Mother Earth: Indigenous Voices (cont'd), T Living Enrichment Center, W Global Community Forum (cont'd), H A Woman's Voice (cont'd), F A World of Possibilities, A Far Right Radio Review (cont'd); **2130** S Perspective (UN program), M In the Moment, T Peace Forum, W Scope (UN program), H Tropical Conservation Newshour (rainforests), F Newmaier Report, A World Citizens Weekly Commentary; **2145** S/A Hightower Report (commentary), M-F UN Today; **2148** S/A Earthwatch (ecology); **2151** S/A Earth & Sky (astronomy); **2155** S/A World Opinion (on terrorism).

VOICE OF AMERICA, Africa Service
2100 D News; **2106** S/A Jazz America, M American Gold, T Roots and Branches, W Classic Rock, H Top 20, F Country Hits.

WBCQ, Maine
7415 kHz.: **2100** S Radio Free Euphoria, M Jean Shepherd, F Pan Global Wireless, A HarvZower; **2130** F Pab Sungenis Project.

WHRI, Indiana
5745 kHz.: **2100** S DXing with Cumbre.

WHRA, Maine
17650 kHz.: **2100** F DXing with Cumbre; **2130** A DXing with Cumbre.

2200 UTC/ 6pm E/3pm P - Page 54 Freqs

ALL INDIA RADIO
2200 D News; **2210** D Commentary; **2215** S Women's World, M/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interview-2nd/4th), W Book Review (1st)/Window on Science (2nd/4th)/Times & Lives (biography-3rd), H General Talk, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); **2225** D Film Tune.

BBC WORLD SERVICE (am)
2200 D The World Today; **2232** A The Interview.

RADIO AUSTRALIA
2200 D News; **2205** F Asia Pacific (regional current affairs), A Correspondents' Report; **2210** S-H AM (morning news magazine); **2230** F AM Saturday (morning news magazine), A Fine Music Australia (classical); **2240** S-H Australia Wide (national report); **2254** A-H Perspective (commentary)

RADIO CANADA INTERNATIONAL
2200 S/A The World This Weekend, M-F The World at 6; **2230** S Inside Track (sports anthologies) M-F As It Happens (interviews with newsmakers), A Summer Comedy Special.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
2200 S A Public Affair, M-F Democracy Now!, A CounterSpin (media analysis); **2230** A Freespeech Radio News (repeat of Fri. newscast).

RADIO PRAGUE
2230 D News; **2235** S Letter from Prague, M-F Newsview, A Insight Central Europe; **2240** S Mailbox, M One on One (interview), T Witness (oral history), W ABC of Czech (language), H Economic Report, F The Arts; **2250** S Readings from Czech Literature, T Talking Point (Czech issues), W Czechs in History or Spotlight (travelogue), F Away from Politics (poetry).

RVi, Belgium
2230 S Radio World, M-F News, A Music from Flanders; **2234** M-F Flanders Today (incl.press review); **2238** S Tourism in Flanders; **2243** M Focus on Europe, T Green Society (ecology), W/F Around the Arts, H Economics; **2244** S Brussels 1043 (letters); **2248** M Sports, W Around Town, H International Report, F Tourism in Flanders; **2254** S-F Soundbox (Flemish music).

VOICE OF TURKEY
2200 D News; **2210** D Press Review; **2215** S Tunes Spanning Centuries, M Last Week, T Live From Turkey, W Review of the Foreign Media, H Big Powers & the Armenian Problem, F Archaeological Settlements in Turkey, A Outlook; **2220** M Hues & Colors of Anatolia, W Letterbox, A The Stream of Love or DX Corner; **2225** S/F Music, H In the Wake of a Contest; **2230** M/A Music; **2235** S Turks in the Mirror of Centuries, M From Past to Present, W Turkey's Off the Beaten Track Sites, H The Culture Parade, F The Travel Itinerary of Anatolia, A Turkish Arts.

WBCQ, Maine
7415 kHz.: **2200** W World of Radio, F Pab Sungenis Project (cont'd), A Radio Timtron Worldwide; **2230** W Goddess Irina I Music Show, H Uncle Ed's Musical Memories, F WDCD.

WHRI, Indiana
9495 kHz.: **2230** A DXing with Cumbre.

2300 UTC/ 7pm E/4pm P - Page 54 Freqs

BBC WORLD SERVICE (am)
2300 D News; **2306** S Documentaries, M-F Outlook (magazine), A Pick of the World (BBC's best); **2332** S Fanshawe (humor); **2345** M-F Off the Shelf (book readings), A Write On (letters).

CHINA RADIO INTERNATIONAL
0100 D News & Reports; **0110** A Report on Developing Countries; **0115** F Cutting Edge (sci/tech); **0120** A In the Spotlight (cultural magazine); **0130** S People in the Know (China's leading personalities), M Biz China, T China Horizons (China outside Beijing), W Voices from Other Lands, H Life in China, F Listeners' Garden.

RADIO AUSTRALIA
2300 D News; **2305** F Country Breakfast (rural life), A All in the Mind; **2310** S-H Asia Pacific (regional current affairs); **2330** S Business Report, M , T Rural Reporter, W The Arts on RA, H The Buzz (technology issues), F Lingua Franca (about language), A Innovations (new products).

RADIO BULGARIA
2300 D News; **2310** A Views Behind the News, S Folk Studio (Bulgarian folk music), M-F Events and Developments (current affairs review); **2320** M Sports; **2325** M-F Timeout for Music; **2330** F Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places); **2335** M-F Keyword Bulgaria (Bulgaria and things Bulgarian), H Answering Your Letters; **2345** M Magazine Economy, T Arts and Artists; W History Club, H The Way We Live, F Radio Bulgaria Calling (for radio hobbyists).

RADIO CANADA INTERNATIONAL
2300 D CBC News; **2305** A Quirks & Quarks (science), S Global Village (world music), M-F As It Happens (interviews with newsmakers)[began at 2230]; **2330** W Dispatches (world events in Canadian perspective).

RADIO NETHERLANDS
2330 S/A News; M-F Newsline; **2335** S Sincerely Yours (letters), A Europe Unzipped; **2355** S The Week Ahead (program previews), A Insight (commentary).

RADIO NEW ZEALAND INTERNATIONAL
2300 S-H World and Pacific News, F/A RNZ News; **2310** S-H Sports News, F Saturday with Kim Hill, A Feature or series; **2315** S-H Pacific Weather; **2317** S-H Nine to Noon (topical magazine).

RADIO FOR PEACE INTERNATIONAL, Costa Rica
2300 S Neumaier Report, M Between the Lines, T A Woman's Voice, W Alternative Radio, H Making Contact, F Honoring Mother Earth: Indigenous Voices, A TUC Radio; **2315** S Living Enrichment Center; **2330** M TUC Radio, H Steppin' Out of Babylon, A Continent of Media.

RADIO ROMANIA INTERNATIONAL
2300 D Radio Newsreel; **2310** S Focus, M-F Commentary, A The Week; **2315** S Sunday Studio, M Pro Memoria (history), T Business Club, W Society Today, H Cards on the Table (debate) or The Romanian Next to You (interview), F Challenge for the Future or Terra 2001, A World of Culture; **2320** M Political Flash, T European Horizons, A RRI Encyclopedia; **2325** S Romanian by Radio, M/W/F Business Update, T Tourist News, H Listeners' Letterbox, A Roots (culture/traditions); **2330** S Romanian Itineraries, M Pulse of Transition, T Mother Nature (ecology), W Visit Romania, F Practical Guide, A Radio Pictures; **2335** S Listeners' Letterbox, M Performing Arts, T Youth Club, W Partners in a Changing World, F Cultural Survey, A Romanian Itineraries; **2340** M Pages of Romanian Literature, T/H Skylark (folk music), W Stage and Screen, F Spectator (voice of the people), A Bucharest Along the Centuries; **2345** M Romanian Hits, W Romanian Musicians, F Romanian Folk Music At Its Best, A DX Mailbag; **2350** S Romanian Folk Music At Its Best, M Sports Roundup, T Athlete of the Week, W Sports Club, H Football Flash, F Sports Weekend.

WBCQ, Maine
7415 kHz.: **2300** S Le Show (humor/entertainment), W Off the Hook (public telecommunications issues), H Uncle Ed's Musical Memories (cont'd from 2230), F The Lost Discs Radio Show, A The Real Amateur Radio Show; **2330** W World of Radio, H Steppin' Out of Babylon, A Fred Flintstone Music Show.

WWCR, Tennessee
5070 kHz.: **2305** W The Bible's Greatest Heroes.
9475 kHz.: **2345** A Ask WWCR.

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Jose Jacob VU2JOS, India; Glenn Hauser, Enid, OK; E. Michael Murray, UK; Adrian Sainsbury, R. NZ Intl; Harold Sellers, Robert Thomas, Bridgeport, CT; Larry Van Horn, MT Asst. Editor; *BBC On Air; BCL News; BCDXC; Cumbre DX; DXA; DX Listening Digest; DX News; ODXA/DX Ontario; Fineware; Hard Core DX; HFCC; NASWA; NASWA Flash Sheet; Observer; World of Radio; Worldwide DX Club.*

Larry Van Horn
larryvanhorn@monitoringtimes.com

Aerial Refueling Tracks, Part II

The following is 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 last month, 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-121N/S	229.50	258.20		Albuquerque	49OSS	Holloman AFB
	Note: Restricted to 49 FW F-117 aircraft only					
AR-167N	235.10	260.20	323.10	380.20	Houston	149FW Kelly AFB
AR-167S	235.10	260.20	380.20	323.10	Houston	149FW Kelly AFB
AR-200	235.10	319.70	307.20	290.50	Miami	6OSS MacDill AFB
	Note: AR-200 intended for use by 6 ARW EC-135 and other operational missions					
AR-201E	336.10	319.50	271.20	343.70	Denver/Salt Lake City	7OSS Dyess AFB
AR-201W	336.10	319.50	343.70	271.20	Denver/Salt Lake City	7OSS Dyess AFB
	Note: AR-201 East/West intended for use by B-1 aircroft and support tankers					
AR-202AN	327.60	319.70	327.10	317.40	Jacksonville	437OSS Charleston AFB
			134.85	135.05	Jacksonville	
	Note: Lost contact frequencies with Jacksonville contact Miami ARTCC: 128.65/343.70, 133.65/348.70. or 132.15/307.80					
AR-202N	327.60	319.70	307.80	317.4	Jacksonville/Miami	437OSS Charleston AFB
			135.05		Miami	
	Note: Lost contact frequencies with Jacksonville contact Miami ARTCC: 128.65/343.70, 133.65/348.70. or 132.15/307.80					
AR-202S	327.60	319.70	317.4	307.80	Jacksonville/Miami	437OSS Charleston AFB
				135.05	Miami	
				327.10	Jacksonville (Alternate exit)	
				134.85	Jacksonville (Alternate exit)	
	Note: Lost contact frequencies with Jacksonville contact Miami ARTCC: 128.65/343.70, 133.65/348.70. or 132.15/307.80					
AR-203NE	238.90	319.70	354.00	338.30	Memphis	2OSS Barksdole AFB
AR-203SW	238.90	319.70	338.30	354.00	Memphis	2OSS Barksdale AFB
AR-204NE	324.60	282.70	282.20	319.10	Boston	305OSS McGuire AFB
AR-204SW	324.60	282.70	319.10	380.30	Boston	305OSS McGuire AFB
AR-205	327.60	282.70	319.10	380.30	Boston	305OSS McGuire AFB
AR-206H	348.90	282.70	323.00	354.10	Boston/Cleveland	305AMW McGuire AFB
AR-206L	235.10	282.70	323.00	307.80	Cleveland/Boston	305AMW McGuire AFB
AR-207NE	324.60	319.70	319.20	352.00	Jacksonville	437OSS Charleston AFB
AR-207SW	324.60	319.70	352.00	346.30	Jacksonville	437OSS Charleston AFB
AR-208	Squadron Tac		340.90/119.10	Sacramento TRACON		129RQW Moffett Federal
	Note: Restricted to 129 RQW Helicopter/C-130 air refueling					
AR-209E/W	238.90	319.50	As assigned		Los Angeles	452AMW March AFB
AR-212NE	238.90	282.70	282.20	346.40	Boston	305OSS McGuire AFB
AR-212SW	238.90	282.70	319.10	380.30	Boston	305OSS McGuire AFB
AR-214	Squadron Tac		As assigned		Oakland	NAS Fallon Range
	Note: Restricted to Navy tacticol aircraft only					
AR-216NE	276.50	319.70	363.10	257.90	Atlanta	437OSS Charleston AFB
AR-216SW	276.50	319.70	257.90	316.10	Atlanta	437OSS Charleston AFB
AR-217	283.90	282.70	306.30	317.40	Cleveland	171ARW Pittburgh
AR-218	352.60	282.70	307.10	269.30	Cleveland	171ARW Pittburgh
AR-219	366.30	282.70	363.10	288.30	Cleveland	171ARW Pittburgh
AR-220	352.60	282.70	307.10	317.40	Cleveland	171ARW Pittburgh
AR-221	Squadron Tac		319.90	319.90	Oakland	129RQW Moffett Fed
	Note: AR-221/222 Restricted to 129 RQW Helicopter/C-130 air refueling					
AR-222	Squadron Tac		263.10	357.60	Oakland	129RQW Moffett Fed
	Note: AR-221/222 Restricted to 129 RQW Helicopter/C-130 air refueling					
AR-223	Squadron Tac		353.50	281.40	Oakland	129RQW Moffett Fed
	Note: Restricted to 129 RQW Helicopter/C-130 air refueling					
AR-224	Squadron Tac		281.40	353.50	Oakland	129RQW Moffett Fed
	Note: Restricted to 129 RQW Helicopter/C-130 air refueling					
AR-255H E/W	283.90	365.775	306.20	133.375	Oakland	60OSS Travis AFB
AR-255L E/W	366.30	365.775	387.10	134.150	Oakland	60OSS Travis AFB
AR-302E	366.30	260.20	281.50	291.70	Houston	2OSS Barksdale AFB
AR-302W	366.30	260.20	281.50	343.90	Houston	2OSS Borksdale AFB
	FL240 East		285.60	322.40	Houston	
	FL240 West		285.60	317.50	Houston	
	Notes: 8000-14000 restricted to C-130 receivers only scheduled by the 16SOW Hurlburt. FL190/230 scheduled by 93BS Barksdale.					
AR-307A E	264.90	238.90	288.10	338.30	Seattle	62OSS McChord AFB
AR-307B W	264.90	238.90	338.30	257.60	Seattle	62OSS McChord AFB
AR-307C	264.90	238.90	288.10	257.60	Seattle	62OSS McChord AFB
AR-309E	283.90	260.20	281.40	279.50	Kansas City	509OSS Whiteman AFB
AR-309W	283.90	260.20	279.50	281.40	Kansas City	509OSS Whiteman AFB
AR-310E/W	352.60	319.50				49OSS Holloman AFB
	East High		251.15	284.60	Albuquerque	

	East Low		307.20	284.60	Albuquerque	
	West High		284.60	251.15	Albuquerque	
	West Low		284.60	307.20	Albuquerque	
AR-312H	284.075	312.225	351.70	351.70	Albuquerque	97OSS Altus AFB
AR-312L	291.90	260.20	351.70	351.70	Albuquerque	97OSS Altus AFB
	Note: AR-312H/L intended for exclusive use by 97AMW aircraft and support tankers only					
AR-313N	352.60	260.20	285.50	291.70	Fort Worth	97OSS Altus AFB
AR-313S	352.60	260.20	291.70	285.50	Fort Worth	97OSS Altus AFB
AR-313A N	352.60	260.20	278.55	291.70	Fort Worth/Houston	97OSS Altus AFB
AR-313A S	352.60	260.20	291.70	278.55	Houston/Fort Worth	97OSS Altus AFB
	Note: AR-313A North/Sauth intended for exclusive use by 97AMW aircraft conducting formation AR training and support tankers only.					
AR-314E/W	295.80	319.50				552OSS Tinker AFB
	East FL240/260		346.35	351.70	Albuquerque	
	East FL270/310		239.25	385.65	Albuquerque	
	West FL240/270		351.70	346.35	Albuquerque	
	WesT FL270/310		385.65	239.25	Albuquerque	
	Note: Restricted for use by the 552ACW aircraft and support tankers only					
AR-315E	295.40	319.70	372.00	253.50	Indionapolis	121ARW Rickenbacker
AR-315W	295.40	319.70	246.00	246.00	Indianapolis	121ARW Rickenbacker
AR-318E	295.80	260.20	343.70	353.50	Chicago/Kansas City	126ARW Chicago OHare
AR-318W	295.80	260.20	370.90	343.70	Kansas City	126ARW Chicago Ohare
AR-321	276.50	282.70	263.00	263.00	Chicago	128ARW Gen Mitchell
AR-324	288.70	389.00	As assigned		San Juan	156FW San Juan Intl
AR-328	235.10	319.70	319.90	319.90	Atlanta	134ARW McGhee Tyson
AR-330E	305.50	260.20	337.40	327.00	Kansas City	184BW McConnell AFB
AR-330W	305.50	260.20	327.00	269.40	Kansas City	184BW McConnell AFB
AR-331E/W	286.60	367.40	305.80	305.80	Bermuda ATCF	Bermuda ATCF
AR-332NW/SE	358.40	389.00	As assigned		San Juan	156FW San Juan Intl
AR-355/356	320.90	238.90	As assigned		Seattle	55OG Offutt AFB
AR-400N	228.25	364.325	281.40	397.85	Denver/Kansas City	97OSS Altus AFB
AR-400S	228.25	364.325	288.35	387.10	Kansas City/Denver	97OSS Altus AFB
AR-452NE	361.70	384.60	269.00	290.50	Oakland/Salt Lake City	366OSS Mt. Home AFB
AR-452SW	361.70	384.60	290.50	269.00	Salt Lake City/Oakland	366OSS Mt. Home AFB
AR-453	291.90	320.90	270.30	270.30	Minneapolis	55 Wing Offutt AFB
AR-455E	336.10	291.90	379.90	290.55	Indianapolis	552OSS Tinker AFB
AR-455W	336.10	291.90	290.55	379.90	Indianapolis	552 OSS Tinker AFB
AR-462	318.00	384.60	379.20	352.00	Oakland	366 OSS Mt. Home AFB
			134.975	132.25	Oakland	
AR-505E	315.90	263.90	353.80/128.10	Anchorage	168ARW Eielson AFB	
					Note: ARIP 372.00/125.20	
AR-505W	315.90	263.90	285.40	353.80	Anchorage	168ARW Eielson AFB
			133.10	128.10	Anchorage	168ARW Eielson AFB
					Note: ARIP 284.70/135.00	
AR-506N	288.80	263.90	323.00	323.00	Anchorage	168ARW Eielson AFB
			127.10	127.10	Anchorage	
AR-506S	288.80	263.90	323.00	323.00	Anchorage	168ARW Eielson AFB
			127.10	127.10	Anchorage	
				263.10	Anchorage	
				119.00	Anchorage	
AR-507E	270.20	263.90	269.40	335.50	Anchorage	168ARW Eielson AFB
			133.60	126.60	Anchorage	
AR-507W	270.20	263.90	335.50	269.40	Anchorage	168ARW Eielson AFB
			126.60	133.60	Anchorage	
AR-508E	288.80	263.90	288.30		Anchorage	168ARW Eielson AFB
			132.90		Anchorage	
AR-508W	288.80	263.90	288.30	338.30	Anchorage	168ARW Eielson AFB
			132.90	127.80	Anchorage	
AR-902E/W	336.70	335.85	284.60	284.60	Honolulu	203ARS Hickam AFB
			126.60	136.60	Honolulu	
			Note: 131.95 San Francisco ARINC			
AR-903E/W	387.90	335.85	306.90	269.40	Honolulu	203ARS Hickan AFB
			119.90	126.50		
			Note: 131.95 San Francisco ARINC			
AR-904NW/SE	336.70	243.30	306.90	269.40	Honolulu	203ARS Hickan AFB
			119.90	126.50		
			Note: 131.95 San Francisco ARINC			

Aerial Refueling Anchors

Track	Refueling		ARTCC			Assigned
	Primary	Secondary	ARCP	Exit	ARTCC	Scheduling Unit
AR-600	348.90	319.70	319.20	319.20	Jacksonville	20OSS Shaw AFB
AR-601	283.90	319.70	381.40	381.40	Jacksonville	20OSS Shaw AFB
AR-602	295.40	319.50	319.20	319.20	Albuquerque	27FW Cannon AFB
	Note: 27FW based aircraft only					
AR-603	238.90	319.50	285.40	285.40	Albuquerque	56RMO Luke AFB
AR-604	276.50	292.60	285.40	285.40	Salt Lake City	120FW Great Falls
AR-606	366.30	320.90	270.30	270.30	Minneapolis	West ADS McChord AFB
	Note: Callsign Big Foot (WADS - Western Air Defense Sector) NORAD AICC 364.20					
AR-607	235.10	320.90	269.00	269.00	Minneapolis	148FW Duluth MN
	Note: Callsign Huntress (Northeast Air Defense Sector) NORAD AICC 364.20 or as directed by military radar					
AR-608	343.50	282.70	307.30	307.30	Boston	NE ADS Rome NY
	Note: Callsign Huntress AICC 364.20 or as directed by military radar					
AR-609	276.50	282.70	323.00	323.0	Boston	NE ADS Rome NY
	Note: Callsign Huntress AICC 364.20					
AR-610A/B	295.40	292.60	338.30	338.30	Salt Lake City	366OSS Mt. Home AFB
AR-611A/B	255.75	275.95	380.05	380.05	Salt Lake City	366OSS Mt. Home AFB
AR-613	305.50	319.50	327.15	327.15	Albuquerque	162FW Tucson IAP
AR-614	352.60	260.20	385.55	385.55	Houston	99FTS Randolph AFB
AR-615	295.40	260.20	As assigned		Houston	16SOW Hurlburt Field
AR-616A/B	283.90	282.70	269.60	269.60	Boston	NE ADS Rome NY

(Continued next month)

Dan Veeneman
danveeneman@monitoringtimes.com
http://www.signalharbor.com

Converting Console IDs

Information about talkgroups in a trunked radio system is often available in different forms. Lists posted on the Internet or released by public safety agencies may have different formats or report numbers in unexpected ways.

❖ Rapides Parish, Louisiana

Dear Dan,

I live in Rapides Parish, Louisiana. The parish was on a Type I system, but is in the process of switching to a Motorola Type II system. I was able to obtain some talkgroup ID information for this system. The talkgroup IDs I have start at 800001 and go to 801117. All talkgroup IDs that I have seen for other areas only go to 5 digits and are usually even numbers. When I put these numbers into a scanner, it says invalid ID. Do these numbers need to be converted and can they be converted by some formula to an ID that the scanner will monitor?

