

AOR AR8200 Mark II B & AR8600 Receivers

Welcome to the Top Shelf



AOR wide-range communications receivers are designed and built for the serious user. Among our customers are governments and government agencies, news gathering operations, military units, laboratories, public safety operations and more. If you are a demanding user who expects the best, you're ready for AOR, The Serious Choice in Advanced Technology Receivers.™ Don't look for AOR on the bottom shelf at your local discount store, you won't find us there. For dealer locations, check our web site, www.aorusa.com



**Technology so advanced,
it's patented** (US Patent 6,002,924).

AR8200 Mark II B

Base performance in a hand-held receiver!

- 530 KHz ~ 2040 MHz * coverage
- 1,000 memory channels (20 banks) with alphanumeric labeling
- Computer control and programming (requires optional cable)
- Download free control software from AOR web site
- "All Mode" reception includes "super narrow" FM plus wide and narrow AM and USB, LSB, CW and standard AM and FM modes
- True carrier reinsertion in USB and LSB modes
Includes 3 KHz SSB filter!
- Detachable MW antenna with negative feedback
- Optional internal slot cards expand capabilities. Choose from Memory Expansion (up to 4,000 memories), CTCSS Squelch & Search, Tone Eliminator, Voice Inverter** and Record Audio (saves up to 20 seconds of audio)
- Tuning steps programmable in multiples of 50 Hz in all modes
- 8.33 KHz airband step is correctly supported
- Noise limiter and attenuator
- Lighted keys
- Band activity "scope" display with "save trace" capability
- Four-way side panel rocker switch allows one-hand operation
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- 4 AA Ni-Cd batteries supplied, also uses standard AA dry cells
- BNC antenna connector
- Wide choice of accessories

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- Receive Modes: WFM, NFM, SFM, WAM, NAM, USB, LSB, CW
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- 1000 memory channels (20 banks x 50 memories/bank)
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- Add up to 3 optional slot cards: Tone eliminator, CTCSS, Voice Inversion**, Recording, External memory
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- 12 VDC operation
- BNC antenna connection
- Download free control software from AOR web site

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AOR U.S.A., Inc.
20655 S. Western Ave., Suite 112, Torrance, CA 90501, USA
Tel: 310-787-8615 Fax: 310-787-8619
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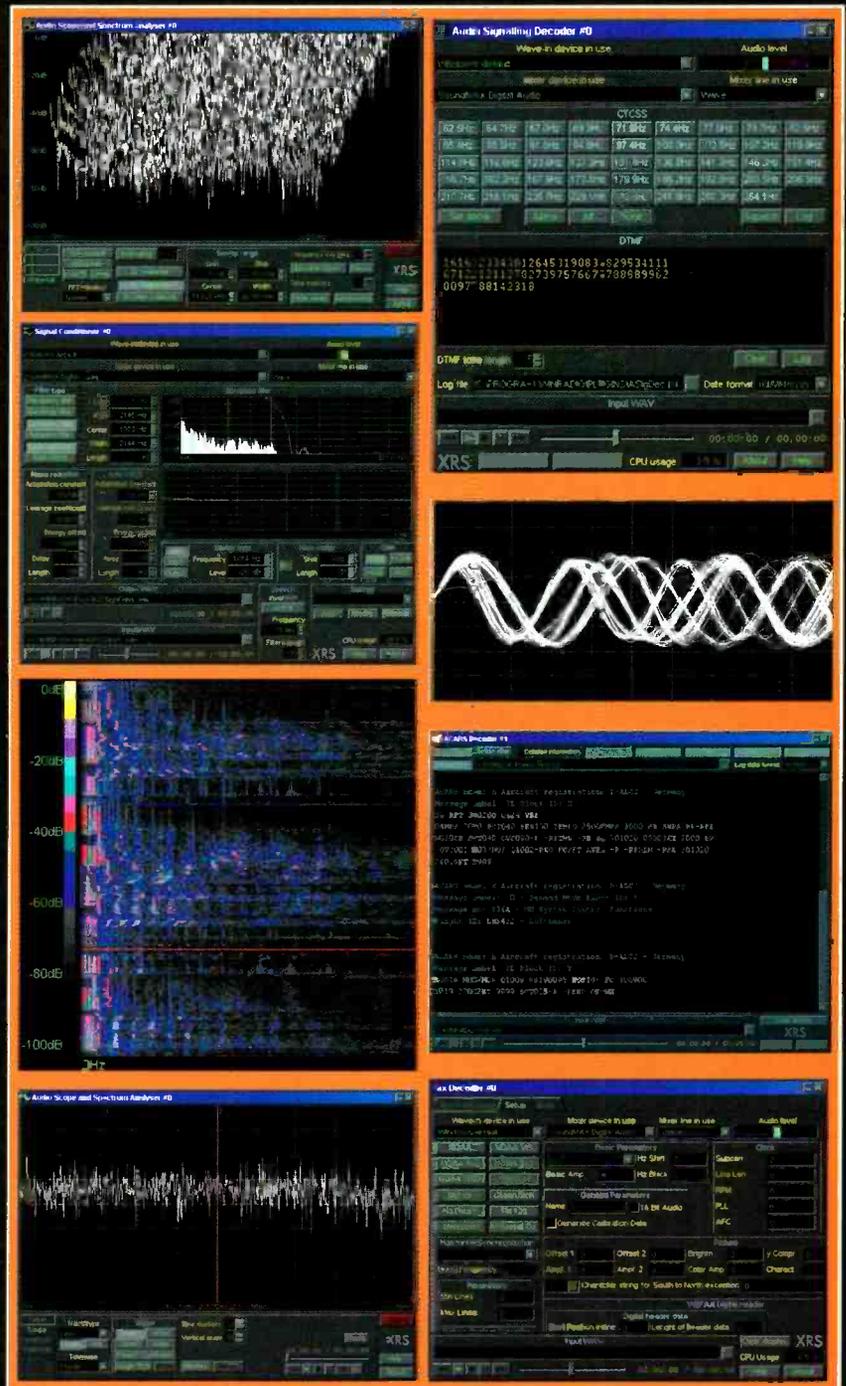
New Advanced Digital Suite.

The WiNRADiO Advanced Digital Suite provides a professional upgrade for existing users of the popular WiNRADiO Digital Suite. For new users it provides entry to the exciting world of signal decoding, analyzing and recording.

Enhanced new features include:

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- Audio Scope and Spectrum Analyzer with 2D and 3D waterfall displays
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- Signal Classifier to speed up scanning by eliminating undesired signals
- Audio Signalling Decoder with DTMF and CTCSS decoders
- Signal Conditioner with many types of filters including noise-reducing adaptive filters
- Packet Radio Decoder with a new correlative demodulator
- Squelch Controlled Recorder with pitch shifting and rate changing
- plus more!!!

All Advanced Digital Suite functions feature completely new and exciting graphics, with many new visual facilities and controls available.



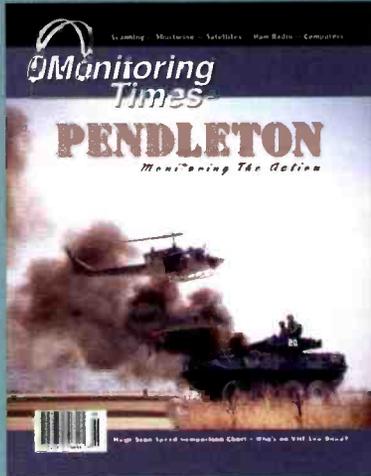
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www.winradio.com

Monitoring Times

Vol. 21, No. 6

June 2002



Lead Story

Monitoring Camp Pendleton

By Laura Quarantiello

Sooner or later, troops in training must experience live fire and undergo conditions as close to actual conflict as possible. The 125,000 acre spread of Camp Pendleton is one of the places where marine and navy forces get that experience, on the ground, in the air, and on the beaches.

With an average daily population of 55,000 people, there are a lot of communications going on, and the author has been listening in for years. Ironically, when she finally gets a chance to go on base and witness a live ordnance exercise in person, she can't hear a thing!

Story starts on page 10.
Cover photo by Laura Quarantiello.

On the Road with WinRADIO 14

By Bob Grove



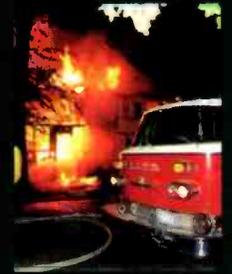
Some may think this computer-hosted radio is intended just for government or detective agencies or computer nerds, but the beauty of software radio is its flexibility. To demonstrate the WinRADIO's usefulness and ease of operation, Bob Grove takes it along on a road trip.

Who's Who in the Spectrum: VHF Low Band 18

By Larry Van Horn

With part six of our series taking us higher into the radio spectrum, we enter the realm of line-of-sight communications. The author explains the rudiments of VHF propagation, and why these frequencies sometimes break all the rules.

A huge variety of services use VHF Low Band. Government and military agencies, wildlife services, public service agencies, amateur radio operators, and business all have a stake in this frequency range.



Radio Aparecida 22

By Cassiano Alves Macedo



The host of the *DX Meeting* show introduces *MT* readers to Rádio Aparecida, which celebrated its 50th anniversary last year. This Catholic-sponsored Brazilian station broadcasts on mediumwave, via satellite, and on the tropical and shortwave bands.



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

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 Periodicals postage paid at Brasstown, NC,
 and additional mailing offices. Short excerpts
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Address: 7540 Highway 64 West,
 Brasstown, NC 28902-0098
 Telephone: (828) 837-9200
 Fax: (828) 837-2216 (24 hours)
 Internet Address: www.grove-ent.com or
 e-mail: mt@grove-ent.com
 Editorial e-mail: mteditor@grove-ent.com
 Subscriptions: order@grove-ent.com

Subscription Rates: \$25.95 in US; \$38.50
 Canada; and \$57.50 foreign elsewhere, US
 funds. Label indicates last issue of subscrip-
 tion. See page 90 for subscription information.

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

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 prises. Unsolicited manuscripts are accepted.
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Owners
 Bob and Judy Grove
 judy@grove-ent.com

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

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

Assistant Editor
 Larry Van Horn, N5FPW

Art Director
 Bill Grove

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

Reviews:

Which scanning receiver has the fastest scanning speed? The slowest? Bob Parnass charts the results of all the reviews he has performed over the years in an enlightening comparison. He also walks you through Tk545 – open source control software for the NRD-545. (See page 80.)

Two months ago John Catalano reviewed the sophisticated transmitter finger-
 printing software from Motron. This

month he tries out Xmit_ID – a freeware program with the same purpose – to be able to pick out individual transmitters operating on the same frequency. (See p.82).

Jock Elliott is still trying to find himself. Fortunately, no soul-searching is required with the Magellan MAP 330 GPS Receiver. (See p.87 for the first of two parts.)

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Chairman Urges Transition to Digital TV

The transition from analog to digital television is going painfully slow. In an unexpected move, FCC chairman Michael Powell unveiled a voluntary plan April 4th that he hopes will jump-start the conversion of the nation's TV industry to digital television.

The plan was contained in identical letters sent to Sen. Fritz Hollings (D- S.C.) Chairman of the Senate Committee on Commerce, Science and Transportation and Rep. W. J. "Billy" Tauzin (R- La.) Chairman, House Committee on Energy and Commerce. Copies of the letters were sent to all committee members.

Powell said he applauded their continuing efforts to advance the availability of digital television for consumers. "In support of those efforts and in the same spirit, I am writing to set forth a plan that I hope will provide a near-term boost to the DTV transition."

"...the plan seeks to advance two key goals: (1) increasing the level of compelling digital content available to consumers; and (2) providing cable subscribers access to that content over their cable systems."

"The plan is purely voluntary but, as you can see, contemplates that each relevant industry will play a significant role." Powell said he would be seeking commitments on his proposal from industry sectors.

The plan asks that television station owners, program content providers, the cable industry and TV set makers cooperate in a speedier transition to digital television. Up until now, each segment of the industry has been waiting for consumer acceptance of digital TV before increasing their participation.

It is a classic "chicken and egg" confrontation. The consumer has been reluctant to invest in a product that is largely unavailable and the television industry has been unwilling to ramp up HDTV content when there are so few receivers capable of high definition content reception.

The National Cable & Telecommunications Association neither endorsed nor opposed Powell's plan. They called the proposals "thought-provoking," many of which "warrant further study."

According to the National Association of Broadcasters, 258 TV stations are currently transmitting digital signals that can reach 76.8% of U.S. households. Congress granted broadcasters a second channel to offer digital and analog TV. As part of the deal, broadcasters keep their analog channel until digital TV penetration reaches 85% or 2006, whichever is later.

Congress expects to take in some \$60 billion from the auction of the analog spectrum that broadcasters are supposed to return, and it wants its money. Forrester Research thinks 2016 is more likely.

Only about 1.4 million of the 28.3 million television sets sold in the U.S. last year were digital TVs. And, of those, only about 100,000 included tuners to receive high-definition programming. But their high price brought in more than one quarter of all television set revenue. Many people buy digital TVs to watch DVDs. More than 2.2 million digital TVs are expected to be sold in 2002, nearly double that of 2001.

Proposal for Voluntary Industry Actions to Speed the Digital Television Transition*

1. To four broadcast networks (i.e., ABC, CBS, Fox and NBC), HBO, and Showtime:

Provide high-definition or other "value-added DTV programming" during at least 50% of their prime-time schedule, beginning with the 2002- 2003 season. Value-added DTV programming could be high-definition, innovative multicasting, interactive, etc. – so long as it gives consumers something significantly different than what they currently receive in analog. This would include something more than a single stream of standard-definition digital programming.

2. Broadcast Licensees:

By January 1, 2003, or as soon thereafter as they commence broadcasting, DTV affiliates of the top four networks in markets 1-100 will obtain and install the equipment necessary to pass through network DTV without degradation of signal quality (e.g., pass through HD programming, if that is what its network provides).

Stations broadcasting DTV programming will inform viewers of their digital content through on-air promotional announcements over their analog broadcast facilities.

3. Cable:

By January 1, 2003, cable systems with 750 MHz or higher channel capacity will:

- Offer to carry, at no cost, the signals of up to five broadcast or other digital programming services that are providing value-added digital programming during at least 50% of their prime-time schedule.
- Provide cable subscribers the option of leasing or purchasing a single set-top box that allows for the display of high definition programming. These devices will include digital connectors (e.g., 1394/5C and/or DWHDCP) at the request of the consumer.
- Market the digital television products the operator provides, including on their systems and in monthly bills, so that consumers know what programming is available and how they can receive it over the cable plant.

4. Direct Broadcast Satellite:

By January 1, 2003, carry the signals of up to five digital programming services that are providing value-added digital programming during at least 50% of their prime-time schedule.

* Nothing contained in this Proposal for Voluntary Industry Action is intended to prejudge any issue in pending or future Commission proceedings.

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*"Outstanding Performance...
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Lawrence Magne, Editor in Chief, Passport to World Band Radio.

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Liquid Crystal Display shows all important data: Frequency, Meter band, Memory position, Time, LSB/USB, Synchronous Detector and more.

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The Frequency Coverage Longwave, AM and shortwave: continuous 100-30,000 KHz. FM: 87-108 MHz VHF Aircraft Band: 118-137 MHz.

The Tuning Controls

- For the traditionalist: a smooth, precise tuning knob produces no audio muting during use. Ultra fine-tuning of 50Hz on LSE/USB, 100Hz in SW, AM and Aircraft Band and 20 KHz in FM.
- For Fixed-step Tuning: Big, responsive Up/Down tuning buttons.
- For direct frequency entry: a responsive, intuitive numeric keypad.

The Operational Controls Knobs where you want them; Buttons where they make sense.

The best combination of traditional and high-tech controls.

The Sound Legendary Grundig Audio Fidelity with separate bass and treble controls, big sound from its powerful speaker and FM-stereo with the included high quality headphones.

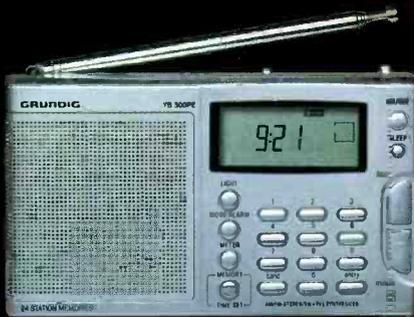
The Many Features 70 user-programmable memories, Two 24 hour format clocks, Two ON/OFF sleep timers, Massive, built-in telescopic antenna, Connectors for external antennas - SW, AM, FM and VHF Aircraft Band, Line-out, headphone and external speaker jacks.

Size: 20.5" L x 9" H x 8" W

Weight: 14.50 lbs.



Satellit 800



Yacht Boy 300PE AM/FM/SW Radio

Power and Performance with Affordability

Designed for the traveller, the titanium look digital AM/FM/SW radio provides incredible power and performance for an incredibly low price! Packed with features, including 3 AA batteries, AC adapter, earphones, supplementary Antenna and carrying case!

State-of-the-art features include:

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Size: 5.75" L x 3.5" H x 1.25" W Weight: 6.92 oz.



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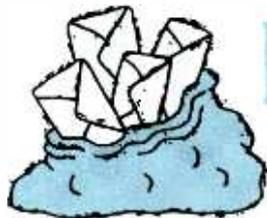
Size: 7.75" L x 4.5" H x 1.5" W

Weight: 1 lb. 5 oz.

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LETTERS TO THE EDITOR

Massachusetts to Dallas Road Trip

"I liked your 'Road Trip' article by John Mayson in the April *Monitoring Times*. I live in Bristol VA/TN. Here are some corrections and additions for Washington County, VA.

Washington Co Sheriff	155.490
Washington Co Fire Assn	151.025
	154.250 Fireground
Virginia State Police	159.165 Dispatch
	154.455 Cars

"Also, Sullivan County, TN, has gone to an 800 MHz system: 855.9875, 856.2625, 857.2625, 858.2625, 859.2625, 856.7375, 857.7375, 858.7375, 859.7375, 860.7375, 860.2625. These take in Bristol, TN, Kingsport, TN, and Sullivan Co, TN (fire, police, EMS).

— Patrick Healy, Bristol, VA

"Really enjoyed your 'Road Trip' articles. I was interested because for the past 25 years I have carried my scanner on many trips from Texas to both coasts. To prepare for these trips I have spent hours preprogramming my scanner for law enforcement agencies in each of the states I was expected to pass through. I have yet to find a good source of frequency information for 'active' frequencies.

"Interesting that you mentioned visiting Radio Shack stores for local information. I have always contended that if the corporate end of Radio Shack would send a questionnaire to each of their stores asking them to list the 'active' frequencies in their particular area. Radio Shack could compile the most useful and valuable book that a public service scanner enthusiast could ever dream of owning."

— John Myers, K5CUI

"Yes, finding frequencies ahead of time can be daunting. With the Internet, it's become easy to find accurate frequency lists for large, metro areas, but rural areas present a challenge. Even on my last trip, I drove large stretches of Virginia and Tennessee with absolutely nothing on my scanner. I would tune over to NOAA Weather Radio just to make sure it was still working."

— John Mayson

Almighty Risen from the Dead

"I know Bob Grove in his February editorial laid the callsign 'Almighty' to rest...but lo and behold it was resurrected March 20:

20.890 Service Center: 2206 USB w/Almighty (possibly USN GUANTANAMO BAY CUBA) in HF radio test. Service Center then asks Almighty to test key 7 at which time they go into extended encrypted voice. Back in the clear they make ref to testing of LQA (nfi) and then go back to scan.

"I wonder if it's just a coincidence that Almighty is back just when Guantanamo is busy

hosting a bunch of Taliban & Al Qaida "vacationers."

— Ron from Maryland

Northernmost It's Not

Regarding John Corby's inadvertent statement in the April issue that Ottawa was the world's most northernmost capital. Martin Potter says, "You must be from Toronto, Hi! Even I know that London, England, is further north than Ottawa. not to mention the five other more northerly capitals that I thought of off the top of my head: Dublin, Oslo, Stockholm, Helsinki, and Moskva."

— Martin Potter, VE3OAT

John and I both feel abashed as we thought we were pretty good in geography. All I can say is he must have been pretty cold when he wrote that, and I was lulled by the sweet turn of a phrase. Thanks for waking us up. One subscriber even sent a map with the 45th parallel highlighted, pointing out that the majority of European capitals appear to be further north than Ottawa!

All you wanted to know about Terion antennas!

In the April edition of *Letters* we asked our readers if they could provide more information on the unusual antenna array photographed by John Musgrave of British Columbia. Many thanks to Dom Mallozzi, Roger Pience, Jacques d'Avignon and Richard McClung for the fascinating details of this system. Here are excerpts from what they said:

"The loop antenna array shown is called an aperiodic loop array. Among others, Hermes Electronics Limited in Dartmouth, NS, Canada, and TCI in California have made them over the years.

"They are designed for receive applications. They have the advantage of allowing multiple receivers to share the antenna at one time to different directions. For example, you could use them in a point to point application to receive HF feeds from various directions on multiple frequencies all at the same time. Unlike many shortwave receive antennas they can be mounted

low (at ground level) and work just fine. In many applications where aesthetic considerations would not allow large arrays or log periodics they are very low profile. Also, they can switch direction quickly and with no mechanical rotators, etc.

"They typically are wideband having an operating range of 2 -30 MHz."

— Dom Mallozzi, N1DM

"I believe this to be a directional, amplified loop, receiving antenna system arranged in an endfire array. In some limited applications it may be used for transmission. The generic antenna has a fairly wide bandwidth depending upon the design goal. Again, the array has low sidelobe patterns and high front-to-back ratios over a wide bandwidth. It is also interesting to note that the vertical beamwidth changes little with frequency and the horizontal beamwidth varies greatly, inversely proportionally, as to frequency. The beam steering is accomplished using hybrids and feed line-phasing techniques.

"Marconi (Ltd. of the UK) has previously manufactured this type of antenna system, as well."

— Roger Pience, Scarborough, ME

"The Canadian company, Hermes Electronics, used to produce a very similar system. Matter of fact, Radio Canada International's receiving station uses this Hermes type of array in addition to their regular log periodic antennas.

— Jacques d'Avignon

"Terion was providing a nationwide service to track rail cars, semi-trucks, and cargo trailers. They used a combination of HF, VHF, satellite and FM-SCA.

"The antenna array is designed and built by TCI. It is the Model 625 (<http://www.tcibr.com/PDFs/612625webs.pdf>). The Antenna Multicouplers are TCI Model 8105. The HF receivers are TCI Model 8172. This is a similar model. The modems were designed by Terion.

"The sites were remotely controlled, via the world wide web, from the Terion control center in Melbourne, FL. There are a few more sites located throughout the US and Puerto Rico. Some sites have a 36 element (four 8 element loop arrays) 625 loop array giving beam forming off of each end and an omni-port.

For example, **Kettle Falls, WA**, has two 8-element arrays with them being end fire on 103 and 158 degrees; **Eckert, CO**, has a full 36-element array; **Golconda, IL**, has a full 36-element array; **Umatilla, FL**, has three 8-element arrays with them being end fire on 0/270/310 degrees. There are also sites in Childwold, NY; Ray, MN; San Augustine, TX; and Clear Lake Oaks, CA."

— Richard M. Mc Clung, WA6KNW



The Great Loop Antenna Experiment

"I have been constructing receiving loop antennas with my students (ages 9-13 years) at Whitby Montessori School in Whitby, Ontario, Canada, as a science and math project – and to build interest in radio. I took my 30-cm (1-foot) square frame antenna to school and we listened for DX during the day. Of course, the daytime DX wasn't terribly spectacular on the mediumwave band. However, the students were amazed to hear nothing but noise without the loop in place and then hear a clear signal when the loop was placed beside the receiver.

"Once the students saw (heard) my antenna in action, I had them make a few simple versions. They made two different versions of frame antennas: a box form antenna and a pancake form antenna. The students used small cardboard boxes that we picked up at a local grocery store as frames for the antennas. We used tuning capacitors from Radio Shack crystal radio kits to tune the students' antennas.

"Our major project, however, was to build a large frame loop antenna on the lawn of the Whitby Public Library. We used two 12-foot (3.65-m) sections of ABS tubing spaced 4.5 m (15 ft.) apart as supports for the antenna. The antenna itself consisted of five turns of number 22 wire in the form of a square with each side 3 m (10 ft.) long. With the assistance of some parents, we put up the antenna on the morning of Tuesday, January 22, 2002. We then tested the



antenna and demonstrated it in the evening of Wednesday, January 23, 2002.

"The evening was a great success. Brian Smith of the Ontario DX Association came out with his receiver and a commercial loop antenna. Alan Jespersen, VE3ALN, from the North Shore Amateur Radio Club was there to help demonstrate and explain. Among the stations we heard were:

Nashville, TN	WSM	650 kHz
Atlanta, GA	WSB	750 kHz
Louisville, KY	WHAS	840 kHz
New Orleans, LA	WWL	870 kHz
New York, NY	WCBS	880 kHz
Winnipeg, Manitoba	CBW	990 kHz
Boston, MA	WBZ	1030 kHz
Moncton, New Brunswick	CBA	1070 kHz
Charlotte, NC	WBT	1110 kHz
St. Louis, MO	KMOX	1120 kHz

Wheeling, WV WWVA 1170 kHz
Washington, DC WTOP 1500 kHz

"I was hoping that we would hear some Caribbean or South American stations, but the propagation didn't seem to be with us that night.

"We took some photos which are on the school's website: <http://members.rogers.com/whitbymontessori>

– Phil Gebhardt, VE3ACK

See *Communications* for more on classroom applications for radio. For more on simple or advanced loop antenna projects, turn to the *Radio Equipment* column for "Storm Detection by Radio." Author Michel Berlie-Sarrazin was trained in electronics and computers, but is employed in professional training and consulting work. He lives in France, and his hobbies include telecommunications, meteorology, photography, sailing, and navigational techniques. He also authored April's feature article on "The Radio Landscape of France."

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

– Rachel Baughn, KE4OPD, editor

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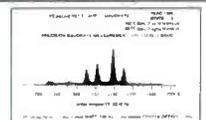
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A Misunderstood Hobby

Utility monitors see nothing strange about it, but to the rest of the world, identifying and logging aircraft tail numbers is bizarre at best, and suspicious or illegal, at worst. A group of British and Dutch hobbyists found themselves totally misunderstood when they took a hobby vacation with an organization called "Touch-down Tours" headed by Paul Coppin. While attending an airshow in Kalamata, Greece, last November, twelve British citizens (including Coppin) and two Dutch hobbyists were arrested for acting suspiciously.

Once officials discovered that not only had they been taking pictures and making notes, but their notebooks contained information about other airports as well, they charged the entire group with espionage and held them in prison for five weeks. The charge was eventually reduced, and the group was allowed to return home for Christmas after raising a stiff bail fee.

The case went to trial in April. During a marathon court session during which three of four interpreters walked out after 15 hours on the job, the court heard testimony from both sides. In defense of the hobbyists the editor of Jane's *All the World Aircraft* said the amount of information the group obtained was miniscule

compared to what is already publicly available, and that a 1992 convention required military information within European countries to be "completely transparent." Mr. Coppin testified that a brigadier general in the Greek Air Force had given the group permission to visit "as many bases as we could" during the Greek military open days.

The three judges returned their verdict just at presstime, as reported by the BBC. To the shock of most parties, eight of the fourteen (including the two Dutchmen) were convicted of espionage and the other seven were convicted of aiding and abetting. Those with the lesser charge were given a suspended sentence, and the eight will be allowed to return to their homes while awaiting appeal.

Although the defendants insisted the information they collected was already publicly available, Greek prosecutors told the court they knew what they were doing was illegal and could compromise the country's national security.



Here in the U.S., we are beginning to hear reports of increasing jitters at US bases and civil airports, especially on the East Coast. It was rumored that no scanners or Family Radio Service radios would be allowed at the Hanscom Air Force Base Air Show in June. Though not prominent on the Hanscom website, it does confirm that no two-way radios will be permitted, in addition to no coolers or large bags. Reports also circulated on the Internet that scanner use would not be permitted inside traffic-controlled civilian airports, but if so, the airports have not informed the public. Our advice? When in doubt, ask! And if traveling abroad, just leave the scanner at home.

No In-Flight Cellular Calls

Scanner users are all too familiar with those prohibitions against using electronic devices while onboard an aircraft in flight, though they may not agree whether there are grounds for concern. Making cellular calls is also a no-no, though for slightly different reasons. Cellular systems are set up so that a handset supposedly sees only one tower at a time, so that frequency re-use is possible. An airborne call can

RADIO HONOR ROLL

Radios in the Classroom (RIC) mailing list

<http://listserv.classroom.com/archives/ric.html>

The RIC list will create a sharing community of educators who are exploring the use of radios for instruction and curriculum integration. Now that "wireless" communication is coming to schools, it is becoming increasingly important for students to understand the science that makes it possible.

The specific radio equipment now being used by classroom teachers includes AM-FM radio, NOAA weather radios, shortwave receivers, amateur (ham) radios, VHF-UHF scanner radios, crystal sets, satellite radios, and others.

The RIC list will be moderated by Gleason Sackmann [gsackmann@classroom.com], moderator of the K12 mailing list Net-Happenings. Gleason first began listening to shortwave broadcasts in 1956, and listens to foreign broadcasts throughout the day using a computer-controlled Ten-Tec RX-320 receiver.

Anton Ninno [aninno@cnyric.org], a Technology Integration Trainer for OCM-BOCES in Syracuse, New York, will serve as a co-moderator. His amateur radio callsign is N2RUD. Anton began using radios with students in 1991, and gives frequent presentations on this topic at K12 education conferences.

Join the fun, and post to the list.

BULLETIN BOARD

June 1: San Francisco, CA

IRCA member Don Kaskey invites DXers to San Francisco on Saturday from "noon to 6pm or whenever"; he's hosting a Get-together at the Miraloma Community Church (Teresita & Arroyo, SF, CA). For details, write Don at 654 35th Avenue San Francisco CA 94121-2710; or e-mail at kaskeyfamily@yahoo.com.

June 15: Dunellen, NJ

Raritan Valley Radio Club Hamfest at Columbia Park near intersections of Route 529 and 28; adm \$5. Talk-in 146.025/625, 447.250/442.250, PL 141.3, 146.520 simplex; 7a.m.-2p.m. Contact Doug Benner W2NJH, 732-469-9009, email wb2njh@aol.com, or Fred Werner KB2HZD 732-968-7789 before 8p.m. Raritan Valley ARC, PO Box 192, Morristown, NJ 08836.

June 15: Seal Beach, CA

Southern California Area DXers (S.C.A.D.S.) meeting: Books. Check <http://www.ocnow.com/community/groups/radiocommunications>.

June 16: Monroe, MI

Monroe County RCA Hamfest, Monroe County Fairgrounds, 2 miles west on M-50, 7:30am-1pm, Adm: \$6. Overnight camping, refreshments, Talk-in: 146.720. Contact Fred VanDaele, 4 Carl Dr, Monroe, MI 48162, 734-242-9487 after 5pm, <http://www.mcra.org> or ka8ebi@arrl.net

June 30: Queens, NY

Hall of Science ARC hamfest at New York Hall of Science parking lot, Flushing Meadows Corona Park, 47-01 111th St.; 9a.m.-? Talk-in 444.200 (PL 136.5), 146.52 simplex; adm \$5 donation. Free parking, door prizes, food. VE exams 10a.m.. Visit <http://www.qsl.net/hosarc> or contact Stephen Greenbaum WB2KD6@Bigfoot.com, 718-898-5599.

Upcoming Radio Events:

July 1-Aug 31: Vacation BCL Contest

Open to DXers worldwide, log one station from each country in Africa, 1 point per country. Official stations only (no pirates, clandestines, or hams) between 2300 kHz-26 MHz. For prizes, send your list before Sept 15 to Frank Porisot, PO Box 6, 92173 Vonves, Cedex, France, or email to frankporisot@hotmail.com. See <http://swlcontest.homestead.com> for details.

August 13-18: Pori, Finland

European DX Council convention <http://www.sdxl.org/edcx/edcx2002.html> (Followed by separate tour to Tallinn, Estonia, and Estonian Radio)

August 16-18: Seattle WA

2002 International Radio Club of America convention at "Towne and Country Suites." For information check <http://www.geocities.com/Heartland/5792/>, or Phil Bytheway, 9705 Mory Ave NW, Seattle WA 98117-2334 phil_tekno@yahoo.com.

August 30-Sept 2: Lima, Ohio

National Radio Club convention, Hompton Inn. Go to <http://www.nrccxos.org> for details

Latin American Radio Tour

(This tour, planned for October, has been delayed to April/May 2003) A radio holiday tour of the great cities of Latin America. Itinerary and booking conditions at the New Zealand Radio DX League website <http://radiodx.com/spdx/dxtour.htm> or from Latin American Radio Tour, PO Box 14339, Wellington, New Zealand.

cause havoc on the ground by capturing or causing interference on a frequency over several cellular sites.

Cellphone calls can also interfere with airborne communications and navigation. The pilot of a Cessna Citation reported in *AOPA Pilot* magazine that while flying over Los Angeles he encountered about a half hour of static and interference. Other airliners were confirming the static and thought it was a stuck mic. Aircraft were able to hear enough of the conversation to determine it was someone in the back of an airliner talking to her grandkids on the other side of the country. Air Traffic Control could hear neither the static nor the conversation. When she hung up, it became obvious which airliner it was, because ATC had been trying to contact that aircraft for half an hour with no reply.

By the way, don't try disobeying the prohibition against airborne phone calls if you're in Saudi Arabia. An army captain who refused to hang up his mobile phone for take-off of a domestic flight delayed the flight 30 minutes and was sentenced to 70 lashes.

Hosts of Radio Liberty Nervous

Radio Liberty, home of the new Radio Afghanistan, is housed in an old government building in the heart of downtown Prague, and its hosts fear it is a natural target for terrorist attack. After the station refused for several months to consider a move, insisting it would be "capitulation to terrorists," the Bush administration relented at the end of January and indicated its willingness to consider alternatives. Several sites have been considered, but no announcement of a decision has been made.

Public Lukewarm toward New Technology

What do 3G, broadband, and HDTV have in common? These are three new buzz-words that the John Q Public could care about less, in spite of the fact that the Federal Communications Commission and US industry are trying very hard to promote them.

3G refers to third generation devices, usually mobile phones (also called smart phones), which will perform multiple functions. In addition to providing phone service, they can provide internet access, download music and games, interface with the computer, store messages and addresses, track appointments, provide GPS positioning, and more. 3G has been quicker to catch on Europe, partly because Europe uses a single wireless communications standard (GSM).

Broadband refers to high-speed internet connections which will allow high-speed exchange of music, streaming video, movies and other multimedia. In a move toward deregulation, the FCC has initiated a proposal to reclassify broadband as "information service" instead of a form of telecommunications. This means it would no longer be required to be open to the public, and could open the door for large tele-

phone and cable TV companies to steer the evolution of the Internet to benefit themselves.

HDTV is high-definition television – Only a few years remain before all television stations are required to switch to digital mode, and a certain percentage of their channels must provide high definition programming. Consumers haven't exactly rushed to buy the high-priced sets, networks haven't rushed to provide special programming to entice them, and stations haven't met the challenge of installing the new equipment and erecting additional relay towers needed to receive them.

When Is "Smart" not so Smart?

The more sophisticated and interconnected modern gadgetry becomes, the more vulnerable it is to breakdown and also to mischief – malicious or otherwise. Experts are predicting the new smart phones will be the next target for hackers and viruses. If your phone can interface with the computer or the internet, it is vulnerable to hacking.

Meanwhile, the concept of "computer warfare" is coming closer to reality. The "Love Bug" launched by a free-lance hacker in the Philippines in 2000 caused billions of dollars of damage. But an intentional strike against the power grid of a northern city in the midst of a winter storm could cost the lives of thousands. Imagine if the air traffic control or the banking system were hacked.

Eighty-five percent of 538 companies responding to a questionnaire said their networks were hacked in the past year. The National Security Agency has certified 23 schools for computer science security programs, and the government has begun to create the "cybercorps," promising scholarship money in return for two years of work at a federal agency after graduation. These 180 or so students may not be much defense against "hacker schools" and software that allows even amateurs to find entrance into corporate or government sites, but traditional computer courses provide virtually no training in computer security.

The Chicago-based HoneyNet Project uses

a different approach, studying how hackers operate by luring the hacker to an attractive net and silently watching his moves. It can also capture a worm or virus for early warning and analysis.

Ernest Cooper Dies

Longtime National Radio Club member, DXer, and *Musings* Editor Ernest Cooper died Sunday April 28, 2002, of complications from pneumonia at Cape End Manor Nursing Home in Provincetown at age 84. Condolences, cards, letters may be sent to his longtime friend and companion Bob Stenger at 5 Anthony Street, Provincetown, MA 02657.

Harry Helms commented that after Cooper took early retirement from the Federal Reserve to Provincetown, "he DXed with the enthusiasm of a kid. He also got interested in FM DX and hosted a program of march music on the local FM station."

Larry Van Horn adds, "When I first started in the radio hobby 38 years ago as a teenager, Ernie Cooper and his NRC *Musing* column probably did more to drag me into the hobby than anything else I can think of. He was a true friend, an ambassador for our hobby and DXer extraordinaire."

More testimonials and reminiscences may be found at <http://www.nrcdxas.org>

"Communications" is compiled by Rachel Baughn (mteeditor@grove-ent.com) from newspaper clippings and emails contributed by our readers. A million thanks to this month's reporters: Anonymous, Albany, NY, Manchester, NH, and Fayetteville, NC; David Carberry, Gales Ferry, CT; Sterling Marcher, La Mirada, CA; Doug Robertson, Oxnard, CA; Brian Rogers, Melvindale, MI; Robert Senkmajer, Pearl Besch, MI; James Stellema, Fruitport, MI. Via e-mail: Chanel Cordell, Harold K2HW, Maryanne Kehoe, Rick Kissel, John LeMay, Gill Lineberry, Ed Muro, Anton Ninno, Bill Siedsma, Doug Smith, Larry Van Horn, Frits Westra, Robert Wyman.

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Monitoring Marine Corps Base Camp Pendleton

Story and Photos by Laura Quarantiello



It's a hot, airless June morning and I'm stuck on a Marine Corps bus with thirty other people and an anemic air conditioning. We're idling in front of the HMLA-775 hanger at Marine Corps Base Camp Pendleton, loaded and ready to go, but in true Marine Corps-fashion, this is a convoy and no one moves until the first of the four buses pulls out. I watch the driver, who is watching the First Sergeant in the doorway, who's standing with a handheld radio to his ear, waiting for orders. That's another thing about the Marine Corps. They wait for orders. A lot.

Just when I think the natives are getting restless, the bus jerks into gear and we're on our way. A cammo-clad Captain has described this as "a little ride to see a live fire exercise on the range." We make a hard left out of the air

station parking lot and then swing onto Basiline Road. Once the bus gets up to speed and we're really rolling, I discover another thing about the Marine Corps: when a Marine says we're going for a "little ride," don't believe him.

I can't see the speedometer, but I know we're going way too fast for something this big. We pass over the Santa Margarita River, and the driver starts a travel monologue, like an enlisted tour guide: "To your right is the base Commandant's quarters, known as the Ranch House. It once belonged to the Pico family, back when this area was a Spanish rancho. They were awarded all of this land by the Mexican governor in 1841. Unfortunately, Pio Pico was a gambler and ended up having to be rescued from debt by his brother-in-law, John Forster. In return, Pico gave the deed to the rancho to Forster,

who turned the area into a cattle ranch. In fact, the river we just passed was the main source of water for the animals. Around 1882 the ranch was sold to cattleman James Flood, who turned a pretty good profit until 1941, when the Marine Corps came knocking."

The driver keeps pointing and talking and I hear something about World War II and the need for a West Coast base to train Marines for the Pacific campaign. Named after Major General Joseph H. Pendleton, construction of the base started in 1942. Today it is the nation's largest amphibious assault training facility with firing ranges for handguns, rifles, and heavy artillery, landing beaches, parachute drop zones, aircraft bombing and strafing ranges, three urban warfare towns, and tactical maneuvering areas for ground troops.

The driver continues to point out landmarks, but at this speed, all I see are rolling hills cross-cut with dirt roads. We've left all signs of civilization behind, except for an occasional vehicle passing in the opposite direction. Camp Pendleton is big: roughly 125,000 acres and over 200 square miles of terrain, plus seventeen and a half miles of beach. Luckily, our bus is still on paved road, but that's about to change.

After what seems like a good thirty minutes of driving, we come to the crest of a long hill and the bus cuts right, wheels bumping off the pavement and into soft dirt. By pressing my nose to the window I can see another bus ahead of us, pulling a rooster tail of brown dust behind. I feel like I'm eight years old in the back of my Dad's Buick whining "are we there yet?" And still we keep driving, over a series of spine-jarring dips and bumps, up a short hill and past a sign that says Range 409. There are numerous live fire ranges at Camp Pendleton, all nestled under the invisible cover of Restricted Area R-2503. Several of the ranges, known as Impact Areas, cater to helicopter and aircraft strafing



and bombing, while others are set aside for heavy artillery training. All are closely guarded by "Longrifle," the base's range control department.

Suddenly, blessedly, we're there. We pull alongside a set of battered bleachers covered by an ineffectual olive-green canopy, and the doors of the bus open. By this time, everyone is sweaty and worn-out; we're not Marines, we're merely guests and we've had quite enough of this little ride. But first we have to hear the safety briefing. "Welcome to Range 409," says a Sergeant in a decidedly un-sweaty uniform of mottled green. "This is a live fire area. We will be watching a helicopter assault using UH-1 Hueys and AH-1 Cobras firing machine guns, as well as launching aerial rockets and Hellfire missiles. You may encounter live ordnance. Please do not pick up any shells or other ammunition you may find. Please stay behind the yellow tape and do not wander away from the viewing area. We hope you enjoy the demonstration." How comforting.

Pendleton's mission support communications

There's always a lot of shooting going on at Pendleton. The base exists to train combat Marines and is the home of the 1st Marine Expeditionary Force, 1st Marine Division, and 1st Service Support Group, as well as tenant units such as Marine Air Group 39, the 11th, 13th, and 15th Marine Expeditionary Units, Marine Corps Tactical Systems Support Activity, and Weapons and Field Training Battalion.

The Navy also shares space here, with six tenant units, including Assault Craft Unit 5. There are also several formal Marine Corps schools aboard the base such as the School of Infantry, Assault Amphibious School, Corporal's School, Instructor Management School, Field Medical Service School, and the Marine Corps University. The average daily population is 55,000.

I climb the bleachers to the top row and pull out my PRO-43 and PRO-94 scanners. This is the moment I've been waiting for: a chance to listen in from ground zero, the heart of the action, instead of my usual spot miles away. As a colonel at a portable microphone tells us about the Marine Air-Ground Task Force (MAGTF) concept, I quietly switch on both radios.

Like so many military bases these days, Camp Pendleton has almost totally abandoned its old VHF frequencies in favor of using a 400 MHz trunked radio system. Talk groups on the system provide communications for almost everyone at the base: Provost Marshal's Office, Base Game Warden, Area Guards, Naval Hospital, Infantry Training Battalion, School of Infantry, Marine Combat Training Battalion, Lifeguards, Maintenance, Crash Crews, Motor Pool, and more. On any given day you may hear the Provost Marshal's Office making traffic stops on speeders, Marine battalions practicing long-range reconnaissance in the field, artillery troops checking in with range control for permission to fire 155mm howitzers, air station ground

crews coordinating helicopter refueling and maintenance, and Marine guards on patrol. The system is extremely busy with over 90 active talk groups.

As the colonel talks I hear a new sound, a rumble deep in my chest, beating like a second heart. It's the sound of Marine helicopters. I punch in the squadron tactical of 273.0 MHz. I've brought my PRO-43 along for a reason: Camp Pendleton is a military air enthusiast's idea of heaven. I'm here today through the courtesy of HMLA-775, one of nine helicopter squadrons that call this base home. Six of the squadrons fly the UH-1N Huey and AH-1W Cobra, while the three heavy lift squadrons fly the CH-46. Air power is a major part of Marine amphibious assault operations.

Helicopters and Harriers form the Aviation Combat Elements of the three Marine Expeditionary Units based here: the 11th, 13th, and 15th MEU's. Anytime the MEU's train at Pendleton, the air elements are active. Of course, having 125,000 acres of real estate available means that most Marine Corps and Navy jet and helicopter squadrons on the West Coast will visit the base to take advantage of the live fire ranges and terrain following routes set amidst the beaches, bluffs, mesas, and canyons.

Coyote 11, a flight of four, comes up on the radio but his words are drowned out by rotor noise as a Cobra makes a high speed run from our left, firing bursts into the canyon from a 20mm machine gun. After two passes, he pulls off and heads south as a Huey comes to a hover on our right. A rope drops from the open side door and six fully armed Marines rappel out and take up defensive positions, their M-16's pointing straight at the crowd. Meanwhile, the Cobra has become a dot in the heat haze to our left.



Monitoring Mecca

If you're a military monitor, there is no better place to catch the action than by listening to activity at Camp Pendleton. Whatever your interest: jets, helicopters, ships, landing craft, amphibious vehicles, or ground troops, Pendleton has something for you to hear. Under the protective cover of 240 miles of restricted airspace are three Impact Areas, 65 Live Fire Training Ranges, 49 Artillery Firing Areas, 7 Mortar Firing Positions, and 31 Maneuver Areas.

The restricted area is composed of three parts: R-2503 A, B, and C. R-2503A is the ocean and land area extending into the base approximately three miles, R-2503B is the inland operating area, and R-2503C is the airspace overlying the northern two thirds of R-2503B. There's also additional airspace including the San Onofre High and Low MOA's and Area Alpha, which are available upon request to support large scale amphibious assault exercises.