Ron

Ron, what you probably have is a list of "Console" Identifiers (IDs), which are the numbers that appear on the operator's console in the dispatch center when a radio is using the system. As you've seen, each of these console numbers has a prefix of "8." The rest of the number is either a talkgroup or radio identifier. It does not include the four status bits that are transmitted over the air and displayed by your scanner as the final digit.

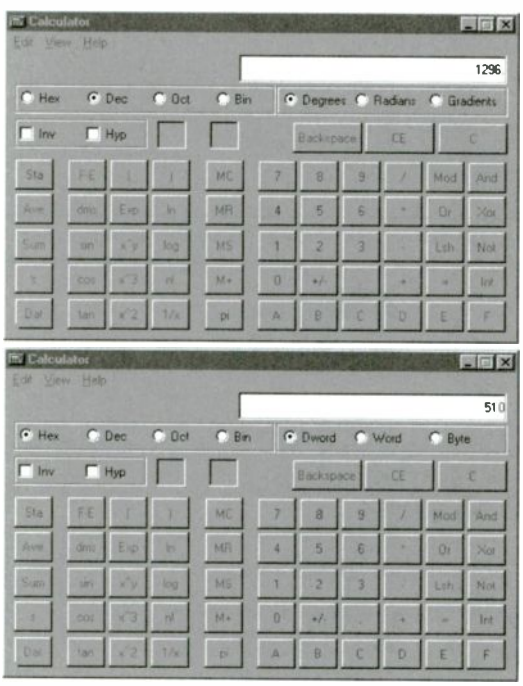
Talkgroup identifiers are usually shown as even numbers because they are reported with all status bits off. In a Motorola Type II system the last four bits ("binary digits") represent the status of the radio.

If the left-most of those four bits is set (has a value of '1' rather than '0') it means the transmission is encrypted. The three right-most status bits indicate if the message is an emergency and whether the talkgroup is interconnected in some way. More information about Motorola Type II trunking can be found in the April 2001 *Tracking the Trunks* column.

A status of all zeroes indicates a normal transmission, so a regular message has status bits of 0000 (0 in decimal). Since the status bits are the least significant part of the talkgroup number, they determine whether the number is odd or even. Since all four bits are normally set to zero, lists of decimal talkgroup numbers show differences of 16 or some multiple of 16. Some lists drop the last four bits altogether. So, to convert each of those console identifiers, remove the "8" prefix and multiply the remaining number by 16. What you have at that point is the decimal representation of the talkgroup number that most scanners and software programs recognize. For example, the console identifier 800050 would be 50 times 16, or 800 decimal.

If you need that number in hexadecimal format, the easiest way to change it is by using a calculator with a conversion capability. Microsoft Windows has this capability in their Calculator accessory, if you choose the "Scientific" mode under the View selections. Click on the "Dec" radio button and enter your decimal number. Then click on the "Hex" radio button and the hexadecimal value will be displayed.

Below is a table that with some examples that should help you perform the conversions.



Click on the "Dec" radio button and enter your decimal number. Then click on the "Hex" radio button and the hexadecimal value will be displayed.

Console Identifier	Decimal	Hex
800001	16	0010
800002	32	0020
800003	48	0030
800004	64	0040
800005	80	0050
...	...	...
800010	160	00A0
800011	176	00B0
...	...	...
800050	800	0320
800051	816	0330
800100	1600	0640
800101	1616	0650
...	...	...
800500	8000	1F40
800501	8016	1F50
...	...	...
801000	16000	3E80
801001	16016	3E90
...	...	...
801117	17872	45D0

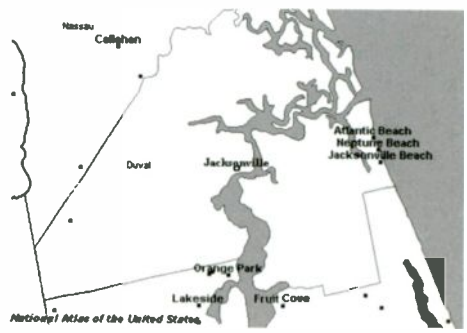
The frequencies I find listed for Rapides Parish are 855.7125, 855.9625, 856.7125, 856.9375, 857.7125, 857.9375, 858.2625, 858.7125, 858.9375, 859.2625, 859.7125, 859.9375, 860.2625, 860.7125 and 860.9375 MHz. I don't have any talkgroup information, so Ron, please send along your list of talkgroups!

❖ Jacksonville, Florida

The police in Jacksonville, Florida, have begun encrypting the digital radio transmissions on their trunked radio system. Under the cover of homeland security, the decision was made to use the optional encryption capability in their system. In defending their decision, the department also indicated that criminals use scanners to keep track of police patrols.

It is not clear which police transmissions, if any, will remain "in the clear" (unencrypted). It is also undecided whether the news media will be given access to some of the less sensitive police talkgroups. Fire and rescue transmissions, as well as public works and other municipal agencies, are expected to remain in the clear.

The decision of the department to encrypt has raised the normal concerns about visibility and accountability within the police department, which has been troubled by corruption and exces-



sive force complaints in the past.

The Jacksonville trunked radio system is a ten-site Motorola ASTRO system used by police, fire, emergency medical personnel as well as city and Duval County employees. This $41 million system has nearly 10,000 radios, half of which are used by police and other law enforcement departments.

Frequencies used on the system are 854.9625, 855.2125, 855.4875, 855.9626, 855.9875, 856.2125, 856.2625, 856.4625, 856.7125, 856.7375, 856.9375, 856.9625, 856.9875, 857.2375, 857.4625, 857.7125, 857.9375, 857.9625, 858.7125, 858.9625, 859.4625, 859.7125, 859.9375, 859.9625, 859.9875, 860.4625, 860.7125 and 860.9375 MHz.

Talkgroups:

Jacksonville Fire/Rescue (Digital)

17360	43D	Main
17392	43F	Fire Dispatch
17424	441	Emergency Medical Service 1

Jacksonville Sheriff's Office (Digital, Encrypted)

18320	479	Zone 1
18352	47B	Zone 2
18384	47D	Zone 3
18416	47F	Zone 4
18448	481	Zone 5
18480	483	Zone 6

Analog talkgroups

16	001	Public Works
48	003	Public Works
336	015	Parking Enforcement
432	01B	Parks Department
688	02B	Street Department
944	03B	Parks Department
1104	045	Jacksonville Fire Rescue
1136	047	Jacksonville Fire Rescue Tactical
1168	049	Jacksonville Fire Rescue Tactical (simulcast 460.525 MHz)
1264	04F	Fleetwide
1296	051	Emergency Operations Center 1
1328	053	Emergency Operations Center 2
1360	055	Emergency Operations Center 3

Nearby Jacksonville Beach operates a Motorola Type II system on 856.7625, 857.7625, 858.7625, 859.7625 and 860.7625 MHz. Some talkgroups:

57360	Fire Dispatch
57392	Fireground
57968	Lifeguard Dispatch
58000	Lifeguard Supervisors
58768	Police Dispatch
58800	Police Tactical

❖ Anne Arundel County, Maryland

Anne Arundel County, Maryland, will be updating their radio system to the tune of $12.7 million over the next year. The county is working to reduce or eliminate cellular tower interference at more than 60 locations, where officers have been unable to reliably communicate with their dispatch center. An additional 16 radio frequencies, to be added as part of the upgrade, should help this situation. Improvements will also include the ability to handle both analog and digital radios.

The County currently operates a Motorola Type II analog system on the following frequencies: 856.3625, 856.3875, 856.4125, 857.3625, 857.3875, 857.4125, 858.3625, 858.3875, 858.4125, 859.3625, 859.3875, 859.4125, 860.3625, 860.3875 and 860.4125 MHz.

Talkgroups:

57360	E01	Emergency Medical Service Dispatch
57392	E03	Emergency Medical Service
57424	E05	Emergency Medical Service
57488	E09	Fireground Operations
57520	E0B	Fireground Operations
57552	E0D	Command
57584	E0F	Mutual Aid (simulcast on 154.280 MHz)
57808	E1D	Fire to Police

❖ Annapolis, Maryland

Meanwhile, in the state capitol of Annapolis, Maryland, a new $330,000 mobile data system from Motorola has come on-line. Twenty patrol cars are equipped with the Mobile Workstation 520 (MW520), a computer system with a radio-modem and flat-panel color touch screen running the Windows operating system. The unit will be able to display text as well as photographs and fingerprints from state and federal databases.

To the north of Annapolis, in Pennsylvania, the state police there are deploying MW520 wireless workstations in more than 600 vehicles after a successful test in the southern part of the state.

❖ Marin County, California

In April of this year Marin County voted to begin operation of their $21 million trunked radio system without a resolution on the placement of a repeater site in Tiburon, in the southern part of the county. The system was originally scheduled to go on-line more than a year ago, but local objections to the construction of some of the dozen or so sites in Marin and Sonoma counties have delayed completion. The towns of Belvedere, Mill Valley and Tiburon will lack effective coverage until the repeater site issue can be resolved.

Marin County, just north of San Francisco, currently operates a Motorola ASTRO mixed analog and digital system in the UHF (Ultra High Frequency) band with a base of 482 MHz, spacing of 12.5 MHz and an offset of 380. The system frequencies are 482.3500, 482.6250, 482.6500, 482.7875, 482.9375, 483.0250, 483.1250, 488.7000 and 489.0750 MHz.

❖ Hamilton County, Ohio

Hamilton County, in the southwest corner of Ohio, is planning on having their $35 million radio system up and running by fall. It will replace a 25-year-old UHF system and a VHF fire network. The county has purchased nearly 2,000 radios for the 40 communities and agencies that will join the system, although some local police departments are objecting to the user fees charged by the county to construction and operating costs. Meanwhile the city of Cincinnati is expected to fully complete their new $24 million system in about a year and half, at which point users from both systems will be able to talk to each other directly.

The Hamilton County radio network is a Motorola ASTRO digital system, but some reports indicate analog traffic is also in use. There are a half-dozen sites operating on the following frequencies: 866.1625, 866.2500, 866.2750, 866.3000, 866.6500, 866.7875, 867.2375, 867.2375, 867.2375, 867.5375, 867.7375, 867.7625, 867.8125, 867.8500, 868.1250, 868.2625, 868.3625, 868.5625 and 868.9500 MHz.

Some talkgroups on this system include:

48	003	Engineering
4816	12D	Water Department
4848	12F	Sewer Department
6512	197	Building Inspectors
9616	259	Fire Mutual Aid
33616	835	County Fire Dispatch (East)
33648	837	County Fire Dispatch (West)
33776	83F	County Fireground 1
33808	841	County Fireground 2
33840	843	County Fireground 3
33872	845	County Fireground 4
33904	847	County Fireground 5
33936	849	County Fireground 6
33968	84B	County Fireground 7
34000	84D	County Fireground 8
35216	899	County Sheriff Dispatch (East)
35248	89B	County Sheriff Dispatch (West)
35280	89D	County Sheriff Dispatch (Central)
35536	8AD	County Sheriff Dispatch Car-to-car

The new Cincinnati system is a Motorola ASTRO digital system (with a 3600-baud control channel) using the following frequencies: 866.1125, 866.1875, 866.2125, 866.4625, 866.5625, 866.5875, 866.6875, 866.8125, 866.8375, 867.0875, 867.1125, 867.2625, 867.3125, 867.3375, 867.6125, 867.6375, 867.6625, 868.6375, 868.7875 and 868.8625 MHz. Detectives have been heard on talkgroup 12912 (hex 327).

Can anyone in the Hamilton County area give us a more up-to-date report on the activity on these two systems?

As a reminder, APCO Project 25 system frequencies and tower locations are available on my website at **http://www.signalharbor.com.** I welcome your questions, comments and corrections via my e-mail address, *dan@monitoringtimes.com*. Until next month, happy monitoring!

THE FED FILES

A GUIDE TO GOVERNMENT COMMUNICATIONS

Larry Van Horn, N5FPW
larryvanhorn@monitoringtimes.com

Homeland Security, Part Deux

In the May edition of this column we presented an overview of the new Department of Homeland Security (DHS). In this month's edition we will start looking at some specific bureaus within the new Department and their frequencies. We start this off with the one DHS agency that is the most visible and has received the bulk of the press coverage since 9/11 – The Transportation Security Administration or TSA.

❖ Transportation Security Administration

On November 19, 2001, President George W. Bush signed into law the Aviation and Transportation Security Act (ATSA), which, among other things, established a new Transportation Security Administration (TSA) within the Department of Transportation. Of course, the TSA was rolled into the Department of Homeland Security earlier this year.

The Transportation Security Administration is responsible for civil aviation security and has established federal security operations in the nation's 429 commercial airports. The most visible sign of the TSA is the presence of federal passenger and baggage screeners at U.S. airports.

Several readers have written *The Fed Files* over the last few months and asked, "What frequencies can we hear the TSA on?"

Since the TSA's original roots came from their bureau assigned to the FAA, we went back to check our extensive notes on where those operations have appeared in the radio spectrum in the past. For many years 172.150 MHz (simplex - channel 9) was a part of the FAA's National Radio Communications System (NARACS) bandplan and was used for security/law enforcement.

TSA Radio Bandplan

Recently several *Fed File* regulars have reported TSA activity on 172.150 MHz. One of our regular reporters, Brian J. Cathcart, passed along the following:

F1	172.150	S1 simplex 1 [digital]
F2	172.150	S1 simplex 2 [digital]
F3	172.150	S1 simplex 3 [digital]
F4	172.150	S1 simplex 4 [digital]
F5	172.900	S2 simplex 5 [digital]
F6	169.300	S3 simplex 6 [digital]
F7	172.900	R1 repeater 1 (169.300 input) [digital]
F8	172.900	R1 repeater 2 (169.300 input) [digital]
F9	172.900	R1 repeater 3 (169.300 input) [digital]
F10	172.900	S2 simplex 7 [digital]
F11	172.900	S2 simplex 8 [digital]
F12	166.4625	F1 Treasury Simplex (with 103.5 CTCSS) [analog]
F13	166.4625	F1 Treasury Simplex [digital]

Note: Channels F12 and F13 are only used with Joint Treasury Operations, not in daily use

TSA is apparently using digital conventional talkgroups (a digital feature of APCO-25 conventional), as the channels do not hear each other (i.e. TX on Channel 3 is not heard on Channel 4, etc). The exception to this is Channel 10 which can be heard on Channel 7.

The radios are Motorola Astro XTS5000 Model 1 with these features:

Hard Ware Encryption
AES/DES-XL/DES-OFB Encryption
Astro 25 and MDC OTAR
Advanced Securnet Multi/OTAR

Brian says he does not know if they actually have encryption modules installed in the radios, but if they don't, the radios are ready for them. So far, in all of the airports that he has traveled through, none of the TSA agents are using encryption, so he has been able to hear everything. However it's rather mundane conversations, nothing of national security importance!

In addition to Brian's report above, two other *Fed File* regulars, Chris Parris and *MT*'s Robert Wyman, have been traveling out and about to see what TSA they could snag. Chris, Bob, and Brian have reported TSA activity at the following airports:

CLT	Charlotte-Douglas International, North Carolina (172.900/169.300 repeater)
DTW	Detroit Metropolitan Wayne County Airport, Michigan
EWR	Newark Liberty International Airport, New Jersey (172.150 simplex)
FLL	Fort Lauderdale-Hollywood International, Florida
LAX	Los Angeles International, California (172.150 simplex)
MCO	Orlando International, Florida (172.900/169.300 repeater)
PDX	Portland International, Oregon (172.150 simplex)
PIA	Greater Peoria Regional, Illinois
PIT	Pittsburgh International, Pennsylvania (172.150 simplex, 172.900/169.300 repeater)
RDU	Raleigh-Durham International, North Carolina
SAN	San Diego Limbergh Field, California (172.150 simplex)
SFO	San Francisco International, California (172.150 simplex)

Brian also mentions, "One airport I just passed through that wasn't using the new TSA frequencies was at Columbus, Ohio (Port Columbus International - CMH). TSA was using UHF analog portables. However, with a small airport like Peoria using the digital radios it's probably safe to say that most airports in the U.S. are now (or will soon be) using digital. And I would guess that all of them would be programmed the same, since coordinating all of those radios across the U.S. would be easier that way.

"At all locations listed above, 172.150 was heard in use in simplex, with only some locations using the repeater. At Fort Lauderdale, the "input" 169.300 was heard as simplex with no activity on the output of 172.150 (of course, it's possible they are using a different output frequency).

"Most of the XTS-5000's I've seen have a big white sticker on front with the channels listed, but it's hard to see the writing when the radio is on their belt, and with security these days you can't exactly walk up and say "Hey can I write down what the front of your radio says?!"

❖ FAA NARACS

Since we mentioned the FAA NARACS net above, I thought I might as well pass along the latest known NARACS bandplan in use nationwide in Table One. CTCSS Private Line tones are used within the FAA radio system with PL1 (136.5 Hz) selected as the system's primary tone.

❖ NEST is Moving

Kenton Hoover reports that the Nuclear Emergency Search Team (NEST) is moving into the Department of Homeland Security from the Energy Department. No word at this time if their Department of Energy (DOE) frequencies are also being transferred during their shift to the DHS.

❖ P-25 Activity Found

Since the new Uniden APCO P-25 digital scanners hit the streets earlier this year, radio enthusiasts are discovering that a lot of the digital signals they hear in the federal bands are in fact P-25 digital streams. This is leading to a bit of a renaissance in federal monitoring among radio hobbyists. Here are just a few examples of this sort of P-25 activity from Chris Parris and Steve Donnell.

165.2875	Portland, OR [Bureau of Alcohol, Tobacco and Firearms-LVH]

Table One: National Radio Communications System

FAA CTCSS Tones: PL1 – 4Z 136.5 Hz (Primary),
PL2 – 4B 146.2 Hz, PL3 – 5A 156.7 Hz

F1	172.925/169.325	Air Facility Region/Sector Maintenance*
F2	172.950/169.350	Air Facility Region/Sector Maintenance*
F3	172.975/169.375	Air Facility Region/Sector Maintenance*
F4	172.850/169.250	Air Facility Region/Sector Maintenance*
F5	172.875/169.275	Air Facility Region/Sector Maintenance*
F6	172.900/169.300	Air Facility Region/Sector Maintenance* Security at Seattle, WA (SEA)
F7	172.825/169.225	Air Facility Region/Sector Maintenance*
F8	172.125 simplex	Air Traffic Control/Flight Standards
F9	172.150 simplex	Air Security
F10	172.175 simplex	Airway Facility Maintenance
F11	166.175 simplex	FAA National Simplex, National Maintenance Directors Net, Regional Administrators Simplex, Scene of Accident Investigation Nationwide
F12	Local Use	This channel is assigned for local use as needed.

* (also talk around on repeater output)

Table Two lists some additional frequencies from *The Fed Files* used by the FAA that you might find interesting.

Table Two: Miscellaneous FAA Frequencies

165.6375 simplex	Security (Great Lakes Region)
Flight evaluation teams for facility alignment (Northern Mountain Region)	
165.6625 simplex	Maintenance net (Central Region)
165.7500 simplex	Scene of the accident investigation (Nationwide)
165.7625 simplex	MALSR (Medium Intensity Approach Lighting System) lighting control – Data (Nationwide)
Scene of the accident investigation (Nationwide)	
169.2250 simplex	Scene of the accident investigation (Alaska)
169.3500 simplex	Administration net (Great Lakes Region)
169.5750 simplex	Portable repeaters and handhelds for FAA/NTSB scene of the accident coordination (Alaska)
170.1500 simplex	Cambridge, MA TSC (DOT) security communications
171.9750 simplex	Portable repeaters and handhelds for FAA/NTSB scene of the accident coordination (Alaska)
172.1250 aero simplex	Flight check communications with air facilities (Great Lakes Region)
172.1500 simplex	Flight standards simplex net (West Pacific Region)
Security training net (Nationwide)	
172.1750 aero simplex	Flight check communications with air facilities (Great Lakes Region)
172.1750 simplex	Airway facility maintenance – Data (Nationwide)
172.325/169.575	Portable repeaters and handhelds for FAA/NTSB scene of accident coordination (Alaska)
172.875/169.250	Security and flight standards net (Central Region)
172.875/169.350	Security/Sky Marshal net (Airports nationwide)
172.8750 simplex	Flight evaluation teams for facility alignment (West Pacific Region)
172.900/169.250	Security at Seattle, WA (SEA)
172.900/169.275	Security and flight standards net (Nationwide)
172.900/169.275	Security and flight standards net (Central Region)
172.900/169.300	Security at Seattle, WA (SEA)
173.175/169.575	Portable repeaters and handhelds for FAA/NTSB scene of the accident coordination (Alaska)
173.4375/169.575	Portable repeaters and handhelds for FAA/NTSB scene of the accident coordination (Alaska)

The 6th edition of the ARTSCI publication *Federal Government Frequency Assignments* lists several assignments as noted in Table Three and implies they might be nationwide assignments. Further research indicates that in fact they are not and that they are local use frequency assignments and designators.

Table Three: Local Frequency Assignments and Designators

A01	172.900/172.100	SoCal FAA Assignment – Maintenance Net (Hawthorne repeater)
A02	170.200/169.250	SoCal FAA Assignment – Los Angeles Federal Executive Board Emergency Net (San Pedro Hill)
H01	170.150/169.225	Hawaii FAA Maintenance Assignments
H02	172.150/171.2625	Hawaii FAA Maintenance Assignments
165.950		Portland, OR [IRS Criminal Investigation Division-LVH]
170.625		Swanton, VT [Immigration and Naturalization Service-LVH]
170.825		Unid simplex traffic [Probable FBI simplex-LVH]
414.725		Portland, OR [US Postal Inspector Service-LVH]

❖ FLETC Getting New Radios

EFJ, Inc. announced earlier this year that its E.F. Johnson subsidiary has received a $970,000 order from the Department of the Treasury for SMARTNET, SmartZone and Project 25 digital portable and mobile radios.

The Treasury Department will deploy E.F. Johnson's software programmable portable 5100 series radio and 5300 series mobile radio at the Federal Law Enforcement Training Center (FLETC) in Glynco, Georgia. The FLETC serves as an interagency law enforcement training organization for more than 70 federal agencies with personnel located throughout the United States and its territories. The Center also provides services to state, local, and international law enforcement agencies.

❖ New Encryption Standard

AES (FIPS 197) is going to replace DES as the U.S. encryption standard for sensitive, but non-classified communications. It is based on the Rijndael (pronounced Rhine-doll) formula. If you want more information point your browser at: http://csrc.nist.gov/encryption/aes/. Thanks to Mark Cobbeldick for the heads up on this.

❖ The Boeing Company in Florida

Robert Wyman, while doing an FCC search, came across these UHF business band frequencies for the Boeing Company (WPPB577) at the Kennedy Space Center in Florida. Of course, Boeing does a lot of contract work for the government and NASA in particular.

451.400/456.400 451.925/456.9256
452.175/457.175 452.225/457.225
461.250/466.250

An anonymous reporter amplifies Bob's report about the Boeing system at the Cape.

"Just happened to find the Boeing Company using ASTRO on a repeater output at Cape Canaveral AFS. Frequency in use was 452.175. 'Delta Control' has been heard reference the gates. My FCC search on the frequency revealed the following information."

Note: Sites are all listed for Phillips Parkway (WPPB577)

Site 1	Site 2
451.400	451.250
451.925	451.400
452.175	452.175
452.225	461.250

Our anonymous reporter indicates that so far the other frequencies have been quiet.

Robert Wyman also passes along these channels which are licensed for use by Boeing at Cecil Field, Florida (ex-Naval Air Station):

WSF80 123.225 123.475
WPQH404 452.300/457.300
464.225/469.225
464.725/469.725

And that does it for this edition of *The Fed Files*. Until next time, 73 and good hunting.

Doug Smith, W9WI
dougsmith@monitoringtimes.com

Digital Status Report

Digital Radio

The conversion to digital is keeping broadcasters busy. It's keeping DXers (or at least those who write about DXing) busy, too. This month, I want to review the status of this conversion.

In the U.S., the "in-band on-channel" scheme for digital radio, better known as "IBOC," has been approved for general use. This system puts digital subcarriers in the unused "guard bands" between channels. On AM, it also uses parts of the adjacent channels. Each station's digital signal is broadcast on the same frequency and antenna as its analog signal. Since March 20th, U.S. stations may begin IBOC digital broadcasts at any time; they need only notify the FCC.

Canada has chosen the "Eureka" system. In doing so, they've joined most of the rest of the world; to my knowledge the U.S. is the only country using IBOC. (I have heard rumors that stations in Windsor, Ontario, may broadcast with both systems – Eureka and IBOC – recognizing their large U.S. audience in Detroit.) The Eureka system requires a different frequency band. Canada is using frequencies near 1450 MHz.

A single Eureka transmitter, using a single frequency, can broadcast as many as six different stereo programs. For example, Toronto-area stations CIAO-530, CHWO-740, CJMR-1320, CFMX-96.3, and CIRV-88.9 are all broadcast over a single digital transmitter.

Canadian stations wishing to begin digital broadcasts must apply for a license. In general, the practice seems to be for most of the stations in a given city to apply simultaneously. Digital stations are on the air in Vancouver, Windsor, Toronto, Ottawa, Halifax, and Montreal. Government practice is to assign all digital stations in a city the same power and transmitter site – all stations get the same coverage. (This is probably one reason the U.S. has rejected this system.) Note below that Toronto is getting a digital-only station – one with no analog counterpart.

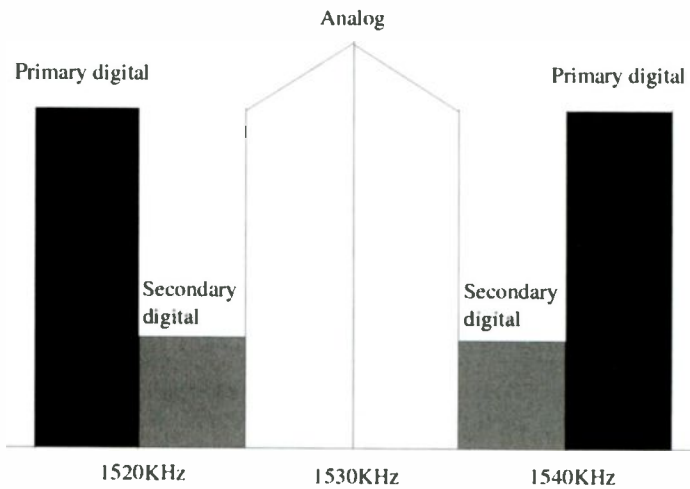
Digital TV

The U.S. and Canada have agreed on a single standard for digital television. In theory, all U.S. full-power TV stations were to have begun digital broadcasts by May 1st. Many stations have obtained extensions. Roughly half are on the air, though many of them at greatly reduced power with special temporary authority. There is no mandatory deadline for digital conversion in Canada. So far, only one digital station (CITY-TV Toronto, on channel 53) is operating north of the border.

Like Eureka digital radio, digital TV cannot be broadcast on the same frequency as the analog signal. Unlike radio, the governments (both U.S. and Canada) have found second channels for digital operation within the same frequency bands used for analog. At the same time, plans call for the removal of channels 52-69 from TV service. Four of these channels will be used for public-safety communications. The rest will be auctioned for commercial service.

In theory, analog television is to come to an end in the U.S. in 2006. Few observers believe this deadline will be met. High prices, the economic slump, and slow rollout of digital carriage on cable, have limited sales of digital receivers. Poor coverage by low-powered and not-yet-on-the-air stations hasn't helped. Some stations may decide it's impossible to make enough money in broadcasting to pay the costs of the digital conversion. KLKE channel 24 in Albion, Nebraska, has already made this decision. They've turned in their license and have gone out of business.

There are three digital-only TV stations operating in the U.S.. WHDT-DT in Stuart, Florida, is an independent station; WTLF-DT is a UPN affiliate in Tallahassee, Florida; and WTPX-DT is a Pax station in Antigo, Wisconsin. All three stations are running very low power. I strongly suspect their sole purpose is to qualify for "must-carry" protection on cable. I'm familiar with the Antigo area and I rather doubt there are *any* digital TV receivers within WTPX's 50 kW coverage!



IBOC digital signals spill over into adjacent channels

Comings and Goings

Toronto is getting some new radio stations. At least one of them will be widely heard outside Canada as well. A station on 1610 kHz (1,000 watts fulltime) will broadcast largely in Spanish, with some programs in five other languages including English. Another proposal for a new expanded-band station on 1650 kHz was denied, as was one for 790. Approved were two new ethnic FM stations, on 101.3 and 105.1. The existing station on 101.3 will move to 91.9.

North America will be getting its first digital-only radio station. Two groups had filed for ethnic digital stations in Toronto on 1454.56 MHz. Because the Eureka system used in Canada allows up to six stations on the same frequency, it would have been technically feasible to grant both requests. However, for non-technical reasons only one of the applications was granted. The station will broadcast in Punjabi, Hindi, and Urdu.

Elsewhere, there's a new station operating in the expanded band. WTNI-1640 is the sister station of WVMI-570 Biloxi, Mississippi. WTNI carries a news-talk format, and has been widely heard across North America. Mississippi can be a tough state to log; if you need it, be sure to give 1640 a try. (WCPC-940 is also widely heard near sunrise.)

Another station has returned to the air after a lengthy silent period. Kraig Krist KG4LAC, near Washington, heard "Super Power 1020" testing with oldies on April 19th. This station was formerly known as "Caribbean Christian Radio." It's located in the Turks and Caicos Islands, a British possession off the far east end of the Bahamas. This should be a relatively easy catch if you're not too close to Pittsburgh.

WSAI-1530 in Cincinnati is reported testing IBOC digital broadcasting. I haven't had much chance to check the effects on adjacent channels. It does seem to cause quite a mess on 1540.

Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to *dougsmith@monitoringtimes.com*. Good DX!

OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

George Zeller
georgezeller@monitoringtimes.com

Information Radio More Commonly Heard

Although the fighting in Iraq has died down, the USA's clandestine **Information Radio** broadcasts to Iraq are continuing. Ironically, now that the intensity of the war has scaled back dramatically, the number of loggings of your tax dollars at work on 9715 kHz around 2200 UTC and somewhat later has increased in North America lately. This station remains an excellent DX catch, so you might want to check this out during the late afternoon hours in North America. The station has been reported using various modulation modes, sometimes in AM, and sometimes in upper sideband, with an occasional logging in lower sideband.

Some European listeners are still hearing this one on an alternative frequency of 4500 kHz, but propagation to the Americas on this one during the daytime is highly unlikely.

❖ North American Pirates Shifting Frequency

Most veteran North American pirate DXers realize that 6955 kHz has been the standard frequency for pirate broadcasting for several years, since the former standard frequency of 7415 kHz was appropriated by licensed stations such as the **Voice of America** from Botswana, and then **WBCQ** in Maine.

But, in recent months, pirates have been active much less frequently on 6955 kHz, largely because of interference from the licensed Peruvian broadcaster **La Voz de Campesimo** on 6956.5 kHz. More than half of the stations that *MT* readers heard this month were operating on 6950 or 6925 kHz. On one broadcast in mid-May, **Grasscutter Radio** operated on both of these new frequencies, announcing a move in the middle of the show to avoid interference from **WHYP**, another pirate.

❖ RTTY Pirate

John Sedlacek takes the honors for several newsworthy items in our column this month. One of his most unusual loggings was a pirate operating in RTTY mode. Using the identification of **KRMA**, this station sent text messages about Japanese philosophers and the Rodent Revolution on 6950 kHz. A logging like this one reminds us that pirate broadcasts can show up just about anyplace, at any time, and in any format.

❖ Dutch Pirate Busts

Dozens of European pirate busts in the Netherlands were recently executed by the Dutch Agency Telcom. Most stations were operating locally on FM, but some were on shortwave. Some of the busts took place even while stations were not transmitting a signal over the air. **Radio Alpha Lima** has been posting the latest news on this situation at their web site, found at **http://www.alfalima.net** on the internet. Alpha Lima promises to return to the air, but they say that the governmental enforcement has curtailed some operations.

❖ What We Are Hearing

Our readers heard all of these North American pirate broadcasters this month, despite an alleged decline in pirate broadcasting volume. Most broadcasts are found on 6950 or 6955 kHz, or on nearby frequencies (see above). All pirates operate on a sporadic schedule, but shortwave pirate broadcasting increases noticeably on weekends, and during major holiday periods.

Big Thunder Radio- Their distinctive name is normally associated with rock music, with some genuine advertisements from TV mixed into the stew. They claim to be broadcasting live from Mexicali, Mexico. (Uses bigthunderradio@hotmail.com e-mail)

Crazy Wave Radio- This Europirate caused c stir during the spring in North America with some high powered relays of other pirates and some transmissions of its own on 6955 kHz, a frequency rarely used by Europirates but commonly used by North American pirates. (Uses crazywave@gmx.net e-mail)

Grasscutter Radio- This relatively new pirate has been broadcasting rock music "from the ionosphere," mixed with some "yeah, man" commentary by their announcer. (None, asks for reports to the Free Radio Network web site)

KRMI- Radio Michigan International normally programs rock music, but they have been producing special programs for various holdays. (Uses krmi6955@yahoo.com e-mail)

Ragnar Radio- Although this new one normally broadcasts rock music, they have mixed patriotic songs into their playlist lately. (None)

Radio Pigmeat International- Their obviously non-kosher identification is not clearly related to their programming format, which is rock music. (None)

Shadow Radio- This one still features a mix of rock music and rebroadcasts of old time radio "The Shadow" detective dramas, sometimes using an interval signal of chimes. (Belfast)

Sunshine Radio- Programming on this relatively new pirate has largely consisted of oldies and soft rock music from the fifties and sixties. (Address not yet clear)

UPMB- Joe Wood heard this new one playing xylophone music and comedy material. Does anybody else know anything about them? (Unknown)

VUDU- This new pirate has been playing classic rock music. It appears to be unrelated to a recent move by the government of Haiti, which has classified Voodoo as an official religion in Haiti. Free Radio Weekly editor John Sedlacek received their QSL that we picture this month. (Uses vudu11@hotmail.com e-mail)

WBNY- Commander Bunny from the Rodent Revolution returns with his clandestine parody shows every year around Easter. But, the Rodent Revolution is now extending its broadcasts beyond Easter. (None, former addresses now invalid)

WHYP- The James Brownyard memorial station still broadcasts antique audio clips from the licensed radio WHYP in North East, PA, but it also programs comedy, rock music, croquet tournament coverage, and pirate radio commentary. (Providence)

WMOE- The station's call letters come from its Three Stooges memorial content, but it also plays rock music. (Belfast)

WMPR- The distinctive programming on this pirate is always techno "dance party" rock music. (None)

WRAY- Rock music is the dominant feature in the shows on this one, sometimes from the group Link Wray, perhaps accounting for the identification. (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 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; Kirk Baxter, North Canton, OH; Artie Bigley, Columbus, OH; Jerry Berg, Lexington, MA; Ralph Brandi, Tinton Falls, NJ; Jerry Coatsworth, Merlin, Ontario; 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; Harry Helms, Las Vegas, NV; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; Bill McClintock, Wellington, OH; Mike Prindle, New Suffolk, NY; Lee Reynolds, Lempster, NH; Zeke Russell, Williams, AZ; Martin Schoech, Merseburg, Germany; John Sedlacek, Omaha, NE; Ronnie Stroup, Wooster, OH; Niel Wolfish, Toronto, Ontario, and Joe Wood, Gray, TN.

SATELLITE SERVICES

MT TRANSPONDER GUIDE *www.monitoringtimes.com/mtssg.html*

All Frequencies MHz

Robert Smathers
robertsmathers@monitoringtimes.com

Satelites Mexicanos Solidaridad 2

Ku-band - 113 degrees West longitude

T01(H)	11730	(none)
T02(H)	11791	Data Transmissions
T03(H)	11852	(none)
T04(H)	11913	(none)
T05(H)	11974	Dota Transmissions
T06(H)	12035	(none)
T07(H)	12096	Data Transmissions
T08(H)	12157	Data Transmissions
T09(V)	11743	(none)
T10(V)	11804	Data Transmissions
T11(V)	11865	Data Transmissions
T12(V)	11926	(none)
T13(V)	11987	Data Transmissions
T14(V)	12048	Data Transmissions
T15(V)	12109	(none)
T16(V)	12170	Data Transmissions

Satelites Mexicanos SATMEX-5

C-band - 116.8 degrees West longitude

1(V)	3720	Data Transmissions
2(H)	3740	Data Transmissions
3(V)	3760	Data Transmissions
4(H)	3780	Data Transmissions
5(V)	3800	PCTV – Television Por Cable (digital)
6(H)	3820	Data Tronsmissions / El Sembrador Nuevo Evangelizacion (digital)
7(V)	3840	PCTV – Television Por Cable (digital)
8(H)	3860	Data Transmissions
9(V)	3880	Data Transmissions
10(H)	3900	Dato Transmissions
11(V)	3920	Dota Transmissions / Hippodromo Presidente Remon (digital)
12(H)	3940	Occasional video
13(V)	3960	XHIMT-TV 7 TV Azteca / XHDF-TV 13 TV Azteca (digital)
14(H)	3980	Data Transmissions
15(V)	4000	Data Transmissions
16(H)	4020	Occasional video
17(V)	4040	Data Transmissions
18(H)	4060	Canal Del Congreso / XEIPN-TV Canal Once / Gobierno De La Republica (digital)
19(V)	4080	Occasional video
20(H)	4100	Data Transmissions / Guatevision (digital) / Radio Cien Guatemala (digital) / NotiColombia (digital)
21(V)	4120	MVS Television Empresarial (digital)
22(H)	4140	Data Transmissions
23(V)	4160	PCTV – Television Por Cable (digital)
24(H)	4180	Edusat (digital)

Satelites Mexicanos SATMEX-5

Ku-Band - 116.8 degrees West longitude

1(H)	11720	Data Transmissions
2(V)	11740	Data Transmissions
3(H)	11760	Data Transmissions
4(V)	11780	Data Transmissions
5(H)	11800	Data Transmissions
6(V)	11820	Data Transmissions
7(H)	11840	Data Transmissions
8(V)	11860	Data Transmissions
9(H)	11880	Data Transmissions
10(V)	11900	Data Transmissions
11(H)	11920	Data Transmissions
12(V)	11940	Data Transmissions
13(H)	11960	Data Transmissions
14(V)	11980	Data Transmissions
15(H)	12000	Data Transmissions
16(V)	12020	Dato Transmissions / Occasional video (digital)
17(H)	12040	Data Transmissions
18(V)	12060	Data Transmissions
19(H)	12080	Atlonta DTH: PTV, P Radio 1 and 2, TV Polonio, Tzu Chi, CCTV-4, Mac TV, ATV, Hwazan (digital)
20(V)	12100	Data Transmissions
21(H)	12120	Data Transmissions
22(V)	12140	Data Transmissions
23(H)	12160	Data Transmissions / Latter Day Saints Television – Mexico (digital)
24(V)	12180	Data Transmissions / Campus Estado de Mexico (digital) / Universidad Virtual Empresarial (digital) / Occasional video (digital)

Telesat Canada Anik E1

C-Band - 118.7 degrees West longitude

1A(H)	3720	(Inactive)
1B(V)	3740	(Inactive)
2A(H)	3760	(Inactive)
2B(V)	3780	(Inactive)
3A(H)	3800	(Inactive)
3B(V)	3820	(Inactive)
4A(H)	3840	(Inactive)
4B(V)	3860	(Inactive)
5A(H)	3880	(Inactive)
5B(V)	3900	(Inactive)
6A(H)	3920	(Inactive)
6B(V)	3940	(Inactive)
7A(H)	3960	(Inactive)
7B(V)	3980	Occasional video
8A(H)	4000	(Inactive)
8B(V)	4020	(Inactive)
9A(H)	4040	Occasional video
9B(V)	4060	(Inactive)
10A(H)	4080	Occasional video
10B(V)	4100	(Inactive)
11A(H)	4120	(Inactive)
11B(V)	4140	(Inactive)
12A(H)	4160	Occasional video
12B(V)	4180	(Inactive)

Telesat Canada Anik E1

Ku-Band - 118.7 degrees West longitude

T01(V)	11717	KTEL-TV Carlsbad, NM (digital) / WYDN-TV Worchester, MA (digital)
T02(V)	11743	(none)
T03(V)	11778	(Inactive)
T04(V)	11804	(Inactive)
T05(V)	11839	(Inactive)
T06(V)	11865	(none)
T07(V)	11900	(none)
T08(V)	11926	(none)
T09(V)	11961	(Inactive)
T10(V)	11987	(Inactive)
T11(V)	12022	(Inactive)
T12(V)	12048	(Inactive)
T13(V)	12083	(Inactive)
T14(V)	12109	(Inactive)
T15(V)	12144	(Inactive)
T16(V)	12170	(Inactive)
T17(H)	11730	(Inactive)
T18(H)	11756	(Inactive)
T19(H)	11791	Occasional video
T20(H)	11817	(none)
T21(H)	11852	(Inactive)
T22(H)	11878	(Inactive)
T23(H)	11913	(Inactive)
T24(H)	11939	(Inactive)
T25(H)	11974	(none)
T26(H)	12000	Equity Broadcasting Corp. (digital)
T27(H)	12035	(Inactive)
T28(H)	12061	(Inactive)
T29(H)	12096	Occasional video
T30(H)	12122	(none)
T31(H)	12157	(Inactive)
T32(H)	12183	(Inactive)

Panamsat Galaxy 10R

C-Band - 123 degrees West longitude

1(V)	3720	Data Transmissions
2(H)	3740	Data Transmissions
3(V)	3760	Data Transmissions
4(H)	3780	Data Transmissions
5(V)	3800	Showtime – West, Showtime Too – West, Showtime Showcase – West, The Movie Channel – West, Flix – West, Sundance Channel – West, The Movie Channel Xtra - West, Showtime Beyond – West, Showtime Extreme – West (digital)
6(H)	3820	Data Transmissions
7(V)	3840	TVN Pay-per-view Theaters, Passion Hot, Outdoor Life Network, WE: Women's Entertainment TV, MusicChoice (digitol)
8(H)	3860	Dota Transmissions
9(V)	3880	TVN Pay-per-view Theaters, Spice, Passion Too, MusicChoice, 4DTV download (digital)
10(H)	3900	Data Transmissions
11(V)	3920	Toon Disney East, Toon Disney West, Soapnet East, Soapnet West (digital)
12(H)	3940	TVN Pay-per-view Theaters, Playboy TV, MusicChoice (digital)
13(V)	3960	TVN Infomercials, DMX Audio, TVN TeleNuestros, Hot Body, Passion, Cable Radio Network various formats (digital)
14(H)	3980	Showtime HDTV – West, Showtime Next – West, Showtime Family Zone – West, Showtime Women – West (digital)
15(V)	4000	Showtime – West (VC2+)
16(H)	4020	TV Land – East (VC2+)
17(V)	4040	Nickelodeon – West (VC2+)
18(H)	4060	The Movie Channel – West (VC2+)
19(V)	4080	MTV – West (VC2+)
20(H)	4100	Data Transmissions
21(V)	4120	ESPNews (VC2+)
22(H)	4140	Data Transmissions
23(V)	4160	A&E – West (VC2+)
24(H)	4180	Outdoor Channel (digital)

Panamsat Galaxy 10R

Ku-Band - 123 degrees West longitude

1(V)	11720	TARBS (Television and Radio Broadcasting Services) (digital)
2(H)	11740	Veterans Administration Knowledge Network (digital)
3(V)	11760	Data Transmissions
4(H)	11780	Data Transmissions / Wal-Mart In-Store Network (digital) / Wal-Mart and Sam's Club In-Store analog audio SCPC services
	1012.80	87.20 Wal-Mart In-store Network
	1013.25	86.75 Sam's Club In-store Network
	1013.65	86.35 Wal-Mart In-store Network
	1014.45	85.55 Sam's Club In-store Network
	1014.85	85.15 Wal-Mart In-store Network
	1015.25	84.75 Wal-Mart In-Store Network
5(V)	11800	Data Transmissions
6(H)	11820	University of Washington Television / KEXP-AM 90.3 Seattle (digital)
7(V)	11840	Data Transmissions
8(H)	11860	Data Transmissions
9(V)	11880	TARBS (Television and Radio Broadcasting Services) (digital)
10(H)	11900	Data Transmissions
11(V)	11920	TARBS (Television and Radio Broadcasting Services) (digital)
12(H)	11940	Data Transmissions
13(V)	11960	TV Korea, SBS, YTN, iskycom television, Radio Korea, Korean Gospel Radio (digital)
14(H)	11980	Data Transmissions
15(V)	12000	California Community College Network (digital) / StarNet (digital)
16(H)	12020	Data Transmissions
17(V)	12040	Occasional video
18(H)	12060	Data Transmissions
19(V)	12080	TARBS (Television and Radio Broadcasting Services) (digital)
20(H)	12100	Data Transmissions
21(V)	12120	Occasional video
22(H)	12140	Occasional video
23(V)	12160	Occasional video
24(H)	12180	Occasional video

Kevin Carey, WB2QMY
kevincarey@monitoringtimes.com

Exploring QRSS

What do you think of when someone mentions slow-speed CW? Five words-per-minute? Two words-per-minute? How about less than *one* word-per-minute? If you chose the last speed, you've entered the realm of QRSS – a relatively new computer-assisted mode for copying extremely weak signals. QRSS has become a mainstream mode for experimenters on the 160-190 kHz license-free band, and it is sure to become a favorite among those exploring the 136 kHz band.

The new mode gets its name from the Q-signal "QRS" used by hams to request that an operator reduce sending speed. By extension, QRSS has come to mean "super-slow" CW, where speeds are often measured in dot lengths of 3 to 60 seconds. Why would anyone want to go this slow in today's world of broadband, high-speed Internet connections? A brief explanation is in order.