The ocean and beach are also part of Camp Pendleton's vast training region. There are five Amphibious Landing Beaches and 294 square



miles of offshore Amphibious Assault Areas adjacent to the shoreline on the west side of the base. It is here that the Navy's Assault Craft Unit 5 trains and Marines in amphibious vehicles practice coming ashore from landing ships at sea which resemble small aircraft carriers. It's not unusual to see UH-1, AH-1, CH-46, and CH-53 helicopters transiting the shoreline in support of offshore operations, while AAV (Assault Amphibious Vehicles) and LCAC's (Landing Craft Air Cushioned) churn ashore. The ACU-5 compound, visible from the I-5 freeway, encompasses 48 acres and supports 40 craft and more than 700 personnel.

As I watch the Cobra launch a Hellfire missile, I realize that the transmissions on the scanner have been all but lost in the noise of aircraft and gunfire. So I switch everything off and sit back to enjoy the show. My monitoring will have to wait until I return to the quiet of home. Fortunately, the Marines at Camp Pendleton train day, night, weekdays, and weekends, so there's always another chance to listen in. Now, I just have to survive the hot, bumpy, dusty bus ride back to the air station.

BASE TACTICAL FREQUENCIES

30.35	Tactical Ground Units
31.55	Tactical Ground Units
40.45	LCAC Tower
46.70	Amphibious Units
49.00	Tactical Ground Units
128.775	Camp Pendleton Tower (VHF)
232.6	LONGRIFLE Range Control Tactical
233.9	LONGRIFLE Range Control Tactical
233.95	LONGRIFLE Range Control Tactical
249.3	LONGRIFLE Range Control Tactical
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253.25	LONGRIFLE Range Control Tactical
255.2	LONGRIFLE Range Control Tactical
265.0	Camp Pendleton Base Ops
267.6	Camp Pendleton ATIS
281.7	SoCal Approach
301.9	LONGRIFLE Range Control Tactical
302.6	LONGRIFLE Range Control Tactical
305.8	LONGRIFLE Range Control Tactical
305.9	3rd MAW/CAL Site Common
310.1	Tactical
310.2	Tactical
310.6	3rd MAW Common
314.075	GCA
323.0	SoCal Approach
336.3	3rd MAW Tactical
338.1	Camp Pendleton GCA
340.2	Camp Pendleton Clearance Delivery
344.6	Camp Pendleton Metro
349.9	LONGRIFLE Range Control Tactical
350.5	Camp Pendleton GCA
353.2	3rd MAW
360.1	Visual Flight Range Advisory
360.2	Camp Pendleton Ground Control
360.3	LONGRIFLE Range Control Tactical
362.2	Camp Pendleton GCA
367.7	CSAR
382.1	LONGRIFLE Range Control Tactical
382.2	Camp Pendleton Tower
390.1	Tactical

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FREQUENCIES

FLEET AREA CONTROL AND SURVEILLANCE SAN DIEGO (FACSFACSD)

227.800	Tactical
229.200	SOAR Range North Primary
236.200	SESEF Range [RELIABLE PARTNER]
238.050	Air to Air
249.800	Tactical
255.800	Tactical
259.200	Air to Air
263.900	EWR Range Coordination
264.000	SOAR Range [STARBURST]
264.200	SESEF Range
265.050	ASW Range [STARBURST] Secondary
266.900	FACSFAC SD Check-In/Out North [BEAVER]
267.400	SOAR Range
272.450	ASW Range
272.600	FACSFAC SD Check-In/Out South
273.100	TMA (Tactical Maneuvering Area) 2
273.900	FACSFAC SD
276.500	AR-651
279.100	Discrete Air to Air
282.000	FACSFAC SD ATIS
282.100	EWR Range Coordination [WITCHDOCTOR]
282.800	Tactical
282.800	Search and Rescue
285.300	EWR Range Primary
285.700	FACSFAC SD Check-In/Out South
289.900	FACSFAC SD Check-In/Out North
299.250	Tactical
301.100	TMA 3
301.500	Tactical
302.600	Air to Air
305.100	Tactical
307.400	ASW Range
308.100	TMA 1
309.300	Discrete Air to Air
313.700	ASW Range
314.700	FACSFAC SD Check-In/Out North
315.300	TMA 7
326.600	Tactical
334.100	Tactical
342.900	Discrete Air to Air
344.100	NAOPA (Northern Air Operating Area)
348.100	SOAR Range South
352.100	ASW Range
353.400	ASW Range
354.900	TMA 6
364.800	Discrete Air to Air
373.300	Tactical
376.800	Discrete Air to Air
380.500	Discrete Air to Air
380.550	Tactical
383.100	Tactical
384.500	Discrete Air to Air
390.400	Tactical
397.100	Tactical

BASE 400 MHZ TRUNKED RADIO SYSTEM AND ID'S

Motorola Type II analog trunked radio system

Base frequency: 406.000 MHz

Offset: 25.0.

406.550, 406.950, 407.175, 407.300, 407.325, 408.200, 408.750, 409.275, 409.750, 409.850, 409.950, 410.150

16	Radio/Electronics Maintenance [ROME0]
528	Naval Hospital Camp Pendleton



592	Naval Hospital Camp Pendleton Security [SIERRA]
688	62 Area Guard (Camp San Mateo)
1040	52 Area Guard
1072	School of Infantry Administration [52 BASE]
1104	Infantry Training Battalion (ITB)
1136	Infantry Training Battalion (ITB)
1168	Infantry Training Battalion (ITB)
1296	Marine Combat Training Battalion (MCT)
1328	Marine Combat Training Battalion (MCT)
1360	Marine Combat Training Battalion (MCT)
1424	Range Control [LONGRIFLE]
1616	32 Area Guard (MASS-3)
1936	Provost Marshal's Office (PMO) Tac 1
1968	PMO Tac 2
2000	PMO Tac 3
2032	PMO Tac 4
2352	Telephone Maintenance [OSCAR]
2512	Lifeguards
2576	Prison Inmate Work Crews
2832	Family Housing Maintenance
2864	Family Housing Maintenance
2896	Family Housing Maintenance
2928	Family Housing Maintenance
3032	Facilities Maintenance 1 [KILO]
3056	Facilities Maintenance 2
3664	Weapons and Field Training Battalion (WFTB) Primary & 31 Area Guard [PHOENIX]
4432	Base Game Warden [MIKE]
4656	Air Station Crash Crew [RODEO CONTROL]
4688	Air Station Operations
4784	Air Station Electronics Maintenance
4848	Air Station Aircraft Maintenance and Refueling
4880	Air Station Ground Control [PENDLETON GROUND]
4944	PMO Tac 10
4976	PMO Tac 11
5104	21 Area Guard
5488	41 Area Guard (Camp Las Flores)
5584	Range Operations
5968	WFTB Field Training
6000	Marksmanship Training
6032	WFTB Field Training
6064	31 Area Guard Tactical
6096	Marksmanship Training
6128	PMO Tac 6
6576	33 Area Guard (Camp Margarita)
8304	53 Area Guard (Camp Harno)
8560	22 Area Guard
10352	Lifeguards
10832	WFTB Field Training
10896	11/16 Area Guard

AVIATION SQUADRONS

Squadron	A/C Type	Tailcode	Call Sign
HMLA-169	AH-1W/UH-1N	SN	Viper
HMLA-267	AH-1W/UH-1N	UV	Stinger
HMLA-367	AH-1W/UH-1N	VT	Scarface

HMLA-369	AH-1W/UH-1N	SM	Gunfighter
HMLA-775	AH-1W/UH-1N	WR	Coyote
HMM-268	CH-46E	YQ	Dragon
HMM-364	CH-46D	PF	Swift
HMMT-164	CH-46E	YT	Knight Rider
HMT-303	AH-1W/UH-1N	QT	Atlas

138.8 CPFD F2 Tactical
140.5 CPFD F1 Tactical

(CPFD has also been heard on the base's 400 MHz trunked system and the San Diego County 800 MHz Regional Communications System.)

Station 1	Bldg 22131 Chappo
Station 2	Bldg 31921 LCAC
Station 3	Bldg 13164 Mainside
Station 4	Bldg 27601 Hospital
Station 5	Bldg 21401 Del Mar
Station 6	Bldg 43103 Los Pulgas
Station 7	Bldg 52161 San Onofre
Station 8	Bldg 63121 Christianitos
Station 9	Bldg 103 Naval Weapons Station
Station 10	Bldg 41340 Los Flores
Station 11	Case Springs (seasonal)

Chief	2701, 2702, 2703
Division	2704, 2705, 2706, 2707, 2708, 2709
Telesquirt	2711, 2712, 2713, 2714, 2715, 2716, 2717, 2718, 2719
Brush	2761, 2762, 2763, 2764, 2765, 2766, 2767, 2768, 2769
Attack	2781, 2782, 2783, 2784, 2785, 2786, 2787, 2788, 2789
Truck	2771
Water Tender	1, 2
Helitack	01, 03
Medic	13, 21, 27, 31, 52
Rescue	2790, 2791

ACRONYMS

AAV	Assault Amphibious Vehicle
Angels	Altitude in thousands of feet
ASW	Anti-Submarine Warfare ??
ATIS	Automatic Terminal Information System
BEAVER	Fleet Area Control and Surveillance Facility San Diego
Binga	Low fuel
Cold	Unarmed weapons run, or No expenditure of ammunition
Cherubs	Altitude in hundreds of feet
CP	Command Post
CSAR	Combat Search and Rescue
FAC	Forward Air Controller
FACS	Fleet Area Control and Surveillance
Frag	On time
GCA	Ground Control Approach
Hot	Armed weapons run
Ingress	Inbound to target
IP	Initial Point
LCAC	Landing Craft Air Cushioned
LONGRIFLE	MCAS Camp Pendleton Restricted Area Control
MCAS	Marine Corps Air Station
MAW	Marine Aircraft Wing
MEU	Marine Expeditionary Units
Mikes	Minutes
MOA	Military Operations Area
Orbit	Aircraft holding pattern
SESEF	Shipboard Electronics Systems Evaluation Facility
SOAR	Special Operations Aviation Regiment ?
TOT	Time on Target
Winchester	Out of ammunition

AVIATION SQUADRON FREQUENCIES

337.1000	HMLA-169	Discrete Air to Air
353.2000	HMLA-169	Discrete Air to Air
339.6000	HMLA-267	Discrete Air to Air
371.0000	HMLA-267	Discrete Air to Air
307.5000	HMLA-367	Discrete Air to Air
325.4000	HMLA-367	Discrete Air to Air
273.0000	HMLA-775	Discrete Air to Air
320.3000	HMM-161	Discrete Air to Air
275.4000	HMM-163	Squadron Base
293.1000	HMM-164	Squadron Base
253.0500	HMM-268	Discrete Air to Air
273.8000	HMM-268	Squadron Base
273.8000	HMM-363	Squadron Base
272.3000	HMM-764	Discrete Air to Air
352.3000	HMT-301	Squadron Base
284.4000	HMT-303	Discrete Air to Air
303.0000	HMT-303	Discrete Air to Air

CAMP PENDLETON FIRE DEPARTMENT

(courtesy Gene Sawyer, Jr.)
138.6 CPFD F3/4 Dispatch

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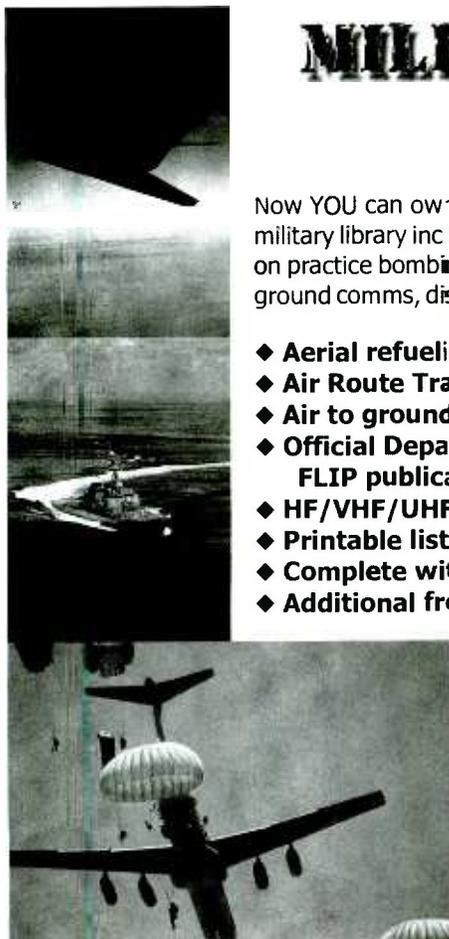
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On the Road with WiNRADiO

By Bob Grove

A recent trip from Brasstown, North Carolina, to Sun City Center, Florida, gave me a great opportunity to try a computer-hosted receiver in a mobile/portable environment. With quite a selection in our sales inventory to choose from, I elected to take the WiNRADiO WR3150e – a 100 kHz-1500 MHz, all-mode, scanning receiver with a built-in spectrum display capable of showing signals present on any band up to 100 MHz wide. This is a favorite among government and military buyers, and is the high-spec version of the popular WR1550e that hobbyists generally select, and which would have worked just as well in my applications.

Conventional scanner features like memory scan, search, data storage, squelch, delay, and so on are included in the operational software. Sensitivity is on par with scanners and shortwave receivers, as are selectivity and dynamic range. Scanning speed is typically 50 channels per

second, and simultaneous spectrum sweep and audio recovery of swept signals is offered.

I decided to host the receiver with my trusty little notebook computer; the entire series of WR portables will run on any Pentium, or even a 486 platform, and under Windows 95, 98, ME, NT4, or 2000 operating systems. A serial interconnect is provided and that's what I used, even though much faster PCMCIA and USB adaptor options are available.

With the computer sitting in the seat next to me, the companion 3150 powered by the vehicle's cigarette lighter socket, and a Nil-Jon Super-M magnet-mount antenna on the roof, I headed down Interstate 75.

Lunchtime at Cracker Barrel is always a good excuse for me to enjoy their delicious grilled chicken salad with the house Italian dressing, my personal favorite. And this visit near Macon, Georgia, provided an additional bonus – several of the serving staff were wearing headsets! I asked the manager what frequency they were using, but all he could offer was that it was channel 4 of some kind, and he thought CB because he kept hearing truckers!

That was tantalizing; I could hardly wait to finish lunch so that I could get back to the car and switch on the spectrum display function of the WiNRADiO. But this game came to a sudden halt when I saw one of the radios



The WinRadio motel monitoring post was compact and sophisticated, but affordable, especially if you already have the notebook computer.

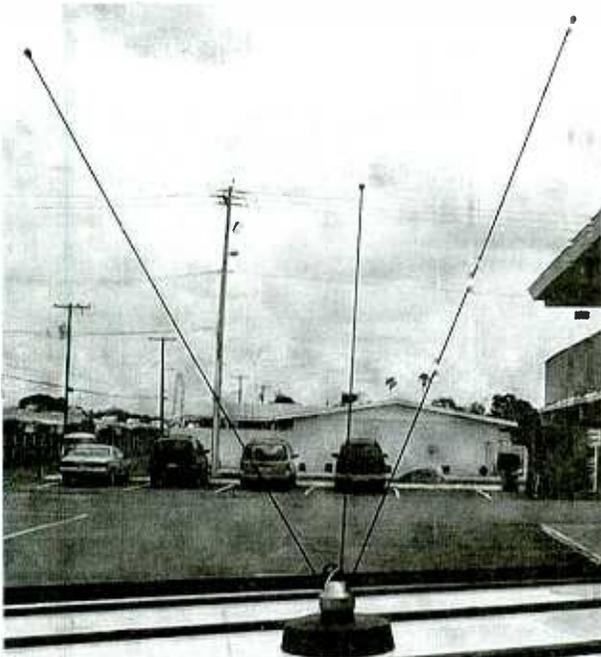


The screen clearly showed where there was radio activity; a click of the mouse would also tune it in!

protruding from a server's pocket – a Radio Shack FRS transceiver! Too easy.

Nonetheless, just to finish the game, I left for my car where I spent the next few minutes checking out the 462 MHz range with my trusty intercept station. While the Cracker Barrel radios didn't come alive during that short period, other drivers on the adjacent interstate were keeping in touch with each other via their FRS transceivers, clearly the "CB truckers" that the restaurant manager thought he was hearing!

Back on I-75, an overpass gave me a great view of a typical interstate complex just north of Unadilla, Georgia – fast food restaurants galore, a gold mine for a scanner sleuth with a new toy! I pulled well off the road, shut off the engine, and switched on the gear. In a tiny town like this, the 151-156 MHz range is a prime target.



A spectrum scan using the top-of-the-line Nil-Jon mobile antenna brought up plenty of signals on the screen in the small town of Unadilla, Georgia.

For this exercise, I decided to invoke a multiple display of re-sweeps to give me an idea of the amount of activity on each occupied frequency. WiNRADiO also has a clever "waterfall display" function,

downloadable from their web site, which provides a 3D look at the chosen spectrum and displays active frequencies over time.

I wasn't disappointed; the first sweep of the spectrum revealed multiple hits – spikes on the spectrum display popped up on 154.510, 154.570, 154.725, 155.205, and 155.640 MHz. Switching on the monitoring function I heard nearby law enforcement simplex and repeaters, fast food windows, and itinerant/business activities.

While I could have searched this out with any scanner, the additional visual features of the WiNRADiO showed the dynamics of the activity on each channel along with relative signal strengths, plus the ability to simply click and drag the cursor to any frequency on the display for instant access to transmissions ("Visa-Tune"). These are distinct advantages when time is an important consideration while looking for brief transmissions.

Finally arriving at my destination, I set

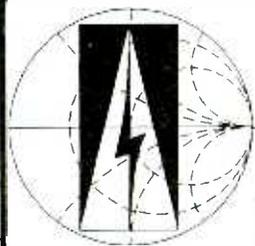
up the WiNRADiO monitoring position on a small table in my motel room; a length of coax through the doorway to an experimental portable antenna (see photo) linked me to the outside world.

Soon after I settled down, the electric power went off, so I quickly reloaded the package into my car so I could monitor local public safety activity. It's bad enough when power goes off anywhere, but when all the traffic signals go out at the massive retirement community of Sun City Center, that's time to worry! Fortunately, drivers behaved rather well, and there were no collisions – a relief from a humanitarian standpoint even if it did deprive me of monitoring excitement!

The little WiNRADiO certainly enhanced the enjoyment of the trip; I still kept my trusty Uniden BC3000XLT with me for casual scanning – and for entering frequencies I spotted on the dynamic WR screen. But for spectrum profiling as the scenes continued to change over the course of the trip, nothing could outperform the spectrum display function of the '3150.

Hints to Increase Hits

Naturally, it helps to have a knowledge of frequency ranges before you start; for example, you won't find road crews on the aircraft bands, nor will you likely find pub-



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lic safety operations in the FM broadcast band! Frequency directories, databases, and magazines like *Monitoring Times* will keep you informed – especially our current "Who's Who in the Radio Spectrum" series.

The WiNRADiO has highly-flexible database management; load your most desirable search ranges into memory, then call them up when you are ready to do a spectrum search. Naturally, you can also load a virtually unlimited number of memory chan-

nels as well for scanning, so you may wish to do this in banks by geographical location, or by service.

When doing a spectrum sweep on screen, keep the span limits as narrow as possible to increase the number of successful hits in a given time period, and make the steps as large as possible, no smaller than the actual channel separation likely to be used in a given swath of spectrum.

Since the sweep rate is 50 steps per

second, it is helpful to select the step sizes as close to the channel spacing as possible. Even if it is off by a few kilohertz, you are still likely to hear the transmission because of the wide bandwidth of frequency-modulated transmissions.

Use a small antenna, and perhaps the attenuator function, for close-by intercept applications; this will decrease the number of false hits from unwanted distant transmitters.

Recreational and Serious Applications

Our Interstate foray barely touched on the many uses for this versatile, portable, signal-intercept system. Beginning at \$500 for the basic unit, its visual and audible signal-detection functions are a very suitable alternative to far more expensive spectrum analyzers costing many thousands of dollars, and because the WiNRADiO products are full receivers, audio recovery of modulated signals is much better than that of far-more-expensive spectrum analyzers.

Consumer/hobby applications:

Tracking down sources of electrical interference to TV sets, shortwave receivers, scanners, wireless mikes, and radio control models can be expedited by watching the levels of the spikes on the screen while moving the portable system from room to room, and by using an antenna probe mounted on a long coaxial lead while sampling signal levels at various suspect locations.

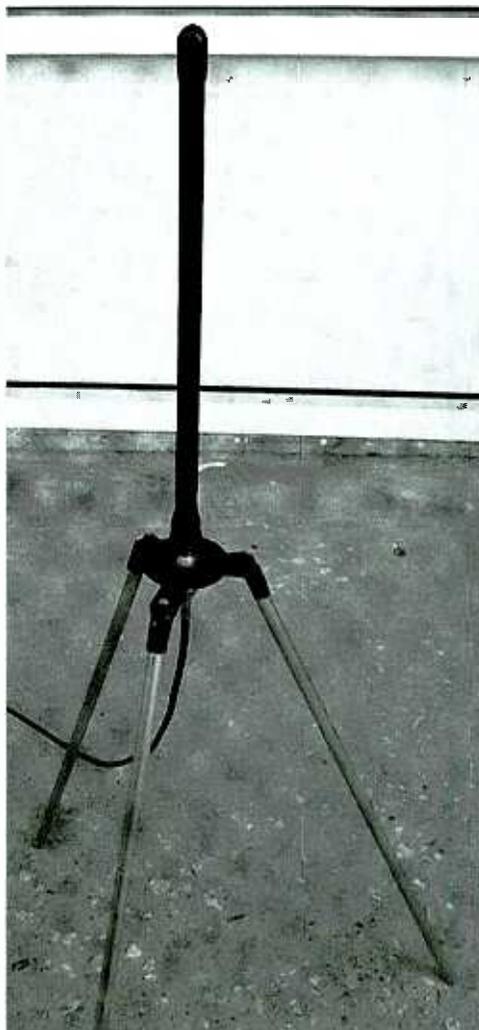
Short-term monitoring on the road can often reveal the communications channels of road crews, military and government installations, convoys, sports and helmet radios, press and media, wireless mikes, airports and air shows, industrial and business complexes and malls, public safety operations, incident command and fire/accident/crime scenes, unlicensed truckers and poachers, tower user identification, security, hotels and motels, amusement parks, casinos, and more.

Professional intercept and test applications:

More serious uses for the WinRADiO involve the detection and determination of specific communications or signals. Such users include security consultants, law enforcement agencies, private investigators, communications service shops, TV and cable installation and maintenance technicians, electric and telephone companies, cellular service providers and cell-site technicians, federal and military agencies, research labs, wildlife telemetry

tracking personnel, broadcast engineers, and communications equipment manufacturers, to name but a few.

Technical surveillance countermeasures (TSCM) is the vernacular for "bug" detection, and determining the signatures of transmitters as well as the contents of the transmissions is entitled Communications Intelligence and Signals Intelligence (COMINT/SIGINT). WiNRADiO has a number of excellent optional software packages for such enhanced monitoring applications.



For scanning from the motel room, an experimental portable antenna was set up outside the room for better reception.

Additional uses for the WR systems seem virtually unlimited. Several which come to mind would include checking RF security systems and remote telemetry transmitters; maintaining two-way radios (signal tracing, waveform analysis, harmonic identification, modulation/deviation adjustment, IF alignment, spurious signal detection); conducting site surveys to detect potential interference to co-located radio and antenna systems; locating sources of intentional and incidental interference generated by radios, jammers, appliances, vehicles, computers, and power lines; conducting spectrum usage profiling and propagation studies; antenna, filter and preamplifier design and alignment; relative field strength measurements; tuning duplexers, cavities and diplexers; and FCC Part 15 screening of new products.

For the convenience and economic considerations of the user, WiNRADiO offers several models of their receiving systems in both plug-in cards for desktop computers, and external modules for laptops and notebooks. All models offer continuous coverage for authorized users, and cellular-blocked for consumers, beginning at 150 kHz up, and continuing through 1500 MHz (WR1550 and WR3150), 2.4 GHz (WR3500), and 4 GHz (WR3700). Prices for these radios start at about \$500 and increase to \$2900. Integrated eight-receiver packages in a custom host computer are also available for advanced multi-tasking requirements.

For high-end security and electronic warfare applications, WiNRADiO has announced their new WD3000 radio direction finder which can be used with other companion WR receivers, or with suitable receiving systems from other manufacturers. Perhaps we will have an opportunity to review this exceptional product in a future issue.

For complete information on WiNRADiO products available in the U.S., visit the web site of the North American representative for WiNRADiO, Grove Enterprises, at <http://www.grove-ent.com>.

Grove is YOUR source for everything WiNRADiO

www.grove-ent.com/winradio.html

Grove Enterprises is your North American WiRADiO headquarters, offering the full line of advanced WiNRADiO computer-hosted receivers for consumer and government/military applications.



The fast-selling WR1550i (internal ISA card for desktop computers) and WR1550e (external module for laptops) provide wide 150 kHz-1500 MHz frequency coverage* and multimode reception (AM/FM/USB/LSB/CW).



For more demanding applications, the WR3150i (with DSP) and WR3150e external module offers more rugged specs. And for extended frequency coverage, select the WR3500 series (up to 2.4 GHz) or WR3700 series (up to 3.5 GHz).



* less cellular

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Who's Who in the Radio Spectrum (Part 6) Your Road Map to the VHF Low Band

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

MHz

1.0 22.0
Amateur

MHz

Amateur

7.5

8.0

8.5

9.0

Air
Force

9.5

WWV
10.0

10.5

Imagine sitting in your easy chair and listening to highway patrol dispatchers, military or government communications from distant locations half way across the United States. Or how about a chance at monitoring long distance communications from a variety of stations south of the border or across the Atlantic or Pacific on your scanner?

Well, it's summertime and monitoring the VHF low bands can become very interesting this time of year. At times these frequencies appear to be almost magical. One minute they are dead, and the next minute the band is filled with fascinating and distant radio signals. Since we are at the high end of solar cycle 23, there are even more exotic VHF low band targets that are not normally heard that might make it into our radio shacks as well.

But, first, we need to examine what is normal reception is in this portion of the VHF spectrum. This will help us better spot the abnormal conditions that produce distant radio reception at frequencies above 30 MHz.

Above 30 MHz – Line-of-Sight

A very common question we hear on the Grove Technical Support line is "I want to increase my scanner's listening range. Will an amplifier help?"

And the simple answer is, "Probably not!"

In theory, reception range on frequencies above 30 MHz is line-of-sight (LOS) as seen from the bottom of the receiving antenna to the listener's horizon. In order for you to hear a particular station on your scanner, the transmitting and receiving antennas have to be able to see one another in a radio sense.

As a general rule, radio waves above 30 MHz are slightly bent over the horizon by the earth's atmosphere. Signals in the VHF low band (30-50 MHz) may travel as much as 30 percent beyond your local horizon. But, as you move

higher in frequency there is less bending, until there is almost none at 800 MHz. Thus reception range is considerably shorter at these shorter wavelengths. You have to only look around your local area and see all the cell phone towers needed to provide reliable coverage in order to grasp this concept. As a simple rule of thumb, "if all other factors are equal, the lower the frequency, the greater the range."

Terrain can have a major effect on LOS reception. Listeners on hilltops will have much better reception than those in valleys. Reception on these frequencies is very terrain/wavelength sensitive: hills, trees, buildings – any tall obstruction can block reception and cause path loss.

Almost all VHF frequencies will provide poor reception inside metal structures. Some of the higher frequencies (shorter wavelengths) can penetrate buildings and are very useful for public safety communications. But higher frequencies, 200 MHz and up, may be attenuated by another factor most scanner enthusiasts never take into account – natural vegetation.

Trees can be a significant source of path loss, and there are a number of variables involved, such as the specific type of tree, whether it is wet or dry, and whether the leaves are present or not. Isolated trees are not usually a major problem, but a dense forest is another story. The attenuation depends on the distance the signal must penetrate through the forest, and it increases with frequency. Pine needles are especially noted for their absorption of 800 MHz and higher frequencies.

So if you live in a deep wooded valley and you want to DX the VHF/UHF spectrum you have three options: 1) move to a better location, 2) erect a very high antenna above the tree tops, or 3) develop another interest.

The Skip Zone Modes

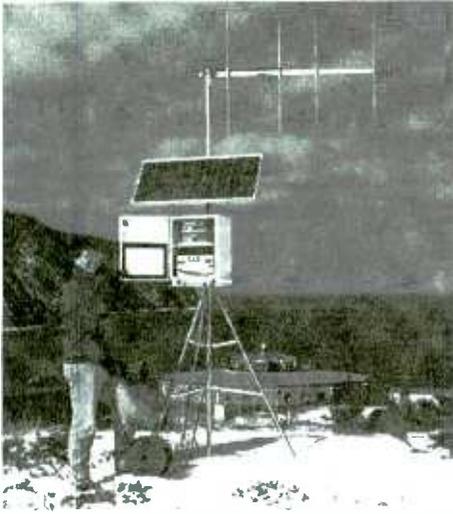
Unlike the regular variations in propagation on the lower frequencies we have covered in previous parts of this series, long haul signals are rather unpredictable on VHF/UHF.

At the peak of especially strong solar cycles such as the one we are in now, VHF signals can be reflected by the ionosphere's F2 layer to distances of 2000 miles or more. At times during these peaks, the monthly sunspot number rises to extremely large values and the ionosphere reflects higher frequencies than is normally the case. VHF F2 skip transmissions in the VHF low band (30-60 MHz) tend to peak in the periods around the spring and fall equinox.

VHF can also be reflected from clouds of increased ionization in the E layer of the ionosphere. This phenomenon is known as sporadic-E or E-skip, and the clouds are generally quite localized (around 60-70 miles in size). Sporadic-E skip occurs at a lower height than the F layer, which tends to limit the distance over which propagation is possible in a single hop. In some cases, multi-hop transmission is possible to achieve longer distance transmission.

Sporadic-E is most likely in the late spring





Fish and wildlife telemetry often uses low band frequencies (courtesy Lotek Wireless)

and into the summer months (May-August) over the local noon period and into the afternoon. E-skip is considerably weaker the further away from the mid-summer months and the peak moves to the late afternoon period, local time. There is another, smaller E-skip season during late November-December here in North America, but it isn't nearly as intense as the one that occurs during the warmer months.

Another common medium for distant reception in the VHF/UHF spectrum is a weather-related phenomenon known as tropospheric bending or tropo. Though a much more stable mode of propagation, tropo, for the most part, lacks the distance characteristic of E-skip. Openings by tropospheric bending can run from 200 to 1,000 miles and sometimes beyond.

Tropo is directly related to weather, with the influence of a high pressure area required for it to happen. With a temperature inversion (warm air meeting cold), a low level conduit forms in the tropospheric layer of the atmosphere that causes VHF/UHF signals to travel hundreds of miles. You will most likely encounter it in the morning and evening, most often in September and October. It's not unusual for tropo conditions to last for several days over a wide area.

The reflection of VHF signals can also occur during an aurora – spectacular curtains of lights arising from charged particles originating from the sun. The aurora is associated with increased ionization in the E layer and it is from this that the signals can be reflected. Aurora conditions are caused by large geomagnetic/ionospheric disturbances, so VHF transmission by this means occurs at times when HF may be

experiencing problems. Aurora conditions are also most commonly seen at polar latitudes. Aurora catches are possible in the 300-800 mile range (and sometimes beyond). If you hear about a solar flare or increased solar activity, be on the lookout for aurora skip. Signals by this mode tend to be distorted.

Finally, the ionized trails left by meteors as they burn up in the earth's atmosphere is also a means by which VHF signals can be reflected. This mode of propagation is often the most frustrating, as the signals are so short-lived. It's best to park on an open frequency and see what happens. Meteor skip usually will bring in signals in the 200-1,200 mile range. The best time to try for this form of skip is during meteor showers. Such showers are the remains of decayed comets and their dates are the same from year-to-year giving repeatable opportunities for VHF transmission. Unlike other modes, do not expect to hear continuous transmissions. You will only hear anywhere from 1-10 seconds of audio. Obviously, it requires a lot of patience! During the big meteor showers, like the Perseids in August or the Leonids in November, you'll hear several signal bursts each minute.

You can get more detailed information on VHF/UHF skip propagation on the World FM-TV DX Association (WFTDA) website written by MT's own Glenn Hauser at URL: <http://www.anarc.org/wftda/propagation.htm>

Another website worth visiting that has complete descriptions of the various modes of tropo skip can be found on Bill Hepburn's TV and Radio DX Information Center website at: <http://www.iprimus.ca/~hepburnw/dx/trmodes.htm>. In addition to detailed descriptions of various VHF/UHF skip modes, you will also find propagation forecast on Bill's website at: <http://www.iprimus.ca/~hepburnw/dx/dx.htm> See Table One for some potential skip communications.

What Can You Hear and Where?

Since VHF and UHF propagation is usually "line of sight," frequency allocations and usage are far more localized on frequencies above 30 MHz. There are some broad allocations for different purposes used in the United States and most of the rest of the Americas. The following is a summary of the main frequency bands found from 30 to 108 MHz.

30 to 50 MHz

This is known as the VHF low band. Most transmissions will be in narrow band FM with channels spaced at 20 and 25 kHz intervals. A wide variety of stations can be heard on this range, including businesses, federal, state, and local governments, law enforcement agencies, and various industrial radio services. In addition to the United States allocations presented below, table one gives a list of some of the foreign DX frequencies recently intercepted in this frequency range. Other countries do not follow the US bandplan, but complete coverage of those foreign allocations is outside the scope of this article.



A bear collar and tracking equipment used by the National Park Service

30.00-30.55 US Government and military: Used by the military services for tactical and training operations to include tactical air-ground and air-air communications. Other Federal agencies use this band for natural resource management and for wildlife telemetry.

30.56-32.00 Forestry and business. Also used by the military services for tactical and training operations on a non-interference basis. Other Federal agencies use this band for natural resource management and for forest fire fighting.

32.00-33.00 US Government and military: This band is used primarily for tactical and training operations by U.S. military units for combat net radio operations that provide command and control for combat, combat support, and combat service support units. Frequencies also used for air-to-ground com-

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You'll find the 6 meter ham band just above the VHF low band (courtesy Icom)

munications for military close air support requirements as well as some other tactical air-ground and air-air communications. Other federal government uses include land management and protection of natural resources

33.00-33.98 Public safety, business and petroleum production: Federal agencies are authorized to use this band as part of mutual aid response with local communities (fire, medical, etc.). Used by the military services for tactical and training operations on a non-interference basis.

34.00-34.99 US Government and military: This band is used primarily for tactical and training operations by the U.S. military for net radio operations that provide command and control for combat, combat support, and combat service support units. Frequencies also used for air-to-ground communications for military close air support requirements as well as some other tactical air-ground and air-air communications. The federal government makes extensive use of the frequencies in this band for natural resource management, park security/law enforcement at national parks, forests, wildlife refuge areas, etc. Some other uses of this are for law enforcement and facilities security management.

35.00-36.00 Business and paging services: Also used by the military services for tactical and training operations on a non-interference basis and for experimental testing.

36.00-36.99 US Government and military: This band is used primarily for tactical and training operations by U.S. military units for combat net radio operations that provide command and control for combat, combat support, and combat service support units. Frequencies also used for air-to-ground communications for military close air support requirements as well as some other tactical air-ground and air-air communications. Other federal government uses include national park management, law enforcement, public safety nets, contingencies, and natural resources management.

37.00-38.00 Public safety, business and power/water utilities: Some Federal agencies are authorized to use this band for mutual aid response to local communities. Military services have some usage for tactical and training operations on a non-interference basis.

37.50-38.25 Radio Astronomy (shared). Used for continuous observations of radiation from the Sun and Jupiter.

38.00-38.99 US Government and military:



The U.S. military is a BIG user of the VHF Low and, especially in tactical and training operations.

This band is extensively used for land mobile radio communications in the operation, protection, and maintenance of national parks, forests, wildlife refuge areas, etc. Frequencies in this band are also used for reservation programs, law enforcement, public safety operations, control of power generation transmission and water facilities, environmental data collection, fish management, and wildlife telemetry programs. This band is primarily for tactical and training operations by U.S. military units for combat net radio operations that provide command and control for combat, combat support, and combat service support units. Frequencies also used for air-to-ground communications for military close air support requirements as well as some other tactical air-ground and air-air communications.

39.00-39.98 Public safety: Some Federal usage is authorized in this band for mutual aid response to local communities (fire, medical, oil spills, etc.).

40.00-41.99 US Government and military: This band is extensively used by the federal government for land mobile radio communications in the operation, protection, and maintenance of national parks, forests, wildlife refuge areas, etc. Frequencies in this band are also used for meteor-burst communications, reservation programs, public safety operations, environmental data collection, fish management, and wildlife telemetry programs. This band is also used primarily for tactical and training operations by U.S. military units for combat net radio operations that provide command and control for combat, combat support, and combat service support units. Frequencies also used for air-to-ground communications for military close air support requirements as well as some other tactical air-ground and air-air communications.

40.66-40.70 Band is designated for industrial, scientific and medical (ISM) applications (center frequency 40.68 MHz)

42.00-46.58 Public safety, business, paging services, forestry and cordless telephones: Primarily used by Federal agencies for mutual aid response with local communities. Used by the military services for tactical and training operations on a non-interference basis.

46.58-47.00 US Government, military, and cordless telephones: Extensive use of this band by the federal government is for contingency response to various national disasters. Others uses are for national resources management, law enforcement, tornado tracking, and various meteorological research support. This band is used primarily for tactical and training operations by U.S. military units for combat net radio operations that provide command and control for combat, combat support, and combat service support units. Frequencies also used for air-to-ground communications for military close air support requirements as well as some other tactical air-ground and air-air communications.

47.02-49.58 Public safety, business, power/water utilities, petroleum production, and cordless phones: US government experimental usage for experimental research to observe and measure currents in harbor areas



Remote control of model airplanes is among the many uses of the 72 to 76 MHz band.

in support of vessel safety. Used by the military services for tactical and training operations on a non-interference basis.

49.61-49.99 US Government, military, and cordless telephones: This band is used extensively by the federal government to support contingencies or natural ecological emergencies, some public safety requirements, MARS system, and air-quality measurements. US government experimental research is performed in various regions of the atmosphere as well as experimental development of portable space orbital debris ground radars. This band is used primarily for tactical and training operations by U.S. military units for combat net radio operations that provide command and control for combat, combat support, and combat service support units. Frequencies also used for air-to-ground communications for military close air support requirements as well as some other tactical air-ground and air-air communications.

50 to 54 MHz

This is the frequency range assigned to the six-meter ham radio band. Below is the ARRL bandplan recommended for six-meter operations. Military units are allowed to conduct tactical and training operations in this band on a non-interference basis.

50.000-50.100	Morse code (CW) and beacons
50.060-50.080	Automatically controlled beacon subband
50.100-50.300	Single sideband (SSB) and Morse code (CW)
50.100-50.125	Single sideband DX window
50.125	Single sideband (SSB) DX calling frequency
50.200	Single sideband (SSB) domestic calling frequency
50.300-50.600	All modes (simplex)
50.600-50.800	Digital, experimental and special modes
50.620	Digital (packet) calling frequency
50.700	Radioteletype (RTTY) calling frequency
50.800-51.000	Radio remote control (10 channels/20-kHz channels)
51.000-51.100	Pacific DX window (Single sideband/Morse code)
51.120-51.180	Digital repeater inputs
51.120-51.480	FM repeater inputs (19 channels)
51.620-51.680	Digital repeater outputs
51.620-51.980	FM repeater outputs (19 channels)
52.000-52.480	FM repeater inputs (except as noted below; 23 channels)
52.020	FM simplex
52.040	FM simplex
52.200	FM repeater test pair (input)

52.500-52.980	FM repeater output (except as noted below; 23 channels)
52.525	Primary FM simplex and calling frequency
52.540	Secondary FM simplex and calling frequency
52.700	FM repeater test pair (output)
53.000-53.480	FM repeater inputs (except as noted below; 19 channels)
53.000	FM simplex remote base
53.020	FM simplex
53.100	Radio remote control
53.200	Radio remote control
53.300	Radio remote control
53.400	Radio remote control
53.500-53.980	FM repeater outputs (except as noted below; 19 channels)
53.500	Radio remote control
53.600	Radio remote control
53.700	Radio remote control
53.800	Radio remote control
53.520	FM simplex
53.900	FM simplex

54 to 72 MHz

Television channels 2, 3, and 4 are located in this range. The video portions will sound like distorted noise on a scanner. The audio portions are in FM, but will sound "clipped" and "tinny" unless your scanner can tune this range using wide band FM. Also the US government is allowed to conduct experimental operations in this band on a non-interference basis. Used primarily for experimental testing and equipment checkout.

Channel	Bandwidth	Video	Color	Audio
Channel 2	54-60	55.25	58.83	59.75
Channel 3	60-66	61.25	64.83	65.75
Channel 4	66-72	67.25	70.83	71.75

72 to 76 MHz

The ranges of 72-73, 74.6-74.8, 75.2-75.4, and 75.4-76 MHz are used by a wide variety of users in the civilian and government sectors such as emergency communications, remote control signals for model airplanes and garage door openers, wireless microphones (including those used by law enforcement agencies and narrators at special events), and two-way communications inside factories, warehouses, and other industrial facilities. Most channels are spaced at 20 kHz intervals and voice communications uses narrowband FM.

In addition to the items mentioned above for the 72-73 MHz range, the US government conducts numerous Research, Development, Test and Evaluation tasks as well as telecommand testing in this band on a non-interference basis. NASA uses Remotely Piloted Vehicles (RPV) at Wallops Flight Facility and Kennedy Space Center.

A radio astronomy band runs from 73-74.6 MHz. It is used to monitor interplanetary weather conditions from the solar wind. It is preferred for continuum observations. These observations help identify characteristics of stars, planets, and gases such as their elemental composition, temperature, etc.

From 74.6-74.8 MHz, military usage in this band ranges from administrative land mobile nets to ground communications for military aircraft crews. Federal government usage ranges from

portable-to-portable communications to low-power communications inside power plant facilities to the remote control of devices.

The first of several aeronautical service allocations is located in this frequency range. The spectrum from 74.8-75.4 MHz contains marker beacons that are part of the instrument landing system. These will probably be decommissioned as GPS navigation usage takes over.

And finally, the federal government usage of the 75.4-76.0 MHz ranges from public safety operations to low power operations to the remote control of mechanical devices. DoD usage ranges from military runway light control systems to aircrew ground communications.

76 to 88 MHz

This frequency range is used for television channels 5 and 6. The range is also used by the military primarily for tactical and training operations on a non-interference basis.

Channel	Bandwidth	Video	Color	Audio
Channel 5	76-82	77.25	80.83	81.75
Channel 6	82-88	83.25	86.83	87.75

88 to 108 MHz

This is the FM broadcasting band worldwide. In the United States, broadcasters are allocated one-hundred 200-kHz wide channels. They start with channel 201 at 88.1 MHz and run through channel 300 at 107.9 MHz. The FCC has set aside a non-commercial segment from 88.1-91.9 MHz (channels 201-220). This band is also used by various Federal agencies for maintenance and calibration testing of aeronautical radio navigation equipment.

Fire Up the Scanner

So fire up your scanner and give low band DXing a try. You may be pleasantly surprised by the signals you are able to hear on the magic VHF low bands.

Table One: Selected VHF Low Band DX Frequencies

Note: A special thanks goes out to the gang on the VHF Skip newsgroup for their help in preparing this table. We especially acknowledge the VHF Skip list administrator Ian Julian for his insight and intercepts.

Arabic language communications:	32.025	32.050	32.525	39.525
	40.500	40.600	40.800	41.610
	42.570	42.900	43.510	43.875
	43.950	45.100	45.150	45.175
	45.250	45.300	45.550	45.750
	45.900	46.450	47.175	47.400
Argentino pager:	47.520			
Argentino police:	49.930			
Asian communications:	32.3875	32.555	42.490	
Asian pager:	33.345	42.750		
Asian phone system:	41.140	42.430	42.450	
Australian army:	31.150	32.150	32.250	32.700
	33.050	33.100	33.280	33.350
	33.450	33.500	33.550	34.150
	34.200	34.400	34.550	37.950
	38.050	38.100	38.350	38.440
	41.450			
Australian pagers:	40.650	40.680	40.750	
Austria military:	31.825			
Azerbaijan military:	44.375			
Brazilian pager:	35.550			
Brazilian police:	47.100	47.265	47.340	

Brazilian taxis:	34.480	34.510	34.520	34.550	34.560	34.570
	34.740	34.760	34.780	34.800	35.060	38.240
	38.360	38.400	38.560	38.740	38.860	38.880
	38.940	38.960	38.980	39.060	39.080	39.100
	39.120	39.620	39.700			
British army training in Canada:	34.300					
Cambodian or Vietnamese military:	39.500					
Canada pagers:	31.920	32.780	34.920	37.220	39.360	42.240
Canadian military ATC net:	33.250					
Central/South American military:	32.075					
Chinese communications:	32.325	32.600	34.675	42.225		
Chinese military:	36.500	36.550	38.800	41.075		
Colombian Police:	44.350	47.100	47.175	47.325	47.350	
Costa Rica Radio Llamor Pager San Jose POCsAG Pager:	36.680					
Cuban agricultural net:	33.375	33.425				
Cuban communications net:	39.475	39.500	40.050	42.775	43.350	43.625
	(every 25 kHz)	44.000	44.075	44.725	44.925	(every 25 kHz)
	45.725	46.025				
Cuba spy number station:	42.050					
Eastern Russian phone system:	33.610	35.100	35.625	35.650	35.825	
Haitian Pager:	43.580					
Hong Kong police marine division:	33.150	33.600				
Indonesian ambulance or medical net:	36.650	36.975	40.350	40.950	40.975	41.000
	41.100	41.125	41.150	41.250	41.275	41.300
	41.325	41.925				
Indonesian phone system:	42.115					
Iranian communications:	39.100	39.775	39.875			
Iraqi Republican Guards (tentative):	40.8483	41.275	41.450	41.850	41.950	42.770
	44.450	44.475				
Israeli communications net:	34.050	34.450	34.600	35.000	35.550	40.800
	41.600	41.850	43.850			
Israel defense forces:	30.750	33.600	39.450	44.350	45.000	45.950
	46.150	46.500	46.600	46.650	46.700	46.750
	46.800					
Japanese military:	33.410	34.200				
Malaysian army - East Timor Asian Peacekeeping net:	34.175	40.800				
Mexican army (tentative):	37.950	39.025	41.050	42.500		
Middle East: POCsAG Pager:	33.350					
New Zealand army:	39.050					
Niger Radio station La Voix du Sahel Niamey:	45.650					
Philippine comms:	39.460					
Romanian communications:	32.150	32.200	32.300			
Russian military:	32.325	32.400	32.425	32.445	32.565	32.685
	33.375	33.610	34.075	34.255	34.335	35.145
Russian pager:	40.050					
Russian wideband data:	32.215	32.915				
South African comm net:	41.275	41.300	41.325	41.550	41.675	41.700
	42.775	42.875	42.975	44.425		
South Korea military:	30.800	30.850	31.220	32.800	33.725	34.300
	35.200	35.500	35.550	35.800	37.350	38.100
	38.250	38.600	40.750	41.450		
South Korea marine police:	42.300					
South Korea police:	34.250	34.500				
Spanish comms:	32.400	32.470	32.660	32.720	33.140	33.160
	33.220	33.240	33.350	33.550	33.980	34.010
	34.070	34.110	34.380	34.545	34.550	34.580
	34.980	35.000	35.040	35.075	35.080	35.110
	35.130	35.160	35.280	35.400	35.520	35.630
	35.710	36.020	36.120	36.200	36.300	36.400
	36.560	36.660	36.940	37.000	37.040	37.125
	37.280	37.420	37.880	38.160	38.260	38.320
	38.350	38.380	38.440	38.840	39.180	39.300
	39.560	40.220	40.320	40.900	41.200	41.425
	41.720	41.840	41.850	41.860	41.900	41.975
	42.020	42.060	42.075	42.080	42.140	42.190
	42.300	42.350	42.370	42.670	42.740	42.825
	42.840	42.850	42.900	43.060	43.090	43.240
	43.280	47.525				
Taiwanese defense force (tentative):	35.000	35.750				
Trinidad oil production comms:	44.270					
Turkish police:	34.3125					



Radio Aparecida – 50 Years on the Air

By Cassiano Alves Macedo
Encontro DX - Rádio Aparecida

The City and the Station

The city of Aparecida is located on the East region of the State of São Paulo, Brazil – a little over 100 miles from São Paulo city and about 150 miles from Rio de Janeiro.