❖ Taking a Narrow View

You may already know that CW occupies one of the narrowest bandwidths of any transmission mode. That's one of the reasons it has remained popular on today's amateur bands. In fact, it is possible for several CW signals to fit into just one 5 kHz slice of spectrum – all communicating simultaneously – without causing mutual interference. The only requirement is that sufficiently narrow receiving filters be used.

As narrow as CW's bandwidth is, it can be made even more so by reducing the transmission speed. A characteristic of CW (or any form of on/off keying) is that the bandwidth is directly related to the speed of transmission. Slow the speed down, and you lower the bandwidth. For example, if a 12 WPM CW signal occupies 10 Hz of bandwidth, slowing the keying down to 4 WPM signal will reduce the bandwidth to a mere 3.3 Hz, and so on. As you get down to the speeds used for QRSS, the bandwidths become so narrow that they are rated in *millihertz* – that's less than 1 Hz!

With narrower bandwidths, you can employ a narrower receiving filter, and this brings us to the main benefit of QRSS. With CW speeds of less than 1 WPM, *extremely* narrow audio filters can be used, virtually eliminating adjacent signals and extraneous noise from the received signal. Nearly all of the receiving energy can be focused on the desired signal, bringing a dramatic increase in signal-to-noise ratio – often 22 dB or more. Of course, this improvement could also be accomplished by raising the transmitter power, but it would require a significant increase in circuit complexity, not to mention the legality of running higher power under FCC rules. All things considered, QRSS is a better solution for boosting the signal-to-noise ratio of a weak signal.

❖ QRSS in Action

Experimenters have proven QRSS to be effective for weak signal work. Recently, several long distance records have been set with QRSS, including a few ocean-spanning intercepts. QRSS seems to be the "magic" solution Lowfers have been looking for years. Figure 1 shows an example of QRSS reception using Argo software. In this instance, W4DEX (NC) was receiving ZL6QH (New Zealand) on the 136 kHz band at a distance of 8,471 miles. This set a record in amateur LF work.

Of course, everything comes with a trade-off, and in this case we are trading transmission speed for signal-to-noise ratio. At 3-second dot lengths (QRSS3), it could easily take half an hour to complete a short contact with another station. For this reason, QRSS sees only limited use in real-time communication.

Where QRSS really shines is in identifying Lowfer beacons. In these cases, you don't mind waiting a little while to confirm reception of a station's short ID. Another common technique is to let the computer monitor activity overnight for later "playback." This takes advantage of enhanced propagation that may occur at various times during the night. Imagine waking up in the morning and discovering that you have logged a Lowfer beacon from five states away! It is possible with QRSS.

What's more, the computer can play back the received signal at a much faster rate, sparing you the agony of sitting through hours of slow speed reception. Think of it as time warp listening for the longwave DXer!

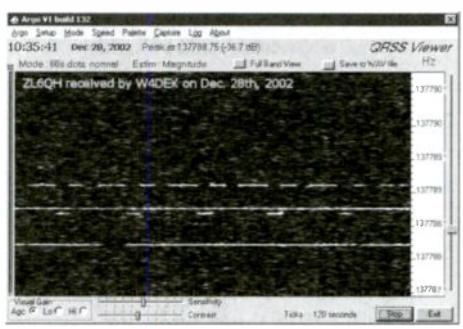


Figure 1. Sample QRSS Viewer Screen (Argo software)
(Image courtesy of Alberto di Bene, I2PHD)

❖ Hardware/Software Requirements

A computer is needed to reap the benefits of QRSS. Although copying by ear is technically possible, it requires a great deal of patience to decode even short message strings, and you would not gain the advantages of signal processing and display offered by a computer.

Most computers sold in the last eight years or so are up to the task of copying QRSS. First, you'll need a sound card, which is standard (built-in) equipment on all but the oldest computers operating today. You will also need to connect a short length of cable between your receiver's audio output and your computer's sound input jack. (Shielded cable is recommended.)

QRSS software is available for free download from the Internet. Programs such as **Argo**, **Spectran** and **Spectrum Lab** are three examples of currently available packages. These downloads will place an executable (.exe) file on your computer that can be double-clicked to install the full program in the location you specify. Sources for downloading these software programs are listed below:

Argo: **www.qsl.net/padan/argo/**
Spectran: **www.qsl.net/padan/spectran.html**
Spectrum Lab: **www.qsl.net/dl4yhf/spectra1.html**

Figure 2. Download Screen for Argo software (www.qsl.net/padan/argo/)

❖ Learning More

There simply isn't enough room to discuss all of the details of QRSS in a one-page column, but I encourage you to learn more about this exciting mode by doing some research and experimentation of your own. Enter "QRSS" in your favorite search engine and you will find a multitude of websites where you can learn more about this exciting mode. For Lowfer operating schedules and frequencies (including QRSS speeds as applicable) visit the Longwave Club

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T.J. "Skip" Arey, N2EI
tjarey@monitoringtimes.com

Pursuing QSLs: A Moving Experience

On the whole, I figure it's a good thing that I can't afford to fly overseas to attend the International Telecommunications Union (ITU) conferences. This would be for no other reason than that I would be dragged out by security for shouting down from the cheap seats: "*No ham in the world should ever ever ever be allowed to change their callsign or move from their address for their entire life!*"

Of course this is a wholly unreasonable request, and just because it's shouted loudly at the floor of the ITU by such an esteemed amateur radio personage as myself makes it no more reasonable. Heck, I can't even say I've abided by it either. I've had three callsigns and six addresses since I first got on the air.

Ahh ... but wouldn't tracking someone down to swap QSL cards be so much easier if the ITU enacted international law based upon my maniacal ravings? We could have one edition of the *Callbook* and just get periodic updates of those folks who have taken up Uncle Skip's challenge and joined the ranks of the amateur radio family.

So what brings on this line of thinking? For me, this is the time of year that things slow down a bit in the operating department. I am a dedicated ham, but not so rabid that I try to get on the air during active thunderstorms (a practice I would not recommend to anyone with intentions of continued participation in this plane of existence). So since I have a few hours of surplus playtime not taken up with keying down, I go through my logs to see where folks have not responded to my requests for confirmation of our QSOs.

As I have stated many times in this column and other places, my personal QSL policy and practice is to send a card to everyone I work either directly or through the ARRL Outgoing QSL Bureau **http://www.arrl.org/qsl/qslout.html**. But, those stations that I truly need a response from for support of an award or some other operating activity, get a card sent directly or through a known QSL Manager with return postage. As a rule this system serves me, and I hope those people I've communicated with, well.

But even such diligence and honoring of the QSL tradition does not extract a valid confirmation from every attempted request. This can happen for a number of reasons and only some of them can be controlled.

◆ You're Busted

For example, there is the classic *Busted Call*. In the heat of battle in a contest or through bleary eyes at the end of a long day, you simply don't write the other station's callsign down correctly in your log. Sometimes through the QRM and QRN a "G" becomes a "J" in voice mode. Or perhaps a CW *Fist* that is a bit too syncopated turns a "G" into "TN" or "ME". In such cases you are simply sending the card and request to the wrong party.

When I get such a QSL in the mail I make a point of returning it with an explanation that the OM or YL was not in my log with best wishes for contact in the future. I'll even return such requests directly at my own expense because it happens rarely enough and I know what it feels like to wait a year for the bureau process to let me know of the incorrect logging.

What gets my goat a bit are those fellow hams to whom I've wrongly sent a card and return postage or for whatever reason I did not appear in their logs as stated. Since I have already paid the freight, at least respond using my return postage and let me know, so I can clean up my log book.

UNCLE SKIP'S FAVORITE QSL RESEARCH WEB SITES

K4UTE DX QSL Manager Search Results
http://no4j.com/nfdxa/qsl/index.asp

NG3K Amateur Radio Contest/DX Page
http://www.cpcug.org/user/wfeidt/

IK3QAR QSL Manager Lookup
http://www.ik3qar.it/manager/

SM5ARL's QSL Address List
http://www.algonet.se/~sm5arl/qsladr.html

SM5ARL's QSL Manager List
http://www.algonet.se/~sm5arl/qslmgr.html

Pathfinder Web Client
http://www.qsl.net/pathfinder/WebClient/

AC6V's Callbooks and QSL Routes
http://ac6v.com/callbooks.htm

The QRZ Callsign Database
http://www.qrz.com/callsign

WM7D's FCC Callsign Database
http://www.wm7d.net/fcc_uls/

IARU QSL Bureaus
http://www.iaru.org/iaruqsl.html

The GoList, QSL Manager Database
http://golist.net/login.cfm

DX-List
http://www.guam.net/pub/midxa/dx-list.html

◆ What's Good About The Internet Is What's Bad

Back when I was a newly minted ham, The West Jersey Radio Amateurs club would always purchase the most up to date "Flying Horse" *Domestic and DX Callbooks*. (Now being published by a German firm, ITfM – *Informations-Technologie für Menschen* **http://www.callbook.com/**) They would also subscribe to the quarterly updates of same. It was an easy process to bring your list of contacts from your log to a meeting and make note of the names and addresses you needed to initiate the QSL process.

There was an inherent problem with these books. If the ham changed addresses but did not update their information with the telecommunications entity in their home country within the same time frame as any forwarding practices of their postal service, QSL requests could come back as "Return to Sender – Address Unknown" if you were lucky enough to be dealing with a country whose post office provided reliable return service.

And the problem was not limited to DX stations. You can see where publishing deadlines could have someone appear out of the loop for a year or more with the old books. Domestic hams to this day move around and, with longer license periods, tend to forget to notify the FCC, leaving folks out in the cold once their forward with the USPS runs out. I wonder how many of these hams are sitting in their shacks, grousing about their poor QSL returns?

The Internet now provides many excellent QSL and QSL manager lookup sites. However, just like the old hard copy books, they are only as good as the information provided; usually, if the ham does not take it upon his or herself to see that their information is updated on these sites, they remain out of the QSL loop for many people.

Thankfully, the Internet still offers a number of options to the tenacious ham in search of a correct address for a direct QSL.

When I am specifically worrying about tracking down a ham whose previously

published information is incorrect, resulting in a returned card, I get back to the basics of Web searching first.

I find I get surprisingly good results by just entering the callsign in question into any of the popular Web Search Engines such as Google or Yahoo. If the DX gods are in your corner, it may turn up current information or even an e-mail address so you can check things out at the source.

Even if the direct callsign search does not turn up specific information about the station, check everything that turns up. Often the search engine will hit on a mention of that station's callsign in the log of someone else who worked the station. I've had positive results from contacting the ham who posted the log. On more than one occasion this has turned up a QSL route when nothing else has worked.

❖ Unstuck in Time

Okay let's take a look at another common problem. Let's say Joe Ham gets permission to operate during the Big Time DX Contest from the land of Freedonia. He is issued a callsign for the duration of his stay in that country. However, a year or so later Sam Amateur flies over to Freedonia and the Freedonian Office of Radio Affairs & Indoor Plumbing issues Sam the same callsign that they gave to Joe. A trip around the web is likely to reveal both Joe and Sam as *accurate* QSL addresses.

Many (but not all) QSL route sites post, at the very least, the date the information was provided or updated to help sort such things out. It is also likely that a DX station may have had more than one QSL manager over the years. A station's current QSL manager might not have access to the older logs or the earlier manager might not have any current information for any number of reasons.

I do note, however, that most "old" QSL managers are very good at responding to let you know they are not in the game anymore, so that helps you at least rule some things out as you go about trying to get that elusive QSL card nailed down.

❖ We're All Friends Here

Something you may not have thought of is the international fellowship that amateur radio represents. I once had a station I simply could not track down. Every resource I could find turned down a dead end. Then I took an odd chance that maybe another ham from the same country as my missing person might be able to help out. I checked my logs and found a station that was from the same nation and also just happened to have a valid e-mail address. I sent a short e-note to this known ham and he was more than happy to help me figure out the situation. A couple of days later I had a correct direct route, QSL manager and e-mail address, allowing me to easily add one more station to the verified QSL list.

Another place where hams can work together to figure out QSL routes is the QSL-INFO Group on **http://www.yahoogroups.com.** This site can often help give you some ideas as to how to proceed even if you can't get a direct route. A whole bunch of heads is better than one.

❖ IRCs, Green Stamps and Mint Stamps

I don't know about your neck of the woods, but it has become increasingly difficult to locate International Reply Coupons (IRCs) at local Post Offices. With this problem you're either forced to wait for the Bureau to turn things around (that is if the country participates as mentioned above), make use of mint stamps from the nation in question or *green stamps*, the almighty US Dollar Bill.

I have always chafed at sending currency because I feel it is against the spirit of the hobby. Further, mail with cash in it is much more likely to be diverted into some unscrupulous person's pocket than ever arrive at its intended destination. Still...in some cases it's the only game in town or it is even expected (a pox on the coax of hams who want money!). If you must resort to sending currency, use a secure style of envelope that is not easily held up to the light and seal things up well against "accidental" opening.

Mint stamps from the country of your contact is probably the easiest way to go these days. Two particular outfits have been serving hams along these lines for years.

William J. Plum DX Supplies
12 Glenn Road
Flemington, NJ 08822-3322
(908) 788-1020 FAX (908)782-2612

James E. Mackey, K3FN
PO Box 270569
West Hartford, CT 06127-0569
http://users.net1plus.com/ryoung/index.htm

UNCLE SKIP'S CONTEST CORNER

RAC Canada Day Contest
July 1 0000 UTC - 2359 UTC

MI QRP July 4th CW Sprint
July 4 2300 UTC - July 5 0300 UTC

Kentucky QSO Party
July 5 1600 UTC - July 60400 UTC

IARU HF World Championship
July 12 1200 UTC - July 13 1200 UTC

FISTS Summer Sprint
July 12 1700 UTC - 2100 UTC

QRP ARCI Summer Homebrew Sprint
July 132000 UTC - 2400 UTC

North American QSO Party, RTTY
July 19 1800 UTC - July 20 0600 UTC

CQ Worldwide VHF Contest
July 19 1800 UTC - July 20 2100 UTC

IOTA Contest
July 26 1200 UTC - July 27 1200 UTC

❖ Things Easily Forgotten

Even though I have been at this for quite a long time, I still occasionally make the mistake of sending a card through the Bureau to a fellow ham in a country that is not part of the DX Bureau system. After a month or so this card will come back via my Incoming Bureau stamped "Not Available Through Bureau." At this point I will usually smack myself on the forehead and then go look up the station's direct QSL route.

Checking the list at the ARRL Outgoing Bureau site **http://www.arrl.org/qsl/qslout.htm** will help you avoid this mistake. Remember also that there are also a few countries that restrict Bureau services to members of their national amateur radio organization. A list of the current countries that hold to this practice is also available on the League site.

It has become the practice of many top drawer DXpeditions to publish their logs on the Internet. If you have any question about whether or not you made the log during the pile up, save yourself a few steps and a few stamps and check the on line information first. Very often these operations will publish the best QSL route and policies on their sites as well.

It is perfectly acceptable to list more than one contact on a card. Contest and DX stations often do this to cut down on postage and handling.

So, until the ITU decides to listen to Old Uncle Skip's rants, we will just have to accept QSL research as part of the fun of ham radio. I'll see you on the bottom end of 40 meters.

Clem Small, KR6A
clemsmall@monitoringtimes.com

A Two-Element Cubical Quad Beam For HF or VHF

Cubical quad antennas are popular with many beam users. This is because quads offer more gain per element than Yagi-Uda beams; quads are noted for their relatively low response to noise; and they perform well even without being mounted high in the air. When I lived in California I tested a 14-MHz quad which I had made before I put it up in the air. It was sitting on the ground. It had no mast; it was just the antenna sitting on my lawn. I called "CQ," and a station in Guam came right back with a good signal report! And after it was mounted on its mast it continued to nicely outperform my halfwave dipole and my trap vertical. That beam was a two-element quad like the one described below; so it offered useful off-beam interference and noise rejection, plus about 7 dBd forward gain.

One problem with building cubical-quad antennas is that either special hubs or special X-fittings are needed to mount the arms which hold the antenna's elements. These problems, and their expense, can be avoided by making a homebrew hub (fig. 1) patterned after one designed by Richard E. James, W4DQU (*CQ*, May 1970).

❖ Let's Make One!

If you're planning to make an HF quad it's a good idea to check on availability and price of arm material in your area (see step 8) before you start.

1. Check Table One for the sizes and number of hub pieces you'll need. Use 3/4-inch wood no softer than pine to make those pieces for HF; use 1/2-inch wood for VHF.
2. Sizes for the end braces shown in fig. 1B are given in table one. These braces can be of 1/4-inch plywood for HF, or 1/8-inch plywood (door skins) for VHF.
3. Make a drawing of the rectangle and its enclosed "X" as in fig. 1A. Use the HF or VHF dimensions as appropriate for your antenna. You will use this drawing as a pattern for the angles of the ends of the hub pieces, the length of those pieces, and as a template for putting those pieces together to make the hub.
4. It's good to put some waxed paper (like that used for wrapping sandwiches) under the template to prevent gluing it to your work table. Fit one long and two short pieces into an X directly on the X of the template which you have drawn. This gives the correct angles to your hub. As you build the hub put strong, weather-resistant glue on all surfaces that are to be joined.
5. Build the hub up by topping each long X leg with two short X legs, and each two short ones with one long one. This alternation is shown in fig. 1B.
6. When finished, lay a piece of waxed paper followed by a modest weight (a few books or whatever) on top of the X to make sure all the pieces stay close together for drying.
7. When that glue is dry (set) then glue the end braces in place; holding them in place with small nails. Let this glue set.
8. Arms for antennas above 100 MHz can be made of material such as wooden dowels, plastic or fiberglass rods such as those used for bicycle safety flags, or small-diameter PVC pipe. For HF arms, dry, stout bamboo poles work well. This grows wild in some warm location;, it's also sold for fishing poles other places. Fiberglass poles work for HF, but PVC water pipe is too limber for the longer lengths used at HF. Some companies sell fiberglass arms (e.g. **http://www.cubex.com/hard.htm**), also check ham radio magazine ads for these.
9. Cut the VHF arms an inch or two longer than needed, and the HF arms 2 to 3 inches longer than needed. Trim the excess as desired later. Driven element arm lengths, in inches, from hub center to where the elements attach, is $2222/F_{MHz}$, and $2294/F_{MHz}$ for the reflector. For lengths in meters use $56.44/F_{MHz}$ (driven element), and $58.26/F_{MHz}$ (reflector).
10. Mount the arms on the hub as shown. U-bolt clamps are good for holding larger (HF) arms to the hub. Small tubing or dowels (VHF) arms can be drilled, and then attached to the hub with small bolts. For wooden arms the use of glue in addition to the bolts will help hold the arms securely.
11. Total loop lengths, in inches, are $11970/F_{MHz}$ for the driven element, and $12318/F_{MHz}$ for the reflector. For lengths in meters use $304/F_{MHz}$ (driven element), and $312.9/F_{MHz}$ (reflector). About any size of bare, solid, or stranded copper wire about number 14 or larger should work OK for the elements. The larger

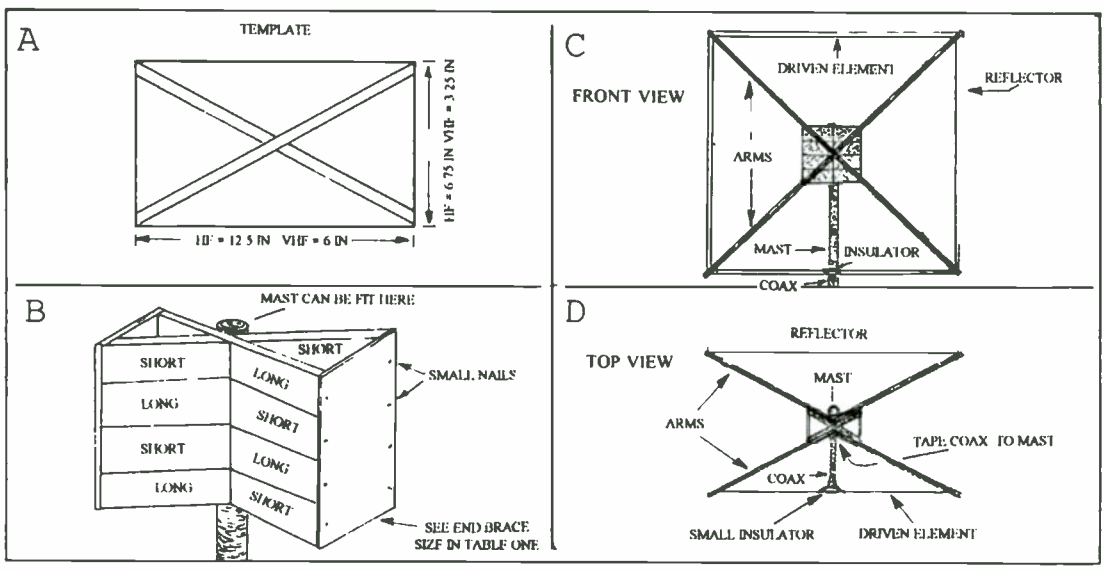


Fig. 1. A two-element cubicle quad beam antenna. See text for dimensions.

This Month's Interesting Antenna-Related Web site:

Check out the cubical quad's interesting history on:
http://www2.gvsu.edu/~w8gvu/qad-hst.html

gauges give more bandwidth. If you use insulated wire the electrical lengths will be wrong.

12. Connect the reflector-element ends together to make one continuous loop. One end of the driven element connects to the 50-ohm coax center-conductor, and the other end to the coax braid or shield. For VHF quads no center insulator is needed on the driven element. For HF quads a small insulator, as shown in Figs. 1C and 1D, is needed.
13. The loops can then be attached to the arms, holding them in place with a number of turns of nylon string or dental floss. Later cover these ties, and all wood, with varnish for durability.
14. Spacing between the elements is automatically set by mounting each element fully expanded into a square on the arms as shown.
15. Solder all electrical connections. Seal the coax end against weather with coax sealant, or black-plastic tape if no sealant is available.
16. U-bolt clamps work well for attaching metal-pipe masts. For the smaller VHF antennas, strong, wood masts are OK.
17. Smaller VHF models can be used for pedestrian-mobile work. A short, handheld wooden mast attached to the hub with wood screws works well for this.
18. If you mount this antenna outside don't forget lightning protection. The minimum is to never use the antenna during weather likely to produce lightning, and disconnect and ground the antenna when it is not in use.

RADIO RIDDLES

Last Month:

I asked: "Let's say that a radio operator was operating a radio direction-finding system at the North Pole. She took a direction bearing on a signal coming from an amateur radio transmitter in Des Moines, Iowa, USA, and another bearing on a shortwave broadcast signal coming out of Berne, Switzerland. From what compass directions did each of these signals arrive at her location?"

Well, any compass direction in which you look from the North Pole is south, there is no east or west there! And I suppose to point north from this pole you'd have to point at your feet! If this seems odd just check it out on a globe of earth. So, strangely enough, any signal the operator receives, except for those coming from above, comes from a southerly bearing. And, of course, at the South Pole, pointing in any compass direction is pointing north.