The legend goes that in the year 1717 an unknown darkened clay image of the Virgin Mary suddenly appeared in the nets of three humble fishermen, brought from the bottom waters of the *Paraíba do Sul* river. From that moment on the small barge almost sank under the weight of abundant fish.

The fishermen called it “Aparecida” (“The Emerged”) and enthroned it in a small makeshift chapel in the house of one of the fishermen’s mother. The image quickly gained a reputation as a miraculous icon and was soon transferred to a shrine of its own.

Our Lady of Aparecida was later consecrated as the nation’s patroness saint and the city that grew around it adopted the name “Aparecida.” A national cathedral was build to



The author Cassiano Macedo and “Encontro DX” co-host José Moura

honor Her. With the later addition of a huge Matriarchal Shrine in the ‘60s it became the world’s second biggest catholic temple.

As early as 1937 some residents considered installing a local radio station, as thousands and thousands of pilgrims started to flow to the city of Aparecida every year. But it wasn’t until 1945 that the city’s parishioners decided to apply for a government license to operate a radio channel. That it was granted was the result of a remarkable effort undertaken by several preachers of the Aparecida National Shrine at the time.

Starting with a small 100 watt STP transmitter assembled in Brazil, plus some other equipment donated by the distinguished Brazilian radio entrepreneur Dr. Paulo Machado de Carvalho, the station had its humble beginnings operating on the 600 kHz band.

First Days

“Praised be Our Lord Jesus Christ and the Holy Name of Mary” – with these words the Auxiliary Bishop of São Paulo’s Archdiocese Dom Antônio Alves de Siqueira opened Radio Aparecida in September 08, 1951, under the call letters ZYR 44.

From a regional listenership in the beginning, the station grew in 1952 to its tropical band in 5,035 kHz, and then to a nationwide audience reached by its powerful shortwave band. A second SW frequency was added in 1968 – 6,135 kHz in the 49 meter band. In 1976 the mediumwave bands were moved to the frequency of 820 kHz.

Even though its target is a national audience, Radio

Aparecida outreaches its goals beyond the Brazilian boundaries. Letters arriving from the most diverse regions of the world give proof of the station’s powerful shortwave emissions.

Besides short, medium, and tropical waves and FM bands, Radio Aparecida also broadcasts via satellite. Its first experience with the new media was in September 1992 through an analog system, interrupted in 1994. Satellite service was resumed in 1995, this time using digital signals, with Radio Aparecida as the flagship of the Catholic Radio Network (RCR), comprising more than 170 stations throughout the country. State of the art technology holds this network together, controlled by the computerized system of COMSAT Brazil.

The quality of its equipment has always been a concern at Radio Aparecida, where all the studios are equipped with AEV’s Virtual Radio system, minidisks and computer workstations. Likewise, the station’s music library is all on CDs.

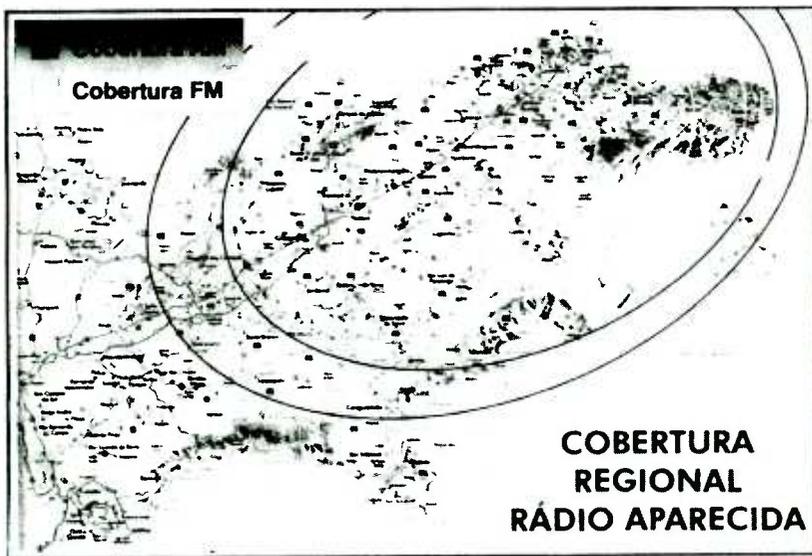
Programming

Despite being a Catholic station, Radio Aparecida is in no way driven by religious proselytism. Besides the religious shows that teach doctrine, other shows emphasize strong Christian and civic values. During the times when soap operas were a popular radio feature, Radio Aparecida came up with several successful series of that type, produced and performed by its own talents.

While most of the interior radio stations in Brazil tend to be part of one of the big national networks as opposed to having their own lineup, Radio Aparecida produces its own shows, including several musical programs and locally written newscasts.

During the so-called military dictatorship in Brazil, the station had its transmitters locked

OBERTURA RÁDIO APARECIDA



up for a day by the DENTEL authorities (the Country's National Telecommunication Agency), simply because one of the station's broadcasters, Father Victor, read live on the air *The Universal Declaration of The Human Rights*. Father Victor has always been one of the station's most outspoken and influential communicators. He played a crucial role in the consolidation of Radio Aparecida as a national institution.

On September 7, 1955, the Radio Aparecida's *Members Club* show was aired for the first time, conducted by Father Laurindo Rauber and co-hosted by Reinaldo César. Since its beginning the main stated goal of the show has been to unite listeners in the task of spreading the Gospel through devotion to *Our Lady of Aparecida*. With their small donations, members of the audience help with the station's evangelization mission and are eligible to win several gifts in drawings throughout the year. Representatives of the *Members Club* from all over Brazil gather together once a year.

The DX Meeting Show (Encontro DX)

This past November, the *DX Meeting* show celebrated its 15th anniversary, with 745 editions being aired. This is probably one of the oldest radio shows in Portuguese still active and dedicated to the broadcasting world.

DX Encounter was created by Raimundo Leonardo Bezerra who, at the time, was the president of *Globo DX Clube* (now defunct) – one of

the groups responsible for the remarkable growth of DXing in Brazil.

The first commercial sponsor for *DX Meeting* was a small company founded by local DXer Antonio de Oliveira in order to help keep the show running. The show's patron was, since the beginning, Father Ronaldo Pelaquim – at that time the director of Radio Aparecida. As a future director of the Brazilian Branch at Radio Vatican, he surely knew very well the important role of shortwave.

From the beginning, *DX Meeting* was hosted by one of the station's best known announcers, Eriberto Carvalho, and co-hosted by Raimundo Leonardo Bezerra. Due to a health problem Mr. Bezerra had to leave the show in 1990. The Globo DX Club's vice-president at the time, Cassiano Alves Macedo, filled in, taking over the tasks of producing and hosting the show.

When Mr. Macedo had to take a six-month leave from the show in 1992 in order to meet professional commitments as a teacher, Mr. Paulo Fernando Kasseb – then the president of the São Paulo State Radio-Amateur League – filled in. From that time onward, the show dedicated a session to amateur radio. One focus was on radiotelegraphy (CW), by well-known ham operator "Tony" (Antonio Carlos Pascoal, now deceased) who administered a progressive CW course during the show.

Since the beginning of year 2000 a great enthusiast of DXing in Brazil – Mr. José Moura, AKA "Mr. VOA" – a long time *DX Meeting* backstage collaborator and supporter – started co-hosting the show together with Mr. Cassiano Macedo.

During the so-called Golden Years of international shortwave broadcasting, several distinguished announcers from the mainstream organizations participated on the show. Broadcasters who made history on the international radio scene, such as Tarcísio Lages (Radio Netherlands), Luiz Edmundo (Voice of America), Maria Costa Pinto (BBC), Serguey Beldinsky (Voice of Russia), Luiz Henrique Pádua (RN), Jeff White (WRMI), Christina Sun Wook Choi (KBS), and Irene Faith (RHC), among others, were interviewed for the show during these 15 years.

Well-known Brazilian DXers such as the long missed Prof. Robert Veljmeijer, Rudolf Grimm, Carlos Felipe, Alencar Aldo Fossá, as well as many such famous radio-amateurs as Léo Keiteris, Captain Baranof (from the Brazilian Aeronautics Technological Center), the late Professor Paulo Maia and Mr. Amir Klink (who recorded a message to the listeners when he was at the North Pole) also participated on the program.

"We believe *DX Meeting* has greatly contributed to disseminate the diverse spectrum of this very important means of social communication, which is not restricted to the short range of the AM and FM bands, but reveals itself in many other useful and broadly employed forms of radio broadcasting."

The show heavily relies on the great support it has always received from the present directors of Radio Aparecida: Father César Moreira – a renowned journalist who has passed through several of the major radio stations in the city of São Paulo – and Father Luís Rodrigues – a tireless defender of the freedom of expression.

DX Meeting (Encontro DX) airs on Saturdays at 2200 UTC on 820 kHz AM, shortwave and satellite (see below for frequencies). A music program, *Pé na Estrada*, airs in the previous hour.

If you listen to our station and like what you hear, but would like to understand it better, try our language program *Aprendendo Nossa Língua* (Learning Our Language), 0845 and 1845 weekdays and at 1215 UTC Saturday. Radio Aparecida's broadcast day is from 0800 to 0300 UTC.

RÁDIO APARECIDA

Address:

Caixa Postal 2
CEP 12570-970
Aparecida - SP

Phone: (0xx12) 564-4400

Home-Page:

<http://www.radioaparecida.com.br>

E-mail:

radioaparecida@redempetor.com.br

Frequencies:

AM 820 kHz;	FM 90.9 MHz
5035 kHz	10 kW
6135kHz	25 kW
9630 kHz	10 kW
11855 kHz	1 kW

Bibliographical References:

Paiva, Gilberto – *Rádio Aparecida – 50 Anos de História*, Editora Santuário, 2001.
Rádio Aparecida – Special Edition Newsletter Commemorative of the 45th anniversary of Radio Aparecida - 1996.

Five Tips for Ham Radio Beginners

Over the last year and a half I've encouraged anyone who reads this column to get started in amateur radio by getting their first license. More than a few of you have done so and have earned my heartiest congratulations.

But, now that you have your ticket, a whole new set of questions have popped up. You, like many other new hams, might be frustrated by the lukewarm reception given to you by "old timers" or by attitudes and operating procedures you were told in the exam material was frowned upon but seem widely practiced. You might be bewildered by the vast landscape of modes, bands, equipment, and activities.

If you've just joined the ranks this year, remember that this hobby already has a 100 year head start on you. Understand also that being a ham is a lifelong process. Your license doesn't have to be renewed for 10 years! Some years you'll be really active and other years you won't. I recently talked with a ham who took a 45 year layoff from the hobby. Although he admitted to feeling like Rip VanWinkle, he was excited about getting involved again.

For all new hams standing at the threshold of the hobby I'd like to offer the following ideas

about some of the directions you might take.

1) Join a Local Club

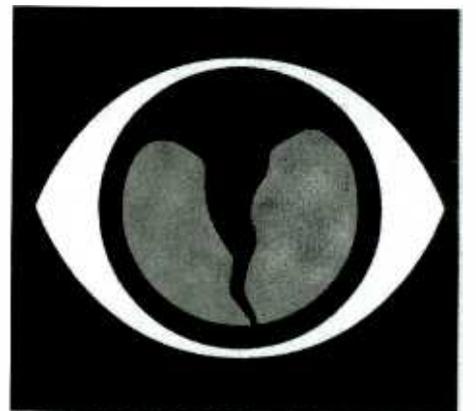
Every local area has an amateur radio club. The easiest way to find the club is to ask on any local repeater. Most repeaters are operated by local clubs and the more active members of the clubs are usually found on those repeaters. Most club members are happy to see new hams interested in their club and will tell you the location, time and date of the next meeting. It's at the club meeting that you'll get a chance to put a face to the voices you hear on the repeater and a chance to see what the local club's interests are.

Local clubs usually have many projects they're involved with at any given moment. Some have ongoing license up-grade study sessions, others work to handle communications at local events such as bike races and marathons. Some use their meeting to educate members on new technology or offer seminars on a wide range of topics from home brewing equipment to how to interpret solar flare data. The better the club the more you'll get out of it. Think about that when you consider joining.

Most clubs plan all year for Field Day; that's the last full weekend in June each year, when hams all across America set up field stations in a simulated emergency situation to test their organizing and operating skills. Setting up your radio and an antenna and operating using emergency power while making as many contacts as possible in a 24 hour period is a real test. For many clubs Field Day is more like a fiesta with lots of barbecuing, hamming and retelling the tales of all the previous Field Days.

2) Look for a Niche

The ham radio universe is so huge that no one can become thoroughly involved in all aspects, even in the course of a long life. So, start by finding a niche.



U.S. DEPARTMENT OF COMMERCE

2) Public service via any of these national organizations is a good place you put your new ham energy to work. (Courtesy: ARES <http://www.ares.org>)

The most obvious niche for hams is in Public Service. It's the aspect of hamming that is most visible to the public. Being part of your area's disaster preparedness can be a very rewarding experience. The events of last September have brought a new sense of urgency to this niche and a greater understanding of its necessity from the public and hams alike.

Public service can be anything from joining your local Amateur Radio Emergency Service



1) The Richmond Amateur Telecommunications Society is a typical local club. Their well designed web site links to national and local amateur resources, includes club announcements, meeting info and much more. What's your local club doing? (Courtesy: RATS <http://www.rats.net>)

(ARES) or SkyWarn program to getting involved with a regional traffic net such as East Coast Amateur Radio Service (EastCARS), or the Maritime Mobile net. Just remember this: in public service there's always room for one more! The best source for information on public service is at <http://www.ares.org>. This is the web site for the Amateur Radio Disaster Services, with links to most of the other public service organizations.

3) Get on the Air

This may seem like an obvious suggestion but I've found that new hams sometimes have to break through a barrier which seems to stop them from getting on the air. Sometimes it's because there's not a convenient place to locate the "shack." Sometimes it's because the job, family, and other activities leave little time for hamming. Again, throughout your ham lifetime you'll find you have more or less time for on-air action. Just try not to stay away for 45 years!

One thing that keeps new hams off the air is lack of HF equipment. Unlike VHF, where a \$100 handi-talkie gets you on the air, HF requires more in the way of equipment and antennas. Never let this be a deterrent. At the local club you've just joined, you'll find several earnest friends who will be more than happy to loan you a transceiver to get on HF. Many hams have two, three or even a dozen extra rigs on their desks and shelves or in closets. Someone wants to lend you a rig.

But, remember, these are friends who are trying to help you. Don't abuse them. Return the rigs to the lenders in exactly the same condition received and in a timely fashion. When you take the loaner agree to a term after which you'll return the loaner and buy your own rig. Also, a small gift as a token of appreciation for this friend is the least you can do. Give your friend a gift certificate to Radio Shack, Ham Radio Outlet, Amateur Electronic Supply or similar "toy store." Be creative as well as appreciative.

4) Set Personal Goals

It's very easy to fall into a radio rut. I've heard no-code Techs talking for years about how and when they were going to up-grade, get on HF, learn CW, do something different. But, somehow they don't. I've heard many old timers who never stray from their 75 meter phone net which gets together just after dinner and ends after midnight. Year after year. Now for some this is their niche! But, if that's all you want from your license privileges you might as well stick with Internet chat rooms and skip the studying and tests.

There's a universe of interesting subjects and ideas in electronics and communications happening every day in amateur radio. If you really have an interest in any of it you'll need a strategy for achieving your goals. Some hams want to become high speed CW operators and dive into the code, pushing themselves to go faster and faster. Some hams want to work all states, all continents, all DX zones, all counties. There are over 3,000 awards available to hams ranging from *The Rag Chewers Club* (chat with another ham for at least 30 minutes in Morse Code) to



3) *Just a few personal goals you can shoot for in ham radio. The Worked All Continents Award, DXCC/QRP Award, or something a little more esoteric the Diploma Cuba (worked and confirmed the 8 call districts of Cuba). There are over 3,000 awards you can earn, so what are you waiting for?* (<http://www.arrl.org/awards/>, <http://www.frc.co.cu/diplomas.htm>)

DXCC Worked All Countries (there are 334 official countries and you'll need QSL cards from every one to qualify). Some awards you can get with just one contact: others you'll spend a lifetime chasing.

Some hams want to learn to build their own equipment and eventually have a complete station that they've "home-brewed" themselves. Some operate only QRP (low power, limited to 5 watts CW or 10 watts voice). Imagine getting DXCC QRP! Some want to experiment with antennas. I ran into a ham recently on 17 meters who was using a 36" no-gap loop antenna two feet off the ground. He had a very copiable signal. He said he's built dozens of antennas.

Being a ham is a lifetime adventure. Never stop until you become a silent key.

5) Consider Your Own On-Air Behavior

Many hams fall into a routine when it comes to on-air contacts. A brief exchange of signal reports, weather, and equipment passes for about 75% of all on-air discussions I hear on the bands. Learn to become more of a "rag chewer." Start a real dialog with the other person. We all worked hard to get our HF privilege. Don't you want to know a little more about the person you've just contacted?

Be an interested listener. Ask about the other ham's other hobbies, previous ham experiences, or career. Are there any other hams in the family? You can ask a lot of questions without ever once finding out the political or religious views of your fellow hams. I like to ask how they became hams. I talked to one 95 year old ham who confessed to having been a bootleg spark gap operator before he got his license in 1929! There's an interesting story out there for each ham you contact. Find out what it is.

Always be a "considerate operator." Again this seems obvious but in this day of *road rage* there's also a fair amount of "on-air rage" which can be sampled almost daily. Always ask if the frequency is in use on the HF bands before operating. Ask at least three times with enough time for response in between. Even so, you might have someone angrily come back to your CQ call telling you you're on *their* frequency. Be polite, explain that you had asked if the frequency was in use and had not heard a response, then suggest that you'll QSY (move to another frequency). It's particularly important to maintain high considerate operator standards with DX stations whose command of English may not be up to a long winded discussion of the finer points of FCC rules and regulations.

Get a copy of the ARRL's *FCC Rule Book*. Always consult the *band plan* section when operating HF. (*MT's May issue also carried a comprehensive amateur HF band plan - ed.*) It's your responsibility to make sure you're not operating on the SSTV (Slow Scan TV) meeting frequency, the QRP calling frequency, the DX window, the WIAW CW practice frequency, or the International Maritime Mobile net. Always defer to nets which are beginning, ending or in progress. Dozens of hams are standing by and don't appreciate inconsiderate operators. Always operate at least 2 full kHz from every band edge. Your radio may not be calibrated perfectly and a portion of your transmission may be falling out of band.

◆ Last Say

This month Field Day will be held June 22-23 beginning at 1800 UTC Saturday and ending at 2100 UTC Sunday. You couldn't ask for a better time to get started in your new ham radio hobby. Find out what your local club has planned and join in. I plan to be operating with a few family members and friends. I'll be trying out one of my operating goals: kite and balloon supported antennas. I'll tell you how it worked out, and meanwhile I hope to hear you on the bands!

Q. What became of the proposal to make several itinerant/low power frequencies available to the general public? (Ron Blocker, Glenwood, IL)

A. It was adopted by the FCC on November 13, 2000, and transceivers are being marketed. The new Multi-Use Radio Service (MURS) consists of five 2-watt channels: 151.820, 151.880, 151.940, 154.570, and 154.600 MHz. Virtually any legitimate application is acceptable, and external (non-gain) antennas may be used.

Q. Can an inexpensive pocket AM/FM radio be retuned to cover the 118-137 MHz aircraft band? (Robert E. Brock, Tempe, AZ)

A. Yes, by stretching the coils further apart and re-peaking the appropriate RF and oscillator trimmers on the tuning capacitor. But the signals are AM, so recovered audio will be low. You may be able to help that by readjusting the discriminator coil.

Be sure to make a note of all the original settings so you can return to them if the experiment doesn't work!

Q. I recently installed 100 feet of coax on an outdoor scanner antenna. Is it necessary to have a ground wire attached to the antenna mast? Should I install a lightning arrestor? (Dave Boyle)

A. A ground is absolutely unnecessary for scanner reception. Even at lower frequencies (long and short wave), all a ground does is reduce or prevent electrical shock from faulty AC installations, and occasionally reduce background electrical noise.

So far as the lightning arrestor goes, yes, it's a good idea. I have one on each of my personal scanners, transceivers, and shortwave receivers, and have never had a problem from nearby lightning strikes.

Q. Do those ultrasonic insect and rodent repellents really work? (Mark Burns, Terre Haute, IN)

A. Not according to user groups on the Internet. In fact, several of them noted how some pests

were actually building nests next to them!

Q. In your review of the Miracle Whip antenna, you say that it provides an extra measure of selectivity. Is this a "miracle" solution to inexpensive portables with strong-signal overload? (Roger Porter, email)

A. A receiver has three types of selectivity:

(1) RF (radio frequency selectivity refers to the receiver's tuning ability to sharply choose a narrow swath of spectrum for reception);

(2) IF (intermediate frequency stages are those in which adjacent-channel rejection, that is the ability to select just one signal, is determined by filters); and

(3) AF (audio frequency components contour the bass and treble ranges of the sound for crispness, or to notch out specific interfering tones).

The Miracle Whip is an external whip with a tunable preselector on it; it can help narrow the swath of spectrum which is being received, thus assisting RF selectivity in order to reduce or prevent intermodulation ("intermod") and feed-through from strong, well-off-frequency signals which provide a din in the background, but it cannot assist IF or AF selectivity because its frequency selectivity bandwidth is 1 MHz or wider.

Q. I've seen references to frequency bands by letter, like S, X, K, Ka, etc. Is there a complete list of these and their corresponding frequencies? (Ron Blocker, Glenwood, IL)

A. Many lists have been created over the years in order to follow the needs of industry. For example, the 3-30 MHz range has been called high frequency (HF), shortwave, international, decametric, low band (by hams), and more.

The lettered designators were assigned by World War II British radar operators, and have been considerably revised since. Largely obsolete except for historical reference, here is a list of approximate ranges in MHz, including sub-bands:

Designator	Band (MHz)
L	390-1550
S	1550-5200
C	3700-6500
X	5200-10,900
K	10,900-36,000
Ku	10,700-18,000

Ka	18,000-31,000
Q	36,000-46,000
V	46,000-56,000
W	56,000-100,000

Q. I'm interested in buying a decoder for shortwave; I have a computer. Is there enough unencrypted digital traffic there to make the investment worthwhile? Should I get decoding software for my computer, or buy a dedicated decoder? (George Valdes, Croydon, PA)

A. There certainly is plenty to see, but modes change over time. While the days of teletype news feeds are long gone, you can still copy diplomatic, military, government, commercial, marine, aviation, and hams, most of which is in the clear.

So far as the choice of equipment, dedicated decoders are more expensive, but integrated and easier to use; software systems are cheaper and can be upgraded, but require more keyboard exercise.

Before you buy, check <http://www.wunclub.com> and download the "Digital FAQ" for more information.

Q. When is all-digital shortwave broadcasting supposed to take effect, and will it make synchronous detection obsolete? (Richard Dailey, Pittsburgh, PA)

A. If it were to take effect, it would make synchronous detection obsolete – except it won't take effect anytime soon. Since the proposal for stations to switch over within the next couple of years is an international effort, it would be voluntary. But there are no receivers being made to hear digital shortwave, so stations are understandably reluctant to make the change and lose 100% of their audience!

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

Gary Webbenhurst

P. O. Box 344, Colbert, WA 99005-0344

ab7ni@arrl.net

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Get ready for fire season. As the summer sun dries out the trees and vegetation, the summer wildland fire season starts heating up. There are hundreds of federal frequencies used by BIA, BLM, USFS, NPS, etc. There are many web pages for you to research. Or just search the 162-174 ranges in three MHz chunks. If you have a radio that is PC programmable, there is probably a database file already typed up for you. Search the net. Here is a starting point: <http://groups.yahoo.com/group/PRO-93/files/> and <http://www.pro-92.com/database.htm>.

If you are really into monitoring these frequencies, as I am, I will be glad to exchange my master list via email. The catch? You need to send me your list first. It must include the agency or use assigned to each frequency in your area. I prefer Word 97 format.

52

Summertime also spells power outages from storms that bring down wires or produce lightning strikes. Would you like to continue listening to your radio after the power goes out? Consider an uninterruptible power supply (UPS.) These units filter and protect against electrical surges, and have a battery backup that immediately kicks in if the power goes out. Although aimed at personal computer operations, it will work for scanners, receivers, cordless phones, and clocks – i.e., your listening post. They cost about \$50 at your local office/computer store. I had a \$10 coupon at Staples and bought one for \$45, minus the \$10 and another \$15 from a rebate. Net cost about \$20. Mighty cheap insurance! I liked them so much I bought three!

53

When it comes to summer preparedness, are you ready *right now*? Do whatever you need to for minimal lighting. As you read this you are probably at your favorite chair or desk. Is there a flashlight within reaching distance? I found that the glow from my little 2-inch LCD TV would double as a flashlight as I move about the house. I also bought a Coleman lantern that uses rechargeable batteries for its fluorescent light. Can you find your stash of AA batteries in the dark? The new generation of LED flashlights are cheap and run for hours.

54

I always like to learn as much as I can about the agencies I am monitoring. With the additional activity on HF military channels, I decided to research our

military branches. Here are some good websites for our military services:

<http://www.af.mil/news/>
<http://www.chinfo.navy.mil/navpalib/news/www/news.html>
<http://www.army.mil/>
<http://www.army.mil/enduringfreedom/>
<http://www.uscg.mil/news/cgnews.shtml>

Many other countries have similar sites. Here is one for the Australian Royal Navy <http://www.navy.gov.au/>

55

I just returned home after attending the Radio Communications Academy 2002 in Seattle. I have a couple of bright ideas for getting the most from a conference. I carefully select those presentations that seem to be of interest. Remember to check for handouts at the front of the room. I take a seat at the rear of the room along the side. If the presentation is not what I expected, I slowly and quietly get up, and leave. I just head for choice #2, and quietly slip in the back.

At the break, I network with people. In advance, I print out a few of my business cards on my deskjet printer. (Avery #26551, use blue ink if you have a color inkjet.) This beats scribbling your name, phone number, and email address on the back of some scrap of paper. Hopefully, the people I am exchanging information with will have done the same. I always wear my ARRL/RACES/ARES name badge. If you are not a ham, you can still get a generic badge with your name and hometown.

That evening, I write up my notes for the different sessions. At our next ARES/RACES meeting, I shared a brief review of what I learned at the academy. You can look at their website at <http://www.kc7iay.com/2002>. There are similar workshops elsewhere. Check with your local ARES group.

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Amongst emergency radio responders, there is a new "let's get professional" effort. Thus the ARRL's new Emergency Communication classes for levels I, II, and III. Visit <http://www.arrl.org/ccc/>. You are either part of the solution, or part of the problem.

57

I found a cheap (\$5) cordless toothbrush. This is great for cleaning the little cracks and crevices on small radios. At a hamfest, an Alinco rep suggested using a child's large soft-bristle paint brush for removing the dust in those delicate areas.

58

Ham radio's Field Day is June 28, 29 and 30th. Set-up usually begins on Friday, with operating commencing on Saturday and ending on Sunday. This is a great opportunity for HF monitoring. You can even work it from home. If you are a ham, participate. If not, listen in, or visit the local site.

59

Flipping through my regular mail, I found a small catalog from Our Designs Inc. They carry a full line of Fire/EMS/Police related items. I must warn you that you WILL find something in the catalog to order. I ordered the personalized attaché case. This is perfect for carrying all my radios and related equipment. See photo. You can reach them at 1 800-382-5252.



60

I saved the best for last. Since you read through the entire column I am going to throw you a good bargain. While surfing the net, I stumbled across a company that makes paper that you write on in the rain or moist conditions. They have a wide selection of small notebooks right up to large reams of copy paper (not for inkjets). Okay, here is the best part. They will send you a sample of their products for just \$10. And that includes their special pen, which is the one used by our astronauts in space. It is pressurized and writes upside down, under water, etc. The pen alone retails for \$20. So get out your credit card and call 253-922-5000 (west coast business hours) or go to their website at <http://www.RiteintheRain.com>. Look for their Introductory Sample Special.

I verify all URLs just before the publishing deadlines, but as we all know these can change quickly. Use your search engine to find the new website if necessary. I have been a little overwhelmed with regular and email. Be patient. I will get back to you. Next month we will look at some bright ideas for SWLs and those who are physically challenged. Keep listening!

Travels with a Scanner

Summertime scanning is here once again. Let's see, we usually talk about vacations and hurricanes about this time of the year, right? Well, let's save the hurricane stuff since they seem to be coming in toward the end of summer in recent years, and move right into the vacation information.

John Mayson, our intrepid cross-country traveler and frequent *MT* contributor, sends along these notes as an addendum to his April 2002 *MT* cover story:

"I'm sending this...to encourage readers to take their scanners along if they expect a long layover somewhere, such as Newark. I recently flew from Austin to Manchester, NH, with a long layover in Newark, New Jersey. Spending four hours in Newark Airport was never my definition of fun until I took my scanner along. Situated only a few miles from New York City, with a great view of Manhattan, Newark Airport offers a superb scanning location. Here's a brief summary of all I heard."

NYPD: First those letters symbolized a TV show, then the heroic actions on September 11. The New York Police Department uses the UHF-T band (470-512 MHz). A breakdown of Manhattan borough frequencies can be found in the November issue of *Monitoring Times*.

PANYNJ: The Port Authority of New York and New Jersey is responsible for the three New York area airports, the shipping ports, and was once headquartered in the now fallen World Trade Center. The PANYNJ operates an EDACS trunked radio system and has towers throughout the New York metropolitan area. The frequencies for this system are: 1=866.2125, 2=866.8125, 3=867.3750, 4=867.8750, 5=868.5500, 6=868.6000, 7=868.9125 MHz.

NJSP: The New Jersey State Police has a very heavy presence at Newark Airport. They rely on a statewide Motorola trunked radio system. The frequencies for this system are: 856.4625, 856.9625, 857.4625, 857.9625, 858.4625, 858.9625, 859.4625, 859.9625, 860.4625, 860.9625, 866.5625, 867.7625 MHz with a fleetmap of s13, s13. I did not hear any airport specific traffic on my scanner, but did note the troopers do carry their Motorola radios with them. Interestingly, the New Jersey National Guard troops carry Motorola iDEN radios, presumably Nextel. I did not see the state troopers carrying these radios. I don't know how they would communicate should the unexpected happen.

"One final note: Few airlines allow scanners to be used while in flight. Should you find your-

self on an airline that allows scanners, here's a good way to track your location with somewhat reasonable accuracy. The National Weather Service has VHF transmitters all over the country broadcasting 24 hour weather information. These stations are very good about identifying themselves. Also, the content itself is a big clue as to where the broadcast originates. By periodically tuning in the strongest weather broadcast, a passenger could determine with reasonable accuracy his location. Remember, check with the flight crew before using the scanner and abide by their instructions if you're asked to turn it off."

Thanks, John, for the great reporting from Newark. As a footnote to his report, I've personally refrained from using scanners or even asking if I can use scanners in aircraft since last fall. Instead, I bring a GPS unit and get a window seat. It's great sport to see your handheld GPS read out something like 540 mph and 34,000 feet! I've also used the GPS connected to a notebook computer and Microsoft *Street & Trips* software to produce a moving map display. Use your own common sense and never hesitate to let the Flight Crew inspect whatever devices you ultimately choose to bring onboard.

◆ Around the Country

Norman Hill of Arlington, Virginia, shares these channels with us:

451.525	Virginia Power	
460.575	Fairfax Fire	ch. 1
460.600	Fairfax Fire	ch. 2
460.625	Fairfax Fire	ch. 3
460.550	Fairfax Fire	ch. 4
460.525	Fairfax Fire	ch. 5

Next, George Kupraszewicz follows with a list of **Detroit, Michigan**, channels:

Detroit Police Department		
Chan	Freq	Notes
01	453.350	precincts 1, 3, 4
02	453.750	precincts 2, 10
03	453.300	precincts 7, 13, 16
04	453.800	precincts 11, 12
05	453.550	precinct desks citywide
06	453.250	precincts 6, 8



07	453.700	precincts 5, 9
08	453.325	headquarters, detectives
09	453.375	precinct desks secondary
10	453.425	precinct desks tertiary
11	453.875	tactical
12	453.925	command
13	453.975	detectives
14	453.775	special events

Detroit Fire Department

153.950	
153.980	
154.295	mutual aid
154.310	dispatch
154.400	

Detroit EMS

155.160
155.280
155.325
155.340
462.950
462.975

Additional area channels

153.890	Hamtramck Fire, Highland Park Fire
155.610	Hamtramck EMS
453.525	Highland Park Police

Phillip Cegielski of Hollywood, California, provides these channels for the **Los Angeles County Metro Transportation Authority**:

Channel	Frequency	Notes
01	472.5375	
02	472.6375	
03	472.5625	
04	472.6625	data
05	472.5875	
06	472.6875	

07	472.7125	data
08	472.6125	
09	471.3625	
10	471.3375	data
11	471.9875	data
12	472.0375	
13	472.0625	
14	471.2125	
15	472.1375	

Other related transit frequencies:

453.2750	mechanics
453.3250	supervisors
453.4750	"Tiger Team" supervisors
453.6250	security
472.4875	Blue Line road channel
472.7625	Blue Line yard channel
160.6950	Red Line road channel (subway)
160.5450	MetroLink Volley sub-dispatcher
160.8150	MetroLink Union Station
161.4150	MetroLink San Gabriel sub-dispatcher
482.1625	Culver City Municipal Bus Lines
506.6625	Santa Monica Municipal Bus Lines

Phillip also requests information on the Foot-hill Transit system in the San Gabriel Valley. Please send any frequency information here and I'll post it in a future column. Thanks, Phillip, for your detailed list.

❖ **The Geographic Frequency List, Part 4**

In Part 3 of the Geographic Frequency List project, we looked at searching for addresses in the Microsoft *Streets and Trips* mapping software and creating pushpin icons for each address of interest. We then filled in frequency information corresponding to each icon.

This procedure is preferred when your frequency database is referenced by addresses or named sites. That is, if you regularly group information by precinct, dispatch zone, police or fire station location, geographic area or facility name (such as "City Stadium"), then the procedure of listing all frequencies under one address pushpin is the best. Your resulting map will have frequencies grouped and located by the facilities they serve.

Since pushpin names can be searched along with street addresses, your site information is readily available through the Search Window and FIND command. For example, if a pushpin exists at City Stadium, a search for "City Stadium" will return all occurrences of the words "city" and "stadium" in the database. You'll get every road and every facility with these words, but you'll also see your pushpin at the top of the list. Click on your pushpin, and a map centered on City Stadium will appear. Your frequencies for City Stadium will be listed in the text balloon next to the pushpin icon.

An alternate to grouping frequencies under their corresponding facility or geographic name is to make each frequency an individual pushpin. This procedure is useful if you like to keep frequency lists in numerical order (by frequency) instead of alphabetical order (by agency or facility name). It's also extremely useful for identifying frequencies with multiple uses in your listening area.

Let's say that City Stadium uses these busi-

ness channels for event operations:

461.2625	security
461.2875	concessions
461.3125	traffic
461.3875	administration

A few miles away, City Vocational and Technical School uses these channels:

461.2125	custodial
461.2375	security ch. 1
461.2875	security ch. 2
461.3625	administration

Within the mapping software, you create individual pushpins for each frequency. The City Stadium pushpins will all have the stadium's address, and the City Vo-Tech School pushpins will all have the school's address. This will, of course, produce an overlapping group of pushpins at each address. The software handles this without losing data: when any of the overlapping pushpins are selected, a new window opens that lists all the nearby pushpins and allows for individual selections.

After these entries are made, assume you're listening to a stadium event on Sunday afternoon, but then hear other radio traffic on one of the channels early Monday morning. The frequency is 461.2875, and you search for this channel in the mapping software.

"461.2875" is entered into the Search Window, and the FIND command immediately locates both pushpins. In *Streets and Trips* software, they will appear on the PLACE / DATA tab of the search module instead of the ADDRESS tab. Again, either pushpin can be selected and the map will jump to the corresponding location. You can easily see that 461.2875 is the concession channel at the stadium on weekends and a security channel at the school on weekdays.

If you have your data in a spreadsheet or database, importing data into the map is very easy, since a "wizard" automates the process. The mapping software will be able to read your data directly, but you must first add spreadsheet columns or database fields to identify each entry's geographic location. The mapping software Help File will provide information about various database and spreadsheet programs and how to operate the wizard accurately.

A street address or latitude/longitude must be associated with each data record. Once each record is updated in the proper format and the wizard is started, data will be imported and "geo-coded" to the map. Your original data file will not be altered.

The resulting map will be a list of all frequencies, represented by pushpins, located exactly on the map where the frequency is in operation. Pushpins may then be edited, copied, moved or deleted. The pushpin icons may be changed individually or globally (affecting all pushpins at once).

In the next installment of this series, we'll continue looking at pushpin importing, plus the establishment of pushpin groups, and transferring pushpin files between computers and users.

❖ **Bank One: The Quiet Ones**

Old-time scanner hobbyists will often speak of *finally* getting activity on a rarely-used

channel. Newcomers may not realize that radio frequencies experience every level of activity, from constant use to as little as once-a-year use. A metropolitan police frequency, for example, may have more in-use time per minute than idle time. An emergency frequency, though, may get tested once a year for thirty seconds and never be used again.

South Florida used to have a channel on 162.5 MHz called the Hurricane Net, used as a link between the National Hurricane Center (NOAA) and the Miami Air Route Traffic Control Center (FAA). It was, quite literally, tested once a year and never used again. That frequency is now in the NOAA Weather Radio pool of channels.

If your Bank One has some available memory channels, load in some rarely-used frequencies to see if you too can *finally* log some activity. Examples are more common than you may realize. The Space Shuttle, on 259.7 MHz (AM), is a good one if your scanner covers 225-400 MHz military aircraft and you're located in the southeast. "Ultra High Altitude" FAA Air Route Traffic Control Center channels are an example in the VHF aircraft band as well as the UHF band.

How about Mutual Aid channels for police and fire? These may be rarely used, but often carry the most important information of the day. On the marine band, Coast Guard and Port Operations channels are worth looking at.

Every band and every radio service has something worth investigating in this manner. Pick out the channels you'd like to confirm, program them into a scanner and leave them programmed...for a good, long time! Be patient and you'll probably have something to brag about with friends and family: "Hey, I heard the Space Shuttle today!"

❖ **On the Keyboard**

The Geographic Frequency List, Part 5 and more of your letters and information. We may even talk about hurricanes!

Links of interest from this column:

Newark International Airport:
<http://www.panynj.gov/aviation/ewrframe.htm>
 The Port Authority of New York and New Jersey:
<http://www.panynj.gov/index.html>
 NYPD: <http://www.ci.nyc.ny.us/html/nypd/>
 NJSP: <http://www.njsp.org/front.html>

American Airlines policy on "electronic devices:"
<http://www.aa.com/content/customerService/baggage/carryOnAllowance.jhtml>

Continental Airlines policy on "Personal Electronic Devices:"
<http://www.continental.com/tis/>

Delta Air Lines policy on "portable electronic devices:"
http://www.delta.com/travel/trav_serv/bag_info/Portable_Electronics/index.jsp

Frontier Airlines policy on "Electronics On Board:"
<http://www.frontierairlines.com/faq/index.asp>

United Airlines policy on "Electronic Devices:"
<http://www.uol.com/site/primary/0,10017,1036,00.html>

Canadian Hams Monitor Severe Weather

Scanning Canada pays a special tribute this month to a group of amateur radio operators who participate in a severe weather monitoring program called "CANWARN." Scanning Canada recognizes and thanks one of CANWARN's founders, Paul Robertson VE3HFQ, for contributing the material in this month's column. But, before we look up at the skies for summer storms, *Scanning Canada* points its antenna at the City of Quebec to check in at the Quebec provincial capital's airport on our airborne tour of Canada.

♦ Monitoring Quebec City's Jean Lesage International Airport

Table 1: Airport Communications

Radio: 123.55, 126.7
Automotive Terminal Information Service (ATIS): 128.3 (French) 134.6 (English)
Ground: 121.9, 250.0
Tower: 120.3, 236.6
Terminal: 127.85, 322.8, 124.0, 120.3
Peripheral Station, Montreal Centre: 132.025, 270.9

Table 2: Navigation beacons

VOT (VHF Omnidirectional range Test facility): 115.7
VORTAC (VHF Omnidirectional Range/Tactical Air Navigation):
callsign YQB 112.8 — located at 46 42 19N, 71 37 36W
ILS (Instrument Landing System): callsign IQB 109.5

Quebec is a beautiful and historic city that sits atop high cliffs overlooking the St Lawrence River. It was here, in 1759, on the Plains of Abraham battlefield, that British General Wolfe met French General Montcalm in one of the most famous battles in Canada's history. Both generals died in the battle. But moving back from the storm of battle to storms in the sky, we give the remainder of this month's column over to VE3HFQ.

♦ CANWARN Weather Net

"VE3HFQ to net control... 11:44... we have a funnel on the ground 8215.4420 moving north east....Roger, we will notify the Severe Weather desk in Downsview. All stations we are now in condition red...repeat, condition red."

What kind of a coded message is this? Actually, it is a typical transmission you could hear on one of the many CANWARN Nets that take

place throughout the country during times of severe weather (usually April – October).

The foregoing message is based on CANWARN protocol using the TEL method (time, event and location). Here is the breakdown....

TIME (of the report)... 11:44 (am)

ELEMENT (what you see) ...a funnel (tornado) on the ground

LOCATION (use the grid atlas coordinates if possible)... 8215.4420 (these are the geographic co-ordinate grid numbers based on the CANWARN Grid Atlas for Southern Ontario.)

The net controller has declared the net in a "condition red" based on the fact that funnel clouds or tornadoes are occurring. This means that all stations on frequency are to stand down and only report the following conditions: funnel clouds, wall clouds, or tornadoes.

CANWARN is a volunteer organization of amateur radio operators who report severe weather observations to Environment Canada, the federal government agency responsible for monitoring and reporting on Canada's climate and weather conditions.

When Environment Canada's weather centers issue severe weather watches or warnings, they alert the CANWARN volunteers at the organization's regional stations in the affected areas. The volunteers contact other CANWARN members on their ham radios, tell them a watch or warning has been issued and ask them to report signs of approaching severe weather (lightning, hail, cumulonimbus clouds, wall clouds, tornadoes).

Four amateurs formed CANWARN in Windsor, Ontario, in 1987: Bill Leal (VE3ES), Jerry Beneteau (VE3EXT), Randy Mawson (VE3TRW) and Paul Robertson (VE3HFQ). CANWARN is organized into local nets or networks. When CANWARN members spot severe weather, they send their reports to the CANWARN network controller who forwards the information to Environment Canada's severe weather center in Downsview (Toronto) using either the special telephone "hotline" or the CANWARN web page. This web page is

unique as the message sent actually "pops up" instantly on the computer screen that is monitored by the severe weather meteorologist in Downsview.

At the severe weather center, the meteorologist combines the data from the satellites and radar with the information from the ground to refine the forecast or prepare a severe weather watch or warning in order that the public may take the necessary safety precautions. CANWARN stations are equipped with computers, printers, and ham radio equipment and are usually located in community centers such as airports, police and fire stations.

Environment Canada's Downsview building in Toronto (see figure) is highlighted by a giant 100 foot high steel sculpture weighing over 30 tons. The sculpture has large moving parts that respond to the wind. Inside, government workers monitor weather conditions and coordinate reports from across the country.

Each spring, prior to severe weather season, Environment Canada trains ham radio operators to spot and report severe weather. They learn about the structure of storms, the types of clouds to watch for and what the department's severe weather watches and warnings mean. All CANWARN volunteers are encouraged to sign up for the refresher courses which the department offers each year.

Any licensed ham radio operator may become a CANWARN volunteer. Simply contact your local amateur radio club or e-mail canwarn@ec.gc.ca. Your severe weather report could be a lifesaver!

♦ Erratum:

ScanCan goofed in April. As readers pointed out in several e-mails, Ottawa is not the most northerly capital city in the world, but may lay claim to being the coldest!

Next month *Scanning Canada* flies east into the Maritime provinces and crosses into its fifth time zone since the journey began on the Pacific coast last fall. Join us as we breathe the fresh salt air and look out across the shimmering Atlantic Ocean from the city of Halifax, Nova Scotia.



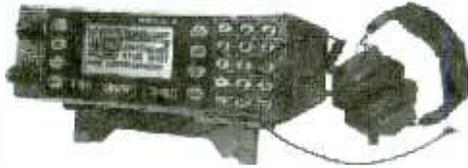
Environment Canada's CANWARN training center in Toronto

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Bearcat 248XLT 50 ch. base AM/FM/weather alert scanner.....	\$89.95
Bearcat Sportcat 200 alpha handheld sports scanner.....	\$169.95
Bearcat Sportcat 180B handheld sports scanner.....	\$149.95
Bearcat 80XLT 50 channel handheld scanner.....	\$99.95
Bearcat 60XLT 30 channel handheld scanner.....	\$74.95
Bearcat BCT7 information mobile scanner.....	\$139.95
AOR AR8200 Mark II Wide Band handheld scanner.....	\$539.95
AOR AR16BQ Wide Band scanner with quick charger.....	\$209.95
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ICOM R3 handheld wideband receiver with video display.....	\$379.95
Uniden WX100 Weather Alert with S.A.M.E. feature.....	\$49.95

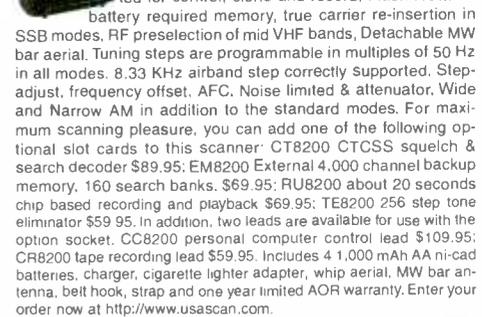
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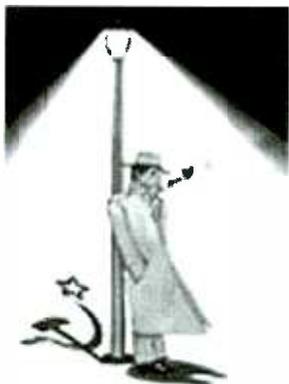
More Russian "Numbers" Weirdness

As noted in this month's log, Barry Williams has apparently heard what sounded like a "real," live, human, male voice reading "numbers." It came on 6866.0 kHz, a frequency more commonly used by a Russian Morse code transmission of similar format. The voice station, also Russian, is often called the "English Man," for language and computer-speech "gender." ENIGMA (the European Numbers Information Gathering and Monitoring Association) has given this one the code of E6 (E for English) on its "official" list that's become the de facto standard in this hobby.

The "English Man" uses 5-figure groups, with "00000" meaning "end of message." The machine that usually does this broadcast is extremely mechanical sounding, and would never be taken for a human. The pitch is weird, and the "accent" is even weirder. Dozens of frequencies are used in an unpredictable schedule, but recent E6 intercepts include 6865, 9090, 13390, 13520, 14840, and 15890 kilohertz.

Meanwhile, there's the problem of the Cuban "English Lady" (ENIGMA E17 or E17y). This robot "female," which is basically just a higher-pitched English Man, got weird in November of 2001, right about the time the Russians began the process of closing their spy base at Lourdes, near Havana. The English Lady began sending various tones and irregular groups, suggesting that testing was going on.

Last month, in this column, we reported that E17 was being heard "a bit less" in 2002.



Well, we understated the situation, to say the least. Actually, E17 may very well be gone. As of press time, we've had only one logging in 2002, and there's always the possibility of a mistake on that one.

Therefore,

it's probably as safe as anything ever gets in the "numbers" scene to say that the Cuban English Lady came from Lourdes. "She" is either in an extended moving outage, or just plain dead.

❖ Japanese Maritime Morse

Morse code radiotelegraph stations are leaving the air as fast as people can say "goodbye" at 20 words per minute and throw the "off" switches, but there are still holdouts for this old mode.

Consider the case of Dick Dillman, the San Francisco ham who has done a superhuman amount of work to help preserve that city's 100-year heritage of maritime radio.

He's had the nice experience of sitting at a receiver hooked to one of the last of the huge old antenna farms, namely, what survives of the site used by KPH. This RCA station, originally started by Marconi, is now part of a state park at Point Reyes, CA. When it's heard on the air for special observances of maritime Morse history, that's the real thing talking,

via restored vintage transmitters several miles away.

Well, there's another antenna farm on Point Reyes, the one formerly used by the receivers at KMI, the telephone company's High Seas Operator station for the Pacific. The Internet has old pictures of the side-by-side installations, with their miles of wooden poles and wires all the way to the horizon. It was awesome.

KMI, along with WOO (New Jersey) and WOM (Florida), once handled hundreds of phone calls daily. By the late '90s, though, Carnival Cruise Lines was pretty much keeping the whole service afloat (pun intended). It, too, switched to all satellite, and, despite legal challenges from users of small vessels, the three stations closed in 1999.

Some of the antennas survive, though. Last winter, Dillman and friends got permission to chase maritime utilities on these. The rest of us, with our 40-foot wires in urban noise jungles, were pretty interested in whatever they came up with. In fact, the results were not disappointing.

One good discovery made by Dillman and company was JFUE, which just might be the last Morse station in Japan. KMI's powerful

antennas gave an azimuth in that direction. The call, too, is Japanese.

The same highly skilled operator was heard daily, working numerous ships in plain old CW ("Continuous Wave" wireless telegraphy). Apparently, this guy knows his stuff. There are still a few of them out there!

On or about 11 February, the callsign became JFF, but nothing else changed. Those wanting to try for this one should crank in their narrow filters and check 22681.5 kHz, plus the working frequency of 22257.5. I know I will.

❖ WWV Changes

You might have noticed some new language if you observe radio propagation with the help of the WWV/WWVH Geophysical Alert ("Geoalert") messages at 18/45 minutes after each hour. It's a small change, but a rather significant one.

In the A (24-hour magnetic variation) and K (three-hourly magnetic), the word "Boulder" has been changed to "mid-latitude" to allow data from stations other than the World Data Center in Colorado. The A and K indices are useful in determining the state of the ionosphere, with lower numbers being better.

The next two paragraphs, which used to give solar flare and geomagnetic observations and predictions in plain language, have been replaced by the NOAA Space Weather Scales. NOAA, of course, is the National Oceanic and Atmospheric Administration of the US Department of Commerce. The three scales now being used are Geomagnetic Storms (G1 through G5), Solar Radiation Storms (S1 through S5), and Radio Blackouts (R1 through R5).

In all three cases, the numbers correspond to the states of minor, moderate, strong, severe, and extreme, where extreme (5) is an event of historic importance occurring less than once per 11-year solar cycle. The full description is available online at <http://www.sec.noaa.gov/NOAAScales/index.html>.

A text version of the WWV Geoalert can be obtained at <http://www.sec.noaa.gov/ftpdir/latest/wwv.txt>. The real hard core, though, will want to join WWV's e-mail list, and smile when their Geoalerts come eight times daily. This is done by sending e-mail to majordomo@dawn.sec.noaa.gov. Leave the subject line blank, and say nothing in the body except "subscribe wwv-list you@youraddress" (without the quotes).

Until next month, happy WWVing.



Logo of the GRU - Russia's military intelligence arm

ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
Arinc	Aeronautical Radio, Inc.
ARQ	Automatic Repeat Request teleprinting system
AWACS	Airborne Warning and Control System
CAMSLANT	Communication Area Master Station, Atlantic
CW	Morse code telegraphy ("Continuous Wave")
DEA	Drug Enforcement Administration
DX	Distant Transmitter
E3	British MI6/SIS, "Lincolnshire Poacher" tune
E6	Russian intelligence, male in English, ends 00000
E10	Israeli phonetic female, callup and message
E10a	Israeli phonetic female, callup only
EAM	Emergency Action Message
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
FGS	Federal German Ship
GANTSEC	US Coast Guard Greater Antilles Section
GHFS	Global High-Frequency System
HAARP	High-Frequency Active Auroral Research Project
HFDL	High-Frequency Data Link (air digital system)
LSB	Lower Sideband
M22	4XZ, Israeli CW "numbers"
MARS	Military Affiliate Radio Service
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
NATO	North Atlantic Treaty Organization
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SAM	Special Air Mission
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, says "Atencion!"
XSL	Asian multitone digital "Slot Machine" sound

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.

147.3	DDH47-German weather RTTY, at 1736. (Ary Boender-Netherlands)
2679.0	Coast Guard Group Ft. Macon-US Coast Guard, NC, with Mid-Atlantic marine information at 0018. (Ron Perron-MD)
3200.0	Unid-Steady tone in AM, then interrupted CW carrier, probably the HAARP project in Alaska, came from 5800 kHz at 0826. (Tom Severt-KS)
4213.5	Unid-Strong, steady carrier shifted 170 hertz twice per second, probably our friend HAARP again, at 0610. (Hugh Stegman-CA)
4216.0	TAH-Istanbul Radio, Turkey, SITOR-A marker at 0100. (Ken Maltz-NY)
4219.0	TAH-Istanbul Radio, SITOR-A marker at 0109. (Maltz-NY)
4241.0	4XZ-Israeli Navy, Haifa (M22), CW marker at 0117. (Maltz-NY)
4424.4	DHJ58-German Navy, Glucksburg, RTTY markers every 2 minutes, then plain and encrypted English traffic for exercise "Strong Resolve" at 1735. (Day Watson-UK)
4462.0	FTJ-Israeli intelligence, callup and message (E10), at 0330. (Barry Williams-AL)
4477.0	Cuban AM numbers (V2), 5-figure groups, heavy interference, at 0330. (Williams-AL)
4721.0	AFB-US Air Force SAM 28000, often a Presidential aircraft, working AF9, SAM 29000, often the Vice-President's plane, in ALE at 1903. (Severt-KS)
5236.0	KGD 34A-US National Communications System portable, calling KOR 43, unknown agency, USB and LSB, at 2242. (Perron-MD)

5399.6	GANTSEC-US Coast Guard Greater Antilles Section, PR, working Striker 33, at 0109. (Perron-MD)
5680.0	"O-Q-V"-Possible US Navy, exercise, EAM at 0024. (Jeff Haverlah-TX)
5800.0	Unid-AM carrier with repeating tones, probably HAARP, moved to 3200 kHz, at 0909. (Severt-KS)
5850.0	OXT-Copenhagen Meteo, Denmark, FAX ice chart at 0026 (Boender-Netherlands)
6697.0	Unid-station broadcasting rock music on this and 8992, at 0600. Music stopped for Pot Luck to call Pool Cue, no joy, at 0604, briefly started up again at 0613. (Haverlah-TX)
6739.0	Elmendorf-US Air Force, AK, with EAM and test count, at 0412 (Brent Davenport-CO)
6757.0	Difficult-US military, with 28-character EAM simulcast on 8992 and 11244, at 1706. (Haverlah-TX)
6761.0	Turbo 41-US Air Force Reserve tanker, calling Reach 806T, no joy, at 0108. (Perron-MD)
6866.0	Unid-Heavily accented English "numbers" in live male voice, ended with 5 zeroes, at 0315. (Williams-AL) [Sounds like a weird variant of the Russian "English Man" (E6). -Hugh]
6911.0	AAA9CE-US Army MARS, with net check-ins at 0354. (Davenport-CO)
6912.0	CIO2-Israeli intelligence, callup only (E10a), at 0247. (Williams-AL)
6913.0	AAA9LR-US Army MARS western net control, then AAA9CE for east, LSB at 0330. (Fred Kelly-TX)
6925.0	Unid-Fishing boat off eastern US, nightly chat with female, at 0100. (Williams-AL)
6930.0	MIW2-Israeli intelligence, female numbers voice with callup only (E10a), at 0119. (Severt-KS)
6930.0	MIW2-Israeli intelligence, female AM numbers voice with callup only (E10a), at 0120, carrier remained up for hours. Also at 0320 and 0415. (Williams-AL)
7569.9	Unid-Tashkent Meteo, Russia, Persian Gulf weather chart in slow FAX (90/576), at 2354. (Watson-UK)
7570.0	RBX72-Tashkent Meteo, Uzbekistan, slow FAX charts (90/576), at 1930 (Boender-Netherlands)
7589.0	"Y-2-W"- Possible US Navy exercise, with EAM at 1416. (Haverlah-TX)
7657.0	Panther-DEA, Bahamas, working Coast Guard 13C at 0318. (Perron-MD)
8191.7	9MR-Malaysian Navy, Johore Bahru, RTTY message in Malay to all ships, at 1520. (Bob Hall-RSA)
8303.0	LOR-Argentine Navy, Puerto Belgrano, 5-letter groups in RTTY, at 0545. (Hall-RSA)
8313.0	Unid-Mystery "Slot Machine" station (XSL), weird digital modulation at 0930. (Bob Voelker-CA) [New frequency, bringing the count to 13. -Hugh]
8390.0	TCJX- Turkish vessel Bursa, working TAH, Istanbul, in ARQ at 2050. (Patrice Privat-France)
8432.5	UFN-Novorossiysk Radio, Russia, SITOR-A marker at 0428. (Maltz-NY)
8885.0	"015"-Arinc, Bahrain, with HFDL squitters at 2347. (Watson-UK)
8971.0	Fiddle-US Navy, Jacksonville, FL, working Fighting Tiger 71H, at 1749. Fiddle, working Mad Fox at 1949. (Allan Stern-FL)
8983.0	Coast Guard Rescue 6003-US Coast Guard helicopter, enroute to a medical emergency at sea, at 2015. (Stern-FL) CAMSLANT Chesapeake-US Coast Guard, VA, working 1710, 1711, 24C, and 2101, at 2156. (Severt-KS)
8992.0	Andrews-US Air Force GHFS, Andrews AFB, MD, patching Quartet 712/ Lima Lima 58 (same aircraft) to Jacksonville Naval Air Station Duty Office, at 2334. (Stern-FL)
9007.0	Trenton Military-Canadian Forces, patching Canforce 2654 to meteo and wing operations, at 2305. (Perron-MD)
9016.0	Lordship-US military, with a 6-character EAM simulcast on 8992 and 11244, at 1909. (Haverlah-TX)
9025.0	Train 4-ALE callsign of unknown US Air Force, working Train3, at 1937. (Severt-KS)
9043.0	Cape Radio-US Air Force, Cape Canaveral, FL, working space shuttle booster recovery vessels Liberty Star and Freedom Star, at 0737. (Severt-KS)
9144.0	RIW-Russian Navy, Moscow, working vessel RMYK in CW, at 0925. (Geoff Halligey-UK)
9227.0	AAA-Possible Israeli Air Force, ALE sounding at 2022. (Privat-France)

- 9237.0 Unid-Unknown badly hand sent 4-letter groups, ended "756 756," at 1154 CW 4-number groups, ended "0678 1426 3 90," at 1155. (Halligey-UK)
- 9360.0 OXT-Copenhagen Meteo, Denmark, with FAX ice chart at 0003 (Boender-Netherlands)
- 10192.5 DRAV-German Navy frigate FGS Karlsruhe, voice and data with DHJ59, Wilhelmshaven, at 0830. (Privat-France)
- 10993.0 "Z-4-V"-Tactical identifier, probably US Coast Guard, calling "M-5-N," at 0132. (Perron-MD)
- 11080.0 YKP80-Syrian Arab News Agency, Damascus, with RTTY news in Arabic, English, and French, starting at 1605. (Watson-UK)
- 11118.0 Andrews-US Air Force GHFS, working Navy 515 (aircraft often used by Commander in Chief, Air Force, Southern Europe), at 0708. (Stern-FL)
- 11125.0 HZN-Jeddah Meteo, RTTY weather at 1651. (Hall-RSA)
- 11175.0 Julie Gold 15-Probable US Air Force, patch to Mountain Home AFB via Thule GHFS, at 0332. "P-7-F"-US military, patch via McClellan to Lackland AFB, TX, with coded "exercise Esteem Highly Alpha" messages, at 0358. (Davenport-CO) Andrews, working US Navy Tractor 1 (C-130, CA), at 2102. Andrews, patching Shark 26 to Smasher at 2314. (Stern-FL)
- 11186.0 Polar Bear 802-Probable US Navy, working Keep Track at 0140. (Perron-MD)
- 11200.0 McClellan-US Air Force GHFS, came from 11175 to call Noble 26, no joy, at 0313. (Haverlah-TX) [Frequency deleted from offroute band plan in '94. Oops. -Hugh]
- 11220.0 Trout 99-US Air Force EC-135 flight test aircraft, in patch to Banner Ops (Royal Air Force, Mildenhall, UK), regarding refueling, at 0440. (Perron-MD)
- 11226.0 Sentry 05-US Air Force AWACS, working Raymond 24 (Tinker AFB), at 2127. (Sevart-KS)
- 11232.0 Trenton, working NATO 10 (an AWACS), at 0045, and Magic 75 (another NATO AWACS), at 2340. (Perron-MD)
- 11246.0 Lear 2BA-Unknown aircraft calling MacDill Radio, needless to say no joy, at 2038. (Haverlah-TX) [Station and frequency long gone. Oops. -Hugh]
- 11271.0 Trenton Military-Canadian forces, calling Canforce 305, no joy, at 2302. (Perron-MD)
- 11300.0 Cairo and Khartoum air route control, working Sudan Air 131, also Tripoli working Libyan Air Force 113, all at 0350. (Perron-MD)
- 11345.0 Stockholm Radio, working VDA (Volga Dniepr Airlines) flight, at 0730. (Privat-France)
- 11396.0 New York-NY Radio, working American 655 at 1407. (Sevart-KS)
- 11478.0 Unknown-Male working "Train" in probable US military exercise, also "112" working "FLB," at 0338. (Perron-MD)
- 11530.0 BR1-Brazilian Navy, Brasilia, with long ALE call to RS1, at 2340. (Watson-UK)
- 11545.0 Lincolnshire Poacher (E3), Cyprus, with music and callup "49491," at 2200 (Mid-Atlantic DXer-MD)
- 11566.0 EZI-Israeli intelligence "numbers" (E10), frequency would shift unpredictably to 11568 and back, at 0203. (Arik Hesseldahl-NY)
- 12412.5 NOJ-US Coast Guard, Kodiak, AK, with FAX charts at 1825 (Boender-Netherlands)
- 12666.5 FUG-French Navy, La Regine, RTTY markers with spurious emissions on 12657.2, 12661.8, 12671.5, and 12675.8; at 0814. (Watson-UK)
- 12710.7 PWZ33-Brazilian Navy, RTTY weather in Portuguese, at 0617. (Hall-RSA)
- 12756.5 A9M-Hamala Radio, Bahrain, CW marker at 2244. (Maltz-NY)
- 12771.0 7TF-Boufarik Radio, Algeria, CW marker at 2240. (Maltz-NY)
- 12902.8 VTH-Indian Navy, Mumbai, RTTY markers, then traffic for VWGZ, at 2300. (Watson-UK)
- 13149.0 XSQ-Guangzhou Radio, working ships in Chinese, at 2150. (Watson-UK)
- 13155.0 Decorous-US military, with half-hourly 07/37 EAMs, this one at 1907. (Haverlah-TX)
- 13215.0 Tribe 40-US Air Force, patch to Ellis Meteo at 2000. (Sevart-KS)
- 13242.0 Awareness-US military, with a 28-character EAM simulcast on 8992 and 11244, at 1539. (Haverlah-TX)
- 13257.0 Trenton Military-Canadian Forces, working Gonzo 06A and 06C, at 2248. (Perron-MD)
- 13288.0 Mumbai-Air route control, India, working Condor 344 and Singapore 336, at 2140. (Perron-MD)
- 13550.5 ZKLF-Wellington Meteo, New Zealand, with FAX charts at 0900. (Boender-Netherlands)
- 13907.0 Service Center-US Customs Service, clear and secure with an unknown station, at 2326. (Perron-MD)
- 14698.0 "2-D-G"- Possible US Navy exercise, with 3 EAMs at 1619. (Haverlah-TX)
- 14867.7 Unid-Egyptian MFA, Cairo, with Arabic message to Harare, Zimbabwe, at 1646 (RH2) [Heavy traffic related to Zimbabwe's disputed election. -Hugh]
- 14982.5 RBV76-Tashkent Meteo, Uzbekistan, slow FAX charts (90/576), at 1910 (Boender-Netherlands)
- 15016.0 Andrews-US Air Force GHFS, MD, 48-character EAM at 1813. (Haverlah-TX)
- 15025.0 "03"-Arinc, Reykjavik, Iceland, uplinking HFDL airport information to VP-BAY (Aeroflot), at 1623. (Privat-France)
- 15043.0 200018-US Air Force aircraft, calling CRO, Croughton, UK, in ALE at 1350. (Privat-France)
- 15633.4 HMF26-Korean Central News Agency, Pyongyang, N. Korea, English RTTY "news" at 0958, restart for jammed tape at 1018. (Watson-UK)
- 16034.7 Unid-Egyptian MFA, Cairo, with Arabic SITOR-A traffic at 1032. (Watson-UK)
- 16078.5 Split 21-US military, working Ghost rider Base at 1700. (Sevart-KS)
- 16117.0 "M-0-W"-Possible US Navy exercise, with EAM at 2140. (Haverlah-TX)
- 16276.7 rfkps-Egyptian Embassy, Harare, Zimbabwe, with Arabic ARQ message to Cairo, at 1740. (Hall-RSA)
- 16631.7 dlkgmk-Egyptian Embassy, Luanda, Angola, with Arabic ARQ messages to Cairo, at 1530. (Hall-RSA)
- 16706.5 UCPG-Russian vessel Pioneer Yakufii, working UCE, Arkhangelsk, in ARQ at 0850. (Privat-France)
- 16710.5 UAUC-Russian vessel Marshal Vasilevsky, working UIW, Kaliningrad, at 1030. (Privat-France)
- 17925.0 Shark 67-US military, came from 21964, departure message for Smasher (US military, Key West, FL), via New York, at 1926. (Perron-MD)
- 17928.0 CO954-Continental Airlines flight working Arinc 06, Hat Yai, Thailand, in HFDL at 1655. (Privat-France)
- 18003.0 Train5-ALE callsign of unknown US Air Force, working Class02, Train1, and Train4, at 1937. (Sevart-KS)
- 19131.0 Atlas-DEA, Iowa, setting Sierra Juliet (19131 kHz) primary and Sierra Papa (14686) secondary, with Flint 942 (DEA aircraft), at 2102. Flint 451, enroute to Panther (DEA, Bahamas), working Atlas, at 2103. (Perron-MD)
- 19706.0 LSD 836-Globe Wireless, Buenos Aires, Argentina, with SITOR markers at 2330. (Maltz-NY)
- 20036.7 Unid-Egyptian Embassy, Dakar, Senegal, Arabic SITOR-A traffic at 1325. (Watson-UK)
- 20056.7 Unid-Egyptian diplomatic, Arabic SITOR-A operator chatter at 0915. (Watson-UK)
- 20126.7 Unid-Egyptian MFA, Cairo, calling KKKO, Abidjan in SITOR-A, then traffic in SITOR-B, all starting at 0930. (Watson-UK)
- 20610.0 HBD48-Swiss Embassy, Riyadh, Saudi Arabia, with encrypted SITOR-A at 1000. (Watson-UK)
- 20976.9 P6Z-French MFA, Paris, calling Z4D in FEC, at 1733. (Hall-RSA)
- 21931.0 "04"-Arinc, Riverhead, NY, with HFDL squitters at 1935. (Watson-UK)
- 21934.0 UP6127-United Parcel Service flight, passing position to Arinc San Francisco in HFDL, at 1908. (Watson-UK)
- 21948.0 "08"-Arinc, Johannesburg, RSA, working aircraft D-ALCA in HFDL, at 1848. (Watson-UK)
- 21964.0 Shark 67-US military, attempting a departure message to Smasher via Miami, no joy, went to 17925, at 1924. (Perron-MD)
- 22928.6 S97-Swedish Embassy, Abidjan, sounding in ALE at 1013. (Watson-UK)
- 23214.0 Service Center-US Customs Service working "42" in clear and secure voice, then back to scan at 1634. (Perron-MD)
- 24370.0 P6Z-French MFA, Paris, calling N2G in FEC, then 5-letter groups, at 0631. (Hall-RSA)
- 25350.0 5AB-Tripoli Radio, Libya, with CW harmonic of marker on 8450, at 1054. (Watson-UK)

Good Tools and New Targets

This month we take a look at the latest utility database from well-known monitor Joerg Klingenfuss, find new software to decode HFDDL signals, examine a new French OTHR (Over The Horizon Radar) system code-named Nostradamus, and update you on a few more interesting ALE networks.

❖ Klingenfuss 2002

We recently had the opportunity to peruse the current database of stations from long-time and pioneering utility listener Joerg Klingenfuss.

As ever, a neatly presented and compiled database is available in book or CD-ROM form with all the usual facilities for searching and sorting made possible in the digital format. As regards content, the utility database provides the usual information on frequency, callsign, user, location, system type (digital, SSB and others) and system information such as mode, baudrate and so on. For easy reference, you can also browse a database of past stations – useful in case new equipment resurrects a long-gone user or where tests are sometimes conducted on old, familiar channels.

However, we do have some issues with the coverage of systems in this latest incarnation. One might conclude from a quick scan of the 2002 release that the only new thing on shortwave were a plethora of PactOR-II-based yachting email services and International Red Cross and other humanitarian organizations (also using PactOR-II) in the Balkans and lately Afghanistan.

It is curious that there is no listing of any advanced system other than PactOR-II – which excludes the huge increase in ALE-based networks, MIL-188-110A and other modes – many of which are readily identifiable. Also largely missing are vast numbers of regularly audible Russian Military systems (BEE, MS5 etc) which broadcast at set intervals and would surely be noted by even the most casual listener. We find these kinds of omissions rather curious.

In truth, though, the Internet has largely superceded books and CD-ROMs of this form. Through such active sources as WUN (see Resources) one can very rapidly assimilate a large, accurate and comprehensive database of utility stations equally representative of current HF goings-on – and for free. True, not everyone has access to the internet, but most with an interest in shortwave radio probably do, or at least know someone who does.

Klingenfuss products are available direct

from the man himself (see Resources) or via Grove (see Resources) here in the US.

Next month we'll test drive a new web-based database subscription service – HFDecoding.com – which, at first glance, looks like it's providing some serious competition for more traditional offerings.

❖ PC-HFDDL for HF Decoding

Over the past years, we've often mentioned the presence of Aeronautical Radio Inc (ARINC)'s HF Globalink or HF DataLink (HFDDL) system on the shortwave dial. Up until now, the only decoder we knew to be available to the consumer and capable of decoding this system was the Code30-series from Hoka. That is, up until now.

Charles Brain, famous for kick-starting the decoding of ALE signals with his free PC-ALE software, has now released PC-HFDDL. Like its ALE counterpart, PC-HFDDL is a Windows application for the PC that listens to HFDDL signals via a standard PC soundcard device, then decodes and displays the traffic in human-readable form.

PC-HFDDL can be downloaded from a number of places (see Resources), is a snap to install, and can be "up and running" in moments. HFDDL is a more complex and demanding signal than ALE, so careful tuning with an accurate radio and some reasonable computing "horsepower" is required.

Naturally, PC-HFDDL has caused a firestorm of traffic on the WUN email list and monitors have now pretty much pieced together ARINC's network of 15 or so groundstations worldwide, their frequencies, and the airlines that use HFDDL for ACARS-like functions where VHF can't reach.

We'll cover the ARINC HFDDL network in more detail next month.

❖ Nostradamus OTHR

Keen-eared listeners will have noted a new HF Radar (OTHR-over the horizon radar) around the shortwave frequencies. Nostradamus can be recognized by a buzzing signal over a wide bandwidth of 20 kHz with pulse repetition frequency of 25 Hz – something which you can easily measure with simple software like Digipan (see April 2002 DD). The radar was developed by ONERA, the French national office of aerospace studies, for the French defense procurement agency.

The Nostradamus radar is located near Dreux, west of Paris, and has a quoted range of over 1000 miles. Interestingly, the ONERA website has one picture of "test" output from the radar – covering the Lebanon, Israel and Palestine area. There are

rumors in the intelligence community that a second Nostradamus is also operating within or close to China.

You can hear a clip of the radar from LDO's excellent shortwave audio website (see Resources).

❖ Closing in on some unusual ALE Networks

One network, originally attributed to an Iranian source by some monitors, has at last been pinned-down to Turkey. All of the identifiers use the style "000000" + 4 digits, sometimes dropping the leading six zeroes.

The ALE triggers USB voice communications using Codan radios and the network is audible after dark in the US, the 6 MHz frequencies being particularly active at that time. The user has yet to be determined.

Frequencies: 6966, 6800, 6900, 7620, 8633, 10360, 11481, 11492, 12134 kHz (USB)
Identifiers: 0000001220, 0000002222, 0000006137, 0000006138, etc

❖ Unidentified Greek Network

As another example of the numerically formatted ALE identifiers that form various Codan-based networks, take this unidentified example from Greece where the format is "0000" + 2 digits + "00" + 2 digits. This network triggers data using the Codan 80 Bd CHIRP BPSK waveform and the Codan 16 tone waveform. Occasional voice traffic is seen on the circuits as well.

Frequencies: 4925, 11490kHz (all USB)
Identifiers: 0000210001, 0000210002, 0000210401, 0000210602, 0000210688, 0000210788, 0000210888 etc

Any help with further identification of the organizations behind either of these networks would be much appreciated

That's it for this month. 73 and enjoy your HF 1s and 0s.

Resources:

ONERA: <http://www.onera.fr>
Klingenfuss: <http://www.klingenfuss.org>
Grove: <http://www.grove-ent.com>
PC-HFDDL: <http://www.chbrain.dircon.co.uk/hfdl.html>
Nostradamus Clip: <http://rover.vistecprivat.de/~signals/TABLES/ALE.HTML#ONERA>
WUN: <http://www.wunclub.com>

U.S. Still Broadcasting in Afghanistan

Although Commando Solo aircraft had returned to home base in Pennsylvania in late March, at last month's deadline the 8700-USB transmissions continued to be heard at 1435, same kind of programming as last several months. If this is still Information Radio, it must be (and has been?) land based, notes Jari Savolainen in Finland, where it is audible as late as 1930 and still there at 2300. Maybe 24h now? Anker Petersen, Denmark, DSWCI *DX Window* believes the feeder continues from Sa'udi Arabia or the Persian Gulf area.

Lt. Shank, at Commando Solo HQ in Middletown, PA, 193rd Special Operations Wing, sent a no-details gif file as a "verie" to previous reporters of Information Radio 8700, including David Hochfelder, NJ.

Michelle Boorstein filed this AP dispatch from Bagram, Afghanistan, sent on to us by Artie Bigley:

In a classified area of this sprawling, dusty military base, behind rolls of barbed wire, a different sort of battle is under way. Four Humvees and a canvas tent have been transformed into a radio station run by the U.S. Army Psychological Operations unit, broadcasting Afghan folk music, Dari language techno and informational items crafted by Army marketing experts. Luring listeners with a program that is heavy on music – banned under the Taliban – Information Radio weaves in announcements that carry a clear message across Afghanistan: Support the allies and the interim government of Hamid Karzai. The station broadcasts 24 hours a day and can be heard nationwide. The station broadcasts on 864 AM, which can be heard around the two allied bases – Kandahar and Bagram – with regular radios. Short-waves pick up the station around the country [sic].

What does that mean? Is the 8700-USB, still being heard, now

land-based here, as 864 MW has become? *Media Network* confirmed transmissions continuing on 8700 are part of the ongoing Operation Enduring Freedom, described by military sources as humanitarian and informative, from a mobile transmission system, Special Operation Media System B (SOMS-B). For security reasons the exact location of the transmitters is not disclosed. In addition to 8700 kHz, broadcasts are also heard on mediumwave 980.

According to official US military documents on the Internet, SOMS-B is a tactically deployable ground radio and television broadcasting system for use by Army Psychological Operations (PSYOPS) forces. SOMS-B provides self-contained ground tactical capabilities that can be rapidly moved to any place in the world by military or commercial means and can operate for extended periods of time with limited support.

The \$4.2 million system is operated by the Army's 4th PSYOPS Group <http://www.psywarrior.com/4thpog.html> [Ft. Bragg, NC]. That unit was responsible for preparing the programmes that were broadcast from the Commando Solo aircraft of the 193rd Special Operations Wing of the USAF. Like the equipment on board the Commando Solo, SOMS-B "allows soldiers to produce high-quality television and AM-FM and short-wave radio products." (© Radio Netherlands *Media Network*)

SW Resources

- HFCC A02 schedule is now available at: <http://www.hfcc.org/data/index.html> (Andy Sennitt, Netherlands)
- Comprehensive SW schedules by time for A-02: <http://www.eibi.de.vu/> (Eike Bierwirth, Russia)
- New discussion forums for DXers: <http://www.dxing.info/communitiy/> (Mika Makelainen, Finland)

(Brian Alexander, PA, *DX Listening Digest*)

BOLIVIA R. Casmos, here in Cochabamba, was heard testing in the daytime on 7130 and 6036, and at 0135 on 3405 (Ragildo F. Aragão, Bolivia, @*tividad* DX)

BULGARIA A-02 R. Bulgaria in English hours: WEU 1100 UT 17500 kHz, 1900 and 2100 UT 9400 kHz; NAm 2300 and 0200 UT 9400 kHz. Effective July 1: 1100 UT 15700 kHz, 1900 and 2100 UT 11900 kHz, 2300 and 0200 UT 11700 kHz (Observer, Bulgaria) Not clear whether the July 1 frequencies are in addition to or replacing the earlier ones; previously always had two at once, but recently only one (gh)

BURMA [non] Democratic Voice of Burma was not audible on any of its listed frequencies 17805, 15405 and 5945, for the 1430-1530 broadcast. Instead heard on 15620, confirmed by parallel to a stream delayed about 30 seconds via the DVB website <http://www.communique.no/dvb/> So wonder what the site is? (Glenn Hauser, OK, *World Of Radio*) Tha listed as Jülich, Germany, 15620 is much stronger than usual Jülich signals at my place, due to skip zone (Wolfgang Büschel, Germany, BC-DX) RNZI confirms Rangitai, New Zealand, is the relay, since March 15 (RNZI Mailbox)

CANADA Production staff at RCI's head office in Montreal has been locked out as part of a larger conflict between the French service of the Canadian Broadcasting Corporation (CBC) and the union representing production staff. Frustrated with lack of progress in negotiations, the Communications Union of Radio-Canada (SCRC is the French acronym), called a 24 hour strike on Friday, March 22. The French network then promptly locked out the 1300 employees (about 50 from RCI) and is using managerial staff to fill air time. The main issues in the conflict: the inequality of wages between men and women, the precarious situation of half of the employees who are not staff, and a call for a just wage increase. Great site in French of one of our members from the domestic service, with lots of photos: <http://radcan.blogspot.com/> (RCI Action Committee via DXLD) The 'one-day' strike was thus prolonged at least a month (gh)

CHECHNYA [non] Russian objections to R. Liberty broadcasting in Northern Caucasian languages succeeded only in delaying it a bit more than a month, as the service started April 3, provoking even more harsh criticism, threats of jamming, withdrawing RL's license to broadcast in Russia, etc. RL was thought

AFGHANISTAN [non] Voice of Afghanistan, based in London, is on new 15480 ex-9950 at 1330-1430 UT (Olle Alm, Sweden, *World Of Radio*) Note the planned expanded hours and site shown here: (gh) Moldova 15480 kHz 1230-1630 UT 500 kW; alternative frequency 15430 (Nikalai Rudnev, RUS-DX via Japan Premium)

ANGOLA RNA on new 7216.8 in French at 2000, ex-7245 (Craig Seager, Australia, *hard-core-dx*) English at 2100 (Mahendra Vaghjee, Mauritius, *ibid.*)

[non] Rádía Ecclésia, relays via DTK Germany at 160 degrees: 0500-0559 15545; 1800-1859 (Sat to 2130) 13810 (via Kai Ludwig) R. Ecclésia began April 15 new relay via Meyerton, South Africa, 6100 328° 1900-2000, 250 kW (André du Toit, RSA, *hard-core-dx*) Will they stay via Germany too? And what about their own SW transmitter supposedly being installed? (gh) Good on 6100 here, 1900 ID as Radio Ecclésia, Emissara Católica de Angola (Mike Barraclough, UK, *DX Listening Digest*)

ANTARCTICA In March and April, LRA-36, 15475.55, was running later than usual, until about 2215*, greatly improving reception chances in North America (David Hodgson, TN, DXLD) On a Friday until 2210* on 15475.49 (Brian Alexander, PA, *World Of Radio*) Besides 15475.5. LRA36, Base Esperanza, heard also on 14402.5 USB; maybe switching error as this is assigned to Base Esperanza, Base General Belgrano II and Base General San Martin for radiotelephone traffic (Maarten van Delft, Netherlands, DSWCI *DX Window*)

ARGENTINA Nice QSL letter from Army station LTA, Batallón de Comunicaciones 602, Ejército Argentino, Azopardo 250, piso 18, 1328 Buenos Aires. They are responsible for relays of broadcast stations on 15820 (Maarten van Delft, Netherlands, DSWCI *DX Window*)

AUSTRALIA Contrary to page 269 of the 2002 *Passpart to World Band Radio*, former Radio Australia personality Keith Glaver has not died, but is living in retirement in Melbourne (New Zealand *DX Times*)

AZERBAIJAN External Service as from Azerbaijan State TV and Radio Company via RV-48, 6110 kHz, Gence, includes 1700-1730 English (Arzu Abdullayev via Mike Bethge, Germany, WWDXC)

BENIN R. Benin, 7210.27, heard until 2303* on a Sat, and again from *0556 past 0615 on a Sun, opening and closing with national anthem; weekday sign-on believed to be 0500

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; A-02=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

to be incapable of objectivity, and the service would promote separatism and terrorism (numerous press reports)

Initial frequencies were poorly chosen, two of them actually already in use by V. of Russia! Latest revision at presstime:

0400-0500	15355	Holzkirchen	100 kW 077 degrees
	9850	Biblis	100 kW 085 degrees
	11760	Kavalla	250 kW 095 degrees
1700-1800	9810	Kavalla	250 kW 051 degrees
	11760	Biblis	100 kW 105 degrees
	15350	Lampertheim	100 kW 092 degrees

(Ivo and Angel! Observer, Bulgaria)

CHINA A very southerly site for some new SW jamming from China had been suspected for propagational reasons. Now we have some confirmation. A Thales transmitter on Hainan was scheduled for DRM tests toward Beijing, which, however, could not be heard on the frequencies mentioned. This may be co-located with MW facility at Dongfang, but so far the SW site appears to be used only for jamming. And adding DRM tests is in line with the regular jamming (Olle Alm, Sweden, DX Listening Digest)

Voice of Strait schedule is 2225-1700, except Wed from 1000, with three different channels: News and Politics 6115; Literary and Life 7280; Amy Language 4940 (via Ogino, Cumbre DX) VOS, 6115, heard on a Saturday at 0937 with news in English (Samuel Cassio, SP, @tividade DX) Voice of Strait (Haixia zhi Sheng), 6115, English Fri and Sun 0930-1000*. (Roland Schulze, Philippines, BC-DX) 0930-1000 on 6115 seems to be Focus on China (Barry Hartley, New Zealand, BC-DX)

COLOMBIA Anti-narcotic police destroyed FARC clandestine station Voz de la Resistencia, which operated on MW 660 from a location 25 km outside Vistahermosa, Meta Dept. (Caracol via Henrik Klemetz) It broadcast on MW, SW and FM (El Pais via Klemetz) But was the 6 MHz transmitter at the same location? (gh)

Idea Radio, which tested on 7380, 7415 and other 7 MHz frequencies several months ago, apparently thought better of SW (gh) Now Andrea Laudicina's station is on <http://www.live365.com> as Bogotá Radio (Horacio Collace, Dario Monferini)

CONGO DR Radio Okapi, 9550, sent an e-veri. Dominique Jaccard at Hirondele's main office confirmed my reception as reported in an audio file. It indeed came from Kinshasa with just 10 kW (Hans Johnson, FL, Cumbre DX) Due to technical difficulties, unable to broadcast on shortwave, but continued on FM. Within about two months, this situation should have been rectified with broadcasts available on 9550 (AllAfrica.com mid-April via Dave White)

CROATIA [and non] A-02 Croatian Radio, mostly in Croatian: Eu 0400-0900 UT 7365 kHz, 0400-2300 6165, 0400-1700 9830, 0900-2300 13830. SAM 2300-0100 9925, ENAm 0100-0300 9925, WNA 0300-0500 9925; NZ 0500-0700 9470; Au 0700-0900 13820 (Croatian Radio website via Alan Roe) To Eu believed direct from Croatia; elsewhere via Germany (gh) Latter has 5 minute news in English and Spanish about 5 minutes into program and again after 1 hr 40 minutes: 2305, 0040, 0105, 0240, 0305, 0440, 0505, 0640, 0705, 0840 (Alan Pennington, BDXC-UK)

CZECH REPUBLIC [and non] R. Prague A-02 English to NAm: 2230-2257 UT 11600 15545 kHz; 0000-0027 7345 11615; 0100-0127 6200 7345; 0300-0327 7345 9870, and via WRMI 7385. Also try 21745 intended for As/Af at 0900, 1300, 1600, 1700 (via Alan Roe, UK)

ECUADOR On March 31, HCJB terminated multi-lingual live Internet audio in favor of on-demand archived audio (HCJB Website)

Tnx to tip from Björn Malm, heard R. Cosmopolita, Quito, with greetings program in Quichua on new 5900-USB, 0015-0100 (Johan Berglund, Sweden, hard-core-dx)

EL SALVADOR YSDA, R. Imperial, Sonsonate, heard at 0100 on 17833.83, at first thought to have been a very high-order harmonic since it's about 22 X the MW channel of 810. Carrier there most evenings, but almost inaudible modulation, with music until 0100, then religious talk show (Björn Malm, Ecuador, SW Bulletin) But 17835 has appeared in listings for Luis Palau evangelical programs, at first dismissed as imaginary. Henrik Klemetz asked Humberto Molina in El Salvador to investigate. To our surprise, he found out from José Ernesto Arévalo, administrator of R. Imperial, that it does have a 1.5 kW SW transmitter on 17835 which operates sporadically, to keep the license active (DX Listening Digest) 17833.9, just an open carrier here in the 1900-2200 range, seemingly AM mode, and gone at 2320 recheck (Terry Krueger, FL)

ETHIOPIA [non] Received very nice, personal reply from TISJD, Tigrean International Solidarity for Justice and Democracy and their "Host and Producer" Dade Desta, P O Box 60040, Washington, DC 20039. Schedule is Wed & Sat 1600-1630 on 15700. They also call themselves RADIO FITHI (=justice). E-mail address: TISforJD@aol.com (Björn Fransson, Sweden, DX Listening Digest)

GEORGIA R Georgia A-02 English: NEu 0630 11805, 1930 11760; SEu 0730 6080 Tue, Thu, 1830 6080 Sat, Sun; WEu 0830 11910, 1830 11910; ME 0930 11910, 1630 6180 (Rumen Pankov, Bulgaria, BC-DX)

GREECE A-02 ERA-5, V. of Greece: NAm 0000-0350 7475, 1200-1500 9590, 1600-2200 17705; SAM 0000-0357 9420, 2000-2200 17565, 2300-2400 12110. [all US relays except 7475, 9420] Macedonia Station, to Eu: 1100-1550 11595, 1600-2250 9935 (ERA-5 via WWDXC Germany)

Also showed VOG on 17905 at 0700-1000, 1100-1300, in the aero band carefully avoided by most broadcasters (gh) Huge signal on new 17905 at 0700-1300. This is in Aeronautical Mobile allocation of 17900-17970. Normally, 17904 is busy with traffic to and from Honolulu, Tokyo and San Francisco with aircraft crossing the Pacific. No possibility of the aircraft getting through as long as Athens stays there (Morrison Hoyle, Australia) Soon shifted to 17900, but that still overlaps into aero band (gh) Includes English Orientations 0930-1000, also on 15630. Sunday only It's All Greek to Me 1800-1900 on 9420, 15630 and 17705 via Delano (Mike Barraclough, World DX Club Contact)

HONDURAS La Voz Evangélica reactivated on 4819.21. A really "profane" program at

0200 with ads and pop music (Björn Malm, Ecuador, SW Bulletin)

INDIA AIR A-02 GOS in English

1000-1100	1053 15260 Sri Lanka
	11585 15020 17800 NE Asia
	13685 17510 17895 Australia NZ
1330-1500	9690 11620 13710 SE Asia
1745-1945	7410 11620 W Europe
	11935 15075 17670 E Africa
	13605 15155 W, NW Africa
2045-2230	7410 9650 11620 W Europe
	7150 9910 11715 11620 Australia NZ
2245-0045	9705 9950 11620 13605 Asia

(Jose Jacob, dx_india)

INTERNATIONAL VACUUM World Radio Network-1 to NAm changed World Of Radio

from Sat to Sun at 1400 (Mike Cooper)

IRAN Terrible jamming against clandestine Voice of Iran in Persian, 1630-1730 on 15690 via Issoudun, France, strong bubble jamming, unbelievable 116 kHz super-wide, from 15631 to 15747 affected. On \ \ 17525 only small motorcycle noise (Wolfgang Büschel, Germany, DX Listening Digest) Then VOI changed to 17510 at 1530-1730, 15770 at 1630-1730, excellent here (Observer, Bulgaria) Yes, but where will they be tomorrow? (gh)

Voice Of The Islamic Republic Of Iran, English to NAm: 0030-0130 UT 11970 9610 kHz. To other targets: 1100-1230 15215 15585 15600 21470 21730; 1530-1630 7245 9635 11775; 1930-2030 9800 11670 11695 11855; 2130-2230 9570 13665 (Website via Mike Barraclough)

IRAQ [non] Voice of Zowaa (Kala Zowaa), 9155, new station belonging to the Assyrian Democratic Movement, heard Sat 1655-1900, mostly in Arabic, but in Assyrian as well, Russian accent (Mauno Ritola, Finland, Cumbre DX) Opposition party based in Northern Iraq. Zowaa is the party's acronym, and they have a website at <http://www.zowaa.com> (Hans Johnson, Cumbre DX) It's a dialect called Assyrian, mainly for people in Iraq. ID translates to Voice of the Democratic Assyrian (Tarek Zeidan, Egypt, via Wolfgang Büschel) So it can be called Voice of The Assyrian Democratic Party (Mauno Ritola, Finland, BC-DX) Suspected site: AZERBAIJAN

ISRAEL Kol Israel will continue until 1 July. After receiving countless letters from angry Diaspora Jews, the Israel Broadcasting Authority decided not to eliminate its shortwave broadcasts. The broadcasts are heard in 11 languages by hundreds of thousands of people throughout the world. IBA decided to maintain the broadcasts for at least the next three months, while it seeks funding from the Jewish Agency, the Immigrant Absorption Ministry, and organizations dealing with the Diaspora. Prime Minister Ariel Sharon and Tzipi Livni, the minister in charge of public relations in the Prime Minister's Office, pushed to save the broadcasts at a cabinet meeting. (George Poppin, CA, DX Listening Digest, Gil Hoffman, Jerusalem Post, via Daniel Rosenzweig, and Bill Westenhaver)

Israeli TV was considering changing time of English news to 1600 UT. This would require Reshet Alef on radio to change the time of its English news, and consequently the SW relay away from 1600-1630 (Bill Westenhaver, QC, DX Listening Digest)

JAPAN Three R. Japan English programs in rotation now account for all the weekend 50-minute broadcasts after news on the hour:

WEEKEND SQUARE: Sat 0310, 1410, 2110, Sun 0610, 1010, Mon 0010

HELLO FROM TOKYO: Sat 0510, 1010, 1710, Sun 0010, 0310, 1110, 1510, Mon 0110.