This Month:

What is the meaning of the term "quad" in "cubical quad? As for that matter what is the meaning of the term "cubical?"

You'll find an answer for this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

TABLE ONE: HUB PIECES

ALL MEASUREMENTS ARE IN INCHES (AND CENTIMETERS)

FREQUENCY OF ANTENNA OPERATION	HUBHEIGHT	PIECE HEIGHT	NUMBER OF LONG PIECES	NUMBER OF SHORT PIECES	SIZE OF END BRACE
ABOVE 50 MHz	6 (15.2)	1.5 (3.81)	4	8	6 X 3.25(15.2 x 8.26)
BELOW50 MHZ	12.5 (31.8)	1.25 (3.18)	10	20	12.5 X 6.75 (31.8 x 17.12)

Marc Ellis
marcellis@monitoringtimes.com

The Hallicrafters S-40A: Clearing the Decks

Before getting started, I want to acknowledge some reader e-mails I received after concluding the Zenith restoration last month. **Bob Pote**, **John Ebeling** and **Larry Fowkes** wrote to let me know that they are enjoying the column.

Larry said that he had been bitten by the collecting bug, big time, since "Radio Restorations" first appeared in the January, 2000 *MT*. Back then he had two vintage radios; now he owns over 40 and has restored about half of them. He attached a pic of part of his collection, which I'm including here. The results of the Zenith restoration have inspired him to take a closer look at radios he had previously considered to be junk.

John, noting that I was seeking a new source for replacement capacitors, wanted to recommend DH Distributors, PO Box 48623, Wichita, KS 67201-8623. Phone 316-864-0050.

Part of Larry Fowkes' growing collection of vintage radios (see text). Philco 16-B cathedral and RCA T10-1 are just to left of TV set. A Zenith "black dial" similar to the 6S229 but in a more modern low-profile cabinet is second from left on top shelf.

❖ About This Project

Last month, we began the restoration of this Hallicrafters S-40A, an early post World War II receiver targeted for shortwave listeners and radio amateurs. Though an inexpensive radio, it was several cuts more sophisticated than its low-end companion of the same era, the S-38 – which was primarily for beginning SWLs and not really suitable for serious radio communication. In line with my original instructions from *MT*'s editors, I've been building up to gradually more complex receivers in my restoration columns and this set continues the trend.

Though previously we've done a military surplus long-wave "Command Set" and couple of radios with shortwave capability (National's S-38 equivalent, the SW-54, as well as a broadcast receiver with a few shortwave bands, the Zenith 6S229), our current subject combines features we haven't seen before in a single receiver. Like the command set, it includes a stage of r.f. amplification and two stages of i.f. amplification where the SW-54 and 6S229 have none and one. Like the SW-54, the S-40 is a multiband receiver. But it boasts a more elaborate array of controls for communications use and has a tube complement of nine, compared to the five in the command set and SW-54 and six in the 6S229.

Looking at the S40's schematic, which I've included here, you'll see the familiar superheterodyne layout. The extra tubes are for the r.f. amplifier, the extra i.f. amplifier, the noise limiter/AVC and the c.w. oscillator. During the later testing of the receiver, we'll discuss the functions of the various controls.

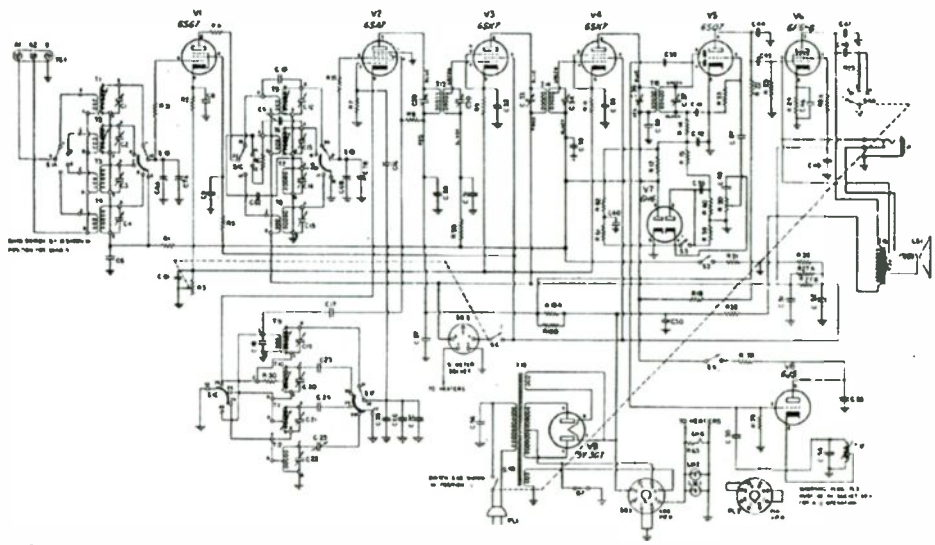
One bit of circuit sophistication we haven't run into up to this time involves the tuned circuits for the oscillator and r.f. stages. In the SW-54, for example, the oscillator and r.f. stages each had a single fixed coil; adjustable trimmer capacitors for the various bands were wired across switch-selected segments of these coils. In the S-40A, however, the tuned circuit for each band is an individual transformer consisting of a coil-and-trimmer-capacitor assembly. Many of these coils have adjustable slugs that are included in the alignment process – improving the tracking between the high and low ends of each band.

❖ "BAMA" Saves the Day

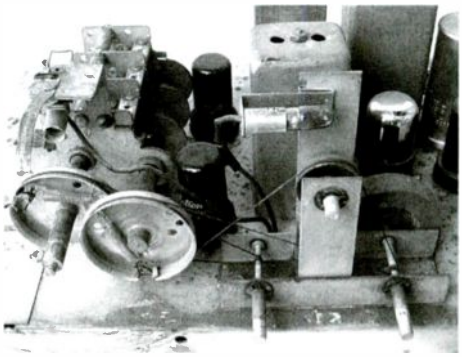
I began this month's work with a trip to "BAMA" (Boat Anchor Manual Archive) at **http://bama.sbc.edu** to try to find a copy of the service manual for the S-40A. The one I had in my files was incomplete and of very poor quality. I've mentioned BAMA's wonderful collection of manuals for tube gear before. The site is maintained by ham radio operator K4XL as a service to those who love to restore vintage equipment. The collection is large and growing. You may download what you wish at no cost and are free to pass on copies of anything you receive to others – as long as you do not charge for them. If you visit the site, look over the list of items that are still needed and – if you can help – follow the instructions to scan and upload your material.

Since the manuals at BAMA are scanned and contributed by many different individuals, users are warned that quality will vary. Though you'll probably get the data you need to restore your piece, it may not be perfectly crisp and clear. In spite of that warning, I was able to download very nice copy of the service manual and an operating manual copy that was at least readable.

BAMA's delivery system has been improved since I last visited the site. Previously the pages of each manual had to be downloaded individually – a tedious process. Now all the pages in a given manual are combined in one file (compressed into remarkably small size) by a program called "DejaVue." This utility is similar to the more familiar Acrobat and, like the Acrobat reader, the Dejavue reader can be downloaded free. Once you open a file for a manual in the reader, you can page through it on screen and/or print out a copy.



Schematic of the S-40A. Though details are hard to read at this reduced size, you can see the typical superheterodyne layout. Extra bells and whistles are described in text.



S-40A's tuning shaft/flywheel assembly (lower right) and main tuning/bandspread capacitor (to left of black tubes) had to be removed to facilitate chassis refinishing. Semicircular plates fully open at right constitute rotor of the bandspread capacitor.

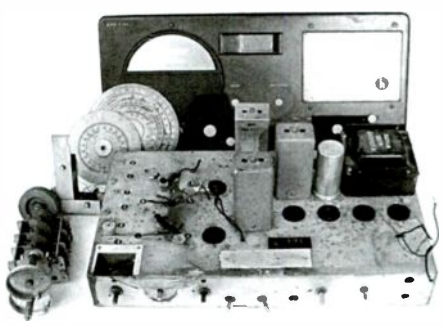
❖ Preparing for Refinishing

With the manuals on hand I could begin serious restoration work on the S-40A. Last month, we had given the receiver a preliminary examination, removing the cabinet so we could peek under the chassis. There were no nasty surprises, though we confirmed that the power transformer was not original. We also decided that, because of discoloration and spotting, the chassis should receive a coat of metallic paint to approximate the original anodized finish.

For openers, I decided to remove the front panel to make way for refinishing the chassis. At first it wasn't obvious how to do this. Though the panel certainly was securely attached, there were no screws holding the panel and chassis together. I finally realized that the only fasteners were the shafts of the toggle switches and phone jack.

This was a bit of a problem because the "nuts" securing the switches to the panel were decorative knurled rings. Trying to remove those with pliers instead of the special tool made for the purpose (which I've heard of but never seen), would certainly result in scarring both the rings and, quite likely the painted panel. The panel had already been scarred at one switch location and I didn't want to compound the problem.

The solution was to grasp the body of each switch from behind with a pair of pliers (an offset type to facilitate getting a proper grip in the tight places) and give it a small counterclockwise twist. That was enough to loosen the grip of the knurled "nut" in front, and I could back it off using only my fingers as tools turn the nut while rotating the switch body in the opposite direction. The phone jack was secured with an ordinary hex nut and I was able to remove that safely with a flat open-end wrench. After unsoldering the leads to the speaker, I was able to separate the panel and set it aside.



Virtually bare S-40 chassis as stripped down for refinishing. Capacitor can to left of transformer will be removed after replacement below the chassis, then reinstalled – just for looks – -after paintwork is completed.

Next to be removed were the plastic main tuning and bandspread dials (after noting their proper orientation with respect to the position of the tuning capacitor plates). Now exposed with the removal of the panel, they would be subject to damage when the chassis was turned upside down for restoration work. I should mention that the bandspread is electrical, instead of being mechanical as in the SW-54. Turning the bandspread dial moves an auxiliary set of low-capacity plates built into the main tuning capacitor.

Now it became obvious that, in order to facilitate chassis cleaning and painting, I would have to remove the hardware holding the tuning shafts, flywheel and drive pulleys. This would mean disturbing the dial cord system so that it would have to be restrung on reassembly. I didn't mind that at all because the old cords often break when a vintage receiver is put back into service, and this would be an excellent opportunity to renew them. I did take the precaution, prior to disassembly, of supplementing the dial cord restringing information in the service manual with some additional notes of my own.

After pulling the tubes, the only items left on the chassis were the tuning capacitor, electrolytic capacitor, power transformer and i.f. transformers. In the SW-54 project I had decided to remove both the i.f. transformer cans and tuning capacitor prior to chassis repainting. Thinking about that experience, I decided that removal of the S-40A's i.f. cans would require much too much busywork for the benefit gained. These straight-sided units would be very easy to mask before painting and could be left in place.

❖ Decisions, Decisions

I had to do some soul searching about removing the tuning capacitor. It would be more difficult than on the SW-54. Connections were a little more inaccessible and there were more of them. (Because of the r.f. stage, the S-40A had three gangs rather than two.) But realizing that I would never be able properly to paint the chassis or clean the tuning capacitor with the latter in place, I gritted my teeth and went about the removal.

After I had made up my mind to do it, the job wasn't as hard as I thought – particularly since my oversized 250-watt iron made short work of removing the heavy ground braid sweat-soldered to the capacitor frame. And as it turned out, the removal process unmasked a problem that would have been very difficult to track down otherwise. One of the connecting leads looked as if it were firmly soldered to its terminal, but separated immediately as I was applying the soldering iron. Apparently corrosion had loosened an already poor bond.

I plan to remove the electrolytic capacitor can prior to painting. All of its sections will be replaced with new capacitors placed under the chassis. However, I don't want to disconnect it until installing the replacement caps, otherwise I might lose the information about the proper connection points. Later, after, completing refinishing of the chassis, I'll reinstall the old can just for looks.

Now I had to make a decision about the non-original power transformer. I would remove that only if I was planning to replace it with an original unit from my S-40 parts set. Otherwise, I would leave it in place and mask for painting. I powered up the transformer so that I could check the voltages it was delivering. Since the rectifier tube had already been pulled, there would be no risk of introducing plate or screen voltage into the circuitry at this stage. The high voltage was spot on according to the specs in the manual. Whoever had replaced the transformer had done his homework! The filament windings were fine, too.

After comparing the underside of the power transformer in my S-40 parts set with that shown in the S-40A manual, I decided not to make the swap. The unit in the parts set had an exposed core fitted with terminal lugs while the one in the manual had wire leads emerging from a metal end bell. Swapping would bastardize the radio just as much as leaving the replacement installed. Furthermore, though the new unit had been neatly installed, the mounting hole had to be widened to accommodate it. Replacing the transformer with the smaller Hallicrafters unit might expose the definitely non-factory file work. In this case, I could take the lazy man's way out and be perfectly justified!

Next month we'll begin by deep-cleaning the tuning capacitor and cleaning and painting the chassis. See you then!

Bob Parnass, AJ9S
bobparnass@monitoringtimes.com
http://www.parnass.org

ICOM IC-R5 Portable Receiver

The ICOM IC-R5 is a tiny, handheld scanning receiver with wide frequency coverage. Like the IC-R2 it replaces (April 1999 *MT*), the IC-R5 detects FM, wide FM, and AM signals from the VLF to UHF spectrum.

The palm-sized IC-R5 provides memory channel labeling, but lacks a full numeric keypad. It competes with the Yaesu VR-120 (July 2001 *MT*), the Japanese-only VR-150 (November 2002 *MT*), and the Alinco DJ-X3 (March 2002 *MT*). The accompanying photo shows an IC-R5, IC-R2, and a VR-120. All these models are simply powered by two AA batteries, except the DJ-X3, which requires three.

The USA version IC-R5 is furnished with two 1100 mAH NiCd AA batteries and a 6 VDC 1000 mA wall wart which can be used recharge the batteries while in the radio.

❖ Frequency Coverage

The older IC-R2 begins coverage at 495 kHz, but the IC-R5 tunes lower – down to 150 kHz.

ICOM deletes the 822 - 851 and 867 - 896 MHz ranges in the US version IC-R5 to comply with FCC requirements for rejection of cellular telephone signals. This includes 822 - 824, 849 - 851, 867 - 870, and 894 - 896 MHz – bands which are not allocated to cellular telephony. The IC-R5's wider gaps are troublesome to those of us who monitor the conventional and trunked systems in those ranges.

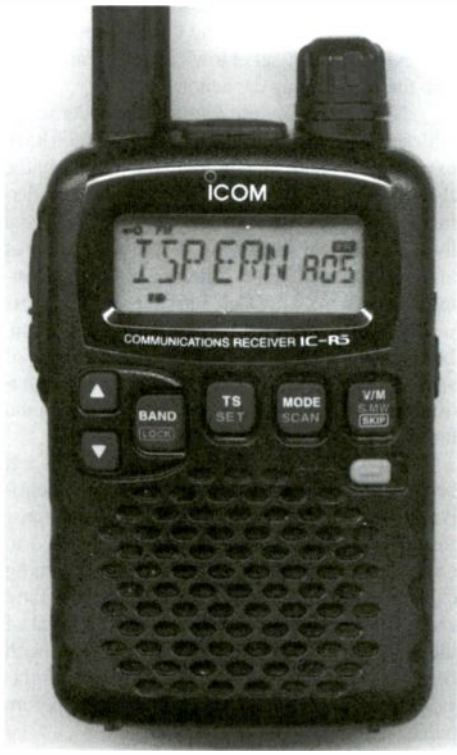
The IC-R5's frequency step size choices are the same as the earlier IC-R2, with the addition of 8.33 kHz available only in the VHF air band. Missing is a 7.5 kHz step size, which would be useful on the VHF-high band.

❖ Memory

The IC-R5 memory organization is a departure from other scanners. It provides up to 18 memory banks of variable size, with up to 100 channels in a bank, with a maximum number of 1000 channels. Banks are named with a single letter: A-H, J, L, N, O-R, and may be identified by an optional text label, as well.

The variable size bank scheme is designed in an interesting way. There are 1000 "regular" memory channels, 000 to 999, which hold the frequency, mode (AM, FM, WFM), CTCSS or Digital Code (DTCS) settings, scan skip, and offset information.

In addition, you can associate a regular memory channel with bank and channel number within that bank. For example, regular memory channel 205 may be assigned to bank A, channel 7. A regular memory channel can be associated



with only one bank or none at all. If you want the frequency 155.475 MHz to appear in three different banks, you must program it into three different regular memory channels first.

As with the other wide coverage handhelds, memory programming requires you tune the frequency and select other settings using a VFO, then write the information to a regular memory channel. But, IC-R5 memory programming is more complex than other palm sized scanners. If you want the channel to appear in a bank, you must then assign the regular memory channel to a bank and channel number.

❖ Scanning and Searching

The IC-R5 follows ICOM's tradition of restricting memory scanning to a single bank or all banks. You can scan the regular memories, too, but you cannot scan a combination of memory banks. Channels may be locked out by setting the Skip flag.

The IC-R5 provides 25 pairs of scan "edges" for searching between frequency limits, the same as the IC-R2. A single range may be searched, though multiple ranges cannot be chained together for searching. Frequencies may be skipped during searches by programming them in a memory channels with the Pskip flag set.

A memory write scan stores active frequencies found while searching into a special group of 200 channels. The IC-R5 is smart enough to recognize duplicate hits and store only unique frequencies.

❖ CTCSS and Digital Code Squelch

One of the IC-R2's major assets is its CTCSS squelch. The IC-R5 carries forward the CTCSS tradition and adds a Digital Coded Squelch (aka DTCS, DCS, and DPL), too.

You can program a known CTCSS or DTCS code for a memory channel or sit on a frequency and search for the proper CTCSS or DTCS code. When a signal is present, the IC-R5 slowly steps through all codes in sequence until it finds a match. Hunting for the right code is so slow that we can't find the code unless listening to an unusually long transmission.

❖ Other Features

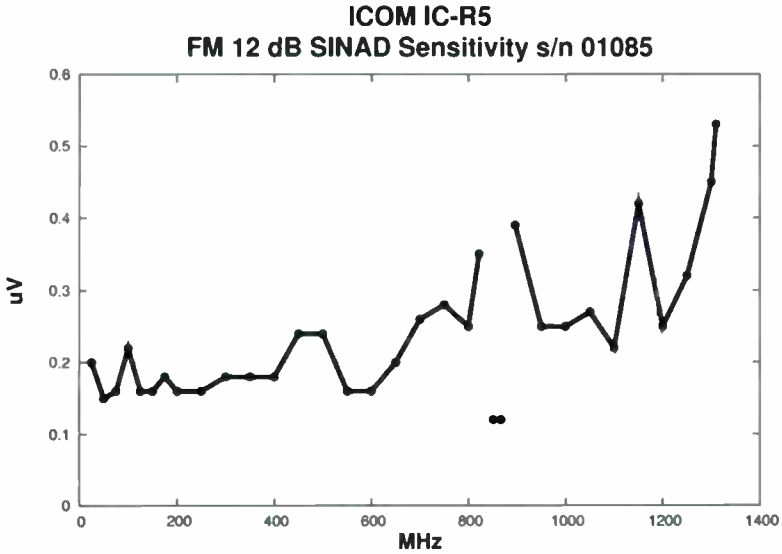
The IC-R5's belt clip arrangement is similar to the IC-R2. We prefer to carry the radio in a pocket or cell phone case rather than trust the odd plastic clip.

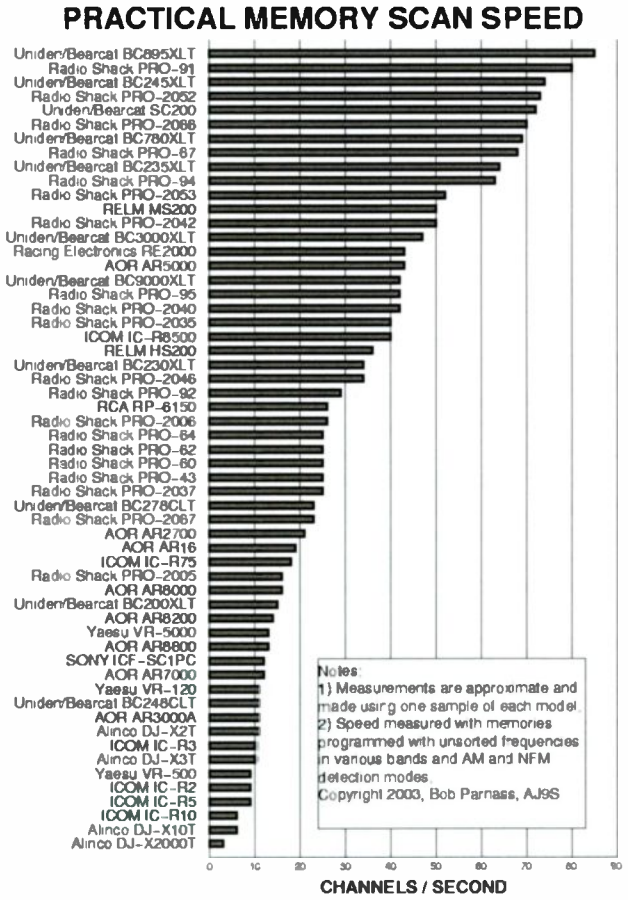
An auto power-off feature can turn off the IC-R5 after 30, 60, 90, or 120 minutes. We exploit the power-off feature in case we forget to turn off the radio.

A variable duty cycle power save function can be enabled to cut battery drain while the radio is silently monitoring one frequency.

The earphone cord can be used as an antenna for FM broadcast band reception, though you will have to furnish your own earphone.

The IC-R5's LCD display contrast is ad-





justable and the larger display is easier to see than the IC-R2.

The IC-R5 may be cloned to another radio or configured using a computer. ICOM has not made public the information needed to write IC-R5 configuration software, though some hobbyists have started to figure out the memory image layout and cloning protocol.

Measurements

ICOM IC-R5 Receiver S/N 01085

Icom America Inc.
2380 116th Ave NE
Bellevue, WA 98004
Phone: (425) 454-8155
Fax: (425) 454-1509
Customer Service: (425) 454-7619
http://www.icomamerica.com

Frequency coverage, USA version (MHz):
0.150 - 821.995
851 - 866.995
896 - 1309.995

Step sizes (kHz):
5, 6.25, 8.33 (VHF air), 9 (AM BCB), 10, 12.5, 15, 20, 25, 30, 50, and 100

Modes: AM, WFM, FM, user selectable

NFM modulation acceptance: 10 kHz

Audio output at earphone jack:
0.1 watt @ 9% distortion

Attenuator:
15 dB @ 40 MHz
16 dB @ 155 MHz
15 dB @ 460 MHz
10 dB @ 860 MHz

Intermediate Frequencies (MHz):
266.7, 19.65, 0.45

Image Rejection Due to 1st IF (266.7 MHz):
51 dB @ 40 MHz
76 dB @ 460 MHz
37 dB @ 860 MHz

Squelch tail near threshhold
(1 uV @ 155 MHz): 20 ms.