POP JOINS THE WORLD (new): Sat 0610, 1110, 1510, Sun 0110, 0510, 1410, 1710, 2110 (from schedule via Richard Lemke, Alberta, DX Listening Digest)

LAOS A02 season cleared co-channel interference to 7145. Very listenable signals 1330-1400 English, nice programs featuring Lao traditional life, 1345 news. S-off varies 1355-1400 with National Anthem (Victor Goonetilleke, Sri Lanka, BC-DX)

LITHUANIA R. Vilnius, A-02 in English: NAm 2300-2400 UT 9875 kHz; 0030-0100 11690. Repeated to Eu 0930-1000 9710 (Ted Schuerzinger, svprograms) Radio Vilnius - backup arrangement available 0000-0100 via DK Germany on 9855 at 295 degrees (Kai Ludwig, Germany)

MALTA [non] V of the Mediterranean, English: Mon-Sat 1730-1800 UT 9605 kHz via Rome; Sat-Thu 1900-2000 12060 via Moscow; Sun 0800-0900 9605 via Rome (via Alan Pennington, BDXC-UK)

MÉXICO R. Educación, 6185, has a DX show I happened across quite by chance, UT Fri at 0611. Believe called Cápsula DX and this one gave a propagation primer starting with longwave, and on up. After timeshift it should be at 0511, but not reconfirmed, so times may vary (gh, OK)

R. Mil's Encuentro DX airs fortnightly at 0500 UT Sat on 6010; several repeats in daytime and UT Mon 0400 (Héctor García Bojorge, DF, DX Listening Digest)

MONGOLIA A-02 Voice of Mongolia in English, all on 12015: 1000-1030, 1500-1530, 2000-2030 UT (via Alan Roe, Teddington, UK)

NEW ZEALAND From March 23 RNZI launched a new lineup of weekend programs especially for Defence Forces overseas. Produced and presented by RNZ broadcaster Katrina Batten, including news and features from home, sports, entertainment and news from the NZDF. To Asia/Pacific Sat and Sun 1105-1305. An hour repeated Sat 1905 for Europe and Pacific. Forces Radio audio also downloadable from <http://www.rnzi.com> (RNZI via Paul Ormandy) See also BURMA non

RNZI until September 1; first two M-F only at 35 degrees: 1650-1850 6095 NE Pac: 1851-1950 11725 NE Pacific; daily at 000 degrees to all Pacific and beyond: 1951-2215 15160; 2216-0458 17675; 0459-0658 11820; 0659-1105 9885; 325 degrees to NW Pacific: 1106-1310 9825; 1311-1650 occasional 6095 000 degrees (Observer, Bulgaria and RNZI Mailbox)

NIGERIA [non] Salama Radio via Woofferton: 12520 250 kW, 170 degrees at 1900-2000 Arabic to Waf (ex 15475) (Ivo and Angel! Observer, Bulgaria)

PAKISTAN Introduced DST for the first time April 7, changing to UT +6, half an hour ahead of India to its east! (Jose Jacob, dx_india) External SW services monitored an hour earlier, including WS to WEu 0700-1005 on 17520 (now co-channel

Greece first hour), and 21465, English at start and finish. English news and Commentary at 1500-1515 (ex 1600) on 11570, 15100, 15725, inaudible on 17725 (Noel Green, UK, DX Listening Digest) R. Pakistan, 15455.66, English at 0006-0016 "Good Morning Pakistan." (Mark Fine, VA, DXLD) That would be the so-called "Assami" service at its new DST-shifted time 2345-2415 (gh) Heard from 2347 but no English until news at 0002 (Vern Matheson, Trepassey NF) other frequency at 2345 is 11580 (Observer)

PARAGUAY I visited R. América, but did not get to see the new SW facilities. I talked with Sr. Dom Mur, who is very cordial, and gave me lots of details, such as the SW transmitter is completely transistorized and operates at very low voltage, allowing it to be battery-powered. He also introduced me to the head of the institution, Pastor José Halowaty, who showed me around the studios, including two Gates consoles which used to be at KGEI. He does not permit music with modern rhythms, so plays a lot of classical (Levi Iversen, Paraguay, Conexión Digital) Supposed to start testing 7300 in early April, but no reports of it by late April (gh) HFCC shows R. América on 7300, 5 kW, 24 hours to zones 14 and 16 (Nicolás Éramo, Argentina)

PERÚ Sign on and sign off times vary with some smaller Peruvians. If nonstop music is heard beyond "regular" schedule, it's probable someone paid for a couple of hours of "background music" for a private event, a birthday party, a wedding anniversary, etc. The next morning, such a station will typically sign on much later than usual, if at all (Henrik Klemetz, Sweden, DSWCI DX Window)

Radio LTC on new 5005.3, 2315-0005, Spanish, latino pop songs, several clear IDs (Michael Schnitzer, Germany, hard-core-dx) 5005.32, at 2355. New after a short time on 5032.04 with heavy splash from Dr. Gene Scott! Before that was on 6011.32 (Björn Malm, Ecuador, SW Bulletin)

R. Comercial, Lajas, heard on two harmonics of MW 1107.12: 5535.61 and 6642.72 (Björn Malm, Quito, Ecuador, SW Bulletin) Radio Comercial Lajas, 5557.6, usual musical programming, announcing MW 1070, which does not make this a harmonic of it (Rafael Rodríguez R., Colombia, Conexión Digital) Unless off-frequency

R. Melodia, Arequipa, on 5940.2 ex-5995 0635-0730 covering the Venezuelan coup instead of music (Rafael Rodríguez R., Colombia, Conexión Digital) 5940.06 two days later, back with music, 0045 ID (Johan Berglund, Trollhättan, Sweden, DX Listening Digest)

PHILIPPINES Radyo Pilipinas languages are reversed compared with previous season: 0200-0330 in Pilipino, 11885, 15120, 15270; 1730-1930 in English, 11720, 15190, 17720 (IBB via Vladimir Kovalenko, Russia, Signal)

POLAND Radio Polonia's Multimedia detailed English schedule with reduced number of transmitters due to poor quality and financial difficulties. Website updated: 1200-1259 UT 6095 9525 11820 kHz; 1700-1759 5995; 1930-2029 7165 7265 (Mike Barraclough, UK)

PORTUGAL At an event in São Paulo, RDPI Director Jaime Marques promoted their new 300 kW transmitter going into service in June, which will significantly improve reception in Brazil and Europe. The station still has a commitment to SW, and may resume broadcasts in foreign languages in the near future (Cassiano A. Macedo and José Moura, radioescutas)

RUSSIA [non] HFCC shows Voice of Russia via Santa Maria di Galeria [Vatican site] now 9450 2100-2130 (210 deg.) and 11825 0100-0200 (310 deg.) (Kai Ludwig, Germany) The latter, English to NAM

SIERRA LEONE Rodio UNAMSIL, 6137.84, 0635 phone in show in English, deep voiced African-accented announcer IDing as "Radio UNAMSIL" (sounds kind of like "Radio National," but digital processing revealed it to be UNAMSIL) before each phone call, "You're listening to The Hotline on Radio UNAMSIL," African-accented callers on the phone, time check 0650 for "ten minutes to seven," which matches the time in Freetown, into possible news 0653, signal starting to fade out by 0656, "welcome back to our listeners," music, another "Radio UNAMSIL" ID, into news read by YL 0700 (Ralph Brondi, NJ, SWBC)

SLOVAKIA Radio Slovakia International A-02 in English: 0100-0130 NAM 5930, CAm 6190, SAm 9440; 0700-0730 Au/Oc 9440, 15460, 17550; 1630-1700 & 1830-1900 WEu 5920, 6055, 7345 (via Alokesh Gupta, India; Kraig Krist, VA)

SOMALIA SOUTHWEST There's some new Somali activity on 6750.25, in the Rahonwein language (Chris Greenway, Kenya, DX Listening Digest) On Mar 31, the Rohowains declared South West Somalia an independent state! (Donish Press via Anker Petersen, DSWCI DX Window)

SOUTH AFRICA Chonnell Africo A-02 English, all to Af: 0300-0330 UT 6035 kHz; 0400-0430 5955; 0500-0530 11710; 0600-0630 15215; 1300-1455 Sa-Su 11720, 17780, 21725; 1500-1530 17770; 1600-1630 9525; 1700-1730 17860; 1800-1830 17870 (via Daniel Sampson, Alan Roe)

Radio Sonder Grense, 100 kW in Afrikaans to Northern Cape: 0530-0800 7185, 0800-1620 9650, 1620-0530 3320 (From Sentech website via Alan Roe, UK)

Rodio Veritas Productions of Troyville begins service over leased SENTECH outlets May 1: 1000-1200 on 7240, 1700-1900 on 3280. Noon for moss; evening, magazine show. <http://za.op.org/veritas/> (Catholic Radio Update)

SPAIN Two different schedules for REE were circulating, and for a while the station itself could not decide which to follow. Ultimately, two of the three English hours to North America were cancelled, leaving only 0000-0100 on 15385, while 6055 switched to Spanish at that hour and at 0100, 0500 (gh, Mike Cooper, Bob Thomas, Mark Fine) Sephordic weekly to NAM: Tue 0415-0445 9650 ex-9690 (Ramón Vázquez Dourado, DX Listening Digest)

[non] REE relay on new 3350 at 0400 in Spanish (Piet Pijpers, Netherlands, World Of Radio) Used to be 3210 but absent for some time. Now back on 90m, far away from WWCR. 3350 is an air 0200-0600 per <http://www.rtve.es/rne/ree/OndaCorta/America.htm> (gh)

SUDAN Interesting entries in HFCC A-02 under the Al Aitahob transmitter site: some long inactive frequencies, 4995, 6150, 9505, 11835 and 15170, as well as the only

current channel of 7200 at 0300-0830, 1100-2200. The highest two are marked "under repair" so perhaps they will be returning, both scheduled 0500-2400; 120 kW at 180 degrees and 300 kW at 90 degrees respectively (via Tony Rogers, BDXC-UK)

TIBET [non] V. of Tibet introduced a repeat of its 1215-1300 transmission at 1430-1515 on April 4. By April 8, China found it and started jamming 21650. April 13 changed to 21570 and has China co-channeling it. The 1215-1300 transmission continues to dodge the jammers, but the Chinese jammer follows them like the plague! Some used for that have been 15645, 15670, 15680, 15225, 15330 etc. China is using more transmitters for deliberate interference of VOA, BBC, RFA, VOT, etc. than ever before in history (Victor Goonetilleke, Sri Lanka, BC-DX)

TURKEY The disappearance of the voices of the Morali sisters from the Voice of Turkey has caused reaction worldwide from our fans. However, the directors of the VOT are ignorant as to what a good broadcast sounds like and so they believe everyone with a smattering of English who drifts in off the streets is adequate to entertain a worldwide audience, many of whom speak English as a native language. We are still interested in DXing and do continue to send your emails to our address: ankayra@yahoo.com We hope that one day we will be able to use our talents in computer broadcasting because we have a lot to say and we must remember that Turkey is the cradle of civilizations and provides an inexhaustible wealth of topics to culturally enrich listeners (Reshide and Kizilgul Morali, World Of Radio)

UKRAINE Radio Ukraine International A02 English hours: 2100 UT 5905, 6020, 9950, 11705, 11950 kHz; 0000 UT 5905, 7320, 12040 kHz; 0300 UT 7150, 12040 kHz; 1100 UT 11840, 15520 kHz. All 100 kW, except 1000 kW on 12040. <http://www.nrcu.gov.ua> (Alexander Yegorov, RUI, via Kraig Krist and Alokesh Gupta, DXLD) Future is misty. RUI's schedule must be changed soon: it is planned to revive Lviv's transmitter for Au, SAm and NAM. But some are planning to abandon SW for satellites and Internet only (Alexander Yegorov, RUI via Krist)

U S A Due to interference caused by R. Free Asia, and clandestines on adjacent frequencies and associated jamming, WWCR had to abandon its longtime frequency 15685; from April 22 replaced by 15825. This affects World Of Radio Thursdays at 2030, and Mundo Radial Fridays 2115, Mondays 2130. During June-July-August, 9475 stays on one hour longer until 0100, including WOR UT Mondays at 0000 instead of 3210 (gh)

Since SW stations are not serving any local city of license, unlike AM, FM and TV stations, they do not have to maintain a public access file. It is doubtful that as far as FCC is concerned, anyone, anywhere, has legal standing to object to anything broadcast by a US SW station (George McClintock, WWCR, DX Listening Digest) Those considering buying SW airtime would be well advised to digest *Buying Shortwave Airtime Questions And Answers* at http://www.wwcr.com/sw_airtime_q_and_a.html (gh)

WJCR 7490 was to be relaunched under new ownership April 28 as WJIE, after the FM station in Louisville KY (gh)

FCC A-02 schedules for KAIJ, KFBS, KHBN, KJES, KNLS, KSDA, KTBN, KTRW, KVOH, KWHR, WBCQ, WEWN, WGTG, WHRA, WHRI, WINB, WJCR, WMLK, WRMI, WRNO, WSHB, WTJC, WWCR, WWBS and WYFR: http://www.fcc.gov/ib/pnd/neg/hf_web/hff0x02.txt (Daniel Sampson, WI, Prime Time Shortwave)

VOA News Now launched new format April 8, expanding business and economic news, sports and American subjects, and added some music (Johnathan Grant, DXLD)

Never mind last month's top story about "Reorganizing U.S. International Broadcasting." The Bush administration nixed Republican Hyde's plan because it would reduce the "flexibility" of the president to run foreign policy and determine America's message to the world. (Ben Barber, Washington Times via Kim Elliott)

The new Middle East Radio Network, a US Government-sponsored Arabic service aimed at young people, had a low-key launch on 22 March. On-air ID is "Radio Sawo" (Together), initially available on FM in Amman and the West Bank on 98.1 MHz and in Kuwait City on 95.7 MHz. MERN is expected to be fully operational by late summer 2002. Web site is <http://www.ibt.gov/radiosawa/> (© Radio Netherlands Media Network) Radio Sowa replaced VOA's "traditional" Arabic April 20, taking over previous VOA Arabic shortwave schedule (Kim Elliott, VOA) Radio Sowa's premise was that SW is useless (gh)

VOA's first use of 19 MHz band is 19000, Uzbek 1230-1300 (Don Ferguson, DC) via Sri Lanka site (IBB schedule via Joe Honlon)

[non] Voice of Hope / High Adventure Ministries is transmitted not only via DTK Jülich, Germany, but also via IBB Biblis: daily 1700-1900 on 9495 at 80 degrees (via Kai Ludwig) Jülich transmitters are quite busy during these hours, so some transmissions were "outsourced" to Wertachtal and Nouen, and now also the IBB started to do some work for DTAG with its otherwise underused facilities in Germany (Kai Ludwig, Germany)

Two years after launching, World Beacon closed April 15. Affiliated Medio Group broadcast from transmitters in England, South Africa, Russia and the United Arab Emirates. The agency found demand for its domestic services far exceeded client requests for overseas radio ministry opportunities (from <http://www.worldbeacon.net>)

UZBEKISTAN R. Tashkent A-02 English: 1200-1230 UT 5975 7285 9715 15295 17775 kHz. 1330-1400 some plus 5040 5060. 2030-2100 & 2100-2200 5025 9545 11905. 0100-0130 5025 7190 9530 9715 (HFCC via BC-DX)

VATICAN [and non] Vatican Radio is now on even 5890 (ex odd 5882) (Rudolf Krumm, Germany, BC-DX) Comes from two different sites depending on time of day, in variety of European languages and azimuths: direct from Vatican garden at 0225-1710 with 80 kW; then 1710-2215 from Santa Maria di Galeria 100 kW (HFCC via BC-DX)

ZIMBABWE [non] V. of People, 7310 via Madogascor, audible at 0330 but sandwiched, heavy splatter from both sides, including WHRI 7315 (Walt Salmaniwi, BC) *Until the Next, Best of DX and 73 de Glenn!*

0000 UTC on 4052

GUATEMALA: Radio Verdad. Spanish. Interval signal to ID and religious format. **Radio Buenas Nuevas** 0200 on 4800. (Fernando Garcia, Baltimore, MD) **Radio Maya de Barillas** 3324.8, 1020-1030+. (Harold Frodge, Midland, MI) **Radio Ke'kchi** 4844, 0143-0155. (Daniele Canonica, Muggio, Switzerland) **La Voz De Nahuala** 3360, *1100 ID/freqs to Andean music and math tutorial program. (Garcia, MD)

0000 UTC on 9925

GERMANY: Voice of Croatia. Station sign-on in English/Spanish, followed by English newscast. (Garcia, MD) ID 0145 to national and regional news. Spanish service commencing 0148. **Deutsche Welle** audible 13780, 1900-1910. 0300 on 11895. (William McGuire, Cheverly, MD)

0030 UTC on 6185

MEXICO: Radio Educacion. Spanish, Soft music theme to PSA's on the National Lottery and Mexico Transportation. (Garcia, MD). **Radio Mexico Int'l** 11770 at 1417 no // 9705. (Frodge, MI)

0130 UTC on 5040

ECUADOR: Radio Oriental. Station ID to soccer game. **La Voz del Napo** 5040 at 0130 & 3279 at 0900. **Radio Catholica Nacional** 3280 at 1100. **Radio Interoceánica** 4840, 0445 with religious text to 0500 * ID. (Garcia, MD) **Radio Maria del Ecuador** 3279.6 at 0920. (Garcia, MD)

0300 UTC on 9690

SPAIN: China Radio Int'l relay. World to national newscasts. Financial market update followed by *Life in China* segment. (Garcia, MD) **Radio Exterior Espana** 21700. Soccer commentary with interviews at 2015. (Stewart H. MacKenzie, Huntington Beach, CA)

0510 UTC on 17580

AUSTRALIA: Radio Australia. Regional news to *South Pacific Beat* with segment on New Guinea soldiers mutiny. Good signal // 15240 weaker. (Moser, IL) Newscast 2240 on 21740 on India's riots and HIV medicine lacking in Africa, // 17795. (MacKenzie, CA)

0600 UTC on 4760

LIBERIA: ELWA. Instrumental religious music to hymns and sermon. (Garcia, MD) 2149-2202* with IDs to closing announcements. (Frodge, MI)

0615 UTC on 7255

NIGERIA: Voice of Nigeria. Talk on minimizing problems in Zimbabwe. (Moser, IL) VON 15120, 1940-1946+ with feature on west coast African music, and Nigerian government's development plans. SIO=3+4-3. (Frodge, MI)

0626 UTC on 11830

ROMANIA: Radio Romania Int'l. *Practical Guide* program's focus on ecology. (Moser, IL) 2141-2146+ on 7105. RRI contest info to ID. Best to monitor in LSB for co-channel noise and interference. (Frodge, MI)

0700 UTC on 7120

ITALY: IRRS. Interval signal to religious text and pop music. Station ID/address, fax and transmission info from Milan. (Garcia, MD) **RAI** 11800, 0050-0055. (McGuire, MD)

0720 UTC on 7210.26

BENIN: ORTB. Poor signal with vernacular announcements, best in LSB to eliminate 7205 unid station. (Ormandy, NZ/HCDX)

0900 UTC on 3290

GUYANA: Voice of. BBC news relay to station mailbag segment at 0935. "This is the Voice of Guyana." (Garcia, MD)

0915 UTC on 6025

BOLIVIA: Radio Santa Cruz. Andes folk music to program ID. Local time check to *First Edition* newscast. **Radio Illimani** 0930 on 6025. (Garcia, MD)

0915 UTC on 3230

PERU: Radio El Sol de los Andes. Poor-fair with lively talk show. **Radio Oriental** 5176.1, 1101 with tentative ID. Anthem format suffering from interferences. (Paul Ormandy, NZ/HCDX)

0945 UTC on 4940

VENEZUELA: Radio Amazonas. Spanish. Sports show to ID and time check. (Garcia, MD) **Radio Tachira** 4830, 0249-0254. Salsa music to ID. **Ecos del Torbes** 4980, 0255-0300. "Loteria del Tachira" promo. (Garcia, MD)

1030 UTC on 5955

COLOMBIA: Caracol. Spanish. National newscast sponsored by Banco Santander to 1058. National anthem 1100 to ID "La Voz de los Centauros dpt del Meta." Regional news ads to AM format from HJRW 1040 AM. (Garcia, MD; Ormandy, NZ)

1030 UTC on 5745

USA: VOA. Political discussion on electronics. (Glen Bowman, Saline, MI) 21485 at 2116 with segment on Microsoft. (MacKenzie, CA)

1330 UTC on 13675

UAE: Radio Dubai. International news to *Birth of a Prophet* segment. (Garcia, MD)

1353 UTC on 4890

PAPUA NEW GUINEA: NBC. ID/freqs quotes to anthem and 1403*. (Frodge, MI)

1838 UTC on 15190

PHILIPPINES: Radio Philipinas. News in Tagalog service with occasional English/Spanish phrases to *Masterpiece Theater* bumper music. ID and promo 1841, SIO= 333. (Frodge, MI) **VOA** relay 17820, 2300 with VOA News by Jon Bershard // 17735. (MacKenzie, CA)

2015 UTC on 12085

SYRIA: Radio Damascus. Middle Eastern news to Arabic music at 2022. SIO 322+. Audible 2200-2210* with commentaries and pop music tunes. (Frodge, MI)

2018 UTC on 21675

USA: Radio Marti. Spanish. Sports coverage, possibly soccer, followed by post game interviews. (MacKenzie, CA) **KAIJ** 13815, 2025 with Dr. Gene Scott. **WYFR** 13820, 2025 Mailbag show; Radio Carolina via **WBCQ** 7415, 2110-2121+; **WWCR** 3210, 2300+. (Frodge, MI)

2030 UTC on 17830

ASCENSION ISLAND: BBC relay. Announcer's text on the Taliban. (MacKenzie, CA) Noted 2031 on 15400 // 17830. (Fraser, MA)

2037 UTC on 13710

BOTSWANA: VOA relay. *Dateline Africa* program. Messages and contact information for folks in Liberia. (SIO=4+53. (Frodge, MI)

2100 UTC on 9320

USA: WWRB. *Body, Mind and Spirit* program to bible study segment. Shift to 5085 at 2300. (Garcia, MD)

2100 UTC on 17850

COSTA RICA: Radio Exterior Espana relay. Live soccer game coverage for Tenerife vs Real Madrid. (Garcia, MD) Costa Rica's **RFPI** 21815 USB, 2235 with environmental and liberty issues. (MacKenzie, CA)

2129 UTC on 11980

GUAM: AWR. Religious program // 9660 via Moosbrun, but noted a one minute delay. **AWR** audible 17880, 2200-2230+ in Mandarin // 11970. (Lee Silvi, Mentor, OH) AWR 17835, 2355 with Vietnamese vocals to English ID at 2300. (MacKenzie, CA)

2130 UTC on 11680

FALKLAND ISLANDS: BBC. Station ID to opening news on global ecosystem, RAF, rescue teams at sea, and more to 2145*. (Garcia, MD)

2209 UTC on 3366

GHANA: GBC. Presumed. English service for world news and Afro music. SIO 352+ // 4915. (Frodge, MI)

2238 UTC on 9737.75

PARAGUAY: Radio Nacional. Sports program to commercial. Station ID at 2301 amid bumper music. SIO 3+33 best in LSB. (Frodge, MI; Garcia, MD)

2250 UTC on 15820 LSB

ARGENTINA: Radio Continental. Pre soccer game interviews for Argentina vs Ecuador from Guayaquil. Moderator Guillermo Capanaletti. Commercials for Pico de Oro cerveza and Rafa animal feed. IDs and time checks. (Garcia, MD) Buenos Aires' **Radio Diez** feeder 15820 LSB // 710 AM. Promo, "premio Radio Diez a la caridad..." followed by news and information and ID. **Radio Rivadavia** 15820 LSB, 2040-2050. Sports scores to "Somos Rivadavia." (Arnaldo Slaen, Buenos Aires, Argentina)

Thanks to our contributors - Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times (or e-mail
gayle@webworkz.com) Please note: paper strips and cassette
recordings will no longer be accepted.
English broadcast unless otherwise noted.

Radio Netherlands Releases New QSL Cards

Radio Netherlands has recently introduced a series of eight new QSL cards, depicting different scenes from a typical Dutch morning. These colorful cards most likely will be very popular among collectors. The cards are available for viewing at <http://www.rnw.nl/realradio/html/qslcards.html>. Get those reports out before time runs out.



Speaking of time, it's later than you think. Radio VNG, Australia's Time and Signal station, is slated to close on July 1, 2002. A stalwart for decades, hobbyists have used VNG to gauge propagation to the Pacific. VNG emits voice identifications at 15, 30, 45 and 60 minutes on the hour on 2.5, 5 and 16 MHz. Morse code IDs are audible on 8638 and 12984 kHz. Send your report to: Radio VNG, National Standards Commission, P.O. Box 282, North Ryde, NSW 1670 Australia. An

IRC must be enclosed but consider an extra since the station's resources are critical.

Did I mention an IRC? Chances are, you've noticed the enlarged International Reply Coupons, available at your local post office, and at a new price of \$1.75 each in U.S. currency.

Participating countries exchange your IRC for return postage to you. Because of this increase, enclosing currency or mint postage (my preference), appears to be increasing in popularity. As a guide to IRCs required to return a QSL to the United States, refer to: <http://www.qsl.net/n6dzh/irc-chart.html>.

Looking to QSL Voice of America/IBB network in a speedy fashion? From John Vodenik comes word he now verifies reports sent to: VOA Delano Transmitting Station, 11015 Mercer Road, Delano, CA 93215.

AMATEUR RADIO

Malta-9H0A, 10 Meters USB. Full data via LA2TO. Received in 30 days for two US dollars and a nested Euro envelope (used for reply). QSL Manager-LA2TO, Kai Martin Mauseth Kai Martin, Ellen Gleditsch v 9, 0987 Oslo, Norway. (Larry Van Horn N5FPW, Brasstown, NC)

Monteserrat-VP2MDY, 10 Meters USB. Full data QSL via N2NB. Received in 17 days for an SASE. QSL Manager-N2NB, Arthur M. Blank, 91 A Brookside Dr., Smithtown, NY 11787-4456 USA. (Van Horn N5FPW, NC)

Tunisia-3V8BB, 10 Meters USB. Full data color card. Received in five months for two US dollars and a nested Euro envelope (used for reply). QSL via YT1AD, Dr. Hrane Milosevic, 26206 Vitanovac, Yugoslavia. ARO country # 138. (Van Horn N5FPW, NC)

BELGIUM

Radio Vlaanderen Int'l 13700 kHz. Full data unsigned QSL card plus sticker. Received in 17 days for an English report. Station address: B-1043 Brussels, Belgium. (Joe Squashic, Wake Forest, NC)

CANADA

Radio Canada Int'l, 9755 kHz. Full data card signed by Bill Westenhaver, plus station pennant, sticker and schedule. Received in 16 days for an English report. Station address: P.O. Box 6000, Montreal, Canada H3C 3A8. (Squashic, NC)

HONDURAS

HRPC- Radio Luz y Vida, 3250 kHz. Full data map *Certificado de Sintonia*, with illegible signature. Received in one year for an English report, photo post card and two U.S. dollars. Station address: Apartado Postal 303, San Pedro Sula, Honduras, though envelope was postmarked Independence, KS. (William R. Wilkins, Springfield, MO)

MEDIUM WAVE

KNX, 1070 kHz AM. Full data studio photo card signed by Larry Wichman-Director, Technical Operations. Received in 22 days for a taped cassette report. Station address: 6121 Sunset Blvd., Los Angeles, CA 90028 USA. (Mark Redfox, Albuquerque, NM)

KRLD, 1080 kHz AM. Full data verification on station letterhead, signed by Erik Disen-Director of Engineering, plus a fridge magnet. Received in 23 days for a taped cassette report and one U.S. dollar. (returned with letter). Station address: Infinity Radio Div., Viacom Corp., 1080 Ballpark Way, Arlington, TX 76011. (Redfox, NM)

KRVN, 880 kHz AM. Full data logo/cartoon card signed by Director of Engineering, plus info sheet, coverage map, antenna diagram and two station stickers. Received in 23 days for a taped cassette report and one U.S. dollar (returned). Station address: P.O. Box 880, Lexington, NE 68850-0880. Website: <http://www.krvn.com> Email: krvnam@krvn.com. (Redfox, NM)

KSL, 1160 kHz AM. Full data color station logo card signed by Chief Engineer. Received in 15 days for a taped cassette report. Station address: 300 West 55 North, Salt Lake City, UT 84180. Website: <http://www.ksl.com/radio>. (Redfox, NM)

KWKH, 1130 kHz AM. Full data verification on station letterhead, signed by James Kester-Asst. Engineer. Received in 33 days for a taped cassette report. Station address: 6341 Westport Ave., Shreveport, LA 71129. (Redfox, NM)

PAPUA NEW GUINEA

Radio Simbu, 3355 kHz. Freq only verification letter signed by Paia Ottawa-Technican. Received in 13 months after one English follow up report. Station address: P.O. Box 228, Kundiawa, Chimbu, Papua New Guinea. (Joe Talbot, Alberta, Canada/Cumbre DX)

RUSSIA

Radio Center, 5925 kHz (via St. Petersburg transmitter). Full data card. Received in 60 days for an English report and two U.S. dollars. Station address: Nikolskaya Sr. 7, Moscow 103012 Russia. (Bob Combs, Tome, NM) Station is Russia's first Christian nondenominational radio station and targets areas to European parts of Russia, Ukraine, Belarus and the Baltic states. Radio Center is located in Moscow, next to Red Square. <http://www.radiocenter.net/testimony.htm>.

UKRAINE

Radio Ukraine Int'l, 12040 kHz. Full data QSL plus sticker and schedule. Received in 179 days for an English report and two U.S. dollars. Station address: c/o English Service, Kreshchatik str., 26 252001 Kiev, Ukraine. (Squashic, NC)

SOUTH AFRICA

Channel Africa, 17870 kHz. Full data QSL card verified, plus program schedule. Received in 30 days for an English report. Station address: P.O. Box 91313, Auckland Park 2006, South Africa. (Dave Weronka-WDX4KBE, Benson, NC)

UTILITY

Greece-SVO, 12603.5 kHz. Full data verification letter signed by I. Troyis-Manager, plus station brochure. Received in 31 days for a utility report and one U.S. dollar. Station address: Hellenic Telecommunications Organization, C/S Olympia Radio/SVO, 153 42 Agia Paraskevi, Athens, Greece. (George Clement, Powder Springs, GA)

OXT Copenhagen Meteo 9360, 13855, 17510 kHz USB. Full data verification on station letterhead. Received in 18 days for a utility report. Station address: Danish Meteorological Institute, Communications Dept., Lyngbyvej 100, DK-2100 Kobnhavn, Denmark. (Hans-Peter/WUN)

Notes From Camp

As I write this, I am sitting in a comfortable lodge at Shadow Lake, a bucolic location situated about thirty miles north of Toronto. Sitting in front of me is my cherished Lowe HF-150 receiver/preselector/audio processor combo, seven fellow Ontario DX Association colleagues, and a round deep lake surrounded by forest. In the large paneled, windowed room we are sharing, are a range of receivers tethered to a melange of cables and wires running along the floor and out several of the windows. Outside the window, strewn in various directions from the building into surrounding trees, up a flagpole, or attached to a drainpipe, are a fine collection of antennae – dipoles, longwires, windoms, slopers. The lights are low and the room is very quiet, save for the occasional excited expression in the nature of, “Indonesia fading in on 15150” or “Burkina blasting on 5030.”

I am at camp – DX camp to be precise – and it is one of the most enjoyable things a radio enthusiast can experience.

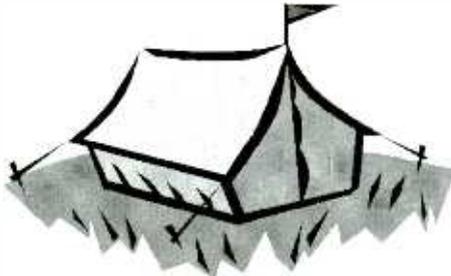
It may be the one place on Earth where you don't have to explain what it is you do. (“No, Aunt Mary, I'm not a ham; I'm a shortwave listener...”) It turns listening from a solitary activity into a collaborative experience, where DXers help one another to hear stations and countries they may have never heard before.

Why a DX camp, you ask? Well, beyond the camaraderie built through spending time with friends of similar interest, the single most important reason is the quiet. Not the obvious quiet of a country setting; but the quiet in your headphones produced through the absence of RF (radio frequency noise – that is, non-radio electrical and electronic devices radiating signals of their own into and across the radio frequency spectrum).

Until you've been to DX camp (or at least an area away from most of the noise and interference produced in more heavily populated, industrial areas), you just can't believe how good your radio can sound. At my first camp, I repeatedly tried to turn on my already activated receiver. At home, the noise coming out of the speaker when tuned to unused frequencies reminds me that the receiver is on (along with family members' complaints of injury to their ear drums). At camp, that noise (actually both kinds!) was absent. I was achieving a form of radio silence; and, with this “noise floor” now dropped literally below the basement. I could hear signals that heretofore had been buried within and beneath it. One gains new re-

spect for that old receiver – and for the radio in general – at DX camp. There's almost always nothing wrong with your receiver or antenna that a little quiet won't cure.

In Jerry Berg's excellent book, *On the Shortwaves, 1923-1945*, there are several accounts of very low powered (compared to today) stations being heard across oceans and continents in the early years of radio. It was not uncommon – when propagation conditions were favorable – for listeners on the east coast of North America to be able to hear MW stations from the South Pacific, and vice-versa! This was possible in large measure because there were, relative to today, very few devices producing RF noise.



Today, with the number of stations and the amount of ambient noise in the environment so much higher than it was years ago, we could never approximate the experiences of our ancestors in the radio listening hobby – even with the vast improvements in receiver technology realized over the decades. If all this noise and interference has been marring your experiences and causing you enough frustration to force consideration of abandoning the whole effort, I prescribe for you a DX camp. I always come away reinvigorated and I know you will, too. Check with one of the clubs that advertise here in *MT* about when and where their next camp is scheduled.

v Not Just For DXers Only!

The quiet doesn't work *just* for avid DXers. Although I do a little DXing while at camp, most of the time I kick back and sample a range of programs and stations that I can't experience much when at home, whether due to lack of time or poor receiving conditions.

For example, this last time, I was able to enjoy a couple of days worth of programs from the Voice of Indonesia, which I can't hear well enough at home to make the encounter worthwhile.

“Getting away from it all” also promotes

some philosophical thinking – something that the fast pace of our daily lives generally discourages. It occurred to me while at Shadow Lake that there might be one essential difference between radio devotees and computer/Internet aficionados.

Those favoring the Internet are more likely to seek dominance over or subjugation of natural phenomena to human wants and desires. The wired, hard and fast connections, digital transmissions and other like characteristics all represent attempts to eliminate the potential for natural anomalies to “interfere.” Internet use promotes unrealistic expectations and grandiose designs.

Radio hobbyists, on the other hand, seek to learn about and cooperate with nature to gain what they seek. Through greater understanding of aspects of the natural world such as the sun, the ionosphere, radio signal propagation characteristics, antennae and reception principles, the radio listener seeks to maximize his or her opportunities. Rather than harnessing or overcoming nature, those devoted to radio join with and seek to maximize it, making for a far more healthy and holistic experience. Radio listeners recognize that life has its limitations and are more grounded and realistic in their assessments.

Is this kind of thinking promoted by the relaxed setting...or is it the beer (did he say “beer”?) talking? I'll leave that judgment to you.

v A Closing Thought...

...from a recent article by Michael Kimmelman in *The New York Times*. “Lamenting the Fade Out of Classical Radio.” Although the article dealt specifically with the reduced time being given by public radio stations to presentation of and serious discussion about classical music recordings and performances, his words (and my adaptation of them) have application to the unwelcome growing influence of commercial radio principles and the on-demand nature of the Internet on international public service radio – such as is occurring at the BBC World Service – issues we have dealt with at length in this column before:

“...Radio has always been about serendipity, hearing what you don't know or didn't think you would like...That's how many [of us have] learned...Those shows are disappearing. I wonder if the executives entrusted with public radio's future know how to quantify that sort of loss.”

Until July, good listening!

HOW TO USE THE SHORTWAVE GUIDE

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

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Savings Time) 4, 5, 6, or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each page.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

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

If a broadcast is not daily, the days of broadcast A 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 prob-

lems, 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 John Figliozi
 Frequency Manager Program Manager
 gayle@webworkz.com jfiglio1@nycap.rr.com

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

Program Highlights

John Figliozi

MAJOR Improvement at VOA

On April 8th, without warning or fanfare, **VOA News Now** instituted a new schedule of programs. The revisions represent a major improvement over NN's prior schedule, harking back to a time when the service painted a brighter and broader tapestry of life in the U.S. While **VOA** does not target the stateside audience, it is generally receivable here around the clock on shortwave, as well as via audio streaming on the Internet. Here's the schedule outline: (*denotes a program new to shortwave)

M-F

News: Full summary on the hour; Headlines on the half-hour.

*Focus**: Top news in perspective at :15 past 00, 02, 04, 06, 10, 12, 14, 16, 18, 22.

Sports: At :23 past most hours.

*Coast to Coast**: American magazine w/Dave Arlington: After Headlines at :30 past 00, 12, 14, 16, 18 and after 00 (A) to Latin America.

Business and economic news: After Headlines at :30 past 01, 03, 05, 11, 15, 20, 23

Dateline: Documentary at :45 past 01, 03, 05, 11, 15, 20, 23.

*Opinion Roundup**: At :55 past 00, 07, 12, 15, 17.

Talk to America: Live global phone-in at 1700, repeated next weekday at 0800.

*Music**: At 09, 13, 21 as follows—*American Gold* (M), *Roots & Branches* (T), *Classic Rock* (W), *Top 20* (H), *Country Hits* (F). At 19 (M-F), *Border Crossings*.

*VOA News Review**: 1930 (F).

Repeats of weekend programs: At :30 past 02, 04, 06, 10, 22 as follows: *Press Conference USA* (M), *Encounter* (T), *Our World* (W), *On the Line* (H), *Best of Talk to America* (F)

A/S

News first half-hour (except summary at 09, 13, 21)

*Jazz America**: at 09, 13, 21.

Features second half-hour as follows—

Encounter: S 00, 04, 12, 16, 20.

VOA News Review: A 01, 05.

Best of Talk to America: S 01, 05; A/S 08, 17.

On the Line: A/S 02, 06, 10, 14, 18, 22.

Our World: A 03, 07, 11, 15, 19, 23.

Issues in the News: S 03, 07, 11, 15, 19, 23.

Press Conference USA: A 04, 12, 16, 20.

0000 UTC - 8PM E / 7PM C / 5PM P			
0000	0015	Cambodia, National Radio Of	11940as
0000	0015	Japan, Radio	13650as 17810as
0000	0015	Japan, Radio	6145na 13650as 17810as
0000	0030	Egypt, Radio Cairo	9900na
0000	0030	Mexico, Radio Mexico Intl	9705am 11770am
0000	0030	Saloman Islands, SIBC	5020do
0000	0030	Sri Lanka, SLBC	4940do
0000	0030	Thailand, Radio	9690va
0000	0030	Vanuatu, Radio	4960do 7260do
0000	0045	India, All India Radio	9705as 11620as 13605as
0000	0055	Spain, R Exterior Espana	15385na
0000	0100	Anguilla, Caribbean Beacon	6090am
0000	0100	Australia, ABC NT Alice Springs	4835do
0000	0100	Australia, ABC NT Katherine	5025do
0000	0100	Australia, ABC NT Tennant Crk	4910do
0000	0100	Australia, Radio	9660pa 12080pa 15240pa 15415as
0000	0100	Cameroon, RTV	4850do 17580pa 17750as 17795pa 21725as
0000	0100	Canada, CBC Northern Service	9625do
0000	0100	Canada, CFRX Toronto ON	6070do
0000	0100	Canada, CFVP Calgary AB	6030do
0000	0100	Canada, CKZN St John's NF	6160do
0000	0100	Canada, CKZU Vancouver BC	6160do
0000	0100	Canada, Radio Canada Intl	9640as 11895as
0000	0100	Costa Rica, R for Peace Intl	15040va 21815usb 7375am 9725sa
0000	0100	Costa Rica, University Network	5030am 6150am 7375am 9725sa
0000	0100	Finland, Scandy Weekend Radio	5980va 11720va
0000	0100	Finland, YLE/Radio Finland	11990na 13730na
0000	0100	Guatemala, Radio Cultural	3300do 5955do
0000	0100	Guyana, Voice of	3290do 5950do
0000	0100	Malaysia, Radio	7295do
0000	0100	Namibia, NBC	3290do
0000	0100	Netherlands, Radio	6165na 9845na
0000	0100	New Zealand, Radio NZ Intl	17675pa
0000	0100	Russia, University Network	9940as
0000	0100	Singapore, SBC Radio One	6150do
0000	0100	UK, BBC World Service	3915as 5970as 5975am 6195va
0000	0100	USA, Armed Forces Network	9410as 9825sa 11835ca 11765me 11945as 11955as 12095sa
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	USA, Voice of America	5995am 6130am 7405am 9455am 9775am
0000	0100	USA, WBCQ Kennebunk, ME	7415na 9335na
0000	0100	USA, WEWN Birmingham AL	5825na 9355na 15745na
0000	0100	USA, WHRA Greenbush ME	7580va
0000	0100	USA, WHRI Noblesville IN	5745va 7315am
0000	0100	USA, WINB Red Lion PA	12160am
0000	0100	USA, WJIE Upton KY	7490am
0000	0100	USA, WRMI Miami FL	7385am
0000	0100	USA, WRMI Miami FL	9955am
0000	0100	USA, WRNO New Orleans LA	7355am
0000	0100	USA, WSHB Cypress Creek SC	7535am 9430sa 15285sa
0000	0100	USA, WTJC Newport NC	9370na
0000	0100	USA, WWBS Macon GA	11900na
0000	0100	USA, WWCR Nashville TN	3210na 5070na 7435na
0000	0100	USA, WWRB Manchester TN	3270va 5085va 6890va 9320va
0000	0100	USA, WYFR Okeechobee FL	6085na 9505na
0000	0100	Zambia, Christian Voice	4965af
0000	0115	Pakistan, Radio	11580as 15455as
0003	0010	Croatia, Croatian Radio	9925sa
0003	0010	Japan, Radio	6145na
0003	0010	Iran, VOIRI	9610am 11970am
0003	0010	Lithuania, R Vilnius	11690na
0003	0010	Saloman Islands, SIBC	5020do
0003	0010	Sri Lanka, SIBC	6005as 6075as 6130do 9770as 15425as
0003	0010	Thailand, Radio	15395na
0003	0010	UAE, AWR	6035as 6055as
0003	0010	USA, Voice of America	7215va 9770va 11760va 15185va 15290va
0003	0010	USA, Voice of America	17740va 17820va
0055	0100	Italy, RAI Intl	9675na 11800na

0100 UTC - 9PM E / 8PM C / 6PM P			
0100	0115	Italy, RAI Intl	9675na 11800na
0100	0125	Netherlands, Radio	6165na 9845na
0100	0127	Czech Rep, Radio Prague Intl	7345na 11615na

0100	0127	Iran, VOIRI	9610am 11970am
0100	0127	Vietnam, Voice of	6175na
0100	0130	Germany, Universal Life/Santec	9435as
0100	0130	Hungary, Radio Budapest	9560na
0100	0130	Slovakia, R Slovakia Intl	5930na 6190ca 9440sa
0100	0130	USA, Voice of America	5995am 6130am 7405am 9455am
0100	0130	Uzbekistan, Radio Tashkent	5025as 7190as 9530as 9715as
0100	0145	Germany, Deutsche Welle	6040na 9640am 11810na
0100	0159	Canada, Radio Canada Intl	5960am 13670am 15170am
0100	0200	Anguilla, Caribbean Beacon	6090am
0100	0200	Australia, ABC NT Katherine	5025do
0100	0200	Australia, ABC NT Tennant Crk	4910do
0100	0200	Australia, Radio	9660pa 12080pa 15240pa 15415as
0100	0200	Canada, CBC Northern Service	9625do
0100	0200	Canada, CFRX Toronto ON	6070do
0100	0200	Canada, CFVP Calgary AB	6030do
0100	0200	Canada, CKZN St John's NF	6160do
0100	0200	Canada, CKZU Vancouver BC	6160do
0100	0200	China, China Radio Intl	9580na 9790na
0100	0200	Costa Rica, R for Peace Intl	15040va 21815usb 7375am 9725sa
0100	0200	Costa Rica, University Network	5030am 6150am 7375am 9725sa
0100	0200	Cuba, Radio Havana	6000na 9820na 11705usb
0100	0200	Ecuador, HCBJ	9745na 11960na 21455usb
0100	0200	Finland, Scandy Weekend Radio	5980va 11720va
0100	0200	Guatemala, Radio Cultural	3300do 5955do
0100	0200	Guyana, Voice of	3290do 5950do
0100	0200	Indonesia, Voice of	9525pa 11785al 15150as
0100	0200	Japan, Radio	11860as 11870me 15325as
0100	0200	Malaysia, Radio	7295do
0100	0200	Namibia, NBC	3290do
0100	0200	New Zealand, Radio NZ Intl	17675pa
0100	0200	North Korea, Voice of	6195as 6520am 7140as 7580am 9335as
0100	0200	Russia, University Network	9940as
0100	0200	Russia, Voice of Russia	9665na 9725na 11825na 12000na
0100	0200	Singapore, SBC Radio One	6150do
0100	0200	Saloman Islands, SIBC	5020do
0100	0200	Sri Lanka, SLBC	6005as 6075as 6130do 9770as
0100	0200	UK, BBC World Service	5975am 6195as 9410as 9825as
0100	0200	USA, Armed Forces Network	9410as 9825sa 11835ca 11765me 11945as 11955as 12095sa
0100	0200	USA, KAIJ Dallas TX	13815va
0100	0200	USA, KTBN Salt Lk City UT	15590na
0100	0200	USA, KWHR Naalehu HI	17510as
0100	0200	USA, Voice of America	5995am 6130am 7405am 9455am 9775am
0100	0200	USA, WBCQ Kennebunk, ME	7415na 9335na
0100	0200	USA, WEWN Birmingham AL	5825na 9355na 15745na
0100	0200	USA, WHRA Greenbush ME	7580va
0100	0200	USA, WHRI Noblesville IN	5745va 7315am
0100	0200	USA, WINB Red Lion PA	12160am
0100	0200	USA, WJIE Upton KY	7490am
0100	0200	USA, WRMI Miami FL	7385am
0100	0200	USA, WRMI Miami FL	9955am
0100	0200	USA, WRNO New Orleans LA	7355am
0100	0200	USA, WSHB Cypress Creek SC	7535am 9430sa 15285sa
0100	0200	USA, WTJC Newport NC	9370na
0100	0200	USA, WWBS Macon GA	11900na
0100	0200	USA, WWCR Nashville TN	3210na 5070na 7435na
0100	0200	USA, WWRB Manchester TN	3270va 5085va 6890va 9320va
0100	0200	USA, WYFR Okeechobee FL	6085na 9505na
0100	0200	Zambia, Christian Voice	4965af
0103	0110	Croatia, Croatian Radio	9925sa
0130	0145	Libya, Voice of Africa	15435irr 17750irr
0130	0200	Austria, Radio Austria Intl	9870na
0130	0200	Sweden, Radio	13625va
0130	0200	UK, RTE Radio	6155na
0130	0200	USA, Voice of America	5995am 6130am 7405va 9455am 9775va
0140	0200	Vatican City, Vatican Radio	9650au 12055au
0145	0200	Albania, Radio Tirana Intl	6115na 7160na

0200 UTC - 10PM E / 9PM C / 7PM P			
0200	0227	Czech Rep, Radio Prague Intl	6200na 7345na
0200	0230	Austria, AWR	9820as
0200	0230	Belarus, Radio Belarus Intl	6070eu 7210eu
0200	0230	Myanmar, Radio	7185do
0200	0230	Saloman Islands, SIBC	5020do

SELECTED PROGRAMMING BEGINS ON PAGE 55

Shortwave Guide

0300	0400	USA, WWCR Nashville TN	3210na	5070na	5935na	7435na
0300	0400	USA, WWRB Manchester TN	5085va	6890va		
0300	0400	USA, WYFR Okeechobee FL	6065na	9505na		
0300	0400	Zambia, Christian Voice 6065af				
0300	0400	Zambia, Radio ZNBC 4910do	6265af			
0310	0315	Vatican City, Vatican Radio	7305am	9605am	9660af	
0315	0340	Vatican City, Vatican Radio	9660af			
0330	0345	Libya, Voice of Africa 15435irr	17750irr			
0330	0350	UAE, Emirates Radio 12005na	13675na	15395na	15435na	
0330	0357	Czech Rep, Radio Prague Intl	11600va	15260va		
0330	0357	Vietnam, Voice of	6175na			
0330	0400	Ecuador, HCJB	11960na			
0330	0400	Malaysia, RTM Kota Kinabalu	5979do			
0330	0400	Nigeria, Radio/Kaduna 4770do				
0330	0400	Nigeria, Radio/Lagos 3326do	4990af			
0330	0400	Sweden, Radio	9490na			
0330	0400	UAE, AWR 11775as				
0345	0400	Seychelles, FEBA Radio	11880af			
0345	0400	Tajikistan, Radio	7245as			

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

0400	0415	Israel, Kol Israel	9435na	15640va	17600va	
0400	0425	Belgium, RVI Flanders R Intl	15565na			
0400	0430	France Radio France Intl 9550af	15155af			
0400	0430	Guatemala, Radio Cultural	3300do	5955do		
0400	0430	Mexico, Radio Mexico Intl	9705am	11770am		
0400	0430	S Africa, AWR	7235af			
0400	0430	S Africa, Channel Africa	5955af			
0400	0430	Sri Lanka, SLBC	6005as	6075as	6130do	9770as 15475as
0400	0445	Germany, Deutsche Welle	6180af	7225af	12045af	13690af
0400	0458	New Zealand, Radio NZ Intl	12080pa			
0400	0500	Anguilla, Caribbean Beacon	6090am	4835do		
0400	0500	Australia, ABC NT Alice Springs	5025do			
0400	0500	Australia, ABC NT Katherine	4910do			
0400	0500	Australia, ABC NT Tennant Crk	9660pa	12080pa	15240pa	15415as
0400	0500	Australia, ABC NT Tennant Crk	15515pa 17580pa	17750as		
0400	0500	Botswana, Radio	3356do	4820do	7255do	
0400	0500	Cameroon, RTV	4850do			
0400	0500	Canada, CBC Northern Service	9625do			
0400	0500	Canada, CFRX Toronto ON	6070do			
0400	0500	Canada, CKZN St John's NF	6160do			
0400	0500	Canada, CKZU Vancouver BC	6160do			
0400	0500	China, China Radio Intl 9730na				
0400	0500	Costa Rica, R for Peace Intl	7455va	15040va		
0400	0500	Costa Rica, University Network	5030am	6150am	7375am	9725sa
0400	0500	Costa Rica, University Network	11870am 13750na 17645as			
0400	0500	Cuba, Radio Havana	6000na	9820na	11705usb	
0400	0500	Ecuador, HCJB	9745na	11960na	21455usb	
0400	0500	Finland, Scandv Weekend Radio	5980va	5950do	11720va	
0400	0500	Guyana, Voice of	3290do			
0400	0500	Kenya, Kenya BC Corp	4885do	4935do		
0400	0500	Malaysia, Radio	7295do			
0400	0500	Malaysia, RTM Kota Kinabalu	5979do			
0400	0500	Malaysia, Voice of	6175as			
0400	0500	Namibia, NBC	3290do			
0400	0500	Nigeria, Radio/Kaduna 4770do	6090do			
0400	0500	Nigeria, Radio/Lagos 3326do	4990af			
0400	0500	Nigeria, Voice of	7255af			
0400	0500	Romania, R Romania Intl	9510na	11940na	17735as	21480as
0400	0500	Russia, University Network	17765as			
0400	0500	Russia, Voice of Russia	7180na	9665na	11750na	12000na
0400	0500	Russia, Voice of Russia	17565na 17650na	17660na	17690na	6150do
0400	0500	Singapore, SBC Radio One	5020do			
0400	0500	Solomon Islands, SIBC	5020do			
0400	0500	Uganda, Radio	4976do	5026af	7195af	
0400	0500	UK, BBC World Service	3255af	6005af	6190af	6195af 7120af
0400	0500	UK, BBC World Service	7160af 9410eu	11835am	12095va	15280as 15310as 15420af
0400	0500	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
0400	0500	USA, Armed Forces Network	6458usb	10320usb	10940usb	12579usb 12689usb 13362usb
0400	0500	USA, KAIJ Dallas TX	5755va			
0400	0500	USA, KTBN Salt Lk City UT	7510na			
0400	0500	USA, KWHR Naalehu HI	17780as			
0400	0500	USA, Voice of America	4960af	5855af	6080af	9530va 7275af
0400	0500	USA, Voice of America	7290af 9575af	11965va	15205va	17895af
0400	0500	USA, WBCQ Kennebunk, ME	7415na			
0400	0500	USA, WEWN Birmingham AL	5825na	7425na	15745na	
0400	0500	USA, WHRA Greenbush ME	7580na			
0400	0500	USA, WHRI Noblesville IN	5745va	7315am		
0400	0500	USA, WJIE Upton KY	7490am			
0400	0500	USA, WMLK Bethel PA	9465eu			
0400	0500	USA, WRFM Miami FL	7385am			
0400	0500	USA, WSHB Cypress Creek SC	11550am 15195am	5850am	7535eu	9455eu
0400	0500	USA, WTJC Newport NC	9370na			
0400	0500	USA, WWCR Nashville TN	3210na	5070na	5935na	7560na

0400	0500	USA, WWRB Manchester TN	5085va	6890va		
0400	0500	USA, WYFR Okeechobee FL	6065na	9355eu	9505na	11580eu
0400	0500	Zambia, Christian Voice 6065af				
0400	0500	Zambia, Radio ZNBC 4910do	6265af			
0403	0410	Croatia, Croatian Radio 9925na				
0427	0500	Madagascar, Radio VO Hope	12060af	15320af		
0430	0500	Italy, IRRS 3985va				
0430	0500	Netherlands, Radio	6165na	9590na		
0430	0500	Nigeria, Radio/Enugu	6025do			
0430	0500	Nigeria, Radio/Ibadan	6050do			
0430	0500	S Africa, AWR	11975af			
0430	0500	Sri Lanka, SLBC	6130do			
0430	0500	Swaziland, TWR	4775af			
0430	0500	Swaziland, TWR	3200af			
0430	0500	UK, BBC World Service	6010eu	9815eu		
0445	0500	Italy, RAI Intl	7235af	9875af		
0459	0500	New Zealand, Radio NZ Intl	11820pa			

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

0500	0520	Vatican City, Vatican Radio	4005eu	5890eu	7250eu	9660af
0500	0525	Vatican City, Vatican Radio	11625af 15570af			
0500	0530	Madagascar, Radio VO Hope	12060af	15320af		
0500	0530	France Radio France Intl 11685af	17800af			
0500	0530	Netherlands, Radio	6165na	9590na		
0500	0530	S Africa, AWR	5960af	6015af		
0500	0530	S Africa, Channel Africa	11710af			
0500	0530	Uganda, Radio	4976do	5026af	7195oi	
0500	0545	Germany, Deutsche Welle	9670na	9875na	11985na	
0500	0600	Anguilla, Caribbean Beacon	6090am	4835do		
0500	0600	Australia, ABC NT Alice Springs	5025do			
0500	0600	Australia, ABC NT Katherine	4910do			
0500	0600	Australia, ABC NT Tennant Crk	9660pa	12080pa	15240pa	15415as
0500	0600	Australia, ABC NT Tennant Crk	15515pa 17580pa	17750as		
0500	0600	Bhutan, Bhutan BC Service	5030af	6035do		
0500	0600	Botswana, Radio	3356do	4820do	7255do	
0500	0600	Cameroon, RTV	4850do			
0500	0600	Canada, CBC Northern Service	9625do			
0500	0600	Canada, CFRX Toronto ON	6070do			
0500	0600	Canada, CKZN St John's NF	6160do			
0500	0600	Canada, CKZU Vancouver BC	6160do			
0500	0600	China, China Radio Intl 9560na				
0500	0600	Costa Rica, R for Peace Intl	7455va	15040va		
0500	0600	Costa Rica, University Network	5030am	6150am	7375am	9725sa
0500	0600	Costa Rica, University Network	11870am 13750na 17645as			
0500	0600	Cuba, Radio Havana	9550am	9665usb	9820na	
0500	0600	Ecuador, HCJB	9745na	11960na	21455usb	
0500	0600	Finland, Scandv Weekend Radio	5980va	5950do	11720va	
0500	0600	Guyana, Voice of	3290do			
0500	0600	Italy, IRRS 3985va				
0500	0600	Japan, Radio	5975eu	6110na	7230eu	11715as 11760as
0500	0600	Japan, Radio	13630na 15195as	17810as	21755pa	
0500	0600	Kenya, Kenya BC Corp	4885do	4935do		
0500	0600	Liberia, R Liberia Intl	6100do			
0500	0600	Malaysia, Radio	7295do			
0500	0600	Malaysia, RTM Kota Kinabalu	5979do			
0500	0600	Malaysia, Voice of	6175as	9750as	15295as	
0500	0600	Namibia, NBC	3290do			
0500	0600	New Zealand, Radio NZ Intl	11820pa			
0500	0600	Nigeria, Radio/Enugu	6025do			
0500	0600	Nigeria, Radio/Ibadan	6050do			
0500	0600	Nigeria, Radio/Kaduna 4770do	6090do	9570do		
0500	0600	Nigeria, Radio/Lagos 3326do	4990af			
0500	0600	Nigeria, Voice of	7255af			
0500	0600	Russia, University Network	17765as			
0500	0600	Russia, Voice of Russia	17685eu	17795as	21790au	
0500	0600	Singapore, SBC Radio One	6150do			
0500	0600	Solomon Islands, SIBC	5020do			
0500	0600	Sri Lanka, SLBC	6130do			
0500	0600	Swaziland, TWR	4775af	6035af	9500af	
0500	0600	UK, BBC World Service	6005af	6190af	6195eu	7160af 9410eu
0500	0600	UK, BBC World Service	9875eu 11675eu	11760me	11765af	11940af 11955as 12095eu
0500	0600	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
0500	0600	USA, Armed Forces Network	6458usb	10320usb	10940usb	12579usb 12689usb 13362usb
0500	0600	USA, KAIJ Dallas TX	5755va			
0500	0600	USA, KTBN Salt Lk City UT	7510na			
0500	0600	USA, KWHR Naalehu HI	11565as			
0500	0600	USA, Voice of America	5970af	6035af	6080af	7195af 9530va
0500	0600	USA, Voice of America	7290af 9575af	12080af 13670af	15205va	
0500	0600	USA, WBCQ Kennebunk, ME	7415na			
0500	0600	USA, WEWN Birmingham AL	5825na	7425na	15745na	
0500	0600	USA, WHRA Greenbush ME	7580na			
0500	0600	USA, WHRI Noblesville IN	5745va	7315am		
0500	0600	USA, WJIE Upton KY	7490am			
0500	0600	USA, WMLK Bethel PA	9465eu			

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0600	0600	USA, WRMI Miami FL	7385am				
0600	0600	USA, WRNO New Orleans LA	7395am				
0500	0600	USA, WSHB Cypress Creek SC	5850am	7535eu	9455eu	9840eu	
		11550va					
0600	0600	USA, WTJC Newport NC	9370na				
0600	0600	USA, WWCR Nashville TN	3210na	5070na	5935na	7560na	
0600	0600	USA, WWRB Manchester TN	6890va				
0600	0600	USA, WYFR Okeechobee FL	9355eu				
0600	0600	Zambia, Christian Voice	6065af				
0600	0530	tw hfa	Mexico, Radio Mexico Intl	9705am	11770am		
0503	0510		Croatia, Croatian Radio	9925na			
0520	0530		Vatican City, Vatican Radio	9660af	11625af	15570af	
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915do		
0530	0550		UAE, Emirates Radio	15435au	17830au	21695au	
0530	0600		S Africa, AWR	15105af			
0530	0600		Thailand, Radio	21795eu			
0532	0600		Austria, Radio Austria Intl	6155eu	13730eu	17870me	

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

0600	0615		S Africa TWR	11640af			
0600	0630	mtwhf	France Radio France Intl	11710af	17800af	21620af	
0600	0630		Namibia, NBC	3290do			
0600	0630		S Africa, AWR	15105af			
0600	0630		S Africa, Channel Africa	15215af			
0600	0630	vl	Zimbabwe, ZBC Corp	5975do			
0600	0645		Germany, Deutsche Welle	11925af	13790af	17860af	
0600	0658		New Zealand, Radio NZ Intl	11820pa			
0600	0700		Anguilla, Caribbean Beacon	6090am			
0600	0700		Australia, ABC NT Alice Springs	4835do			
0600	0700		Australia, ABC NT Katherine	5025do			
0600	0700		Australia, ABC NT Tennant Crk	4910do			
0600	0700		Australia, Radio	9660pa	12080pa	15240pa	15415as
			15515pa	17580pa	17750as		
0600	0700	vl	Botswana, Radio	4820do	7255do		
0600	0700	irrg/vl	Cameroon, RTV	4850do			
0600	0700		Canada, CFRX Toronto ON	6070do			
0600	0700		Canada, CFVP Calgary AB	6030do			
0600	0700		Canada, CKZN St John's NF	6160do			
0600	0700		Canada, CKZU Vancouver BC	6160do			
0600	0700		Costa Rica, R for Peace Intl	7455va			
0600	0700		Costa Rica, University Network	5030am	6150am	7375am	9725sa
			11870am	13750na	17645as		
0600	0700		Cuba, Radio Havana	9550am	9665usb	9820na	
0600	0700		Ecuador, HCJB	11680eu			
0600	0700	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va		
0600	0700		Germany, Deutsche Welle	6140eu			
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do		
0600	0700		Guyana, Voice of	3290do	5950do		
0600	0700	vl	Italy, IRRS	7120va			
0600	0700		Japan, Radio	7230eu	11740as	13630na	15195as
			17870pa	21755pa			
0600	0700	irreg	Kenya, Kenya BC Corp	4885do	4935do		
0600	0700		Liberia, ELWA	4760do			
0600	0700		Liberia, R Liberia Intl	6100do			
0600	0700		Malaysia, Radio	7295do			
0600	0700		Malaysia, Voice of	6175as	9750as	15295as	
0600	0700		Nigeria, Radio/Enugu	6025do			
0600	0700		Nigeria, Radio/Ibadan	6050do			
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do	9570do	
0600	0700		Nigeria, Radio/Lagos	3326do	4990af		
0600	0700		Nigeria, Voice of	7255af			
0600	0700		Romania, R Romania Intl	9635na	11940na		
0600	0700		Russia, University Network	17765as			
0600	0700		Russia, Voice of Russia	15490au	17635au	17685au	17795as
			21790au				
0600	0700		Sierra Leone, SLBS	3316do			
0600	0700	vl	Singapore, SBC Radio One	6150do			
0600	0700		Solomon Islands, SIBC	5020do			
0600	0700		Swaziland, TWR	4775af	6035af	9500af	
0600	0700		UK, BBC World Service	6055af	6190af	9410eu	11765af
			11955as	12095eu	15310as	15360as	11940af
			17760af	17790as	17885af	21660as	17640as
0600	0700	mtwhf	UK, BBC World Service	15400af	15575me		
0600	0700		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
			6458usb	10320usb	10940usb	12579usb	
0600	0700		USA, KAIJ Dallas TX	5755va			
0600	0700		USA, KTBN Salt Lk City UT	7510na			
0600	0700		USA, KWHR Naahehu HI	11565as	17780as		
0600	0700		USA, WJIE Upton KY	5970af	6035af	6080af	7195af
			9760va	11965va	11995af	12080af	9530va
			17790as	17885af	21660as	13670af	15205va
0600	0700		USA, WEWN Birmingham AL	5825na	7425na	15745na	
0600	0700		USA, WHRA Greenbush ME	11730va			
0600	0700		USA, WHRI Noblesville IN	5745va	7315am		
0600	0700		USA, WJIE Upton KY	7490am			
0600	0700		USA, WMLK Bethel PA	9465eu			
0600	0700		USA, WRMI Miami FL	7385am			
0600	0700		USA, WRNO New Orleans LA	7395am			

0600	0700		USA, WSHB Cypress Creek SC	9455sa	11550am		
0600	0700		USA, WTJC Newport NC	9370na			
0600	0700		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na
0600	0700		USA, WWRB Manchester TN	6890va			
0600	0700		USA, WYFR Okeechobee FL	9355eu	11580eu		
0600	0700	vl	Vanuatu, Radio	4960do	7260do		
0600	0700		Yemen, Rep of Yemen Radio	9780me			
0600	0700		Zambia, Christian Voice	9865af			
0600	0700	vl	Zambia, Radio ZNBC	4910do	6265ai		
0630	0700		Ecuador, HCJB	21455usb			
0630	0700		Georgia, Georgian Radio	11805eu			
0630	0700		Vatican City, Vatican Radio	11625af	13765af	15570af	
0637	0656		Romania, R Romania Intl	7105eu	9625eu	9550eu	11775eu
0645	0655	as	Monaco, TWR	9870eu			
0645	0700	as	Germany, TWR	6045eu			
0655	0700		Germany, TWR	6045eu			
0655	0700		Monaco, TWR	9870eu			
0659	0700		New Zealand, Radio NZ Intl	9885pa			

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

0700	0725		Belgium, RVI Flanders R Intl	5985eu			
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu		
0700	0730		Austria, AWR	7230va			
0700	0730		Slovakia, R Slovakia Intl	9440va	15460va	17550va	
0700	0750		Germany, TWR	6045eu			
0700	0750		Monaco, TWR	9870eu			
0700	0750		Swaziland, TWR	4775af	6035af	9500af	
0700	0800		Anguilla, Caribbean Beacon	6090am			
0700	0800		Australia, ABC NT Alice Springs	4835do			
0700	0800		Australia, ABC NT Katherine	5025do			
0700	0800		Australia, ABC NT Tennant Crk	4910do			
0700	0800		Australia, Radio	9660pa	12080pa	15240pa	15415as
			17580pa	17750as	17725as		
0700	0800	vl	Botswana, Radio	4820do	7255do		
0700	0800	irrg/vl	Cameroon, RTV	4850do			
0700	0800		Canada, CFRX Toronto ON	6070do			
0700	0800		Canada, CFVP Calgary AB	6030do			
0700	0800		Canada, CKZN St John's NF	6160do			
0700	0800		Canada, CKZU Vancouver BC	6160do			
0700	0800		Costa Rica, R for Peace Intl	7455va			
0700	0800		Costa Rica, University Network	5030am	6150am	7375am	9725sa
			11870am	13750na	17645as		
0700	0800		Ecuador, HCJB	11680eu	11755pa	21455usb	
0700	0800	mtwhf	Eq Guinea, Radio Africa	15185af			
0700	0800	as/vl	Eq Guinea, Radio East Africa	15185af			
0700	0800	a/monthly	Finland, Scandv Weekend Radio	6170va	11720va		
0700	0800	mtwhf	France Radio France Intl	15605af			
0700	0800		Germany, Deutsche Welle	6140eu			
0700	0800		Germany, Voice of Hope	5975eu	21590me		
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do		
0700	0800		Guyana, Voice of	3290do	5950do		
0700	0800	as/vl	Italy, IRRS	7120va			
0700	0800		Kenya, Kenya BC Corp	4885do	4935do		
0700	0800	irreg	Liberia, ELWA	4760do			
0700	0800		Liberia, R Liberia Intl	6100do			
0700	0800		Malaysia, Radio	7295do			
0700	0800		Malaysia, RTM Kota Kinabalu	5979do			
0700	0800		Malaysia, Voice of	6175as	9750as	15295as	
0700	0800		Myanmar, Radio	9730do			
0700	0800		New Zealand, Radio NZ Intl	9885pa			
0700	0800		Nigeria, Radio/Enugu	6025do			
0700	0800		Nigeria, Radio/Ibadan	6050do			
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do	9570do	
0700	0800		Nigeria, Radio/Lagos	3326do	4990af		
0700	0800	vl	Pakistan, Radio	17520as	21465as		
0700	0800		Palau, KHBN/VO Hope	9965as	9985as	15725as	
0700	0800		Papua New Guinea, NBC	4890do	9675af		
0700	0800		Romania, R Romania Intl	21530af			
0700	0800		Russia, University Network	17765as			
0700	0800		Russia, Voice of Russia	15490au	17495au	17525au	17635au
			17685au	17795as	17635au	17675as	
0700	0800		Sierra Leone, SLBS	3316do			
0700	0800		Singapore, SBC Radio One	6150do			
0700	0800	vl	Solomon Islands, SIBC	5020do			
0700	0800		Sri Lanka, SLBC	6130do			
0700	0800		Taiwan, R Taipei Intl	5950na			
0700	0800		UK, BBC World Service	6190af	11760me	11765af	11940af
			12095eu	15310as	15360as	15400af	11955as
			17790as	17885af	21660as	15565eu	17640af
			17790as	17885af	21660as	15565eu	17640af
0700	0800		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
			6458usb	10320usb	10940usb	12579usb	
0700	0800		USA, KAIJ Dallas TX	5755va			
0700	0800		USA, KTBN Salt Lk City UT	7510na			
0700	0800		USA, KWHR Naahehu HI	11565as	17780as		
0700	0800		USA, WEWN Birmingham AL	5825na	7425na	15745na	
0700	0800		USA, WHRA Greenbush ME	11730va			
0700	0800		USA, WHRI Noblesville IN	5745va	7315am		
0700	0800		USA, WJIE Upton KY	7490am			
0700	0800		USA, WMLK Bethel PA	9465eu			
0700	0800		USA, WRMI Miami FL	7385am			
0700	0800		USA, WRNO New Orleans LA	7395am			

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0700	0800	USA, WMLK Bethel PA	9465eu				
0700	0800	USA, WRNO New Orleans LA	7395am				
0700	0800	USA, WSHB Cypress Creek SC	9455sa	11550am			
0700	0800	USA, WTJC Newport NC	9370na				
0700	0800	USA, WWCR Nashville TN	3210na	5070na	5935na	7560na	
0700	0800	USA, WWRB Manchester TN	6890va				
0700	0800	USA, WYFR Okeechobee FL	7355eu	13695af	15170af		
0700	0800	vi Vanuatu, Radio	4960do				
0700	0800	Zambia, Christian Voice	9865af				
0700	0800	vi Zambia, Radio ZNBC	4910do	6265af			
0715	0800	Guam, TWR 11850as	11980as				
0730	0800	th Georgia, Georgian Radio	6080me				
0730	0800	Switzerland, Swiss R Intl	15445af	17685af	21750af		
0730	0800	as UK, BBC World Service	15575as				
0750	0800	smtwhf Germany, TWR	6045eu				
0750	0800	smtwhf Monaco, TWR	9870eu				

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

0800	0815	Guam, TWR 15215as					
0800	0820	smtwhf Germany, TWR	6045eu				
0800	0820	smtwhf Monaco, TWR	9870eu				
0800	0830	s Armenia, Voice of	15270eu				
0800	0830	Australia, ABC NT Alice Springs	4835do				
0800	0830	Australia, ABC NT Katherine	5025do				
0800	0830	Australia, ABC NT Tennant Crk	4910do				
0800	0830	Malaysia, RTM Kota Kinabalu	5979do				
0800	0830	Malaysia, Voice of	6175as	15295as			
0800	0830	Myanmar, Radio	9730do				
0800	0900	Anguilla, Caribbean Beacon	6090am				
0800	0900	Australia, Radio	5995pa	9580pa	9710pa	12080pa	15240as
0800	0900	Bhutan, Bhutan BC Service	5030af	6035do			
0800	0900	vi Botswana, Radio	4820do	7255do			
0800	0900	irreg/vl Cameroon, RTV	4850do				
0800	0900	Canada, CFRX Toronto ON	6070do				
0800	0900	Canada, CFVP Calgary AB	6030do				
0800	0900	Canada, CKZN St John's NF	6160do				
0800	0900	Canada, CKZU Vancouver BC	6160do				
0800	0900	as Costa Rica, R for Peace Intl	7455va				
0800	0900	Costa Rica, University Network	5030am	6150am	7375am	9725sa	
0800	0900	Ecuador, HCJB	11755pa	21455usb			
0800	0900	mtwhf Eqt Guinea, Radio Africa	15185af				
0800	0900	as/vl Eqt. Guinea, Radio East Africa	15185af				
0800	0900	a/monthly Finland, Scandv Weekend Radio	6170va	11690va			
0800	0900	Germany, Deutsche Welle	6140eu				
0800	0900	a Germany, Remnants Hope Minstr	13810as				
0800	0900	Germany, Voice of Hope 21590me					
0800	0900	vi Ghana, Ghana BC Corp	3366do	4915do			
0800	0900	Guyana, Voice of	3290do	5950do			
0800	0900	Indonesia, Voice of	9525pa	11785af	15150as		
0800	0900	as/vl Italy, IRRS 7120va					
0800	0900	Kenya, Kenya BC Corp	4885do	4935do			
0800	0900	irreg Liberia, ELWA	4760do				
0800	0900	Liberia, R Liberia Intl	6100do				
0800	0900	Malaysia, Radio	7295do				
0800	0900	vl/s Malta, VO Mediterranean	9605eu				
0800	0900	New Zealand, Radio NZ Intl	9885pa				
0800	0900	Nigeria, Radio/Enugu	6025do				
0800	0900	Nigeria, Radio/Ibadan	6050do				
0800	0900	Nigeria, Radio/Kaduna	4770do	6090do	9570do		
0800	0900	Nigeria, Radio/Lagos	3326do	4990af			
0800	0900	Nigeria, Voice of	7255af				
0800	0900	vi Pakistan, Radio	17520as	21465as			
0800	0900	Palau, KHBN/VO Hope	9965as	9985as	15725as		
0800	0900	Papua New Guinea, NBC	4890do	9675af			
0800	0900	Russia, University Network	17765as				
0800	0900	Russia, Voice of Russia	15490au	17495eu	17675as	17685au	17795as
0800	0900	Singapore, SBC Radio One	6150do				
0800	0900	South Korea, R Korea Intl	9570am	13670eu			
0800	0900	Sri Lanka, SLBC	6130do				
0800	0900	UK, BBC World Service	6190af	9410eu	11940af	11955as	12095eu
0800	0900	15310as 15360eu	15485eu	15565eu	17640af	17760as	17885af
0800	0900	21470af 21660as					
0800	0900	mtwhf UK, BBC World Service	15400af	17830af			
0800	0900	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
0800	0900	6458usb 10320usb	10940usb	12579usb	13362usb		
0800	0900	USA, KAUJ Dallas TX	5755va				
0800	0900	USA, KNLS Anchor Point AK		11765as			
0800	0900	USA, KTVN Salt Lk City UT		7510na			
0800	0900	USA, KWHR Naalehu HI	11565as	17780as			
0800	0900	USA, Voice of America	11930va	13610va	15190va		
0800	0900	USA, WEWN Birmingham AL	5825na	7425na	15745na		
0800	0900	USA, WHRI Noblesville IN	5745va	7315am			
0800	0900	USA, WJIE Upton KY	7490am				
0800	0900	USA, WMLK Bethel PA	9465eu				
0800	0900	USA, WRMI Miami FL	7385am				

0800	0900	USA, WRNO New Orleans LA	7395am				
0800	0900	USA, WSHB Cypress Creek SC	9845au	9860eu	11550am		
0800	0900	USA, WTJC Newport NC	9370na				
0800	0900	USA, WWCR Nashville TN	3210na	5070na	5935na	7560na	
0800	0900	USA, WYFR Okeechobee FL	13570af				
0800	0900	vi Vanuatu, Radio	4960do	7260do			
0800	0900	Zambia, Christian Voice	9865af				
0815	0900	Guam, TWR 15215as	15330as				
0830	0900	Australia, ABC NT Katherine	2485do				
0830	0900	Australia, ABC NT Tennant Crk	2325do				
0830	0900	Austria, AWR	17780af				
0830	0900	Georgia, Georgian Radio	11910eu				
0830	0900	Greece, Voice of	15630eu	17905eu			
0830	0900	vi Solomon Islands, SIBC	5020do				
0830	0900	Switzerland, Swiss R Intl	21770af				
0840	0850	Turkmenistan, Turkmen Radio	5015as				

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

0900	0915	mtwhf/vl Solomon Islands, SIBC	5020do	21745va			
0900	0929	Czech Rep, Radio Prague Intl		17780af			
0900	0930	Austria, AWR		17780af			
0900	0930	Guam, TWR 15330as					
0900	0930	irreg Liberia, ELWA	4760do				
0900	0945	Germany, Deutsche Welle	15410af 15470as 17715as	6140eu 17770pa	6160va 17800af	9510am 17820as	12035af 21560af
0900	1000	Anguilla, Caribbean Beacon		6090am			
0900	1000	Australia, ABC NT Katherine		2485do			
0900	1000	Australia, ABC NT Tennant Crk		2325do			
0900	1000	Australia, Radio	9580va	11880as	15240as	17750as	21820as
0900	1000	Australia, Voice International		17645as			
0900	1000	vi Botswana, Radio	4820do	7255do			
0900	1000	irreg/vl Cameroon, RTV	4850do				
0900	1000	Canada, CFRX Toronto ON		6070do			
0900	1000	Canada, CFVP Calgary AB		6030do			
0900	1000	Canada, CKZN St John's NF		6160do			
0900	1000	Canada, CKZU Vancouver BC		6160do			
0900	1000	China, China Radio Intl	11730pa	15210pa			
0900	1000	as Costa Rica, R for Peace Intl		7455va			
0900	1000	Costa Rica, University Network		5030am	6150am	7375am	9725sa
0900	1000	Ecuador, HCJB	11755pa	21455usb			
0900	1000	mtwhf Eqt Guinea, Radio Africa		15185af			
0900	1000	as/vl Eqt. Guinea, Radio East Africa		15185af			
0900	1000	a/monthly Finland, Scandv Weekend Radio		6170va	11690va		
0900	1000	Germany, Deutsche Welle		6140eu			
0900	1000	vi Germany, Voice of Hope 21590me		4915do			
0900	1000	Ghana, Ghana BC Corp		3290do	5950do		
0900	1000	as/vl Italy, IRRS 7120va					
0900	1000	Kenya, Kenya BC Corp	4885do	4935do			
0900	1000	Liberia, R Liberia Intl	6100do				
0900	1000	Malaysia, Radio	7295do				
0900	1000	New Zealand, Radio NZ Intl		9885pa			
0900	1000	Nigeria, Radio/Enugu	6025do				
0900	1000	Nigeria, Radio/Ibadan	6050do				
0900	1000	Nigeria, Radio/Kaduna	4770do	6090do	9570do		
0900	1000	Nigeria, Radio/Lagos	3326do	4990af			
0900	1000	Nigeria, Voice of	7255af				
0900	1000	vi Pakistan, Radio	17520as	21465as			
0900	1000	Palau, KHBN/VO Hope	9965as	9985as	15725as		
0900	1000	Papua New Guinea, NBC	4890do	9675af			
0900	1000	Russia, University Network		17765as			
0900	1000	Sierra Leone, SLBS	3316do				
0900	1000	as/vl Singapore, SBC Radio One		6150do			
0900	1000	Solomon Islands, SIBC	5020do				
0900	1000	Sri Lanka, SLBC	6130do				
0900	1000	UK, BBC World Service	6190af	9410eu	11940af	11955as	12095eu
0900	1000	11760me 11940af 11945as	12095eu	15310as	15360eu	15485eu	15485eu
0900	1000	15565eu 17640af 17760as	17790as	21470af			
0900	1000	mtwhf UK, BBC World Service	15190sa	17830af			
0900	1000	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
0900	1000	6458usb 10320usb	10940usb	12579usb	13362usb		
0900	1000	USA, KAUJ Dallas TX	5755va				
0900	1000	USA, KTVN Salt Lk City UT		7510na			
0900	1000	USA, KWHR Naalehu HI	11565as	17780as			
0900	1000	USA, Voice of America	11930va	13610va	15190va		
0900	1000	USA, WEWN Birmingham AL	5825na	7425na	15745na		
0900	1000	USA, WHRA Greenbush ME		11730va			
0900	1000	USA, WHRI Noblesville IN		5745va	7315am		
0900	1000	USA, WJIE Upton KY	7490am				
0900	1000	USA, WRMI Miami FL	9955am				
0900	1000	USA, WSHB Cypress Creek SC		9455sa	9860eu	11550am	
0900	1000	USA, WTJC Newport NC	9370na				
0900	1000	USA, WWCR Nashville TN		5070na	5935na	7560na	9475na
0900	1000	vi Vanuatu, Radio	4960do	7260do			
0900	1000	mtwhf Vatican City, Vatican Radio		5890eu			
0900	1000	Zambia, Christian Voice	9865af				

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0930	1000		Georgia, Georgian Radio	11910me	
0930	1000	mtwhf	Guam, TWR 15330as		
0930	1000		Lithuania, R Vilnius	9710eu	
0930	1000		Netherlands, Radio	9790pa	12065as 13710as
0945	1000	mtwhf/vl	Salomon Islands, SIBC	5020do	

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

1000	1005	vl	Pakistan, Radio	17520as	21465as			
1000	1027		Vietnam, Voice of	9840au	12020au			
1000	1030		Guam, AWR	11560as	11930as			
1000	1030		Mongolia, Voice of	12015as				
1000	1030		Netherlands, Radio	9790pa	12065as	13710as		
1000	1030		Sri Lanka, SLBC	4940do				
1000	1030		UK, RTE Radio	15280au				
1000	1100		Anguilla, Caribbean Beacon	6090am				
1000	1100		Australia, ABC NT Katherine	2485do				
1000	1100		Australia, ABC NT Tennant Crk	2325do				
1000	1100		Australia, Radio	9580va	15240as	17750as	21820as	
1000	1100		Australia, Voice International	13685as				
1000	1100	as	Bhutan, Bhutan BC Service	5030al	6035do			
1000	1100	vl	Botswana, Radio	4820do	7255do			
1000	1100	irrg/vl	Cameroon, RTV	4850do				
1000	1100		Canada, CFRX Toronto ON	6070do				
1000	1100		Canada, CFVP Calgary AB	6030do				
1000	1100		Canada, CKZN St John's NF	6160do				
1000	1100		Canada, CKZU Vancouver BC	6160do				
1000	1100		China, China Radio Intl	11730pa	15210pa			
1000	1100	as	Costa Rica, R for Peace Intl	7455va				
1000	1100		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am	13750na	17645as			
1000	1100		Ecuador, HCJB	11755pa	21455usb			
1000	1100	mtwhf	Eq Guinea, Radio Africa	15185af				
1000	1100	as/vl	Eq Guinea, Radio East Africa	15185af				
1000	1100	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va			
1000	1100		Germany, Deutsche Welle	6140eu				
1000	1100		Germany, Voice of Hope 21590me					
1000	1100	vl	Ghana, Ghana BC Corp	4915do				
1000	1100		Guyana, Voice of	3290do	5950do			
1000	1100		India, All India Radio	11585as	13685au	15020as	15260as	
			17510au	17800au	17895au			
1000	1100	as/vl	Italy, IRRS 7120va					
1000	1100		Japan, Radio	9695as	15590as	21755pa		
1000	1100		Liberia, R Liberia Intl	6100do				
1000	1100		Malaysia, Radio	7295do				
1000	1100		New Zealand, Radio NZ Intl	9885pa				
1000	1100		Nigeria, Radio/Enugu	6025do				
1000	1100		Nigeria, Radio/Ibadan	6050do				
1000	1100		Nigeria, Radio/Kaduna	4770do	6090do	9570do		
1000	1100		Nigeria, Radio/Lagos	3326do	4990al			
1000	1100		Nigeria, Voice of	7255af				
1000	1100		Palau, KHBN/VO Hope	9965as	12160as	15725as		
1000	1100		Papua New Guinea, NBC	4890do	9675al			
1000	1100		Russia, University Network	17765as				
1000	1100		Singapore, SBC Radio One	6150do				
1000	1100	vl	Salomon Islands, SIBC	5020do				
			UK, BBC World Service	6190af	6195va	9605as	9740as	
			11760me	11945af	12095eu	15280as	15310as	15335as
			15485eu	15565eu	15575as	17640af	17790as	17885af
			21470as	21660as				21730af
1000	1100		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb	10320usb	10940usb	12689usb	13362usb	
1000	1100		USA, KAUJ Dallas TX	5755va				
1000	1100		USA, KTBN Salt Lk City UT	7510na				
1000	1100		USA, KWHR Naalehu HI	9930as	11565pa			
1000	1100		USA, Voice of America	5745am	7370am	9590am	9770va	15240va
			15425va					
1000	1100		USA, WEVN Birmingham AL	7425na	7520na	9465na	15405eu	
			15745eu					
1000	1100		USA, WHRI Noblesville IN	6040na	9495am			
1000	1100	as	USA, WINB Red Lion PA	13570am				
1000	1100		USA, WJIE Upton KY	7490am				
1000	1100		USA, WRMI Miami FL	9955am				
1000	1100		USA, WRNO New Orleans LA	7395am				
1000	1100		USA, WSHB Cypress Creek SC	6095am	9455am			
1000	1100		USA, WTJC Newport NC	9370na				
1000	1100		USA, WWCR Nashville TN	5070na	5935na	7560na		
			15825na					
1000	1100		USA, WYFR Okeechobee FL	5950na				
1030	1035		Israel, Kol Israel	15640va	17545va			
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9704do		
1030	1057		Czech Rep, Radio Prague Intl	9880eu	11615eu			
1030	1100		Guam, AWR	11560as				
1030	1100		Netherlands, Radio	5965na	6045eu	9790pa	9860eu	12065as
			13710as					
1030	1100		Sri Lanka, SLBC	4940do	11835as	15120as	17850as	
1030	1100		UAE, Emirates Radio	13675eu	15370eu	15400eu	21597eu	

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

1100	1105		New Zealand, Radio NZ Intl	9885pa				
1100	1120	fa	Kozakhstan, R Almaty	9620eu	11840eu			
1100	1127		Vietnam, Voice of	7285as				
1100	1130	as	Bhutan, Bhutan BC Service	5030al	6035do			
1100	1130		Netherlands, Radio	5965na	6045eu	9790pa	9860eu	12065as
			13710as					
1100	1130		Sri Lanka, SLBC	4940do	11835as	15120as	17850as	
1100	1130	mtwhf	UK, BBC World Service	15220am				
1100	1130		UK, BBC World Service	15400af	17790as			
1100	1145		Germany, Deutsche Welle	11785af	15410af	17860af	21665af	
1100	1200		Anguilla, Caribbean Beacon	11775am				
1100	1200		Australia, ABC NT Katherine	2485do				
1100	1200		Australia, ABC NT Tennant Crk	2325do				
1100	1200		Australia, Radio	5995pa	6020pa	9475as	9580pa	11650pa
			11880as	12080pa	15240as	21820as		
1100	1200		Australia, Voice International	13635as				
1100	1200	vl	Austria, Radio Africa Intl	17815eu				
1100	1200		Bulgaria, Radio	17500eu				
1100	1200		Canada, CFRX Toronto ON	6070do				
1100	1200		Canada, CFVP Calgary AB	6030do				
1100	1200		Canada, CKZN St John's NF	6160do				
1100	1200		Canada, CKZU Vancouver BC	6160do				
1100	1200	as	Costa Rica, R for Peace Intl	7455va				
1100	1200		Costa Rica, University Network	5030am	6150am	7375am	9725sa	
			11870am	13750na	17645as			
1100	1200		Ecuador, HCJB	12005am	15115na	21455usb		
1100	1200	mtwhf	Eq Guinea, Radio Africa	15185af				
1100	1200	as/vl	Eq Guinea, Radio East Africa	15185af				
1100	1200	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
1100	1200		Germany, Deutsche Welle	6140eu				
1100	1200		Germany, Voice of Hope 21590me					
1100	1200	vl	Ghana, Ghana BC Corp	4915do				
1100	1200		Guyana, Voice of	3290do	5950do			
1100	1200		Iran, VOIRI 15215as	15585as	15600as	21470as	21730au	
1100	1200	as/vl	Italy, IRRS 7120va					
1100	1200		Japan, Radio	6120na	9695as	15590as		
1100	1200		Jordan, Radio	11690eu				
1100	1200		Malaysia, Radio	7295do				
1100	1200		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as	
1100	1200		Papua New Guinea, NBC	4890do	9675al			
1100	1200		Russia, University Network	17765as				
1100	1200		Singapore, R Singapore Intl	6150as	9600as			
1100	1200		Taiwan, R Taipei Intl	7445as	11985as			
1100	1200		UK, BBC World Service	6190af	6195va	9605as	9740as	
			11760me	11945as	12095eu	12105sa	15190va	15220am
			15310as	15400af	15485eu	15565eu	15575as	17640af
			17760as	17830af	17885af	21470af	21660as	17700eu
1100	1200		Ukraine, R Ukraine Intl	11840na	15520na			
1100	1200		USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
			6458usb	10320usb	10940usb	12689usb	13362usb	
1100	1200		USA, KAUJ Dallas TX	5755va				
1100	1200		USA, KTBN Salt Lk City UT	7510na				
1100	1200		USA, KWHR Naalehu HI	9930as	11565pa			
1100	1200		USA, Voice of America	6160va	9645va	9760va	9770va	15190va
			15240va	15425va				
1100	1200		USA, WEVN Birmingham AL	7425na	7520na	9465na	15405eu	
			15745eu					
1100	1200		USA, WHRI Noblesville IN	6040na	9495am			
1100	1200		USA, WINB Red Lion PA	13570am				
1100	1200		USA, WJIE Upton KY	7490am				
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					
1000	1100		USA, WYFR Okeechobee FL	5950na				