Practical memory scan speed:
9 ch/sec

Performance

The older IC-R2, known for splendid audio, is louder and has less distortion than one expects for a palm sized scanner. Subjectively, the IC-R5's audio isn't quite as good because it doesn't have the same treble, or high pitch. Good, high frequency response helps the audio "stand out" when using a scanner in a noisy environment, e.g., while driving.

While the IC-R2's audio sounds best, the IC-R5's audio quality is still excellent – better than our Yaesu VR-120 and much better than our VR-500.

The IC-R5 has a new, internal bar antenna for AM BCB (broadcast band) reception. The IC-R5's BCB reception is improved over the IC-R2, though it is not as good as our VR-120 or a mediocre AM radio.

Summary

If you like the IC-R2, you will probably prefer the IC-R5 except for the missing 800 MHz frequencies and the increased complexity in programming. Good configuration software (not supplied) eases programming of radios lacking a full keypad.

Nitelogger II Source

The BMI Nitelogger II is a tape recorder activator. It may be used with recorders which lack their own sound activation feature.

We reviewed the Nitelogger II in August 1996 *MT* and published a schematic after tracing out the circuit by eye. The Nitelogger contains a sound detector circuit. It connects to a receiver's external speaker jack and a tape recorder's audio input and auxiliary control jacks. The Nitelogger's volume control and internal speaker permit audio to be monitored or the traffic may be silently recorded. The recorder's "hang time" is adjustable between .25 and 2.5 seconds.

We were very impressed with the Nitelogger II and found it worked better and was more flexible than the sound-activated feature built into our VOX recorders. As time passed, we could not find Nitelogger IIs being sold. Recently, a representative of In Compliance Corporation told us they still sell the Nitelogger II for $69.95 plus shipping.

For more information, contact: In Compliance Corp., 3260 N. Hayden Road #106, Scottsdale, AZ 85251, email: incompliancecorp@aol.com. To order, call In Compliance at (800)239-0441.

The Icom IC-R5 pocket-size receiver is available for $199.95 from Grove Enterprises. Check 1-800-438-8155 for sale pricing and current shipping charges.

John Catalano, PhD
johncatalano@monitoringtimes.com

The World in Your PALM

It's been a few years (1999) since we last visited the then-new Palm Pilot and saw how it could be used for radio monitoring. Since that time the price of used Palm IIIs and Vs have skidded to unbelievable lows. This month we'll take a look at what I consider to be some of the best value-for-money Palm programs for controlling radios. We will use the Co-Pilot, a Palm emulator, which runs on the PC, to run the programs and produce the figures. Cost conscious as ever, I have chosen the least expensive Palm III to run the programs. As requested by some readers, links for downloading the programs mentioned this month are included at the end.

The current groups of Palm-based radio control programs have been written primarily for three radios: Icom's IC-PCR1000, the Ten-Tec 320 and Uniden's BC780/245XLT. Let's begin with the radio that was one of the first of its kind, the Icom IC-PCR1000.

Where All It Began

PC-controlled radios can trace their roots back to the Comfocus product, circa 1995. This radio was revolutionary in all respects. However, the Icom ICPCR1000 was the first massed-produced PC-controlled radio. Although designed to be controlled via a PC's serial port, as the Palm computing platform became more popular, creative programmers found ways to control the PCR1000 with the Palm handhelds.

PCRPilot3C

The PCRPilot, which I first reviewed in this column a number of years ago, has been updated a number of times. Today it is available in two forms to cover the different Palm operations systems. Figure 1 displays the simple, yet very useful, layout of PCRPilot's display. The frequency is displayed in nice big digits at the top (must be an over-fifty-year-old programmer!).

Figure 1 PCRPilot Main Screen. I love the size of the digits!

Frequency Selection

Changing the frequency can be accomplished by direct numeric input at the big digits from the palm "keyboard." Selecting either the letters (abcde) or numbers (12345) at the bottom of the Palm screen accesses the keyboard. Alternatively, the up/down arrows, located below the digits, step the frequency by the amount shown to the left of the arrows. The frequency Step is set directly from the Palm "keyboard" as is the Name, or description, of the frequency.

Storing Channel Data

The twenty-six memory channels, labeled A through Z, can be seen in the center of Figure 1. Tapping the boxes along the right side the Palm screen allows the user to select radio functions such as AGC, ATT (attenuation), NB (noise blanker) and the rest. All radio settings visible on the display – including mode, filter, volume and squelch settings – are uniquely "remembered" for each of these channels. In addition, a name or description (for example, NOAA Weather) can be added for identification.

Why Only Twenty-six?

Now you're getting greedy! We should remember that regardless of the fact that Palm calls their machine a computing platform, the early Palms, such as the Palm III, are little more than a high-powered microcontroller, albeit very cleverly designed. I'm sure that the original Palm design concept did not consider it would be used to control a receiver, let alone store hundreds of channels of radio settings.

PCRPilot3C Summary

Perhaps it is because it was the first Palm radio control program I ever tried, but I have always enjoyed using the PCRPilot programs. I am always amazed when I consider how well the Palm III functions with the PCRPilot3C program!

Two for Ten-Tec RX 320

Ten-Tec's RX320 receiver was another milestone in PC-controlled receivers. It was the first mass-produced, under $1000 receiver utilizing digital signal processing (DSP) technology. This little brick of a radio does a great job on the shortwave bands (*see review June MT - ed*). The **Palm320** software is an easy-to-use program that does a nice job of controlling the 320.

Figure 2 Palm320 Main Screen.

The Palm320 main screen can be seen in operation in Figure 2. This program takes you to a different screen for each function setting. For example, tapping "Enter Freq" brings up a keyboard for entering frequencies. The frequency can be "stepped" by selecting the step size from one of the four boxes (.01 to 5 kHz). Then the user taps the + or – box to step the frequency.

Four basic radio functions are controlled from the main display (Figure 2): Frequency, Step Size, Mode and Volume. Tapping the "Menu" button allows you to control the AGC, Filter selection, and speaker muting. Storing or recalling all displayed radio setting, plus a user-supplied description is also accessed from the Menu button.

Simple But Powerful

Palm320 requires three small applications to be downloaded and installed on your Palm. It's well worth the small effort. I suggest you give it a try. I cannot find where I originally obtained the program, but no problem! The author, Greg Majewski, has given Monitoring Times permission to make it available from the MT website.

The Layered Approach

The **RX320** program by Michael A. Newell, WB4HUC, has a different design philosophy. Two small Palm applications are required to be downloaded and sent to your handheld. The RX320's Main screen is seen in Figure 3. You can see that this program is designed around a layered approach where each screen leads to another screen for

Figure 3 RX320 Main Screen.

detailed control. Tapping "control panel" brings up the screen shown in Figure 4, which is where the action is.

Tapping one of these function boxes brings up the next layer of detail screen. For example, clicking "Filter" brings up a screen that allows the user to scroll through all the thirty plus filter bandwidth choices. I think you get the idea. The "ms" memory store and "mr" memory recall buttons, seen under the frequency display, control the memory functions (Figure 4). All radio settings are stored and the user can fill in a description of the intercept. The volume and the BFO settings are controlled from the "General Settings" as seen on the Main screen in Figure 2.

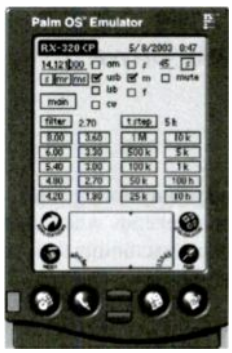


Figure 4 RX320 Control Screen.

RX-320 Comments

This program does everything but make the Ten-Tec RX-320 sing! If you have an RX-320 and a Palm Pilot, you should have this program.

❖ Trunk Tracking on the Palm?

A company with the intriguing name of Black Bag Software has control software for a number of scanners/receivers. **ScanPro780** is their Palm-based control software for the Uniden BC-780XLT. This program can run on just about any Palm handheld having an operating system of version 3.1 or higher.

Downloading and installation on the Palm was quick, easy, and went without a problem. Figure 5, from Black Bag's website, shows the Frequency editor screen. All screen layouts and operating functions are easy and intuitive.

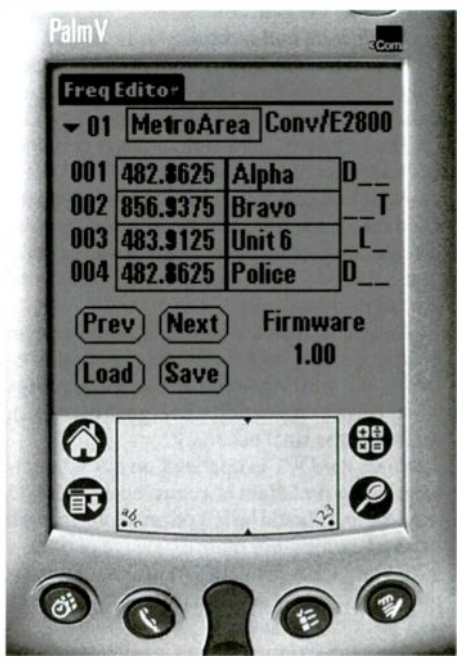


Figure 5 ScanPro780 Frequency Editor Screen

Searching new frequencies with some programs requires the user to memorize quite a number of keystrokes. Using ScanPro780, searching new frequencies is very easy and is accomplished by entering the start and stop frequencies. That's all it takes.

❖ Heck, for FREE Why Not Try Them All!

Oh, I forgot to mention that all the programs we have looked at this time have more than the Palm handheld in common. All available free for downloading. I don't think you can kick about the price of the software. However, we owe a debit of gratitude to these talented software writers for their efforts.

Cost of a Used Palm?

Well, they are not quite as inexpensive as the software, but not far behind. Auctions on Ebay for Palm IIIs have ended in the twenty-dollar range! That just covered the cost of shipping my new Palm III a few years ago.

More On Palm Emulator

This month I used a Palm Emulator program running on a Pentium II laptop to run these programs. The emulator makes screen copying for inclusion as figures in the column much easier to generate. Having written Palm application programs I can tell you that the emulator is indispensable for debugging programs.

The Palm Emulator program is available from the Palm site. *However*, in order to use it you must have a software image of a Palm operating system ROM. This can be uploaded from a Palm handheld, if you own one. See the Palm website for instructions for uploading. Or you can join the Palm Developers group and then get access to their downloadable ROM files.

Go For It!

If you have one of these computer-controlled radios you can now easily afford a Palm pocket controller and software. Internet download links for each of the programs we looked at are listed below.

Till next time, remember, you can now have the world in the Palm of your hands ... well, at least you can listen to it.

Palm Platform Radio Control Software links:

PCRPilot3C
http://www.users.bigpond.com/geoffwicks/PCRPilot.htm
Palm RX320
http://wb4huc.home.texas.net/rx320/rx320install.htm
Palm320
http://www.monitoringtimes.com/palm320.zip
ScanPro780
http://www.blackbagsoftware.com/
Palm Emulator
http://www.palmos.com/dev/tools/emulator/

Below 500 MHz continued from page 71

of America's website at **http://www.lwca.org**.

To encourage more activity on this mode by *MT* readers, I'm offering a free copy of the new ***2003 BeaconFinder*** to the first two readers who send in an image of a QRSS intercept. The image may be a color or grayscale .jpg file, but it should be clear, with a high enough resolution for reprinting. Entries may be sent via e-mail at the address in the masthead.

I would like to thank Larry VanHorn (NC), Jack Roubie (NY) and other readers who offered their encouragement for an article on QRSS. More reader feedback is now needed. Would you like to see additional coverage of computer-assisted, high tech modes? I promise to give all comments serious consideration for future issues.

❖ Endnotes

The April issue contained an error in the website address for an online latitude/longitude mapping tool. The correct address is **http://www.artscipub.com/repeaters/maplatlong.asp**. I would like to thank Perry Crabil (VA) for bringing this error to my attention.

See you next month.

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

Ramsey Radio Direction Finding Kits

By Bob Grove

Radio direction finding (RDF) is both fascinating and useful. It provides the capability of locating sources of interference or unknown signals, beacons from downed aircraft, intentional repeater jammers, hidden transmitters and other radio signal sources.

Most RDF exercises are done at VHF, typically in the 100-200 MHz range, since that's arguably the busiest swath of communications spectrum. Hams occupy the popular two-meter (144-148 MHz) band, and handy-talkies (HTs) by the zillions are propagated among both licensed and unlicensed users of the VHF spectrum.

On a broader scale, RDF can be conducted virtually anywhere in the spectrum, although propagation characteristics change with frequency, and different techniques are required.

In the civilian sector, most RDF projects are conducted by the hams as they pursue their "fox hunts," competitive meets in which participants look for a hidden transmitter.

But in more serious sectors, RDF techniques are used both by federal agencies and military organizations hunting for specific individuals or groups using radios or cellular telephones and, on a smaller scale, by law-enforcement investigators tracking suspects, stolen cars (Lo-Jack system), or even robbed cash parcels equipped with hidden radio-beacon transmitters.

While an extensive RDF system with integrated remote terminals can cost $1 million or more, those of us with thinner wallets can get into the tracking game with much less. Let's take a look at two popular RDF kits available to the experimenter.

Building the Ramsey DF1 "Foxhound"

Ramsey Electronics is an established company with a wide selection of electronic kits for hams and experimenters alike. Their DF1 "Foxhound" is advertised to work "with any radio, any frequency," but realistically, with the dimensions given for the antenna array, its range is roughly 100-200 MHz.

Lower frequencies (longer wavelengths) require wider element spacing, and higher frequencies (shorter wavelengths) require shorter spacing, and the radio must supply a signal with a steady carrier like AM or FM, not SSB or CW bursts.

The kit comprises a circuit board, all electronic components, and the four telescoping whips; the optional case is available at extra cost. The builder must supply PVC pipe, couplings, glue and adequate workshop tools, including a drill and hacksaw as well as the expected soldering utensils, to execute the project.

Component quality is quite good; the circuit board is professionally laid out, tinned for soldering and screen-printed for component placement. I would have preferred a BNC jack over the RCA phono plug for antenna connection, and 1/8" (3.5 mm) audio jacks rather than the 3/32" (2.5 mm) provided, since the former choices are more standardized in the communications industry.

The assembly manual is generally quite good as far as it goes, but there are numerous errors of both commission and omission which are expected to be corrected in future editions. Because of the confusion which I encountered during construction, I estimate that I have approximately 8 hours in what have should taken, according to the advertising, about 2.5 hours for an experienced kit builder.

But to Ramsey's credit, a courteous and helpful customer service department is maintained for just such contingencies, although it is open only during weekdays, not during evenings or weekends when many kit builders are likely to be assembling their projects and encountering problems.

How does it work?

In the simplest terms, the DF1 is a phase detector which measures the time lag (phase difference) between two antennas produced by a signal's arriving wave front. If both antennas are equally distant from the target signal, the wave front strikes the two antennas simultaneously, but if one antenna is closer to the signal, the wave front arrives first on that one, producing a phase differential in the detection circuitry.

Even the displacement of an antenna by a fraction of an inch is detectable, assuring tight accuracy when taking bearings of the target signal. A pair of LEDs provides visual indication of whether the antenna bearing is to the right or left of center. A meter gives additional null indication, registering more precise orientation of the hand-held array.

In use, the DF1 is plugged into the antenna and speaker jacks of the companion radio, most likely a hand-held scanner or HT. A separate jack is provided for an optional headset or speaker since the radio's internal speaker is disabled by the audio interconnect.

Once the target signal is being received, the audio output of the radio is adjusted in combination with the gain control of the DF1 until a good left/right null indication is provided.

It is crucial for the operator to have a good map and a compass, otherwise only a visual indication can give a bearing; this might be OK for final close-in on a signal, but it certainly isn't adequate for a distant start!

An initial compass bearing should be penciled on a map, followed by a second bearing taken at another location; under perfect conditions, the two lines cross on the location of the target signal.

Distant signals are harder to pinpoint than nearby signals, and the wider the angle between the bearings, and the more bearings taken (discarding wildly-divergent bearings), the better the final accuracy.

Since the DF1 is operated on a 9 volt battery and current drain is a consequential 30-35 mA, the unit should be left on only long enough to take bearings. For more extensive periods, a 9-12 volt jack is available on the panel to connect an external DC source such as a battery belt pack or car battery.

For such external power applications, the

internal battery must be disconnected since it remains in parallel with the external power jack. A circuit-breaking jack would have been a much better choice here to avoid frying the internal battery.

We Test the DF1

My trusty Uniden Bearcat BC3000XLT hand-held scanner was connected to the Ramsey DF1. Since these are all low-impedance lines, any loose or intermittent contacts produced enormous fluctuations in readings during bearing-taking. Cables with proper plugs soldered at both ends are strongly recommended over adaptors.

Using a Hewlett Packard signal generator out in the open as a signal source, I tested the DF1 from 25-850 MHz. The lower the frequency, the more accurate and stable the direction finder.

Clear through VHF high band (170 MHz or so), bearings were quite good, but at higher frequencies, the fixed separation of the antennas allowed multiple readings since the pattern assumed the familiar cloverleaf pattern. It is also important to shorten the lengths of the whips as frequencies go higher to avoid multi-lobing and high takeoff angles from excessive length in terms of electrical wavelength.

A means of substituting antenna arrays of different spacing would certainly allow reliable frequency range extension of the DF1.

Signal strength and gain control adjustments were also critical; when properly adjusted, the audio tone produced by the switching circuit would smoothly disappear and the meter deflection would null as the array was pointed at the signal, but as it was rotated, distorted tones would come and go and the meter would fluctuate.

On assessment, the DF1 makes a good direction finding accessory provided the operator was fully aware of and familiar with its idiosyncrasies.

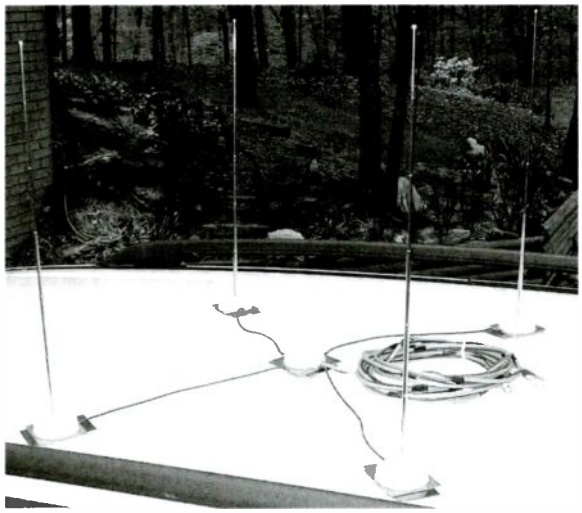
The DDF1 Doppler Direction Finder

Most readers have encountered the Doppler effect, a gradual raising or lowering of a pitch from a siren, car horn, jet aircraft, train whistle, or other audio source as it rapidly approaches or recedes from a listening point.

The same effect may be noted from stars (the "red shift") and radio signals as well, although the speeds are much faster.

Doppler direction finders work on the principle of rotating antennas – in this case, electronically-switched antennas, thus called "pseudo-Doppler" since there is no actual physical movement.

If a circular array of antennas can be switched rapidly and consecutively, their relative positions to an arriving radio wave can be compared. Those on the side moving toward the signal will deliver an upward frequency shift (as with an approaching car horn), while those switching away from the signal will record a downward shift (as heard when a sound source passes by and recedes into the distance).



Explained simply (too simply – this is a sophisticated product!), a resolver circuit provides a readout of this comparison on a circular compass rose of 16 LEDs, alerting the observer to the directional bearing of the signal. This 22.5 degree spacing provides adequate homing bearings for most applications. A very detailed description of the DDF1 circuitry is presented in the manual.

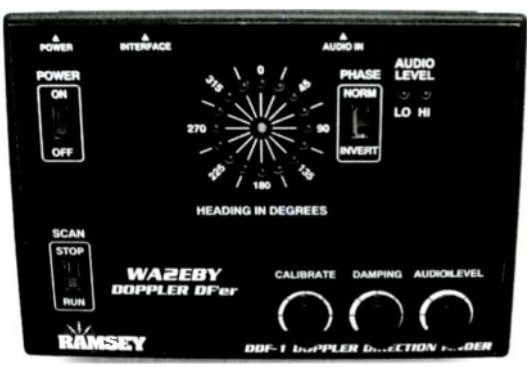
What's in the Box?

To save time, instead of ordering the kit, I ordered the factory-assembled DDF1, comprising the control unit, four whips, flexible magnet strips, and the manual (the same one included with the kit version).

All the user needs to do is stick on the magnetic antenna pads to mount the roof array, plug in the DB9 interconnect cable, attach a source of 12 volt DC power (100 mA average drain) and the audio cable, and dial in the desired frequency on the user-supplied radio! Virtually any frequency in the VHF/UHF land mobile spectrum may be selected.

A comfortable audio level from the DDF1 speaker is set and the automatic antenna scan is started, resulting in a 500 Hz tone overriding the signal. Audio is readjusted to extinguish the overload lights so that only one LED in the circular compass array should remain lighted. Others will flicker erratically, but this jitter may be dampened and a stabilized reading taken with a control for that purpose

A phasing switch assures that the pattern shifts in the correct direction with respect to the movement of the vehicle, and the calibrate control is adjusted to align with the forward direction of the vehicle. You're ready to catch that fox!



How Well did it Work?

With the four-antenna array stuck to the roof of my Jeep Liberty, and the cable running from there to the control unit and my scanner, I was ready for action. The manual warns against road speeds with the antennas in place, yet the manual recommends testing the system by driving past a known transmitter.

It's a respectable warning; the antennas are held in place by extremely weak rubber magnets, and the slightest motion will tip them over. Even when they are fully collapsed to 4" or so, a slight breeze tips them. Not surprisingly, the manual recommends they be replaced by stronger magnets. Good idea; so why didn't they do that at the factory?!

Like its little brother, the DF1, antenna length and spacing are critical for performance, depending upon the frequency. Fortunately, unlike the DF1, the antenna spacing can be easily adjusted, supporting a wide frequency range of operation.

The control unit is handsome and functional, with every adjustment you will need at your fingertips. The advertising says the DDF1 can be used from 130-1300 MHz; at a nearby shopping center I tested the DDF1 from 30-470 MHz with excellent results. We have no communications systems in the area above that to test its upper limit.

Aiming the front of my car north and calibrating the LED readout, I found the bearings for our NOAA weather broadcasters, a local Taco Bell kiosk, nearby Wal-Mart handy-talkies, and the sheriff's repeater. And they were all correct.

This is a nice RDF at a reasonable price. Properly adjusted, it will provide excellent reliability and accuracy for determining bearings on target radio transmissions in the VHF/UHF spectrum. And if you replace the antenna magnets, you can even do it while you're moving!

DF1 "Foxhound" kit, $69.95 less case and knob, $84.90 with case and knob, plus shipping. DDF1 Doppler RDF, $149.95 kit, $269.95 factory wired, plus shipping from Ramsey Electronics. Call (800) 446-2295 or visit their website at **http://www.ramseyelectronicscom.**

Two Eras of Technology
The National NC-183D vs. the Icom R-71A

By Alan Johnson, bench tests by Ben Hester

At first glance, it would appear the comparison we propose would be totally apples and oranges, with no common ground between these receivers. On reflection, however, it is apparent that, although the Icom appeared 30 years later than the National, both were designed for the same task: the reception of radio signals. The companies' engineers just had different tools with which to implement their design goals.

Comparing the two receivers allows for a better understanding of receiver design and the inherent trade-offs of implementing various technologies in a cost-effective manner. Hopefully, this review will assist those listeners who are in the market for a used receiver to better define their goals and choose a receiver design that effectively meets those goals.

The Old

The National NC-183D was produced from 1952 to 1957. The National Company had a well-deserved reputation for technical innovation and quality products, especially for the amateur and commercial market. The NC-183D was a refinement of the previous NC-183, which had been produced from 1947 to 1952. The "D" stood for double conversion, and the 183D used the more modern miniature tubes.

It is a typical radio for its era, both in electrical design and in following the dictum that "bigger is better." The NC-183D measures 19-1/4 x 10-1/4 x 16-3/4 inches (WxHxD) and weighs in at 65 pounds. Although it is not a portable radio, provision was made for battery operation with a six-volt storage battery for the tube filaments and 135 to 180 volts for the plates.

It utilized dual conversion above 4 megahertz and employed the typical tuning setup of the time – four bands covering from medium wave up to 32 MHz and a separate bandswitch position for six meters (50 – 54 MHz).

There is a main tuning knob with dial calibration every 50 kHz on the range 1.6 to 4.4 MHz, every 100 kHz from 4.4 to 12 MHz and every 200 kHz from 12 to 31 MHz. There is a separate bandspread (fine-tuning) knob with a dial scale calibrated for the ham bands. Unlike cheaper sets of the time which used backlash prone dial cord to couple the tuning knob to the tuning dials and tuning capacitors, the 183D used a smooth geared dial drive.

The 183D had several other high-quality features, such as two tuned stages of RF amplification before the first mixer for improved sensitivity. (Manufacturer's spec was 3.5 microvolts for 10 dB signal to noise ratio, but Ben Hester measured a much better 0.4 to 0.6 microvolts across the HF spectrum on his 183D.) Image rejection was rated by the manufacturer at 80 dB below 12 MHz, and a pair of 6V6 audio tubes in push-pull configuration produced eight watts of audio output.

Selectivity was provided by both the IF transformers and the customary single crystal with a sharp nose and very broad skirt response. (The catalog specs were 3.5 kHz and 12.5 kHz at –6/-60 dB with the crystal filter off and 100 Hertz/ 7 kHz with the crystal filter at its sharpest setting.)

Reception modes were AM and CW via a variable BFO – there was no product detector since SSB hadn't come into wide use at the time. A plug-in adapter for narrow band FM was an optional accessory. A separate speaker or headphones are required, since there is no internal speaker. The radio sold new for $399, according to an ad in the 1956 *Amateur's Radio Handbook*. Fred Osterman's book *Shortwave Receivers Past and Present* lists a used price range of $150 to $290 for the radio.

The New

What a difference thirty years makes! Although transistors had been invented in the late 1940s, it took quite a while for them to be incorporated into radios. That same 1956 *ARRL Handbook* devoted all of 5 pages to semiconductor devices versus 19 for vacuum tubes.

The Icom R71A weighs less than a third of the 183D (17 pounds) and measures 11-34 x 4-1/2 x 11 inches, but it's packed with features that would have been considered beyond science fiction by the listener of the fifties. The receiver's frequency coverage is from 100 kHz to 30 MHz without gaps. Not only could frequencies be tuned in with a dial precision of 100 Hertz (minimum tuning steps are 10 Hertz), but a desired frequency can be punched in via a keypad, or 32 favorite frequencies can be stored in memory for instant recall.

The factory's sensitivity specifications in the range of 1.6 to 30 MHz are 0.15 microvolts in SSB/CW modes and 0.5 microvolts in AM mode. (Ben's measurements for the R71A in the AM mode were in the range of 0.4 microvolts with the preamp off and 0.2 microvolts with the preamp on.)

The R71A supports single sideband reception with a product detector. This also permits ECSS tuning, which is tuning in a broadcast station using either LSB or USB modes to reject adjacent channel interference. The R71A is a quadruple conversion design with good quality crystal and ceramic filters, although the filter quality is better for SSB than for AM (another reason to use ECSS tuning).

The rated selectivities in kHz at the -6/-60 dB points are AM 6/15, SSB Wide 2.8/4.7 and SSB normal 2.3/3.3. Optional 250 or 500 Hertz CW filters were available, as well as the FL-44A high quality SSB normal filter. Additional interference fighting controls include passband tuning to narrow the SSB filters' passband down to 500 Hertz and a notch control (inoperative in AM mode). The passband tuning feature was deleted from radios produced from 1989 to 1991.

The radio has an internal speaker, and if the CK-70 option is installed, the radio can be operated from a 12-volt DC supply. Other ac-

cessories for the radio were a high-stability oscillator (CR-64), FM unit (EX-257), computer control interface (UX-14 and CT-17), remote control (RC-11) and voice synthesizer (EX-310).

The R71A's retail price varied from $800 to $1200 over its production run. The used price for this receiver currently runs from $350 to $500 depending on which options have been installed.

The front-end design of the R71A is completely different from that of the NC-183D. Instead of tuned RF amplifiers, the 71A has a series of bandpass filters (the appropriate filter is selected by the tuning logic circuits) to provide front-end selectivity. After the signal has passed through the filter, it can be amplified 10 dB by a wideband amplifier, attenuated 20 dB or passed unaltered to the first mixer stage.

In the first mixer, the RF signals are converted to the 1st intermediate frequency of 70.4515 MHz. This high first IF, at a frequency that would have been difficult to achieve with the technology of the 1950s, is used to reduce image signals in the receiver. This first IF signal is then down-converted to the second IF of 9.0115 MHz, then to 455 kHz and finally back to 9.0115 MHz. This up and down conversion scheme allows for passband tuning, in which the filters' response curves can be shifted relative to each other to adjust selectivity. In the stock R71A, the 2nd IF filters are crystal types and the 3rd IF filters are ceramics. There is a notch filter with a +/- 1.6 kHz tuning range in the 4th IF. The output of the last IF is then routed to the product detector if SSB, CW or RTTY modes are selected or to a diode detector for AM mode.

Unlike the free-running oscillators tuned by capacitors and inductors in the NC-183D, the R71A uses digitally controlled phase-locked loops (PLL) to provide tuning and intermediate frequency conversion. The master oscillator for the PLLs is crystal controlled, resulting in minimal drift. This technology permits 10 Hertz tuning steps, direct frequency tuning via a keypad and the ability to store 32 frequencies in memory.

The Comparison

Before I go into the operational comparison of the two radios, I should relate my experiences with getting them working, as a guide for those contemplating purchasing a used receiver. This is the third NC-183D I've purchased – the first was in poor cosmetic shape, but worked OK. The second unit looked good but had very low audio output, which I was able to fix, but the second conversion oscillator doesn't work properly and I've been unable to find the problem. The third unit works fine, although I have not yet checked for weak tubes or done an alignment (the dial calibration is spot on, however).

The R71A worked well in AM mode with the wide filter, but signals were muffled and distorted with the narrow filter (a FL-44A in this unit) – much more than I would expect just from the narrower bandwidth. Although amateur SSB signals were received clearly, ECSS reception of broadcast signals was distorted and muddy. Since I had the service manual, I was able to adjust the BFO and passband tuning circuits and set the endpoints for the voltage controlled oscillators in the phase-locked loops and now I have a fully functioning R71A.

The lesson to be learned is to insure you can get a refund on a used radio purchase or at least be able to check the radio thoroughly before purchase. If you are technically competent, be sure to get the manual for the radio. The NC-183D manual has full schematics and alignment information, but the Icom has separate operating and service manuals. Fortunately, there are several third-party sources of manual copies for older equipment.

I decided to use an indoor Datong active antenna to test the radios since I am out of desk space in the usual radio room. The output from the antenna was fed through an antenna switch to A-B the radios. The Icom has an SO-239 coaxial socket for antenna input and the National has screw terminals designed for either a single wire feed-in or a twin-lead dipole feed. I used identical Radio Shack mini-speakers for the audio output of each radio.

The Icom wins hands-down for convenience in tuning with its digital frequency readout and keypad tuning. Pressing the "Band" button allows jumping around in one megahertz steps via the main tuning knob and the "TS" button toggles the main tuning between one kHz and 10 Hertz tuning steps (50 Hertz if the knob is turned rapidly). The National tunes smoothly, but requires some cranking to get from one end of each tuning range to the other. I found it easiest to set the main tuning to the high end of the band of interest and then use the bandspread to tune from station to station.

Frequency readout on the National, especially if not using the bandspread on hambands, is approximate at best. There are add-on frequency counters that can be added to these older tube radios (see **http://www.aade.com** for one example), although the 183D's switching from single to double conversion might require some mental arithmetic to determine the actual tuned frequency. It helped having a digital read-out receiver next to the 183D to determine what it was tuned to.

Other than the frequency readout accuracy, I was somewhat surprised by how closely matched the radios were. I did expect that sensitivity would be close and that was the case – there were no stations that could be heard on one receiver and not the other. Most receivers have adequate sensitivity, since reception in the lower shortwave bands is primarily limited by atmospheric and local noise.

Selectivity was better on the Icom due to the ability to tune using the ECSS technique and the 2.4 kHz filter, although I preferred the 2.8 kHz filter for better fidelity, when conditions permitted. The 183D easily separated stations 10 kHz apart, even in the widest bandwidth position. Under tougher conditions, switching in the crystal filter to the "1" or "2" position and tweaking the phasing control for best intelligibility worked quite well. I previously had the impression that Icom radios had poor audio fidelity and had expected the National to sound much richer, but the R71A in AM mode with the wide filter and an external speaker sounded quite good. Both receivers were pleasant to listen to for extended periods.

The R71A wins hands-down for reception of single-sideband signals, thanks to its inherent stability and product detector – simply select the appropriate mode and filter and tune the radio for best intelligibility. On the NC183D, the operator must turn down the RF gain, then adjust the tuning, antenna trimmer and BFO frequency for best signal – a procedure which requires some practice. Also, since the radio does drift, occasional touch-up of the bandspread tuning is required. Overall, the '183D is a very "hands-on" receiver, while the Icom is more of a "set and forget" operation.

The Choice

Deciding which of these receivers (or their class of technology) is best for you depends on the intended use. For someone looking for a step-up from a portable receiver who intends to do serious DXing or utility listening, the more modern receiver is the obvious choice, due to stability, filtering, tuning precision and the product detector. For those who already have a modern receiver and want a radio for program listening or casual bandscanning, the NC-183D would be an attractive addition to the radio desk, if there is room for it.

Reliability is also something to be considered in maintaining equipment. The NC183D is fifty years old and still perking along. Unless the bandswitch or one of the coils fail, most of the parts can be replaced with modern equivalents, and tubes are still available. The open point-to-point wiring of these older receivers makes repairs easier than on the densely packed circuit boards of the modern radios.

One would expect the Icom to be more reliable, since it uses solid-state parts, but there are some particular reliability issues with the R71. The primary one is that the operating software is stored in volatile memory, which is powered by a lithium battery. When the battery dies, the radio must be sent back to Icom for reprogramming. Most users have not reported having this problem. Icom America details how to replace the battery without losing the memory contents at their service FAQ's webpage (start at **http://www.icomamerica.com**).

In addition, there have been problems with electrolytic capacitors drying out and trimmer capacitors failing, detailed in the troubleshooting guide listed on the service FAQ's page. Over time, the integrated circuits used in modern receivers will become unavailable for puchase, potentially rendering these radios inoperable, should one of these ICs fail.

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; editor@monitoringtimes.com.

Jock Elliott KB2GOM
jockelliott@monitoringtimes.com

Cobra's Excellent PR 350-2WXVP

Once again, the outlook has improved for folks who think they might like to have a pair of two-way radios. When Family Radio Services radios were introduced several years ago, it was not uncommon for a single handitalkie to cost $150 or more. If you wanted rechargeable batteries and a drop-in charger, you could expect to spend considerably more. And if you wanted a *pair* of radios, rechargeable batteries, and chargers, it would cost you twice as much.

Now, however, you can obtain a pair of 22-channel Cobra PR350WX radios with rechargeable batteries and a drop-in charger that will charge either both radios or both batteries outside the radios, for a measly $89.95 suggested retail price, neatly packaged in a blister pack and called the "PR 350-2WXVP." Even better, both radios have NOAA weather radio (10 channels) and weather alert capability built in. That, dear reader, is a "Good Deal" in anyone's book.

The PR350WX offers transmit and receive capabilities on 22 channels – 7 FRS/GMRS, 8 GMRS, and 7 FRS.

Here's how they are allocated according to the owner's manual:

	Frequency	Service	Power (watts)
1	462.5625	FRS/GMRS	1
2	462.5875	FRS/GMRS	1
3	462.6125	FRS/GMRS	1
4	462.6375	FRS/GMRS	1
5	462.6625	FRS/GMRS	1
6	462.6875	FRS/GMRS	1
7	462.7125	FRS/GMRS	1
8	467.5625	FRS	.5
9	467.5825	FRS	.5
10.	467.6125	FRS	.5
11	467.6375	FRS	.5
12	467.6625	FRS	.5
13	467.6875	FRS	.5
14	467.7125	FRS	.5
15	462.5500	GMRS	1
16	462.5750	GMRS	1
17	462.6000	GMRS	1
18	462.6250	GMRS	1
19	462.6500	GMRS	1
20	462.6750	GMRS	1
21	462.7000	GMRS	1
22	462.7250	GMRS	1

FRS, of course, stands for Family Radio Service, an unlicensed radio service that is limited by FCC regulation to one-half watt transmitter power. GMRS is the abbreviation for General Mobile Radio Service, a licensed radio service. You pay a fee to the Federal Communications Commission to get a license to use GMRS frequencies. While there are GMRS repeaters across the country, the PR350WX is simplex only.

GMRS handitalkies often have two watts of power. As a result they generally can talk farther than FRS radios under the same condition, so there is an advantage in combining FRS and GMRS in the same two-way radio. The PR350WX has only one watt of transmit power on GRMS frequencies, but as we'll see in just a bit, the impact on performance is minimal.

Page four of the PR350WX Owner's Manual states clearly that a license is required to operate on GMRS frequencies. The Owner's Manual gives complete information on where to obtain the necessary forms and instructions on page 18 of the manual, but it wouldn't surprise me if few people actually do so.

✦ We Test the PR350WX

Let's take a tour of the PR350WX. The first thing that my test partner (and wife) noticed is the sculpted shape that nestles comfortably in the hand. The other thing that struck my eye is that there are no knobs on this radio . . . not one. The upper front panel of the PR350WX is dominated by a backlit liquid crystal display that is surrounded by five soft rubbery buttons. The LCD lets the user know what is going on with the radio – the active channel, CTCSS code, low battery, roger beep status, even a NOAA weather radio all hazards alert icon. Directly to the left of the LCD is a rocker button for raising and lowering the volume; next to that (moving counterclockwise around the display), a CALL button; next, a MODE button for activating various functions of the radio (such as weather radio, weather alert, channel and CTCSS code scan). To the right side of the display, a rocker button for changing channels, and, directly above the display, a LOCK button. Below the display, the bottom of the radio is dominated by a speaker/microphone grill.

On top of the radio is a stubby flexible antenna, a jack for plugging in a headset, and a soft rubber ON/OFF switch. To turn the radio, press the switch and hold it down for a few seconds until the radio wakes up. You also have to press and hold to turn it off. This prevents inadvertent powering on or off while clipped to your belt.

I like the PR350WX a whole lot. The audio was exceptionally clear and strong and the range was within a tenth of a mile of the best FRS/GMRS radios I have tested. The rechargeable batteries can be popped out on a moment's notice and replaced with four ordinary AAA alkaline cells. The push-to-talk button has an audible "click" that never leaves you in doubt whether the button is fully depressed. You can even leave the radios in the charging stand as long as you like without damaging the rechargeable batteries.

In short, the PR350-2WXVP package delivers a whole lot of goodies, with commendable performance, at a very reasonable price. Highly recommended. For additional information, visit **http://www.cobra.com**.

The Cobra PR350-2WXVP: a lot of goodies, commendable performance, and a very reasonable price.

Big Savings on Radio Scanners

Uniden® SCANNERS

AOR

Bearcat® 785DGV APCO P-25 Digital Ready with free deluxe scanner headset

CEI on-line or phone special price $339.95

1,000 Channels • 27 bands • CTCSS/DCS • S Meter

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

New Product. **Scheduled for initial release January 10, 2003. Order now.**
Frequency Coverage: 25.0000-512.0000 MHz., 806.000-823.9875MHz., 849.0125-868.9875 MHz., 894.0125-956.000, 1240.000-1300.000 MHz.

When you buy your Bearcat 785D state-of-the art Digital Capable Trunktracker III package deal from Communications Electronics, you get more. The GV means "Great Value." With your BC785D scanner purchase, you also get a **free deluxe scanner headphone** designed for home or race track use. The Bearcat 785D has 1,000 channels and the widest frequency coverage of any Bearcat scanner ever. When you order the optional **BCI25D, APCO Project 25 Digital Card** for $299.95, when installed, you can monitor Public Safety Organizations who currently use conventional, trunked 3,600 baud and mixed mode APCO Project 25 systems. APCO project 25 is a modulation process where voice communications are converted into digital communications similar to digital mobile phones. You can also monitor Motorola, EDACS, EDACS SCAT, and EF Johnson systems. Many more features such as S.A.M.E. weather alert, full-frequency display and backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control with RS232 port, Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, operate your scanner from your computer running Windows. Order Scancat Gold for Windows, part number **SGFW** for $99.95 and magnetic mount antenna part number **ANTMMBNC** for $29.95. Not compatible with 9,600 baud APCO digital control channel with digital voice, AGEIS, ASTRO or ESAS systems. For fastest delivery, order on-line at www.usascan.com.

Bearcat® 895XLT Trunk Tracker

Manufacturer suggested list price $499.95

Less -$320 Instant Rebate / Special $179.95

300 Channels • 10 banks • Built-in CTCSS • S Meter

Size: 10 1/2" Wide x 7 1/2" Deep x 3 3/8" High

Frequency Coverage: 29.000-54.000 MHz., 108.000-174 MHz., 216.000-512.000 MHz., 806.000-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

The Bearcat 895XLT is superb for intercepting trunked analog communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning pleasure, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. **CAT895** Computer serial cable $29.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.

Bearcat® 245XLT Trunk Tracker II

Mfg. suggested list price $429.95/**CEI price $189.95**

300 Channels • 10 banks • Trunk Scan and Scan Lists
Trunk Lockout • Trunk Delay • Cloning Capability
10 Priority Channels • Programmed Service Search
Size: 2 1/2" Wide x 1 3/4" Deep x 6" High

Frequency Coverage:
29.000-54.000 MHz., 108-174 MHz., 406-512 MHz., 806-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

Our Bearcat TrunkTracker BC245XLT is the world's first scanner designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. Our scanner offers many new benefits such as Multi-Track - Track more than one trunking system at a time and scan conventional and trunked systems at the same time. 300 Channels - Program one frequency into each channel. 12 Bands, 10 Banks - Includes 12 bands, with aircraft and 800 MHz. 10 banks with 30 channels each are useful for storing similar frequencies to maintain faster scanning cycles or for storing all the frequencies of a trunked system. Smart Scanner - Automatically program your BC245XLT with all the frequencies and trunking talk groups for your local area by accessing the Bearcat national database with your PC. If you do not have a PC simply use an external modem. Turbo Search - Increases the search speed to 300 steps per second when monitoring frequency bands with 5 KHz. steps. 10 Priority Channels - You can assign one priority channel in each bank. Assigning a priority channel allows you to keep track of activity on your most important channels while monitoring other channels for transmissions. Preprogrammed Service (SVC) Search - Allows you to toggle through preprogrammed police, fire/emergency, railroad, aircraft, marine, and weather frequencies. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in your scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - An LCD light remains on for 15 seconds when the back light key is pressed. Autolight - Automatically turns the backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BC245XLT automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BC245XLT also works as a conventional scanner. Now it's easy to continuously monitor many radio conversations even though the message is switching frequencies. The BC245XLT comes with AC adapter, one rechargeable long life ni-cad battery pack, belt clip, flexible rubber antenna, earphone, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, ESAS or LTR systems.

Hear more action on your radio scanner today. Order on-line at www.usascan.com for quick delivery. For maximum scanning satisfaction, control your Bearcat 245XLT from your computer running Windows. Order Scancat Gold for Windows, part number **SGFW** for $99.95 or the surveillance enhanced version with audio recording part number **SGFWSE** for $159.95.

More Radio Products

Save even more on radio scanners when purchased directly from CEI. Your CEI price after instant rebate is listed below:

Bearcat 895XLT 300 ch. Trunktracker I base/mobile scanner	$179.95
Bearcat 785D 1,000 channel Trunktracker III base/mobile	$339.95
Bearcat BCi25D APCO Project 25 digital software card	$299.95
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
Sangean ATS818 45 memory shortwave receiver	$139.95
Uniden WX500 Weather Alert with S.A.M.E. feature	$39.95

AOR® AR8200 Mark IIB Radio Scanner

AOR8200 Mark IIB-A wideband handheld scanner/**SPECIAL $539.95**

1,000 Channels • 20 banks • 50 Select Scan Channels
PASS channels: 50 per search bank + 50 for VFO search
Frequency step programmable in multiples of 50 Hz.
Size: 2 1/2" Wide x 1 3/8" Deep x 6 1/8" High

Frequency Coverage:
500 KHz to 823.995 MHz, 849.0125-868.995 MHz, 894.0125-2,040.000 MHz
(Full coverage receivers available for export and FCC approved users.)