Hauser's Highlights

ROMANIA: Radio Romania International English to NAm and Eu A-02:

0200-0300	9510	11940
0400-0500	9510	11940
0600-0700	9635	11940
1400-1500	15250	17735
1700-1800	11740	15365 15380 17805
2100-2200	9 510	9725 11740 11940
2300-2400	9570	11740 11775 15105

(RRI website)

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1100	1200	USA, WRMI Miami FL	9955am			
1100	1200	USA, WRNO New Orleans LA	7395am			
1100	1200	USA, WSHB Cypress Creek SC	6095am	9455am	11660am	
1100	1200	USA, WTJC Newport NC	9370na			
1100	1200	USA, WWCR Nashville TN	5070na	5935na	7560na	
		15825na				
1100	1200	USA, WYFR Okeechobee FL	5850na	5950na	11725sa	
1106	1200	New Zealand, Radio NZ Intl	11675pa			
1115	1145	Nepal, Radio	3230as	5005as		
1120	1140	w Kazakhstan, R Almaty	9620eu	11840eu		
1130	1145	vi Libya, Voice of Africa	1543sirr	17750irr		
1130	1155	Belgium, RVI Flanders R Intl	9865as			
1130	1200	Austria, Radio Austria Intl	6155eu	13730eu	21780as	
1130	1200	Netherlands, Radio	5965na	6045eu	9860eu	
1130	1200	South Korea, R Korea Intl	9650na			
1130	1200	Sri Lanka, SLBC	4940do			
1130	1200	Sweden, Radio	17505va	18960na		
1130	1200	mtwhf UK, BBC World Service	11835am	15190sa		
1130	1200	f Vatican City, Vatican Radio	15595va	17515va		
1140	1200	t Kazakhstan, R Almaty	9620eu	11840eu		
1155	1200	vi Zimbabwe, ZBC Corp	5975do			

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

1200	1215	UK, BBC World Service	7135af			
1200	1225	Netherlands, Radio	5965na	6045eu	9860eu	
1200	1227	Iran, VOIRI	15215as	15585as	15600as	21730au
1200	1230	France Radio France Intl	15540af	25820af		
1200	1230	Mongolia, Voice of	12015eu			
1200	1230	South Korea, R Korea Intl	9650na			
1200	1230	Uzbekistan, Radio Tashkent	5025as	7285as	9715as	15295as
		17775as				
1200	1230	vi Zimbabwe, ZBC Corp	5975do			
1200	1259	Poland, Radio Polonia	6095eu	9525eu	11820eu	
1200	1300	Anguilla, Caribbean Beacon	11775am			
1200	1300	Australia, ABC NT Katherine	2485do			
1200	1300	Australia, ABC NT Tennant Crk	2325do			
1200	1300	Australia, Radio	5995pa	6020pa	9475as	9580pa 11650pa
		11880as 21820as				
1200	1300	Australia, Voice International	13635as			
1200	1300	Bangladesh, Bangla Betar	7185as	9550as		
1200	1300	Canada, CBC Northern Service	9625do			
1200	1300	Canada, CFRX Toronto ON	6070do			
1200	1300	Canada, CFVP Calgary AB	6030do			
1200	1300	Canada, CKZN St John's NF	6160do			
1200	1300	Canada, CKZU Vancouver BC	6160do			
1200	1300	Canada, Radio Canada Intl	9660as	15190as		
1200	1300	Canada, Radio Canada Intl	9515na	13655na	17820na	
1200	1300	mtwhf China, China Radio Intl	9730as	9760as	11760pa	11855pa 11980as
		15415pa				
1200	1300	China, Voice of Hope	7485as			
1200	1300	Costa Rica, R for Peace Intl	15040va	21815usb		
1200	1300	Costa Rica, University Network	5030am	6150am	7375am	9725sa
		11870am 13750na 17645as				
1200	1300	Ecuador, HCJB	12005am	15115na	21455usb	
1200	1300	a/monthly Finland, Scandv Weekend Radio	5990va	11720va		
1200	1300	Germany, Deutsche Welle	6140eu			
1200	1300	Germany, Overcomer Ministries	5975eu			
1200	1300	as Germany, Remnants Hope Minstr	6110eu			
1200	1300	Germany, Voice of Hope	15715me			
1200	1300	Guyana, Voice of	3290do	5950do		
1200	1300	os/vl Italy, IRRS	7120va			
1200	1300	Jordan, Radio	11690eu			
1200	1300	Malaysia, Radio	7295do			
1200	1300	New Zealand, Radio NZ Intl	11675pa			
1200	1300	Palau, KHBV/VO Hope	9965as	12160as	13840as	
1200	1300	mtwhfa Papua New Guinea, NBC	4890do	9675al		
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	9605as	9740as
		11760me 11945as 12095eu	12105sa	15190va	15310as	15280as
		15565eu 15575as 17640af	17700eu	17760as	17830af	17885af
		21660as				
1200	1300	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
		6458usb 10320usb 10940usb	12579usb	12689usb	13362usb	
1200	1300	USA, KAJI Dallas TX	13815va			
1200	1300	USA, KTBN Salt Lk City UT	7510na			
1200	1300	USA, KWHR Naalehu HI	9930as	11565pa		
1200	1300	USA, Voice of America	6160va	9645va	9760va	15160va 15240va
		15425va				
1200	1300	USA, WEWN Birmingham AL	9465na	11550na	11875na	15405eu
		15745eu				
1200	1300	USA, WHRI Noblesville IN	6040na	9495am		
1200	1300	USA, WINB Red Lion PA	13570am			
1200	1300	USA, WJIE Upton KY	7490am			
1200	1300	USA, WRMI Miami FL	15725am			
1200	1300	USA, WRNO New Orleans LA	7395am			

1200	1300	USA, WSHB Cypress Creek SC	6095am	9455am	11660am	
1200	1300	USA, WTJC Newport NC	9370na			
1200	1300	USA, WWCR Nashville TN	7560na	12160na	13845na	
		15825na				
1200	1300	USA, WYFR Okeechobee FL	5850na	5950na	13695na	
		17750na				
1230	1257	Vietnam, Voice of	9840as	12020as		
1230	1300	mtwhfa Finland, YLE/Radio Finland	15400na	17670na		
1230	1300	Sri Lanka, SLBC	4940do	6005as	6075as	9770as 15425as
1230	1300	Sweden, Radio	17505va	18960na	21530as	
1230	1300	Thailand, Radio	9885va			
1230	1300	Turkey, Voice of	17615as	17830eu		
1230	1300	a UK, Wales Radio Intl	17615ou			
1245	1300	tfa Seychelles, FEBA Radio	15535me			

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

1300	1310	New Zealand, Radio NZ Intl	11675pa			
1300	1310	mtwhfa Turkmenistan, Turkmen Radio	5015as			
1300	1315	a s Germany, Remnants Hope Minstr	6110eu			
1300	1329	Czech Rep, Radio Prague Intl	13580eu	21745as		
1300	1330	Germany, Voice of Hope	15715me			
1300	1330	Guam, AWR	15385as			
1300	1330	Turkey, Voice of	17615as	17830eu		
1300	1330	UAE, AWR	17740as			
1300	1400	Anguilla, Caribbean Beacon	11775am			
1300	1400	Australia, ABC NT Katherine	2485do			
1300	1400	Australia, ABC NT Tennant Crk	2325do			
1300	1400	Australia, Radio	5995pa	6020pa	9475as	9580pa 11650pa
		11880as 21820as				
1300	1400	Australia, Voice International	13635as			
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	os Canada, Radio Canada Intl	17820na			
1300	1400	China, China Radio Intl	7405na	9570pa	11760pa	11980as 15180as
1300	1400	China, Voice of Hope	7485as			
1300	1400	Costa Rica, R for Peace Intl	15040va	21815usb		
1300	1400	Costa Rica, University Network	5030am	6150am	7375am	9725sa
		11870am 13750na 17645as				
1300	1400	Ecuador, HCJB	12005am	15115na	21455usb	
1300	1400	a/monthly Finland, Scandv Weekend Radio	5990va	11720va		
1300	1400	Germany, Deutsche Welle	6140eu			
1300	1400	Germany, Overcomer Ministries	5975eu			
1300	1400	as/vl Italy, IRRS	7120va			
1300	1400	Jordan, Radio	11690eu			
1300	1400	Malaysia, Radio	7295do			
1300	1400	North Korea, Voice of	7505eu	9335na	11335eu	11710na
1300	1400	Palau, KHBV/VO Hope	9965as	9985as	12160as	13840as
1300	1400	mtwhfa Papua New Guinea, NBC	4890do	9675al		
1300	1400	Russia, University Network	17765as			
1300	1400	as S Africa, Channel Africa	11720af	17780af	21725af	
1300	1400	Singapore, R Singapore Intl	6150as	9600as		
1300	1400	South Korea, R Korea Intl	9570as	13670am		
1300	1400	Sri Lanka, SLBC	4940do	6005as	6075as	9770as 15425as
1300	1400	UK, BBC World Service	6190af	6195va	9605as	9740as
		11760me 11940af 12095eu	12105sa	15190va	15285as	15310as
		15565eu 15420af 15485eu	15575as	17640af	17720eu	17760as
		17830af 17885af 21470af	21640af			
1300	1400	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb
		6458usb 10320usb 10940usb	12579usb	12689usb	13362usb	
1300	1400	USA, KAJI Dallas TX	13815va			
1300	1400	USA, KNLS Anchor Point AK	11870as			
1300	1400	USA, KTBN Salt Lk City UT	7510na			
1300	1400	USA, KWHR Naalehu HI	9930as	11565pa		
1300	1400	USA, Voice of America	6160va	9645va	9760va	15160va 15425va
1300	1400	USA, WBCQ Kennebunk, ME	17495na			
1300	1400	USA, WEWN Birmingham AL	11550na	11875na	15405eu	15745eu
1300	1400	USA, WHRI Noblesville IN	6040na	9495am		
1300	1400	USA, WINB Red Lion PA	13570am			
1300	1400	USA, WJIE Upton KY	7490am			
1300	1400	USA, WRMI Miami FL	15725am			
1300	1400	USA, WRNO New Orleans LA	7395am			
1300	1400	USA, WSHB Cypress Creek SC	9430na	9455am		
1300	1400	USA, WTJC Newport NC	9370na			
1300	1400	USA, WWCR Nashville TN	9475na	12160na	13845na	
		15825na				
1300	1400	USA, WWRB Manchester TN	9320va	9400va	9495va	12172va
1300	1400	USA, WYFR Okeechobee FL	11550as	11830na	11865sa	
		11970na 17510sa 17750na				
1310	1400	occasional New Zealand, Radio NZ Intl	6095pa			
1330	1350	UAE, Emirates Radio	13630eu	13675eu	15400eu	21597eu
1330	1357	Vietnam, Voice of	7145eu			
1330	1400	Austria, Radio Austria Intl	6155eu	13730eu		
1330	1400	Germany, Voice of Hope	15715me	15775as	17550as	

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1330	1400	Guam, AWR	11705as	11980as			
1330	1400	India, All India Radio	9690as	11620as	13710as		
1330	1400	Laos, Lao National Radio		7145as			
1330	1400	Sweden, Radio	17505va	18960na			
1330	1400	UAE, AWR	15320as				
1330	1400	Uzbekistan, Radio Tashkent	9715as	15295as	17775as		
				5025as	5040as	5060as	7285as

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

1400	1415	mtwhf	UK, BBC World Service	11860af	21490af		
1400	1430		Ecuador, HCJB	12005am	15115na	21455usb	
1400	1430		Germany, Voice of Hope	15715me	15775as	17550as	
1400	1430		Thailand, Radio	9830va			
1400	1500		Anguilla, Caribbean Beacon		11775am		
1400	1500		Australia, ABC NT Katherine		2485do		
1400	1500		Australia, ABC NT Tennant Crk		2325do		
1400	1500		Australia, Radio	5995pa	9580pa	11650pa	11660as
1400	1500		Australia, Voice International		13635as		
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	15305na	17820na
1400	1500		China, China Radio Intl	7405na	9700as	11675pa	13685va
				17720na			15125as
1400	1500		China, Voice of Hope	7485as			
1400	1500		Costa Rica, R for Peace Intl		15040va	21815usb	
1400	1500		Costa Rica, University Network		5030am	6150am	7375am
				11870am	13750na	17645as	9725sa
1400	1500	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va	
1400	1500		France Radio France Intl	11610af	17620af		
1400	1500		Germany, Deutsche Welle		6140eu		
1400	1500		Germany, Overcomer Ministries		5975eu	13810af	
1400	1500		India, All India Radio	9690as	11620as	13710as	
1400	1500	as/vl	Italy, IRRS	7120va			
1400	1500		Japan, Radio	7200as	9505na	11730as	17755me
1400	1500		Jordan, Radio		11690na		
1400	1500	occasional	New Zealand, Radio NZ Intl		6095pa		
1400	1500		Oman, Radio		15140va		
1400	1500		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as
1400	1500	mtwhf	Papua New Guinea, NBC		4890do	9675al	
1400	1500		Romania, R Romania Intl		15250eu	17735eu	
1400	1500		Russia, University Network		17765as		
1400	1500		Russia, Voice of Russia	7390as	9745as	12055as	15560as
1400	1500	as	S Africa, Channel Africa	11720af	17780af	21725af	17645as
1400	1500		Singapore, SBC Radio One		6150do		
1400	1500		Sri Lanka, SLBC	4940do	6005as	6075as	9770as
1400	1500		Taiwan, R Taipei Intl		15265as		
1400	1500		UK, BBC World Service	6190af	6195va	9605as	9740as
				12105sa	15105af	15190va	15285as
				15575eu	15595eu	17640af	17810sa
							17830af
							21470af
1400	1500		USA, Armed Forces Network		4319usb	4993usb	5765usb
					6458usb	10320usb	10940usb
						12579usb	12689usb
							13362usb
1400	1500		USA, KAUJ Dallas TX		13815va		
1400	1500		USA, KJES Vado NM		11715na		
1400	1500		USA, KTBN Salt Lk City UT		7510na		
1400	1500		USA, KWHR Naalehu HI	9930as	11565pa		
1400	1500		USA, Voice of America	6160va	7125va	9760va	15160va
				15425va			15255va
1400	1500		USA, WBCQ Kennebunk, ME		17495na		
1400	1500		USA, WEWN Birmingham AL		11550na	11875na	15375na
1400	1500		USA, WHRI Noblesville IN		6040na	15105am	15745eu
1400	1500		USA, WINB Red Lion PA	13570am			
1400	1500		USA, WJIE Upton KY	7490am			
1400	1500		USA, WRMI Miami FL	15725am			
1400	1500		USA, WRNO New Orleans LA		7395am		
1400	1500		USA, WTJC Newport NC	9370na			
1400	1500		USA, WWCR Nashville TN		9475na	12160na	13845na
					15825na		
1400	1500		USA, WWRB Manchester TN		9320va	9400va	12172va
1400	1500		USA, WYFR Okeechobee FL		11550as	11830na	11865sa
					11970na	17510sa	17750na
1415	1420		Nepal, Radio		3230as	5005as	
1430	1500		Germany, Voice of Hope	15715me	17550as		
1430	1500		Guam, TWR	15330as			
1430	1500		Myanmar, Radio		5985do		
1430	1500		Netherlands, Radio	9890as	11835as	12075as	15220na
1445	1500	f	Seychelles, FEBA Radio	11600as			

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

1500	1515		Pakistan, Radio	11570as	15100as	15725as	
1500	1530		Mexico, Radio Mexico Intl		9705am	11770am	
1500	1530		Mongolia, Voice of	12015eu			
1500	1530		S Africa, Channel Africa	17770af			

1500	1559		Canada, Radio Canada Intl		15455as	17720as	
1500	1559	as	Canada, Radio Canada Intl		9515na	13655na	17800na
1500	1600		Anguilla, Caribbean Beacon		11775am		
1500	1600		Australia, Radio	5995pa	9580pa	11650pa	11650pa
					11650pa		
1500	1600		Australia, Voice International		13635as		
1500	1600	vl	Austria, Radio Africa Intl	17895eu			
1500	1600		Canada, CBC Northern Service		9625do		
1500	1600		Canada, CFRX Toronto ON		6070do		
1500	1600		Canada, CFVP Calgary AB		6030do		
1500	1600		Canada, CKZN St John's NF		6160do		
1500	1600		Canada, CKZU Vancouver BC		6160do		
1500	1600		China, China Radio Intl	7160as	9785as	17720as	
1500	1600		China, Voice of Hope	7485as			
1500	1600		Costa Rica, R for Peace Intl		15040va	21815usb	
1500	1600		Costa Rica, University Network		5030am	6150am	7375am
					11870am	13750na	17645as
1500	1600	a/monthly	Finland, Scandv Weekend Radio		5990va	11720va	
1500	1600		Germany, Deutsche Welle		6140eu		
1500	1600		Germany, Overcomer Ministries		13810af		
1500	1600	a	Germany, Overcomer Ministries		6015af		
1500	1600		Germany, Voice of Hope	15715me	15775as		
1500	1600		Guam, TWR	15330as			
1500	1600		Japan, Radio		7200as	9750as	11730as
1500	1600		Jordan, Radio		11690na		
1500	1600		Myanmar, Radio		5985do		
1500	1600		Netherlands, Radio		9890as	11835as	12075as
1500	1600	occasional	New Zealand, Radio NZ Intl		6095pa		15220na
1500	1600		North Korea, Voice of	7505eu	9335na	11335eu	11710na
1500	1600		Palau, KHBN/VO Hope	9965as	9985as	12160as	13840as
1500	1600	mtwhfa	Papua New Guinea, NBC		4890do	9675al	
1500	1600		Russia, Voice of Russia	4940me	4965me	4975me	7325me
					11500as	11985me	7390as
1500	1600		Singapore, SBC Radio One		6150do		
1500	1600		Sri Lanka, SLBC	4940do	6005as	6075as	9770as
1500	1600		UK, BBC World Service	5975am	6190af	6195va	9740as
				11860af	12095eu	15190va	15310as
				17700as	17830af	17860af	21470af
1500	1600		USA, Armed Forces Network		4319usb	4993usb	5765usb
					6458usb	10320usb	10940usb
1500	1600		USA, KAUJ Dallas TX		13815va		
1500	1600		USA, KJES Vado NM		11715na		
1500	1600		USA, KTBN Salt Lk City UT		15590na		
1500	1600		USA, KWHR Naalehu HI	9930as	11565pa		
1500	1600		USA, Voice of America	6160va	7125va	9590va	9700va
				9845va	12040va	15205va	15255va
1500	1600		USA, WBCQ Kennebunk, ME		17495na		
1500	1600		USA, WEWN Birmingham AL		11550na	11875na	15375na
1500	1600		USA, WHRA Greenbush ME		17650va		
1500	1600		USA, WHRI Noblesville IN		13760na	15105am	
1500	1600		USA, WINB Red Lion PA	13570am			
1500	1600		USA, WJIE Upton KY	7490am			
1500	1600		USA, WRMI Miami FL	15725am			
1500	1600		USA, WRNO New Orleans LA		7395am		
1500	1600		USA, WTJC Newport NC	9370na			
1500	1600		USA, WWCR Nashville TN		9475na	12160na	13845na
					15825na		
1500	1600		USA, WYFR Okeechobee FL		6280as	11830na	15520as
					17750na		
1515	1545	tw	Seychelles, FEBA Radio	11600as			
1515	1600	mif	Seychelles, FEBA Radio	11600as			
1530	1600		Austria, Radio Austria Intl		17865na		
1530	1600		Iran, VOIRI	7245as	9635eu	11775as	
1530	1600	as	Seychelles, FEBA Radio	11600as			
1540	1550		Turkmeniston, Turkmen Radio		4930as		
1550	1600		Vatican City, Vatican Radio		12065au	13765au	15235au

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

1600	1610		Vatican City, Vatican Radio		12065au	13765au	15235au
1600	1625		Netherlands, Radio	9890as	11835as	12075as	15220na
1600	1627		Czech Rep, Radio Prague Intl		5930eu	21745va	
1600	1627		Iran, VOIRI	7245as	9635eu	11775as	
1600	1627		Vietnam, Voice of	7145eu	9730eu		
1600	1630		Israel, Kol Israel		15615va	17545va	
1600	1630		Mexico, Radio Mexico Intl		9705am	11770am	
1600	1630		S Africa, Channel Africa	9525af			

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1600	1700	Canada, CFVP Calgary AB	6030do				
1600	1700	Canada, CKZN St John's NF	6160do				
1600	1700	Canada, CKZU Vancouver BC	6160do				
1600	1700	China, China Radio Intl 7190af	13650af				
1600	1700	Costa Rica, R for Peace Intl	15040va				
1600	1700	Costa Rica, University Network	5030am	6150am	7375am	9725sa	
		11870am 13750na					
1600	1700	Ethiopia, Radio	5990do	7110af	7165af	9560af	9704af
		11800af					
1600	1700	a/monthly		6170va	11720va		
1600	1700	Finland, Scandv Weekend Radio		11995af	12015af	15605af	17605af
		17850af					
1600	1700	Germany, Deutsche Welle	6140eu				
1600	1700	Germany, Overcomer Ministries	6015af				
1600	1700	a		9420eu	15630eu	17705na	
1600	1700	Greece, Voice of					
1600	1700	Jordan, Radio	11690na				
1600	1700	North Korea, Voice of	9975af	11735af			
1600	1700	Palau, KHBN/VO Hope	9965as				
1600	1700	Russia, Voice of Russia	7350as	11720as	11985me	12055as	
		15540me					
1600	1700	South Korea, R Korea Intl	5975am	9515af	9870cf		
1600	1700	Taiwan, R Taipei Intl	11550as				
1600	1700	as		12095eu			
1600	1700	UK, BBC World Service	9635af				
1600	1700	UK, BBC World Service	3915as	5975as	6190af	6195va	7160af
		9410eu	9510as	11860af	11940af	12095eu	15190va
		15400af	15485eu	15565eu	17700eu	17830af	17860af
		21490af	21660af				21470af
1600	1700	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
		6458usb	10320usb	10940usb	12579usb	12689usb	13362usb
1600	1700	USA, KAUJ Dallas TX	13815va				
1600	1700	USA, KJES Vado NM	11715na				
1600	1700	USA, KTBN Salt Lk City UT	15590na				
1600	1700	USA, Voice of America	6035af	6160va	7125va	9700va	9760va
		13600va	13710af	15205va	15225af	15255va	15410af
		17810af	17895va				15445va
1600	1700	USA, WBCQ Kennebunk, ME	17495na				
1600	1700	USA, WEWN Birmingham AL	11550na	13615na	15375na	15745eu	
1600	1700	USA, WHRA Greenbush ME	17650va				
1600	1700	USA, WHRI Noblesville IN	13760na	15105am			
1600	1700	USA, WINB Red Lion PA	13570am				
1600	1700	USA, WJIE Upton KY	7490am				
1600	1700	USA, WMLK Bethel PA	9465eu				
1600	1700	USA, WRMI Miami FL	15725am				
1600	1700	USA, WRNO New Orleans LA	7395am	15420am			
1600	1700	USA, WSHB Cypress Creek SC	18910af				
1600	1700	USA, WTJC Newport NC	9370na				
1600	1700	USA, WWCN Nashville TN	15825na	9475na	12160na	13845na	
1600	1700	USA, WYFR Okeechobee FL	11830na	13855af	15520as		
		17750na	18980eu	21455eu	21525af		
1610	1625	Armenia, TWR	5855eu				
1615	1630	Vatican City, Vatican Radio	15595eu	4005eu	5890eu	7250eu	9645eu
1630	1700	Georgia, Georgian Radio	6180me				
1630	1700	Guam, AWR	9385me	11850me	15450me		
1630	1700	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu		
1630	1700	UAE, AWR	9600me				
1630	1700	UK, BBC World Service	11955as	15645eu			
1635	1700	Germany, Voice of Hope	13810af	15715me			
1645	1700	Tajikistan, Radio	7245as				
1650	1700	New Zealand, Radio NZ Intl	6095pa				

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

1700	1727	Czech Rep, Radio Prague Intl	5930va	21745va			
1700	1730	Azerbaijan, Voice of	6110eu				
1700	1730	France Radio France Intl	15605af	17605af			
1700	1730	S Africa, Channel Africa	17860af				
1700	1759	Poland, Radio Polonia	5995eu				
1700	1800	Anguilla, Caribbean Beacon	11775am				
1700	1800	Australia, Radio	5995pa	9580pa	9815pa	11880pa	
1700	1800	Canada, CBC Northern Service	9625do				
1700	1800	Canada, CFRX Toronto ON	6070do				
1700	1800	Canada, CFVP Calgary AB	6030do				
1700	1800	Canada, CKZN St John's NF	6160do				
1700	1800	Canada, CKZU Vancouver BC	6160do				
1700	1800	China, China Radio Intl 7150af	9570af	9675as	11910af	15205af	
1700	1800	Costa Rica, R for Peace Intl	15040va	21815usb			
1700	1800	Costa Rica, University Network	5030am	6150am	7375am	9725sa	
		11870am 13750na 17645as					
1700	1800	mtwhf		15185af			
1700	1800	a/monthly		6170va	11720va		
1700	1800	a/monthly		6170va	11720va		
1700	1800	Germany, Deutsche Welle	6140eu				
1700	1800	Germany, Overcomer Ministries	6015af				
1700	1800	Germany, Unt. Methodist Church	11735af	13820af			
1700	1800	Germany, Voice of Hope 9495eu	15715me				
1700	1800	Italy, IRRS 3985va					

1700	1800	Japan, Radio	9505na	11970eu	15355af		
1700	1800	New Zealand, Radio NZ Intl	6095pa				
1700	1800	Romania, R Romania Intl	11740eu	15380eu	15365eu	17805eu	
1700	1800	Russia, Voice of Russia	9745af	9775eu	9890eu	11510af	11985af
1700	1800	as		9480eu	11675eu		
1700	1800	Russia, Voice of Russia	7360eu				
1700	1800	Taiwan, R Taipei Intl	11550as				
1700	1800	UK, BBC World Service	3255af	3915af	5975as	6190af	6195eu
		7160af	7230af	9410eu	9510as	9630af	11860af
		15310as	15400af	15420af	17830af	17860af	21470af
1700	1800	USA, Armed Forces Network	4319usb	4993usb	5765usb	6350usb	
		6458usb	10320usb	10940usb	12579usb	12689usb	13362usb
1700	1800	USA, KAUJ Dallas TX	13815va				
1700	1800	USA, KTBN Salt Lk City UT	15590na				
1700	1800	USA, Voice of America	6160va	7125va	7170va	9700va	9645va
		15205va	15255va	15410af	15445af	17895af	
1700	1800	mtwhf		6045va	7215va	9770va	9785va
1700	1800	USA, Voice of America	5990va	17495na			
1700	1800	USA, WBCQ Kennebunk, ME	17495na				
1700	1800	USA, WEWN Birmingham AL	11550na	13615na	15745eu	17595eu	
1700	1800	USA, WHRA Greenbush ME	17650va				
1700	1800	USA, WHRI Noblesville IN	9495am	13760va			
1700	1800	USA, WINB Red Lion PA	13570am				
1700	1800	USA, WJIE Upton KY	7490am				
1700	1800	USA, WMLK Bethel PA	15265eu				
1700	1800	USA, WRMI Miami FL	15725am				
1700	1800	USA, WRNO New Orleans LA	7395am	15420am			
1700	1800	USA, WSHB Cypress Creek SC	18910af				
1700	1800	USA, WTJC Newport NC	9370na				
1700	1800	USA, WWCN Nashville TN	15815na	9475na	12160na	13845na	
1700	1800	USA, WYFR Okeechobee FL	13855af	18980eu	21455eu		
1730	1745	vi		15435irr	17750irr		
1730	1745	UK, BBC World Service	9525af				
1730	1745	mtwhf/vl		6125af	15495me	17580af	
1730	1755	Belgium, RVI Flanders R Intl	9925eu	13690eu	13710eu		
1730	1800	ireg		4760do			
1730	1800	vl/mtwhfa		9605eu			
1730	1800	Malta, VO Mediterranean	6020af	7120af	11655af		
1730	1800	Netherlands, Radio	6020af				
1730	1800	Swaziland, TWR	9500af				
1730	1800	Sweden, Radio	6065va	13580va			
1730	1800	Switzerland, Swiss R Intl	15220va	17735va	21720va		
1730	1800	Vatican City, Vatican Radio	9739sa	13765af	15570af	17515af	
1735	1745	vl/th		9739sa			
1745	1800	Paraguay, Radio Nacional	7185eu	9550eu	15520eu		
1745	1800	Bangladesh, Bangla Betar	7410eu	11620eu	13605af	15075af	
		India, All India Radio	15155af	17670af			

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

1800	1827	Vietnam, Voice of	5970eu	7145eu	9725eu	9730eu	
1800	1830	s		Germany, Universal Life/Santec	15750af		
1800	1830	s		Greece, Voice of	9420eu	15630eu	17705na
1800	1830			Netherlands, Radio	6020af	7120af	11655af
1800	1830			S Africa, AWR	5970af	6095af	7170af
1800	1830			S Africa, Channel Africa	17860af		
1800	1830			UK, RTE Radio	15315me		
1800	1830	vi		Zimbabwe, ZBC Corp	4828do		
1800	1850			New Zealand, Radio NZ Intl	6095pa		
1800	1900			Anguilla, Caribbean Beacon	11775am		
1800	1900			Australia, Radio	6080pa	7240pa	9475as
				11880pa		9580pa	9815pa
1800	1900			Bangladesh, Bangla Betar	7185eu	9550eu	15520eu
1800	1900			Canada, CBC Northern Service	9625do		
1800	1900			Canada, CFRX Toronto ON	6070do		
1800	1900			Canada, CFVP Calgary AB	6030do		
1800	1900			Canada, CKZN St John's NF	6160do		
1800	1900			Canada, CKZU Vancouver BC	6160do		
1800	1900			Costa Rica, R for Peace Intl	15040va	21815usb	
1800	1900			Costa Rica, University Network	5030am	6150am	7375am
				11870am 13750na 17645as			9725sa
1800	1900	mtwhf		Eq Guinea, Radio Africa	15185af		
1800	1900	a/monthly		Finland, Scandv Weekend Radio	6170va	11720va	
1800	1900			Germany, Deutsche Welle	6140eu		
1800	1900			Germany, Unt. Methodist Church	11735af	13820af	
1800	1900			Germany, Voice of Hope 9495eu	15715me		
1800	1900			India, All India Radio	7410eu	11620eu	11935af
				15155af	17670af	13605af	15075af
1800	1900	vi		Italy, IRRS 3985va			
1800	1900			Kuwait, Radio	11990va		
1800	1900	ireg		Liberia, ELWA	4760do		
1800	1900			Liberia, R Liberia Intl	5100do		
1800	1900			Russia, Voice of Russia	5950eu	7300eu	9480eu
				9890eu	11510af	11630eu	9745af
				11675eu	11870af		9775eu
1800	1900			Swaziland, TWR	9500af		
1800	1900			Taiwan, R Taipei Intl	3955eu		
1800	1900			UK, BBC World Service	3255af	5975as	6050eu
				9410eu	9510as	6190af	6195eu
				17885af	21470af	15400af	15420af
				12095eu	15310me	15400af	17830af

Shortwave Guide



1800	1900	USA, Armed Forces Network 6458usb 10320usb	4319usb 12579usb	4993usb 12689usb	5765usb 13362usb	6350usb
1800	1900	USA, KAUJ Dallas TX	13815va			
1800	1900	USA, KTBN Salt Lk City UT	15590na			
1800	1900	USA, Voice of America 15410af 15580af 17895af	7415af	9760va	9770va	11975af
1800	1900	USA, WBCQ Kennebunk, ME	17495na			
1800	1900	USA, WEWN Birmingham AL	11530na	13615na	15745eu	17595eu
1800	1900	USA, WHRA Greenbush ME	17650va			
1800	1900	USA, WHRI Noblesville IN	9495am	13760va		
1800	1900	USA, WINB Red Lion PA	13570am			
1800	1900	USA, WJIE Upton KY	7490am			
1800	1900	USA, WMLK Bethel PA	15265eu			
1800	1900	USA, WRMI Miami FL	15725am			
1800	1900	USA, WRNO New Orleans LA	7395am	15420am		
1800	1900	USA, WSHB Cypress Creek SC	15665eu	18910af		
1800	1900	USA, WTJC Newport NC	9370na			
1800	1900	USA, WWCR Nashville TN 15815na	9475na	12160na	13845na	
1800	1900	USA, WYFR Okeechobee FL	18980eu			
1800	1900	Yemen, Rep of Yemen Radio	9780me			
1830	1900	Austria, Radio Austria Intl	5945eu	6155eu		
1830	1900	Georgia, Georgian Radio	6230eu			
1830	1900	Georgia, Georgian Radio	11910as			
1830	1900	Greece, Voice of	11645eu			
1830	1900	Greece, Voice of	9420eu	15630eu	17705na	
1830	1900	Netherlands, Radio	6020af	7120af	9895af	13700af
1830	1900	S Africa, AWR	7170af			
1830	1900	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu	
1830	1900	Turkey, Voice of	9785eu			
1830	1900	UK, RTE Radio	13640na	21630af		
1830	1900	USA, Voice of America	11690af	13835af	15525af	
1845	1900	Albania, Radio Tirana Intl	7210na	9520na		
1851	1900	New Zealand, Radio NZ Intl	11725pa			

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

1900	1925	Israel, Kol Israel	9435va	11605va	15615va	15640af	17545va
1900	1927	Vietnam, Voice of	7145eu	9730eu			
1900	1930	Hungary, Radio Budapest	6025eu	7130eu			
1900	1930	Turkey, Voice of	9785eu				
1900	1945	Germany, Deutsche Welle 17810af	11805af	11965af	13720af	15390af	
1900	1945	India, All India Radio 15155af 17670af	7410eu	11620eu	11935af	13605af	15075af
1900	1945	Iraq, Radio Iraq Intl	7157irr	9887irr	11787irr		
1900	1945	Zimbabwe, ZBC Corp	4828do	5012do			
1900	1950	New Zealand, Radio NZ Intl	11725pa				
1900	2000	Anguilla, Caribbean Beacon	11775am				
1900	2000	Argentina, RAE	9690eu	15345eu			
1900	2000	Australia, Radio 11880pa	6080pa	7240pa	9500as	9580pa	9815pa
1900	2000	Botswana, Radio	3356do	4820do	7255do		
1900	2000	Bulgaria, Radio	9400eu				
1900	2000	Cameroon, RTV	4850do				
1900	2000	Canada, CBC Northern Service	9625do				
1900	2000	Canada, CFRX Toronto ON	6070do				
1900	2000	Canada, CFVP Calgary AB	6030do				
1900	2000	Canada, CKZN St John's NF	6160do				
1900	2000	Canada, CKZU Vancouver BC	6160do				
1900	2000	China, China Radio Intl	9440af	9585af			
1900	2000	Costa Rica, R for Peace Intl	15040va	21815usb			
1900	2000	Costa Rica, University Network 11870am 13750na 17645as	5030am	6150am	7375am	9725sa	
1900	2000	Eqt Guinea, Radio Africa	15185af				
1900	2000	Finland, Scandv Weekend Radio	6170va	11720va			
1900	2000	Germany, Voice of Hope	15715me				
1900	2000	Ghana, Ghana BC Corp	3366do	4915do			
1900	2000	Guyana, Voice of	3290do	5950do			
1900	2000	Italy, IRRS	3985va	4935do			
1900	2000	Kenya, Kenya BC Corp	4885do	4935do			
1900	2000	Kuwait, Radio	11990va				
1900	2000	Liberia, ELWA	4760do				
1900	2000	Liberia, R Liberia Intl	5100do				
1900	2000	Malaysia, Radio	7295do				
1900	2000	Malta, VO Mediterranean	12060eu				
1900	2000	Namibia, NBC	3290do				
1900	2000	Netherlands, Radio	6020af	7120af	9895af	11655af	13700af
1900	2000	Nigeria, Radio/Enugu	6025do				
1900	2000	Nigeria, Radio/Ibadan	6050do				
1900	2000	Nigeria, Radio/Kaduna	4770do	6090do	9570do		
1900	2000	Nigeria, Radio/Lagos	3326do	4990af			
1900	2000	Nigeria, Voice of	7255af				
1900	2000	North Korea, Voice of	7505eu	11335eu	11710eu		
1900	2000	Papua New Guinea, NBC	4890do	9675af			
1900	2000	Russia, Voice of Russia 12030eu 12070eu 15735am	7440eu	9480eu	9775eu	9890eu	11675eu
1900	2000	Sierra Leone, SLBS	3316do				

1900	2000	South Korea, R Korea Intl	5975am	7275eu		
1900	2000	Thailand, Radio	7155eu			
1900	2000	Uganda, Radio	4976do	5026af	7195af	
1900	2000	UK, BBC World Service	3255af	5975as	6005af	6190af 6195eu
1900	2000	9410eu 9630af 11720as 17830af 17885af	12095eu	15105af	15310as	15400af
1900	2000	USA, Armed Forces Network 6458usb 10320usb 10940usb	4319usb 12579usb	4993usb 12689usb	5765usb 13362usb	6350usb
1900	2000	USA, KAUJ Dallas TX	13815va			
1900	2000	USA, KJES Vado NM	15385va			
1900	2000	USA, KTBN Salt Lk City UT	15590na			
1900	2000	USA, Voice of America	4950af	6035af	6095va	6160va 7260va
1900	2000	7375af 7415af 9525va 13635va 15180va 15410af	9680va	9770va	11770va	11975af
1900	2000	USA, WBCQ Kennebunk, ME	15445af	15580af		
1900	2000	USA, WEWN Birmingham AL	11550na	13615na	15745eu	17595eu
1900	2000	USA, WHRA Greenbush ME	17650va			
1900	2000	USA, WHRI Noblesville IN	9495am	13760va		
1900	2000	USA, WINB Red Lion PA	13570am			
1900	2000	USA, WJIE Upton KY	7490am			
1900	2000	USA, WMLK Bethel PA	15265eu			
1900	2000	USA, WRMI Miami FL	15725am			
1900	2000	USA, WRNO New Orleans LA	7395am	15420am		
1900	2000	USA, WSHB Cypress Creek SC	15665eu	18910af		
1900	2000	USA, WTJC Newport NC	9370na			
1900	2000	USA, WWCR Nashville TN 15815na	9475na	12160na	13845na	
1900	2000	USA, WYFR Okeechobee FL	15775af	18930eu	18980eu	
1900	2000	Vanuatu, Radio	4960do	7260do		
1900	2000	Zambia, Christian Voice	4965af			
1900	2000	Zambia, Radio ZNBC	4910do	6265af		
1930	1955	Belgium, RVI Flanders R Intl	9925eu	13690eu		
1930	2000	Austria, AWR	7130eu			
1930	2000	th Belarus, Radio Belarus Intl	7105eu	7210eu		
1930	2000	Georgia, Georgian Radio	11760eu			
1930	2000	Iran, VOIRI	9800eu	11670eu	11695eu	11855eu
1930	2000	Poland, Radio Polonia	7165eu	7265eu		
1930	2000	mtwhf/vl Solomon Islands, SIBC	5020do			
1930	2000	Sweden, Radio	6065va			
1930	2000	Switzerland, Swiss R Intl	13645af	15220af	17580af	17735af
1930	2000	mtwhf USA, Voice of America	9550va	9840va	11780va	11970va 12015va
1935	1955	Italy, RAI Intl	5970eu	9745eu		
1950	2000	Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu
1951	2000	New Zealand, Radio NZ Intl	15160pa			

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

2000	2010	Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645af
2000	2015	s/vl Solomon Islands, SIBC	9660af 11625af 13765af	5020do		
2000	2025	Netherlands, Radio	6020af	7120af	9895af	11655af 13700af
2000	2027	Czech Rep, Radio Prague Intl	5930va	11600va		
2000	2027	Iran, VOIRI	9800eu	11670eu	11695af	11855eu
2000	2029	Poland, Radio Polonia	7165eu	7265eu		
2000	2030	mtwhf Lithuania, Tomorrow's Nk Today	7590eu			
2000	2030	Mongolia, Voice of	12015eu			
2000	2030	mtwhf/vl Solomon Islands, SIBC	5020do			
2000	2030	Switzerland, Swiss R Intl	13645af	15220af	17580af	17735af
2000	2030	USA, Voice of America	4950af	6035af	7375af	7415af 11855af
2000	2030	11975af 15410af 15445af	15580af	17745af	17895af	
2000	2045	Germany, Deutsche Welle	6140eu			
2000	2045	Iraq, Radio Iraq Intl	7157irr	9887irr	11787irr	
2000	2059	Canada, Radio Canada Intl	5850va	5995va	11690va	11965va
2000	2100	12015va 15325va 15470va	17870va			
2000	2100	Algeria, Radio Algiers Intl	11715eu	15160eu		
2000	2100	Anguilla, Caribbean Beacon	11775am			
2000	2100	Australia, ABC NT Katherine	2485do			
2000	2100	Australia, ABC NT Tennant Crk	2325do			
2000	2100	Australia, Radio	9500as	9580pa	9815pa	11880pa
2000	2100	12080pa				
2000	2100	vl Botswana, Radio	3356do	4820do	7255do	
2000	2100	irreg/vl Cameroon, RTV	4850do			
2000	2100	Canada, CBC Northern Service	9625do			
2000	2100	Canada, CFRX Toronto ON	6070do			
2000	2100	Canada, CFVP Calgary AB	6030do			
2000	2100	Canada, CKZN St John's NF	6160do			
2000	2100	Canada, CKZU Vancouver BC	6160do			
2000	2100	China, China Radio Intl	5965eu	9840eu	11640eu	13640af
2000	2100	Costa Rica, R for Peace Intl	15040va	21815usb		
2000	2100	Costa Rica, University Network 11870am 13750na 17645as	5030am	6150am	7375am	9725sa
2000	2100	Ecuador, HCJB	17660eu			
2000	2100	mtwhf Eqt Guinea, Radio Africa	15185af			
2000	2100	a/monthly Finland, Scandv Weekend Radio	5990va	11720va		
2000	2100	Germany, Voice of Hope	15715me			
2000	2100	vl Ghana, Ghana BC Corp	3366do	4915do		
2000	2100	Indonesia, Voice of	9525pa	11785af	15150as	

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2000	2100	vi	Italy, IRRS 3985va						
2000	2100		Kenya, Kenya BC Corp 4885do	4935do					
2000	2100		Kuwait, Radio 11990va						
2000	2100	irreg	Liberia, ELWA 4760do						
2000	2100		Liberia, R Liberia Intl 5100do						
2000	2100		Malaysia, Radio 7295do						
2000	2100		Namibia, NBC 3290do						
2000	2100		New Zealand, Radio NZ Intl 15160pa						
2000	2100		Nigeria, Radio/Enugu 6025do						
2000	2100		Nigeria, Radio/Ibadan 6050do						
2000	2100		Nigeria, Radio/Kaduna 4770do	6090do	9570do				
2000	2100		Nigeria, Radio/Lagos 3326do	4990af					
2000	2100		Nigeria, Voice of 7255af						
2000	2100		Russia, Voice of Russia 9480eu	9775eu	11675eu	12030eu	12070eu		
			15455eu 15735am						
2000	2100		SAfrica, AWR 9745af						
2000	2100		Sierra Leone, SLBS 3316do						
2000	2100	mtwhf	Spain, R Exterior Espana 9570af	15290af					
2000	2100		Uganda, Radio 4976do	5026af	7195af				
2000	2100		UK, BBC World Service 3255af	5975ca	6005af	6190af	6195eu		
			9410eu 9630af 11835af	11955eu	12095eu	15400af	17830af		
2000	2100		USA, Armed Forces Network 4319usb	4993usb	5765usb	6350usb			
			6458usb 10320usb 10940usb	12579usb	12689usb	13362usb			
2000	2100		USA, KAJI Dallas TX 13815va						
2000	2100		USA, KJES Vado NM 15385na						
2000	2100		USA, KTBN Salt Lk City UT 15590na						
2000	2100		USA, Voice of America 6095va	6160va	9770va				
2000	2100		USA, WBCC Kennebunk, ME 7415na	17495na					
2000	2100		USA, WEWN Birmingham AL 11530na	11550na	13615na	15745eu			
			17595eu						
2000	2100		USA, WHRA Greenbush ME 17650va						
2000	2100		USA, WHRI Noblesville IN 5745va	9495am	13760va				
2000	2100		USA, WINB Red Lion PA 13570am						
2000	2100		USA, WJIE Upton KY 7490am						
2000	2100		USA, WMLK Bethel PA 15265eu						
2000	2100		USA, WRMI Miami FL 15725am						
2000	2100		USA, WRNO New Orleans LA 7395am	15420am					
2000	2100		USA, WTJC Newport NC 9370na						
2000	2100		USA, WWCR Nashville TN 15815na	9475na	12160na	13845na			
2000	2100		USA, WWRB Manchester TN 9320va	9400va	12172va				
2000	2100		USA, WYFR Okeechobee FL 18980eu	13855af	15775af	17725sa	17845af		
2000	2100	vi	Vanuatu, Radio 4960do	7260do					
2000	2100		Zambia, Christian Voice 4965af						
2000	2100	vi	Zambia, Radio ZNBC 4910do	6265af					
2000	2100	vi	Zimbabwe, ZBC Corp 5975do	6045af					
2000	2100		USA, WSHB Cypress Creek SC 15665eu	18910af					
2005	2100	vi	Syria, Radio Damascus 12085eu	13610eu					
2010	2030		Vatican City, Vatican Radio 9660af	11625af	13765af				
2025	2045		Italy, RAI Intl 9670af	11880af					
2030	2045	vi	Libya, Voice of Africa 15435srr	17750srr					
2030	2045		Thailand, Radio 9680eu						
2030	2057		Vietnam, Voice of 7145eu	9730eu					
2030	2100	f	Belarus, Radio Belarus Intl 7105eu	7210eu					
2030	2100		Cuba, Radio Havana 13660usb	13750eu					
2030	2100		Ecuador, HCJB 21455usb						
2030	2100	vi	Solomon Islands, SIBC 5020do						
2030	2100		Turkey, Voice of 9525as						
2030	2100	f	UK, Wales Radio Intl 7325eu						
2030	2100		USA, Voice of America 6035af	7375af	7415af	11975af	15410af		
			15455af 15580af 17745af	17895af					
2030	2100	as	USA, Voice of America 4950af						
2030	2100		Uzbekistan, Radio Tashkent 5025eu	9545eu	11905eu				
2040	2100	mtwhfa	Armenia, Voice of 4810eu	9960eu					
2045	2100		India, All India Radio 7410eu	7150eu	9650eu	11620au			
			11715au						