The AOR AR8200 Mark IIB is the ideal handheld radio scanner for communications professionals. It features all mode receive: WFM, NFM, SFM (Super Narrow FM), WAM, AM, NAM (wide, standard, narrow AM), USB, LSB & CW. Super narrow FM plus Wide and Narrow AM in addition to the standard modes. The AR8200 also has a versatile multifunctional band scope with save trace facility, twin frequency readout with bar signal meter, battery save feature with battery low legend, separate controls for volume and squelch, arrow four way side rocker with separate main tuning dial, user selectable keypad beep/illumination and LCD contrast, write protect and keypad lock, programmable scan and search including LINK, FREE, DELAY, AUDIO, LEVEL, MODE, computer socket fitted for control, clone and record, Flash-ROM no battery required memory, true carrier reinsertion in SSB modes, RF preselection of mid VHF bands, Detachable MW bar aerial. Tuning steps are programmable in multiples of 50 Hz in all modes, 8.33 KHz airband step correctly supported, Step-adjust, frequency offset, AFC, Noise limited & attenuator, Wide and Narrow AM in addition to the standard modes. For maximum scanning pleasure, you can add one of the following optional slot cards to this scanner: **CT8200** CTCSS squelch & search decoder $89.95; **EM8200** External 4,000 channel backup memory, 160 search banks. $69.95; **RU8200** about 20 seconds chip based recording and playback $69.95; **TE8200** 256 step tone eliminator $59.95. In addition, two leads are available for use with the option socket. **CC8200A** personal computer control lead $109.95; **CR8200** tape recording lead $59.95. Includes 4 1,000 mAh AA ni-cad batteries, charger, cigarette lighter adapter, whip aerial, MW bar antenna, belt hook, strap and one year limited AOR warranty. For fastest delivery, enter your order on-line at http://www.usascan.com.

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What's NEW

Tell them you saw it in Monitoring Times

AOR Signal Magnet

The AOR WL500 captures and amplifies transmissions in the 3.5 ~ 30 MHz range (shortwave). Up to 16dB of gain can be realized, using a 9 V battery or an external 12VDC power source. The diamond-shaped antenna, with a diameter of about 2 feet, can hang freely or be placed in a window.

Connection to your receiver is achieved through a standard BNC connector (provided). Assembly and disassembly is easy, and the WL500 fits into a compact travel bag, ready to travel wherever you go. An optional 500LM bar element is available to provide enhanced low band operation.

The WL500 is available from Grove Enterprises for $198.95. For more information call 800-438-8155 or visit **http://www.grove-ent.com** Watch for an upcoming performance review in *Monitoring Times*.

SDR on your PDA?

Just as we are beginning to understand potential applications of software-defined radio (SDR), someone is already figuring out how to make it more mobile, so you don't have to lug around your laptop. Vanu, Inc. has refined the concept into a demonstration model which consists of a standard XScale-based Hewlett-Packard iPAQ PDA running an embedded Linux operating system; a prototype 100-475 MHz radio transceiver housed in a standard iPAQ expansion pack; and Vanu's "Software Radio" technology running the required signal processing functions.

The above configuration is said to support commercial analog FM radio services, including Family Radio Service and the public safety APCO 25 digital standard! Future prototypes are expected to extend the range to 900 MHz and include support for cellular and PCS protocols such as TDMA and GSM.

When interoperability is the catchphrase of the day, a software-defined radio which can substitute for multiple hardware radios and enable users to switch between various frequency ranges and protocols should find a ready market. For more on the Vanu Software Radio, visit **http://www.vanu.com**. To get involved in software radio, the basic GNURadio framework is freely available at **http://www.gnu.org/software/gnuradio/gnuradio.html** Get in on the cutting edge!

Remote Possibilities

Swl-remotes.com has introduced a new product for remote control of the ICOM IC-R75 receiver. You can now control your R75 while relaxing in your easy chair instead of hunched over the radio.

The SWL IR Remote is a full-featured remote control box for the R75 that permits controlling the receiver using a standard TV universal remote. Using the universal remote, you can enter frequencies directly, move through frequencies, adjust the volume, set modes, and even adjust the RF Gain, Squelch, and PBT controls. The memories on the R75 can be directly entered, transferred to the VFO, saved from the VFO to memory, and scans initiated from the remote.

The keys on the universal remote are used in a very intuitive way and with a minimum of keystrokes to perform the operations. The built-in LED on the SWL Remote box gives feedback on the operation of the TV controller and even informs the user when the RF Gain, Squelch, and PBT controls are in their centered or normal positions.

The SWL IR Remote connects to the R75 Remote port with the supplied cable and uses the CI-V protocol built into the R75 to control the radio. The DC wall adapter supplies the necessary power for the control unit. A comprehensive operating manual is available as a download from the Internet. The SWL IR Remote is $79.95 plus shipping. To order or for more information visit the web site at **http://www.swl-remotes.com** or contact sales@swl-remotes.com (sorry, no phone number or address was given).

There is also a version of the SWL IR Remote available to operate ICOM transceivers and receivers that use the CI-V protocol.

Connect to Your Old TV Set

Most older TV sets do not have the audio/video connections needed to hook up a new DVD player, gaming console, or camcorder. But that old TV can be put back to good use with the Monster's ConnectAll 200 that converts S-Video to RF signals for older video tuners.

Just like the connection from cable TV, ConnectAll 200 uses a single cable for both audio and video. But unlike other devices, ConnectAll 200 can use the high-quality S-Video output found on today's DVD players and gaming consoles. Monster's ConnectAll 200 takes the higher quality S-Video signal and converts it for convenient viewing through a regular TV tuner on channel 3 or 4. This results in brighter and sharper video with the convenience of an RF-type connection.

So, older TVs don't have to be replaced because they lack the same high-quality connections as your modern components. Monster's

What's NEW

Tell them you saw it in Monitoring Times

high performance S-Video RF Modulator connects it all!

ConnectAll 200 retails for $29.95 from your local Monster Cable dealer.

ARRL Reviews by

Larry Van Horn, N5FPW

Now You're Talking! *5th edition*

For many years the amateur radio Novice class license was the entry level ticket for operating in the ham (amateur radio) bands. In April 2000 the FCC reworked the amateur license structure and the Novice class license was abolished. Now the Technician amateur radio license is the entry level license for this service. To help the prospective ham study for the 35 question Technician license test, the ARRL has released the new 5th edition of its publication - *Now You're Talking!*

Now You're Talking! is amateur radio's most popular beginner's study guide. In one book, you have everything you need to earn your Technician class license. Study this book and you should have no problem passing your 35-question license exam. (There is no Morse code test required to earn the Technician license.)

Inside this ARRL publication you'll find friendly, easy-to-understand theory and rules associated with the Technician class license. This new edition also has the latest Technician class question pool (Element 2) with the answer key that is being used by the Volunteer Examiners (VE) for use on exams beginning July 1, 2003. There are detailed explanations for all questions in the Tech pool, including FCC rules.

But *Now You're Talking!* is far more than just the Tech exam question pool. You will also learn how to select and set up radios, accessories and antennas for your ham radio station. It will also guide you through your first contacts on all the popular operating modes, including FM repeaters and packet radio. Practical information every beginning ham needs is presented clearly and simply, in small doses. *Now You're Talking!* shows you how to enjoy ham radio to the fullest.

And when you pass that Tech license, you now have a boatload of frequencies to operate on (50 MHz and above). You can experience a wide range of amateur operating activities including digital communications, space communications, terrestrial repeaters, amateur TV and much more.

So what are you waiting for? Time to quit making excuses and start studying for the Tech ham exam. It has never been easier to get on the ham bands and *Now You're Talking!* makes it a snap.

This first printing of the 5th edition (#8810) is available for $19.95 plus shipping and handling from the ARRL online **http://www.arrl.org** or by calling their toll free number at 1-800-277-5289. The snail mail address is ARRL, 225 Main Street, Newington, CT 06111-1494.

ARRL 2003-2004 Repeater Directory

Good things come in small packages, and the 32nd edition of this ARRL publication is no exception. If you travel and carry your VHF/UHF gear along for the trip, or if you want a detailed listing of repeater operations in your area, state or nationwide, nothing fits the bill for the price better than the pocket size *ARRL Repeater Directory*.

In this latest League missive you will find updated listings for thousands of repeaters across the United States, its insular territories, and Canada. There are repeater listings for the following frequency ranges: 29.5-29.7 MHz, 51-54 MHz, 144-148 MHz, 222-225 MHz, 420-450 MHz, 902-928 MHz, and 1240 MHz and above. You will also find listings for ATV (Amateur Television) repeaters and the new IRLP (Internet Linked nodes) repeaters.

In addition to the repeater listings, this publication also includes: operating tips for newly licensed amateurs, frequency coordinator contact information, CTCSS and Digital Coded Squelch (DCS) information, VHF/UHF bandplan listings, and a 2-meter channel-spacing map.

Large on information and small in size, this publication also carries a small price tag – $9.95 plus shipping and handing. You can order this new repeater directory (#8918) or any other League publication via the contacts listed above.

WinScanDP

If you're the owner of a new Uniden digital scanner, you may be waiting for the newest WinScan software to be released before getting hot and heavy into programming those 1000 channels. But, while the anticipated WinScan 3 program will allow you to control the radio

through your computer, you don't have to wait for its release to manage your frequency lists.

The inexpensive WinScanDP Version 1.0 will let you enter and manage frequency and talkgroup IDs, bank settings, search criteria, alpha tags and more. If you own both a BC250D and a BC785D, you can switch radios at the click of a button; the software will detect which radios are connected to your PC on what COM ports.

WinScanDP is $24.95. You can purchase and download the software directly from **http://www.pozillasoft.com** (a demo version is also available) or if you prefer a CD they are available for purchase from The Ham Station, Scanner Master, or MGH Distributing.

Business News

Much concern has been expressed by Grundig fans at the news earlier this year that the German corporation declared bankruptcy. Bottom line: no need to worry. The insolvency of Grundig in Europe has no bearing on the US company (formerly Lextronix, now E-Ton). For the past eighteen years they have been a separate entity and they, not Grundig Europe were manufacturing the shortwave radios. Therefore, sales and repair of Grundig shortwave radios will be unaffected.

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 for All!

As I write, some seventy people – including me – are taking part in the first continuous test transmissions from Europe's new all-digital, geostationary weather satellite (WXSAT) MSG-1. But this was not a scenario the developers intended!

Meteosat Second Generation (MSG-1) was launched last August, but during commissioning in October, a solid-state-amplifier unexpectedly failed – causing a re-think of strategy. In an amazingly fortuitous move, the decision was taken to expand the already-in-operation HotBird-6 digital video broadcast (DVB) transmission of some polar orbiting WXSAT data to include MSG-1 HRIT – high rate information transmission – the highest resolution transmissions available.

Unlike the situation in America where such data is transmitted free-to-air from government funded satellites, transmissions from the European satellite are to be largely encrypted after the testing phase is over. One reason for encryption is that not all European countries have funded the cost of the Meteosat program, so the Council of Ministers decided on this controversial move. With few exceptions, amateurs have had very limited access to high resolution data from the Meteosat satellites during the last ten years or so. Now, amateurs and professionals are helping Eumetsat to establish the reliability of this mode of data transmission.

Fig 1: MSG-1 HRIT test image copyright Eumetsat 2003 received and processed by Arne van Belle.

The two main image streams that will eventually come from MSG-1 and GOES are HRIT and LRIT. HRIT can be compared to Primary Data (PDUS) or GVAR, and LRIT to WEFAX. LRIT – Low Rate Information Transmission – from MSG-1 is being tested later this year.

Amateur interest in HRIT reception would have been virtually zero because of the requirement for a giant dish to receive the data stream direct from MSG-1; in Britain, 3m dishes are not normally acceptable on domestic properties by the local authorities. In addition, the specialist HRIT receiver is likely to be considerably over the budget of the average hobbyist!

Suddenly we have a failed amplifier, followed by a changed downlink plan. Routed via HotBird-6, a European satellite television transponder, means a much cheaper method for hobbyists to obtain quality data. Cheap systems to receive HotBird data were quickly made available by Timestep Weather Systems, UK, and a package that included a DVB card for the receiving computer was included if required. The Eumetsat packet decoding software issued by T-Systems is a compulsory purchase – and you have to produce the pictures! David Taylor of Edinburgh, UK, has developed an MSG-1 data manager that produces all 12 channels.

◆ NOAA - HRIT and LRIT

Between now and 2010, NOAA is implementing LRIT, amongst other changes that take advantage of the new technologies. Meteorologists have requirements for additional data, and there is a need to achieve a cost effective United States environmental satellite program.

GOES WEFAX

The earliest change will be the replacement of the GOES analog WEFAX transmission service with the digital Low Rate Information Transmission during this year and continuing through to 2005. Test LRIT transmissions will be made from the GOES-East (GOES-12) satellite. During 2004, a regular schedule of alternating analog WEFAX and digital LRIT transmissions will be made each hour. By early 2005, it is expected NOAA will have completed this transition and WEFAX will no longer be transmitted from the NOAA GOES satellites.

LRIT will continue to be transmitted on 1691.0 MHz, but users will have to replace receiving hardware and processing software to utilize it. A definition for the global specification for LRIT was agreed to by the nations operating meteorological satellite systems, and NOAA will follow this definition. LRIT is to be implemented by all meteorological/environmental satellite operators during the next few years.

NOAA has released its general hardware specifications as well as the source code for processing the LRIT data stream to manufacturers for the development of LRIT receivers. For further information and documentation on NOAA LRIT transition plans, refer to the LRIT web site. **http://noaasis.noaa.gov/WEFAX/**

◆ NOAA-17 reduced transmission power

Near the end of April, NOAA-17's STX-3 transmitter (1707.0 MHz) power dropped from 8 watts to 2.4 watts. For those of us receiving signals using nominal-sized tracking dishes, the main effect seems to be extra noise near the lower elevation parts of passes.

◆ GMS-5 to GOES-9 Transition Plan

Thomas Renkevens reminds us that GOES-9 (formerly GOES-west) was taken out of service some years ago and replaced with GOES-10, when it was thought that GOES-9 was in imminent danger of failing. Since that time, GOES-9 has been taken out of storage on two separate occasions, and the data do not suggest an imminent failure. Imagery data appears the same as when GOES-9 was shut down. During the most recent time that GOES-9 was tested (December), GOES-9 did experience some problems with its momentum wheels; the satellite was placed back in storage.

The operators are confident that when GOES-9 is brought into operations they can run the spacecraft in a different momentum wheel configuration and we should expect good data. Recall that GOES-8 was running in a similar momentum wheel configuration for years without additional problems.

GOES-9 should be able to provide data over the Pacific until MTSAT-1R (the Japanese Meteorological Agency's replacement for GMS-5) is launched.

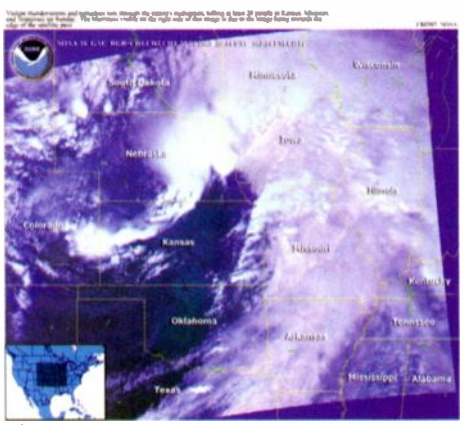

Fig 2: NOAA-16 4 May captures tornadoes and thunderstorms - courtesy NOAA.

Frequencies

NOAA-12 and -15 transmit APT on 137.50 MHz
NOAA-17 transmits APT on 137.62 MHz
GOES-12 and GOES-10 use 1691 MHz for WEFAX

INDEX OF ADVERTISERS

Stock Exchange

LINE ADS

NON-COMMERCIAL SUBSCRIBER RATES: $.25 per word — *Subscribers only!*
All merchandise must be personal and radio-related.

COMMERCIAL, NON-SUBSCRIBER, AND MULTIPLE SALES RATES: $1.00 per word. Commercial line ads printed in bold type.

Ads for **Stock Exchange** must be received 45 days prior to publication date. All ads must be paid in advance to *Monitoring Times*.
Ad copy must be typed for legibility.

1-3/4" SQUARE DISPLAY AD:
$50 per issue if camera-ready copy or, $85 if copy to be typeset. Photo-reduction $5 additional charge. For more information on commercial ads, contact Beth Leinbach, 828-389-4007.

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

MT Marks a Milestone

July marks the anniversary of a very important player in *MT*'s evolution. Assistant editor Larry Van Horn first began writing for *Monitoring Times* 20 years ago, and 10 years ago he moved to Brasstown as a fulltime Grove Enterprises staff member! We quizzed Larry about his long career with radio and with *MT*.

MT> Larry, how did you get started in the radio hobby?

LVH> In 1964 my parents gave me my first radio, an old five tube GE AM clock radio as a Christmas gift. It was supposed to help get me up for school. But that old black clock radio did much more. I also used it to explore the local broadcast dial during the daytime. I soon discovered I could also receive distant stations (especially at night) as well. I then started picking up Popular Electronics, Electronics Illustrated (with articles by my old friend Tom Kneitel) and other magazines of the era to learn more about this hobby of distant radio station listening. I soon discovered that others also listened to distant stations in other bands such as shortwave, the FM and TV broadcast bands. The following Christmas I asked for and received a Hallicrafters S-120 tube/analog dial shortwave radio and the rest is history. I haven't looked back since!

MT> How did you get started writing for MT, and what was your first contribution?

LVH> I actually first started writing the Satellite Listeners column for the now defunct RCMA Scanner Club newsletter, back around 1980-1981. It was there I was first introduced in print to Mr. Bob Grove, the RCMA Federal/Military columnist. Soon afterward I was one of several hundred that received the first paper edition of MT from Bob and Judy. In the summer of 1983 Bob invited me to write a satellite listening column for MT and a book on satellite listening for Grove. My first MT column was written in July or August 1983 and appeared in the Sep/Oct 1983 issue. The column was entitled Signals from Space and the first missive covered ham radio and the STS-9 mission of Owen Garriott, W5LFL. Shortly thereafter MT went monthly and I have had monthly deadlines ever since.

The Signals from Space column ran until Feb 1988. Then I started the Utility World column and wrote that for 10 consecutive years. Now I write MT's Fed Files, Milcom and occasional Service Search columns plus feature articles. I joined the Brasstown staff fulltime in July 1993 as the staff writer, MT assistant editor, columnist, publications author, Grove product technical support, and sales clerk!

MT> You've edited or authored books and columns in such different fields. How did it come about that you developed expertise in so many areas?

LVH> It involves many hours of monitoring any frequency I could find carrying an RF signal. I don't specialize or limit my listening to one or two types of radio monitoring as most do. I consider myself a full spectrum monitor. That is because I love the chase and discovering a new frequency or service that no one else even knew was on the air.

MT> What is your favorite radio target today?

LVH> Wow! That is hard to answer. I still love full spectrum monitoring. I guess my latest passion is what I spend most of my radio time on – amateur radio contesting and chasing DX in the ham bands. Sort of goes along with my love for the thrill of the chase.

MT> Do you have a favorite receiver among all the radios you have owned over the years?

LVH> Again, another hard question to answer. I have been blessed to use just about all of them over the last few years. I love several of the older Drake radios, particularly the Drake SPR-4 receiver. But my favorite shortwave receiver is the Drake R-8 and my favorite VHF/UHF scanner is the new Uniden BC-785D. I don't like any of the wideband radios due to the compromise in performance and the fact that I am limited to monitoring only one thing at a time.

MT> What was your most memorable moment in monitoring?

LVH> Though there have been many monitoring events over my nearly 39 years of dial twisting, I would say the one that sticks in my mind the most was monitoring the Space Shuttle Challenger disaster in Jan 1986. That was a total monitoring effort, bringing together the entire spectrum to cover the story for Monitoring Times.

MT> You're sometimes known as "Mr. Frequency"; how do you manage to compile such accurate frequency lists?

LVH> When you're always on the hunt for new stuff, the fruits of that effort is a solid map of the radio spectrum at your location. I spend hours turning the receiver tuning knob on HF and using the search feature in the VHF/UHF spectrum. I also use sources I trust as a verification tool to what I am hearing. The successful radio monitors in our hobby generate frequency information into the radio community, instead of begging for someone else's list on internet newsgroups.

MT> What's your best piece of advice for newcomers to the hobby?

LVH> Listen, listen, and listen some more. If you do not know what can regularly be heard throughout your local spectrum, you're not going to be very successful. If you don't know what normal is, then when the abnormal shows up you won't be able to recognize it. You need to learn propagation and you need to learn your own station's limitations. And you need to keep good records of what you hear and frequencies you find active. But all this will not happen unless you listen. Turn your radios on and your internet connection off.

MT> Do you have a challenge to issue to those who think there's nothing new to listen to or that digital comms are the end of radio monitoring?

LVH> Quit listening to the doom and gloomers on the internet. This hobby is not dying or dead. Maybe those who say that are dead – to the changes being made to our hobby. There is plenty to hear on the radio spectrum. It may not be what you used to hear 10 or 20 years ago, but the spectrum is dynamic and changing thanks to the changing world of technology. The radio spectrum still has the same amount of real estate, it still propagates frequencies the same way it always has, and the bands are just as crowded now as they were several years ago. But if you aren't willing to change your radio listening habits or upgrade your shack with new technology that lets you hear the new services, you will be left behind. Not only is that true in life, but that is true in the radio hobby as well.

Bob Grove and Rachel Baughn's comments appear on page 6.

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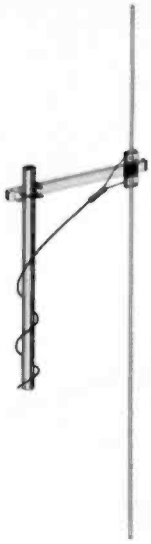

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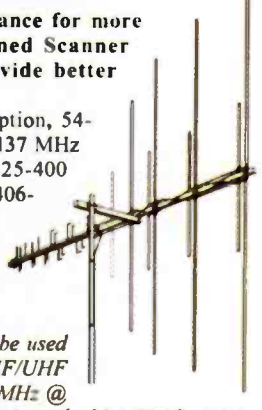

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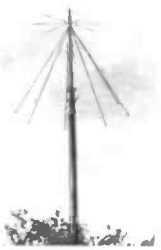

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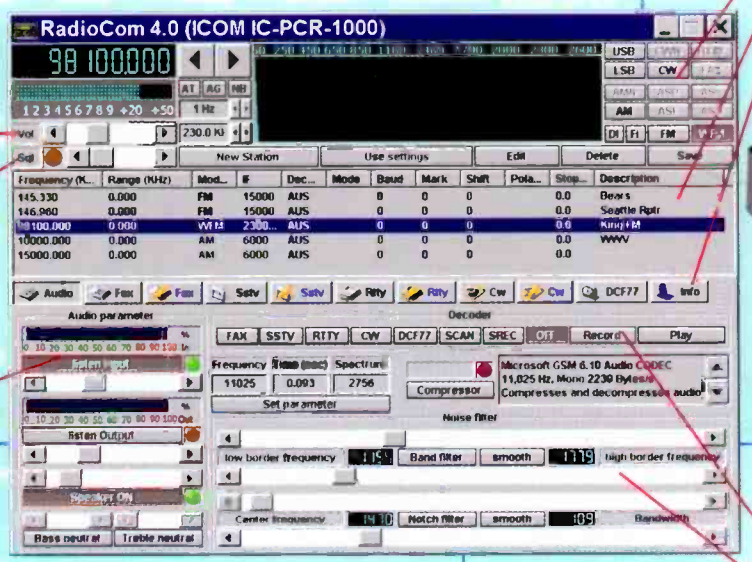

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