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

2100	2130		Australia, ABC NT Katherine 2485do						
2100	2130		Australia, ABC NT Tennant Crk 2325do						
2100	2130		Australia, Radio 7240pa	9500as	9580pa	9660pa	1880pa		
			12080pa 17715pa 21740pa						
2100	2130		Canada, Radio Canada Intl 5850va	7235va	13690va	15325va			
			17870va						
2100	2130		Cuba, Radio Havana 13660ust	13750eu					
2100	2130		Hungary, Radio Budapest 3975eu	6025eu					
2100	2130		Kenya, Kenya BC Corp 4885do	4935do					
2100	2130		Nigeria, Radio/Ibadan 6050do						
2100	2130		South Korea, R Korea Intl 3955eu	15575eu					
2100	2130		Turkey, Voice of 9525as						
2100	2145		Germany, Deutsche Welle 11915as	15135va	9765as	9770pa	9875af	11865af	
2100	2200		Anguilla, Caribbean Beacon 11775am						
2100	2200		Austria, AWR 15355af						
2100	2200	vi	Botswana, Radio 3356do	4820do					
2100	2200		Bulgaria, Radio 9400eu						
2100	2200	irrg/vi	Cameroon, RTV 4850do						

2100	2200		Canada, CBC Northern Service 9625do						
2100	2200		Canada, CFRX Toronto ON 6070do						
2100	2200		Canada, CKVP Calgary AB 6030do						
2100	2200		Canada, CKZN St John's NF 6160do						
2100	2200		Canada, CKZU Vancouver BC 6160do						
2100	2200		China, China Radio Intl 5965eu	9840eu	9840eu	11735eu			
			13630af						
2100	2200		Costa Rica, R for Peace Intl 15040va	21815usb					
2100	2200		Costa Rica, University Network 5030am	6150am	7375am	9725sa			
			11870am 13750na 17645as						
2100	2200		Ecuador, HCJB 17660eu	21455usb					
2100	2200	mtwhf	Eqt Guinea, Radio Africa 15185af						
2100	2200	f/monthly	Finland, Scandv Weekend Radio 6170va	11690va					
2100	2200	vi	Ghana, Ghana BC Corp 3366do	4915do					
2100	2200		Guyana, Voice of 3290do	5950do					
2100	2200		India, All India Radio 7410eu	7150eu	9650au	11620au			
			11715au						
2100	2200	vi	Italy, IRRS 3985va						
2100	2200		Japan, Radio 6035pa	6055eu	6180eu	11830eu			
			11855af 17825na 17860pa	21670pa					
2100	2200	irreg	Liberia, ELWA 4760do						
2100	2200		Liberia, R Liberia Intl 5100do						
2100	2200		Malaysia, Radio 7295do						
2100	2200		Namibia, NBC 3290do						
2100	2200		New Zealand, Radio NZ Intl 15160pa						
2100	2200		New Zealand, Radio NZ Intl 15160pa						
2100	2200		Nigeria, Radio/Enugu 6025do						
2100	2200		Nigeria, Radio/Kaduna 4770do	6090do	9570do				
2100	2200		Nigeria, Radio/Lagos 3326do	4990af					
2100	2200		North Korea, Voice of 7505eu	9335na	11335eu	11710na			
2100	2200		Palau, KHBN/VO Hope 9985as						
2100	2200	mtwhfa	Papua New Guinea, NBC 4890do	9675af					
2100	2200		Romania, R Romania Intl 9510eu	9725eu	11740eu				
			11940eu						
2100	2200		Sierra Leone, SLBS 3316do						
2100	2200	vi	Solomon Islands, SIBC 5020do						
2100	2200	as	Spain, R Exterior Espana 9570af	9840eu					
2100	2200	vi	Syria, Radio Damascus 12085eu	13610eu					
2100	2200		UK, BBC World Service 3255af	3915as	6005af	6190af	6195eu		
			9410eu 11675va 11835af	11945as	12095sa	15400af			
2100	2200		Ukraine, R Ukraine Intl 5905eu	6020eu	9950eu	11705eu			
			11950eu						
2100	2200		USA, Armed Forces Network 4319usb	4993usb	5765usb	6350usb			
			6350usb 6458usb 10320usb	10940usb	12579usb	12689usb			
			13362usb						
2100	2200		USA, KAJI Dallas TX 13815va						
2100	2200		USA, KTBN Salt Lk City UT 15590na						
2100	2200		USA, Voice of America 6035af	6040va	6095va	7375af	7415af		
			9530va 9705va 9760va	11870va	11975af	13765va			
			15185va 15410af 15455af	15580af	17740va	17820va			
			17895af						
2100	2200		USA, WBCC Kennebunk, ME 7415na	9355na					
2100	2200		USA, WEWN Birmingham AL 11530na	11550na	13615na				
			17595eu						
2100	2200		USA, WHRA Greenbush ME 17650va						
2100	2200		USA, WHRI Noblesville IN 5745va	9495am	13760va				
2100	2200		USA, WINB Red Lion PA 13570am						
2100	2200		USA, WJIE Upton KY 7490am						
2100	2200		USA, WMLK Bethel PA 15265eu						
2100	2200		USA, WRMI Miami FL 15725am						
2100	2200		USA, WRNO New Orleans LA 7395am	15420am					
2100	2200		USA, WSHB Cypress Creek SC 15665eu	18910af					
2100	2200		USA, WTJC Newport NC 9370na						
2100	2200		USA, WWCR Nashville TN 15815na	9475na	12160na	13845na			
2100	2200		USA, WWRB Manchester TN 9320va	9400va	12172va				
2100	2200		USA, WYFR Okeechobee FL 18980eu	13855na	15120af	17725sa			
			17845af						
2100	2200	vi	Vanuatu, Radio 4960do	7260do					
2100	2200		Zambia, Christian Voice 4965af						
2100	2200	vi	Zambia, Radio ZNBC 4910do	6265af					
2100	2200	vi	Zimbabwe, ZBC Corp 5975do	6045af					
2130	2157		Czech Rep, Radio Prague Intl 11600va	15545va					
2130	2200	mtwhfa	Albania, Radio Tirana Intl 7130eu	9540eu					
2130	2200		Australia, ABC NT Alice Springs 4835do						
2130	2200		Australia, ABC NT Katherine 5025do						
2130	2200		Australia, ABC NT Tennant Crk 4910do						
2130	2200		Australia, Radio 7240pa	9660pa	11880pa	12080pa			
			17715pa 21740pa						
2130	2200	mtwhf	Austria, Radio Austria Intl 5945va	6155eu					
2130	2200		Guam, AWR 11850as						
2130	2200		Iran, VOIRI 9570as	13655au					
2130	2200		South Korea, R Korea Intl 15575eu						
2130	22								

Shortwave Guide

2200	2215	vi	Italy, IRRS 3985va						
2200	2215		New Zealand, Radio NZ Intl	15160pa					
2200	2227		Iran, VOIRI 9570as	13655su					
2200	2230		Azerbaijan, VOice of	6110as					
2200	2230		Canada, Radio Canada Intl	6175am	9590am	11920am			
			13670am 15305am	17695am	17880am				
2200	2230		India, All India Radio	7410eu	7150eu	9650au	11620au		
			11715su						
2200	2230	as	USA, Voice of America	5855af	6035af	7375af	7415af		
			11975af						
2200	2230	vi	Zambia, Radio ZNBC	4910do	6265al				
2200	2230	vi	Zimbabwe, ZBC Corp	5975do	6045al				
2200	2300		Anguilla, Caribbean Beacon		6090am				
2200	2300		Australia, ABC NT Alice Springs		4835do				
2200	2300		Australia, ABC NT Katherine		5025do				
2200	2300		Australia, ABC NT Tennant Crk		4910do				
2200	2300		Australia, Radio	13620as	15240as	17715pa	17795va		
			21470pa						
2200	2300	irrg/vi	Cameroon, RTV	4850do					
2200	2300		Canada, CBC Northern Service		9625do				
2200	2300		Canada, CFRX Toronto ON		6070do				
2200	2300		Canada, CFVP Calgary AB		6030do				
2200	2300		Canada, CKZN St John's NF		6160do				
2200	2300		Canada, CKZU Vancouver BC		6160do				
2200	2300		China, China Radio Intl	7170eu					
2200	2300		Costa Rica, R for Peace Intl	15040va	21815usb				
2200	2300		Costa Rica, University Network	5030am	6150am	7375am	9725sa		
			11870am 13750na	17645as					
2200	2300	mtwhf	Eat Guinea, Radio Africa		15185af				
2200	2300	f/monthly	Finland, Scandy Weekend Radio		6170va	11690na			
2200	2300	vi	Ghana, Ghana BC Corp		3366do	4915do			
2200	2300		Guyana, Voice of		3290do				
2200	2300	vi/fas	Italy, IRRS 7120va						
2200	2300		Liberia, R Liberia Intl		5100do				
2200	2300		Malaysia, Radio		7295do				
2200	2300		Namibia, NBC		3290do				
2200	2300		Nigeria, Radio/Enugu		6025do				
2200	2300		Nigeria, Radio/Kaduna		4770do	6090do	9570do		
2200	2300		Nigeria, Radio/Lagos		3326do	4990al			
2200	2300		Palau, KHBN/VO Hope		9965as	9985as			
2200	2300		Sierra Leone, SLBS		3316do				
2200	2300	vi	Solomon Islands, SIBC		5020do				
2200	2300		Taiwan, R Taipei Intl		15600eu				
2200	2300		Turkey, Voice of		11960va	12000va			
2200	2300		UK, BBC World Service	3915as	5965as	5975am	6195as	7105as	
			9580eu 9740as	11685as	11945as	11955as	12095af		
			15390ca 15400af						
2200	2300		USA, Armed Forces Network	4319usb	4993usb	5765usb			
			6350usb 6458usb	10320usb	10940usb	12579usb	12689usb		
			13362usb						
2200	2300		USA, KAJJ 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	7215va	9705va	9770va	11760va		
			13765va 15185va	15290va	15305va	17740va	17820va		
2200	2300		USA, WBCQ Kennebunk, ME		7415na	9355na			
2200	2300		USA, WEWN Birmingham AL		9975eu	11530na	11550na		
			15745eu 17595eu						
2200	2300		USA, WHRA Greenbush ME		7580eu	17650af			
2200	2300		USA, WHRI Noblesville IN		5745va	9495am	13760va		
2200	2300		USA, WINB Red Lion PA		13570am				
2200	2300		USA, WJIE Upton KY		7490am				
2200	2300		USA, WRMI Miami FL		15725am				
2200	2300		USA, WRNO New Orleans LA		7395am	15420am			
2200	2300		USA, WSHB Cypress Creek SC		13770eu	15285sa			
2200	2300		USA, WTJC Newport NC		9370na				
2200	2300		USA, WWCR Nashville TN		7435na	9475na	12160na		
			13845na						
2200	2300		USA, WWRB Manchester TN		6890va	9320va	9400va		
			12172va						
2200	2300		USA, WYFR Okeechobee FL		11740na	15695eu	17845af		
2200	2300	vi	Vanuatu, Radio		4960do	7260do			
2200	2300		Zambia, Christian Voice		4965af				
2205	2230		Italy, RAI Intl		11900as	15625as			
2216	2300		New Zealand, Radio NZ Intl		17675pa				
2230	2255		Belgium, RVI Flanders R Intl		15565na				
2230	2257		Czech Rep, Radio Prague Intl		11600na	15545na			
2230	2300		Canada, Radio Canada Intl		6175na	9590na	13670na		
			17695na						
2230	2300		Cuba, Radio Havana		9550am				
2245	2300		India, All India Radio		9705as	9950as	11620as	13605as	

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

2300	0000		Anguilla, Caribbean Beacon		6090am				
2300	0000		Australia, ABC NT Alice Springs		4835do				
2300	0000		Australia, ABC NT Katherine		5025do				
2300	0000		Australia, ABC NT Tennant Crk		4910do				
2300	0000		Australia, Radio		9660pa	12080pa	13620as	15240as	

2300	0000		Bulgaria, Radio		9400na				
2300	0000	irrg/vi	Cameroon, RTV		4850do				
2300	0000		Canada, CBC Northern Service		9625do				
2300	0000		Canada, CFRX Toronto ON		6070do				
2300	0000		Canada, CFVP Calgary AB		6030do				
2300	0000		Canada, CKZN St John's NF		6160do				
2300	0000		Canada, CKZU Vancouver BC		6160do				
2300	0000		China, China Radio Intl	5990na	13680na				
2300	0000		Costa Rica, R for Peace Intl		15040va	21815usb			
2300	0000		Costa Rica, University Network		5030am	6150am	7375am	9725sa	
			11870am 13750na	17645as					
2300	0000		Egypt, Radio Cairo		9900na				
2300	0000	f/monthly	Finland, Scandy Weekend Radio		5980va	11690va			
2300	0000	vi	Ghana, Ghana BC Corp		3366do	4915do			
2300	0000		Guyana, Voice of		3290do	5950do			
2300	0000		India, All India Radio		9705as	9950as	11620as	13605as	
2300	0000		Liberia, R Liberia Intl		5100do				
2300	0000		Malaysia, Radio		7295do				
2300	0000		Namibia, NBC		3290do				
2300	0000		New Zealand, Radio NZ Intl		17675pa				
2300	0000		Palau, KHBN/VO Hope		9965as	9985as			
2300	0000		Romania, R Romania Intl		9570eu	11740na	11775na		
			15105na						
2300	0000		Sierra Leone, SLBS		3316do				
2300	0000		Singapore, SBC Radio One		6150do				
2300	0000		Sri Lanka, SLBC		4940do				
2300	0000		UK, BBC World Service	3915as	5965as	5975am	6195as	7105as	
			9580eu 9740as	11685as	11945as	11955as	12095af	15390ca	
			15400af						
2300	0000		USA, Armed Forces Network		4319usb	4993usb	5765usb	6350usb	
			6458usb 10320usb	10940usb	12579usb	12689usb	13362usb		
2300	0000		USA, KAJJ 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	7215va	9705va	9770va	11760va	13765va	
			15185va 15290va	15305va	17740va	17820va			
2300	0000		USA, WBCQ Kennebunk, ME		7415na	9355na			
2300	0000		USA, WEWN Birmingham AL		9355na	9975eu	15745na	17595eu	
2300	0000		USA, WHRA Greenbush ME		7580eu				
2300	0000		USA, WHRI Noblesville IN		5745va	9495am	13760va		
2300	0000		USA, WINB Red Lion PA		13570am				
2300	0000		USA, WJIE Upton KY		7490am				
2300	0000	smtwhf	USA, WRMI Miami FL		7385am				
2300	0000		USA, WRMI Miami FL		9955am				
2300	0000		USA, WRNO New Orleans LA		7355am				
2300	0000		USA, WSHB Cypress Creek SC		13770eu	15285sa			
2300	0000		USA, WTJC Newport NC		9370na				
2300	0000	as	USA, WWBS Macon GA		11900na				
2300	0000		USA, WWCR Nashville TN		5070na	7435na	9475na		
			13845na						
2300	0000		USA, WWRB Manchester TN		6890va	9320va	9400va	12172va	
2300	0000		USA, WYFR Okeechobee FL		5895sa	11740na	11855sa	15255sa	
			17750sa						
2300	0000	vi	Vanuatu, Radio		4960do	7260do			
2300	0000	vi	Vanuatu, Radio		4960do	7260do			
2300	0000		Zambia, Christian Voice		4965af				
2300	2230		Mexico, Radio Mexico Intl		9705am	11770am			
2300	2330		Cuba, Radio Havana		9550am				
2300	2330		Nigeria, Radio/Enugu		6025do				
2300	2330		Nigeria, Radio/Kaduna		4770do	6090do			
2300	2330		Nigeria, Radio/Lagos		3326do	4990al			
2300	2330	vi	Solomon Islands, SIBC		5020do				
2300	2330		USA, Voice of America		7190va	7200va	9545va	11925va	13755va
			Germany, Deutsche Welle		9815as	12000as	17560as	21790as	
2303	2310		Croatia, Croatian Radio		9925na				
2330	0000		Canada, Radio Canada Intl		6175na	9590na	13670na		
			17695na						
2330	0000		Lithuania, R Vilnius		9875eu				
2330	0000		Netherlands, Radio		6165na	9845na			
2330	0000	a	Russia, Radio Ezra		17665na				
2330	0000		Switzerland, Swiss R Intl		9885sa	11905sa			
2330	0000		USA, Voice of America		7190va	7200va	9545va	11925va	13755va
			11805va 11925va	13735va	13775va	15205va			
2330	2345	vi	Libya, Voice of Africa		15435ir	17750ir			
2330	2357		Vietnam, Voice of		9840as	12020as			
2345	0000	vi	Pakistan, Radio		11580as	15455as			

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BBCWS Americas Stream

This month's BBC World Service program listings include only those for the Americas stream. For other streams, please refer to May's SWG. **BBCWS(am)** is on shortwave at these times and on these frequencies reported by listeners as audible in North America: 1000-1400 on 6195; 1100-1700 on 15190; 2100-0500 on 5975; 0000-0300 on 15245, 12095 and 9915; 0000-0500 on 11835.

WBCQ The Planet

Allan Weiner, a longtime campaigner for "free radio," is owner/general manager of this unique shortwave station in Maine that distinguishes itself by seeking to program - as much as economics permit - content that departs from the now rather pedestrian radical religious and political matter that characterizes almost all of private shortwave in the US. This month's SWG includes comprehensive listings for this WBCQ programming (but not for the station's own schedule of radical political and religious fare) scheduled as of late April. However, be advised that parts of the station's schedule are quite fluid and, therefore, these listings are especially subject to change. All listed programming is on 7415 kHz.

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

SUNDAY		
0000	R. Netherlands	Music 52/15 (Martha Hawley presents musical styles from around the globe)
	WBCQ Maine	A Different Kind of Oldies Show (a unique mix of oldies music with "Big Steve" Cole)
	WHR1(5745kHz)	DXing with Cumbrie (Marie Lamb with the hottest DX catches)
	YLE R. Finland	Capital Weekend (a full hour of people, events and ideas of current interest in Finland)
0005	R. Australia	The Europeans (historical and cultural perspectives on European societies)
	R. Prague	Readings from Czech Literature
0010	R. Japan	Hello from Tokyo (listener letters, music and short features)
	R. Prague	SATURDAY Music (Czech classical, folk, jazz or rock music)
	R. New Zealand Int.	The Week in Parliament (a weekly roundup of NZ political news)
0030	BBCWS(am)	Agenda (the ideas and trends shaping our world)
	R. Netherlands	Roughly Speaking (European youth lifestyles magazine)
	R. New Zealand Int.	Spectrum (a weekly look at the people, places and events around NZ)
0035	R. Australia	Ockham's Razor (sharp commentaries on science issues)
MONDAY-FRIDAY		
0000	R. New Zealand Int.	Midday Report (news updates and in-depth reports)
MONDAY		
0000	R. Netherlands	Dutch Horizons (Bertine Krol chronicles life in Holland)
	WBCQ Maine	Radio New York International (Johnny Lightning plays classic rock)
0010	R. Australia	Awake! (Produced and presented by Aboriginal broadcasters, national indigenous arts and culture program)
	R. Japan	Weekend Square (various aspects of Japan in a friendly and relaxed atmosphere with interviews, music and discussions)
0030	BBCWS(am)	The World Today (the BBC's agenda-setting flagship global news program)
	R. Netherlands	Aural Tapestry (David Swatling weaves threads from different cultures and periods of history to tell interesting stories)
0045	R. Exterior de Espana	Radio Club (a repeat of Saturday's 0035 program)
TUESDAY-SATURDAY		
0000	R. Exterior de Espana	REE's News Service (featuring international, Ibero-American and national news in-depth, a review of the Spanish press)
	VOA	News Now (continuous rolling news service with analysis, sports, business reports and topical features)
0015	R. Japan	44 Minutes (daily current affairs magazine about Japan and Asia)
TUESDAY		
0000	R. Netherlands	The Research File (a magazine emphasizing the relevance of science to all our lives)
0005	BBCWS(am)	Meridian-Masterpiece (critical examinations of creative endeavors)

0010	R. Australia	The Science Show (one of the longest running programs on ABC Radio)
0030	BBCWS(am)	Charlie Gillett (presents his selection of music from around the globe)
	R. Netherlands	EuroQuest (a magazine placing Europe in context)
0033	VOA News Now	Encounter (current events debate and discussion)
WEDNESDAY		
0000	R. Netherlands	Music 52/15 (Martha Hawley presents musical styles from around the globe)
	WBCQ Maine	Off the Hook (discussing computer and information technology issues)
0005	BBCWS(am)	Meridian-Screen (interviews, documentaries, features and discussions on the film arts)
0010	R. Australia	The National Interest (Terry Lane's round-up of the week's major issues)
0030	BBCWS(am)	UK Top Twenty (music from the British rock and pop charts)
	R. Netherlands	A Good Life (how development affects societies)
0033	VOA News Now	Our World (the VOA's science, technology and environment magazine)
THURSDAY		
0000	R. Netherlands	The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)
0005	BBCWS(am)	Meridian-Writing (Harriet Gilbert explores fiction and non-fiction: plays and poetry, lyrics and letters)
0010	R. Australia	Background Briefing (ABC Radio's award-winning agenda-setting, current affairs radio documentary program)
0030	BBCWS(am)	Revolver (popular musicians select and present five current musical releases)
	R. Canada Int.	Dispatches (in-depth reports offering a Canadian perspective on international news topics)
	R. Netherlands	Dutch Horizons (Bertine Krol chronicles life in Holland)
0033	VOA News Now	Kaleidoscope (the VOA's arts and culture magazine)
FRIDAY		
0000	R. Netherlands	Aural Tapestry (David Swatling weaves threads from different cultures and periods of history to tell interesting stories)
0005	BBCWS(am)	The Music Biz (Mark Coles with a weekly look at the global music industry)
0010	R. Australia	Hindsight (Australian social history woven from the memories of those who were there)
0030	BBCWS(am)	John Peel (with his own unique and eclectic mix of new music)
	R. Netherlands	The Research File (a magazine emphasizing the relevance of science to all our lives)
0033	VOA News Now	Best of 'Talk to America' (excerpts from previous editions of this VOA listener phone-in)
SATURDAY		
0000	R. Netherlands	A Good Life (how development affects societies)
	R. New Zealand Int.	RNZ News
	WBCQ Maine	Allan Weiner Worldwide (the station manager's show)
0005	BBCWS(am)	Arts in Action (architects, playwrights, musicians and poets explain the ideas which shape our worlds)
	R. Australia	Feedback (Roger Broadbent answers listener questions and provides regular updates about RA)
0010	R. New Zealand Int.	Focus on Politics (a report on government and politics in NZ)
0030	BBCWS(am)	Jazzmatazz (Alyn Shipton with the best new releases, interviews with modern artists and tributes to the jazz greats)
	R. Australia	Country Breakfast (an entertaining look at Australian rural and regional issues with Belinda Varischett)
	R. New Zealand Int.	The Sampler (Nick Bollinger casts a critical ear over the latest CD offerings)
	R. Netherlands	The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)
0033	VOA News Now	Press Conference USA (Meet the Press' for shortwave)
0035	R. Exterior de Espana	Radio Club (answering listeners' letters)
0045	BBCWS(am)	Revolver (a guest musical artist gives a personal view on best new releases from country to techno)
	R. Exterior de Espana	Radio Waves (a weekly program for radio enthusiasts)
0100 UTC/ 9pm E/6pm P - Page 43 Freqs		
DAILY		
0130	R. Austria Int.	Report from Austria (a daily magazine focusing on Austria and central and eastern Europe)
SUNDAY		
0100	BBCWS(am)	The World Today (the BBC's agenda-setting flagship global news program)
	HCB Ecuador	DX Partyline (Allen Graham hosts a weekly program for DXers and SWLS)
	WBCQ Maine	Marian's Attic (rare and vintage recordings presented by Marian Webster)
0105	Deutsche Welle	Talking Point (European journalists discuss the week's events)
	R. Australia	In Conversation (Robin Williams talks not only to scientists

	R. Netherlands	and others about what it's meant to their lives)
	R. New Zealand Int	Europe Unzipped (the events of the past week in Europe, some unusual)
	R. Prague	At the Movies (a weekly report on cinema with Simon Morris)
0110	R. Canada Int.	Readings from Czech Literature
	R. Prague	Business Sense (an in-depth look at Canadian companies in the global economy)
0111	Voice of Russia	Saturday Music (Czech classical, folk, jazz or rock music)
0115	Deutsche Welle	News and Views (Russian views on news developments)
0120	China R. Int.	Inside Europe (a weekly magazine exploring the topical issues shaping the continent)
0130	BBCWS(am)	In the Spotlight (Chinese arts and cultural magazine)
	HCB Ecuador	Music Review (Andrew Green presents personalities, views and issues from the international world of music)
	R. Australia	Saludos Amigos (HCB's program promoting international friendship)
	R. Australia	Oz Sounds (Australian new music releases)
	R. New Zealand Int	Bookmarks (NZ books, literature and writers)
	RTE Ireland	Sportsnews (reports and accounts on the weekend's events)
0132	Voice of Russia	Moscow Yesterday and Today (recalling the most interesting events in the history of the city)
0135	R. Austria Int.	Network Europe (a weekly magazine on Europe jointly produced by the BBC and other European broadcasters)
	R. Canada Int.	Canada in the World (Wojtek Gwiazda: weekly magazine examining Canadian policies, priorities and international relations)
0140	R. Habana Cuba	DXers Unlimited (Arnie Cora presents a program from radio enthusiasts)
0145	BBCWS(am)	Letter from America (Alistair Cooke's weekly commentary on life in the USA)
MONDAY-FRIDAY		
0105	R. New Zealand Int.	Cadenza (light classical music selections)
0110	R. Australia	Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
MONDAY		
0100	R. Habana Cuba	Weekly Review (Cuba's perspective on current events)
	HCB Ecuador	Musical Mailbag (listener letters, food and the question of the week)
0105	WBCQ Maine	Radio New York International (continues from 0000)
	BBCWS(am)	Wright Around the World (Steve Wright: the best e-mails, letters, answer machine messages and musical requests)
	Deutsche Welle	Religion and Society (an insight into religious events around the world)
	R. Budapest	Spotlight (a monthly magazine)
	R. Canada Int.	Europe Unlimited (Hungary's relations with the rest of Europe)(monthly)
	R. Netherlands	Heading for Hungary (a monthly travelogue)(monthly)
	R. Canada Int.	And the Gatepost (listener letters)(monthly)
0110	R. Netherlands	The Maple Leaf Mailbag (Mark Montgomery answers listener mail and hosts the fortnightly CIDX Report for DXers)
	R. Canada Int.	Wide Angle (a single issue examined in-depth)
0115	Deutsche Welle	The Maple Leaf Mailbag (Ian Jones answers listener mail and hosts the fortnightly CIDX Report for DXers)
	RTE Ireland	Arts on the Air (Breandain O'Shea covers the German cultural scene.)
0130	China R. Int.	People in the Know (interviews with prominent Chinese who are shaping the nation's future)
	R. Australia	The Health Report (Dr. Norman Swan's weekly report on health and medical issues)
	R. Canada Int.	Canada Review (the arts edition of RCI's weekend magazine)
0132	RTE Ireland	Sportsnews (reports and accounts on the weekend's events)
	Voice of Russia	Timelines (Estelle Winters' variety show giving insight into life in Moscow through foreign eyes)
0135	R. Canada Int.	Spotlight (a magazine touching on all facets of artistic and cultural life in Canada)
0140	R. Habana Cuba	The Mailbag Show (listener letters)
0150	R. Habana Cuba	Breakthrough (Arnie Cora's weekly science report)
TUESDAY-SATURDAY		
0100	R. Exterior de Espana	REE's News Service (featuring international, Ibero-American and national news, a review of the Spanish press)
	R. Netherlands	Newsline (news, analysis and background reports)
	VOA	News Now (the VOA's continuous rolling news service with analysis, sports, business reports and topical features)
0105	R. Japan	Newslink (daily current affairs magazine focused on Europe)
	Deutsche Welle	Hungary Today (daily magazine covering current events in Hungary)
0110	R. Budapest	Canada Today (daily magazine of interviews, correspondents' reports and Canadian views on world and national events)
	R. Canada Int.	Commonwealth Update (comments on domestic developments and major domestic issues)
0110	Voice of Russia	Studio 9 (daily magazine with focused reports on Latin America)
0130	HCB Ecuador	The News at Six (RTE's flagship evening news program)
TUESDAY		
0105	BBCWS(am)	Health Matters (reports on the latest research explaining where medicine is going)

Shortwave Guide



0130 BBCWS(am) Everywoman (weekly magazine providing an insight into women and their world)
 China R. Int. Sports World (comprehensive coverage of sports in China and Asia)
 Deutsche Welle Insight (a look at major international trends and developments)
 R. Australia The Law Report (Damien Carrick presents breaking legal stories in Australia and overseas)
 0132 Voice of Russia Folk Box (music drawn from the traditions of the hundreds of nationalities that make up Russia and the CIS)
 0135 R. Canada Int. Media Zone (Ian Jones hosts a weekly forum with Canadian journalists discussing topical issues facing Canadians)

WEDNESDAY

0105 BBCWS(am) Go Digital (technology journalist Tracey Logan explains the latest in IT)
 0130 BBCWS(am) Omnibus (a weekly documentary) [Early this month, Jolyon Mitchell reports from Ghana on the country's thriving film industry]
 Deutsche Welle Man and Environment (John Hoy presents the human element in environmental issues.)
 R. Australia The Religion Report (Stephen Crittenden examines the way religion and societies interact)
 0132 Voice of Russia The Jazz Show (recordings from the Russian world of jazz)
 0135 R. Canada Int. Spotlight (a magazine touching on all facets of artistic and cultural life in Canada)
 0140 R. Habana Cuba DXers Unlimited (Arnie Coro presents a program from radio enthusiasts.)

THURSDAY

0105 BBCWS(am) Discovery (in-depth exploration of ideas and discoveries in science and technology)
 0120 HCJB Ecuador Ham Radio Today (Graham Bulmer and John Beck host a program for radio amateurs)
 0130 BBCWS(am) Sports International (the issues and personalities behind the headlines)
 Deutsche Welle Living in Germany (people, places and events in Germany)
 R. Australia The Media Report (Mick O'Regan takes a critical look at the latest developments in the communications industry)
 0135 R. Canada Int. The Maple Leaf Mailbag (Ian Jones reads listener letters and answers their questions) [The CIDX Report is included fortnightly]

FRIDAY

0105 BBCWS(am) One Planet (stories about the environment, development, agriculture and human impact on the natural world)
 0115 Deutsche Welle Hard to Beat—The World of Sport (weekly report on German and European sport)
 0130 BBCWS(am) People and Places (a forum for the exchange of views and experiences on a global scale)
 R. Australia The Sports Factor (Amanda Smith: debate and celebrate the cultural significance of sport)
 0135 R. Canada Int. Business Sense (an in-depth look at Canadian companies in the global economy)

SATURDAY

0100 WBCQ Maine Tasha Takes Control (upbeat progressive music)
 0105 BBCWS(am) Science in Action (Richard Black reports on the fascinating worlds of science and technology)
 R. Australia Asia-Pacific Weekend Edition (a weekly current events and business report)
 R. New Zealand Int. Your Money (Bruce Wallace and a panel of investment advisors on financial trends)
 0115 HCJB Ecuador Musica del Ecuador (Jorge Zambrano presents selections of Ecuadorian and Andean music)
 0130 BBCWS(am) Essential Guide (the biggest developments, issues and names in global affairs)
 Deutsche Welle German by Radio (a language lesson)
 R. Australia RA Arts with Julie Copeland (an arts-related interview and a film review)
 R. New Zealand Int. The Lord of the Rings (continuation of a 26 part dramatization of the Tolkien trilogy)
 0133 VOA News Now VOA News Review (report on the past week's news)
 0135 R. Canada Int. Canada in the World (Wojtek Gwiazda: weekly magazine examining Canadian policies, priorities and international relations)
 R. Exterior de Espana Radio Club (answering listeners' letters)
 0145 R. Exterior de Espana Radio Waves (a weekly program for radio enthusiasts)
 VOA Special English American Stories (short stories by American authors)

0200 UTC/ 10pm E/7pm P - Page 43 Freqs

DAILY
 0200 BBCWS(am) The World Today (the BBC's agenda-setting flagship global news program)

SUNDAY
 0200 HCJB Ecuador Rock Solid (Elaine Childs brings you thoughtful commentary along with some of the best in contemporary Christian music)
 WBCQ Maine Pocket Calculator (a forum celebrating personal memories

of all integrated circuit-based consumer products from the electronics revolution of the 1970s and 1980s)
 0205 R. Australia Margaret Throsby (a guest is interviewed and presents favorite musical pieces)
 0211 Voice of Russia Moscow Mailbag (Joe Adamov answers listener questions and talks about the latest rumors and jokes sweeping Moscow.)
 0215 R. Taipei Int. Great Wall Forum (the China-Taiwan issue from Taipei's perspective)
 0230 BBCWS(am) World Business Review (analysis of global business developments)
 R. New Zealand Int. Health Matters or Environment Matters
 R. Sweden Weekend (a magazine about Europe, 1st week)
 Sweden Today (George Wood: voices of Sweden, 2nd week)
 Spectrum (Bill Schiller: Swedish cultural scene, 3rd week)
 Studio 49 (conversations on ideas and long-term trends, 4th week)
 WHRA(7580kHz) DXing with Cumbre (Marie Lamb with the hottest DX catches)
 WRMI(7385kHz) Drive-In Double Feature (a celebration of "B" movies with science fiction-related and unusual music)
 WWCR(5070kHz) World of Radio (Glenn Houser's comprehensive review of the week in broadcasting)
 0232 Voice of Russia Songs from Russia (melodies and musical novelties from Russia's past)
 0235 R. Habana Cuba The World of Stamps (This just might be the only program on radio on philatelic matters)

MONDAY-FRIDAY

0205 R. New Zealand Int. In Touch with New Zealand (Wayne Mowat: a domestic afternoon variety program)
 0210 R. Australia The World Today (a comprehensive current affairs program with Monica Attard and John Highfield)

MONDAY

0200 WBCQ Maine Radio New York International (continues from 0000)
 0210 R. Habana Cuba From Havana (a showcase of contemporary Cuban music and musicians)
 0211 Voice of Russia Moscow Mailbag (Joe Adamov answers listener questions and talks about the latest rumors and jokes sweeping Moscow)
 0215 R. Taipei Int. Jade Bells and Bamboo Pipes (Carson Wong introduces selections of traditional Chinese music)
 0230 BBCWS(am) Assignment (documentaries that delve behind the headlines to find out how news events affect people's everyday lives)
 R. Habana Cuba The Jazz Place (the very best of Cuban jazz) or Top Tens (contemporary Cuban hits)
 R. Sweden In Touch with Stockholm (Nidia Hagström: interactive listener contact program)
 Sounds Nordic (Gaby Katz: youth music and trends magazine, every weekend but the first)
 WRMI(7385kHz) Wavescan (Adventist World Radio's program for dxers and shortwave radio enthusiasts)
 0232 Voice of Russia This is Russia (the cities and regions, culture and the arts, the countryside, religion and people)
 0235 R. Budapest Spotlight (a monthly magazine)
 Europe Unlimited (Hungary's relations with the rest of Europe) [monthly]
 Heading for Hungary (a monthly travelogue) [monthly]
 And the Gatepost (listener letters) [monthly]

TUESDAY-SATURDAY

0215 R. Korea Int. Seoul Calling (daily magazine of Korean people, places and events)
 0230 R. Sweden Sixty Degrees North (reports, interviews and analysis on the Nordic region)
 0230 BBCWS(am) World Business Report (a guide through the main business issues of the day)
 0235 R. Budapest Hungary Today (a daily magazine covering current events in Hungary)

TUESDAY

0211 Voice of Russia Science and Engineering (reports on the latest developments in science and technology)
 0232 Voice of Russia Kaleidoscope (the latest economic, social and cultural events in Russia and the CIS)
 0245 BBCWS(am) Analysis (background to the stories in the news)
 0245 R. Sweden Close Up (profiles of people in Sweden from all walks of life)

WEDNESDAY

0200 HCJB Ecuador The Book and the Spade (the latest discoveries and developments in Biblical archaeology)
 0211 Voice of Russia Newmarket (news about business in Russia and Russia's involvement in international business)
 0245 BBCWS(am) Analysis (background to the stories in the news)
 0245 R. Sweden Close Up (profiles of people in Sweden from all walks of life)

THURSDAY

0211 Voice of Russia Moscow Mailbag (Joe Adamov answers listener questions and talks about the latest rumors and jokes sweeping Moscow.)
 0215 R. Taipei Int. Journey into Chinese Culture
 0232 Voice of Russia Moscow Yesterday and Today (recalling the most interest-

ing events in the history of the city)
 0245 BBCWS(am) From Our Own Correspondent (the background to international events from BBC correspondents around the world)
 0245 R. Sweden Money Matters (a weekly economic report on the Nordic region)

FRIDAY

0211 Voice of Russia Science and Engineering (reports on the latest developments in science and technology)
 0232 Voice of Russia Russian by Radio (a language lesson)
 0245 BBCWS(am) Analysis (background to the stories in the news)
 0245 R. Sweden Nordic Report (a monthly magazine on Scandinavia, 1st week)
 Greenscan (Azariah Kirov: Swedish environmental awareness, 2nd week)
 Heart Beat (Gaby Katz: monthly health and medical magazine, 3rd week)
 The S-Files (Kris Boswell: Sweden behind the headlines, 4th week)

SATURDAY

0200 WWCR(3215kHz) World of Radio (Glenn Houser's comprehensive review of the week in broadcasting)
 WWCR(5070kHz) New Horizons (award-winning science and technology report from London Radio Service)
 0205 R. Australia Background Briefing (ABC Radio's award-winning, current affairs radio documentary program)
 R. New Zealand Int. Eureka! (reports on science in NZ)
 0211 Voice of Russia Newmarket (news about business in Russia and Russia's involvement in international business)
 0230 R. New Zealand Int. Health Matters or Environment Matters
 0232 Voice of Russia Audio Book Club (readings from the best of Russian classic and contemporary literature)
 0245 BBCWS(am) Analysis (background to the stories in the news)

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

SUNDAY

0300 HCJB Ecuador Inspirational Classics (a program of sacred classical music by Judy Gillen from New Zealand)
 World Wide Country Radio
 WWCR(3210kHz) Spectrum (communications magazine/phone-in)
 WWCR(5070kHz) Feedback (Roger Broadbent answers listener questions and provides regular updates about RA)
 0305 R. Australia Readings from Czech Literature
 R. Prague Saturday Music (Czech classical, folk, jazz or rock music)
 0310 R. Prague Spectrum (a weekly program looking at developments in the fields of science and technology)
 0315 Deutsche Welle In the Spotlight (Chinese arts and cultural magazine)
 0320 China R. Int. Reporting Religion (Trevor Barnes: how religion shapes major news events and analysis of religious and ethical issues)
 0330 BBCWS(am) All in the Mind (Natasha Mitchell: the mind, brain and behavior—everything from addiction to artificial intelligence)
 R. Australia Weekend (monthly magazine about Europe, 1st week)
 R. Sweden Sweden Today (George Wood: voices of Sweden, 2nd week)
 Spectrum (Bill Schiller: Swedish cultural scene, 3rd week)
 Studio 49 (ideas and long-term trends in Sweden and the Nordic region, 4th week)
 Viva Miami (R. Miami International's listener magazine show)
 0332 Voice of Russia Kaleidoscope (the latest economic, social and cultural events in Russia and the CIS)
 0340 R. Habana Cuba DXers Unlimited (Arnie Coro presents a program from radio enthusiasts)

MONDAY-FRIDAY

0320 R. Australia Pacific Focus (daily regional report concentrating each weekday on a different theme)

MONDAY
 0300 R. Habana Cuba Weekly Review (Cuba's perspective on current events)
 WBCQ Maine Radio New York International (continues from 0000)
 0305 R. New Zealand Int. Togata o te Moana (Anita Purcell: weekly Pacific magazine with regional Pacific news, issues, and music)
 0315 Deutsche Welle Arts on the Air (Breandain O'Shea covers the German cultural scene.)
 0330 BBCWS(am) Westway Omnibus (both episodes of this radio drama serial broadcast last week)

CHINA R. INT.

0211 Voice of Russia People in the Know (interviews with prominent Chinese who are shaping the nation's future)
 R. Sweden In Touch with Stockholm (Nidia Hagström: interactive listener contact program, 1st week)
 Sounds Nordic (Gaby Katz: R. Sweden's youth music and trends magazine, every weekend but the first)
 WHRI(7315kHz) DXing with Cumbre (Marie Lamb with the hottest DX catches)
 0332 Voice of Russia Audio Book Club (readings from the best of Russian classic and contemporary literature)
 0340 R. Australia The Australian Music Show (the latest rock music from the Triple J youth network of the ABC)

Shortwave Guide



R. Habana Cuba
0350 R. Habana Cuba

The Mailbag Show (listener letters)
Breakthrough (Arnie Caro's weekly science report)

HCB Ecuador
R. Australia

Walkin' in the Sunshine (Ben Cummings with the roots in country music from all over the world)
Educational series (a series dealing with Asian or Pacific history, politics or communications.)

and contemporary literature)

TUESDAY-SATURDAY

0305 Deutsche Welle
0311 Voice of Russia
0330 R. Sweden
0345 BBCWS(am)

Newslink (daily current affairs magazine focused on Europe)
News and Views (Russian views on news developments)
Sixty Degrees North (reports, interviews and analysis on the Nordic region)
Off the Shelf (abridged serialized readings of novels, stories and other literature)

TUESDAY

0305 BBCWS(am)
R. New Zealand Int.
0315 Radio Taipei Int.
0330 BBCWS(am)
China R. Int.
Deutsche Welle
0340 R. Australia

Jazzmatazz (Alyn Sipton with the best new releases, interviews with modern artists and tributes to the jazz greats)
Top Five and New Releases (the top five singles and new music releases in NZ with Greg Tate)
Taiwan Economic Journal
Peace Rhythms (12 part series exploring ways that music can help people in war-torn and violence-ridden societies)
Sports World (the sports scene in China and Asia)
Insight (a look at major international trends and developments)
Music Deli (Australian performances of folk, acoustic, traditional and world music)

WEDNESDAY

0305 BBCWS(am)
R. New Zealand Int.
0330 BBCWS(am)
Deutsche Welle
R. New Zealand Int.
0340 R. Australia
R. Habana Cuba
0345 R. Sweden

Charlie Gillett (presents his selection of music from around the globe)
Pacific Report (RNZ) correspondent Dan Wiseman interviews and reports on regional matters)
Write On (Dilly Barlow and Penny Vine sift through the listener mail)
Man and Environment (John Hay presents the human element in environmental issues.)
Tradewinds (Walter Zweifel: weekly report on Pacific regional business and economic news and features)
Blacktracker (Mal Honess presents contemporary Aboriginal music)
DXers Unlimited (Arnie Caro presents a program from radio enthusiasts)
Close Up (profiles of people in Sweden from all walks of life)

THURSDAY

0305 BBCWS(am)
R. New Zealand Int.
0330 BBCWS(am)
Deutsche Welle
R. New Zealand Int.
0340 R. Australia
0345 R. Sweden

John Peel (with his own unique and eclectic mix of new music)
RNZ Talk (introduction to the RNZ and National Radio staff, projects and programmes, fortnightly) [or] Mailbox (program for the serious shortwave listener, with Myra Oh, Paul Ormond, and Frequency Manager Adrian Sainsbury, fortnightly)
Heart and Soul (global religious and spiritual experiences) Living in Germany (people, places and events in Germany)
The World in Sport (Dimitri Edwards: world's sporting week with emphasis on NZ and the Pacific.)
Oz Country Style (country music from Australia)
Money Matters (a weekly economic report on the Nordic region)

FRIDAY

0305 BBCWS(am)
R. New Zealand Int.
0330 BBCWS(am)
China R. Int.
Deutsche Welle
HCB Ecuador
R. New Zealand Int.
0340 R. Australia
0345 R. Sweden

Composer of the Month (the life stories and music of major composers in the Western classical tradition)
Dateline Pacific (Dan Wiseman: the major Pacific stories of the week, with background and reaction)
Chance to Dance (six-part series about an education and training initiative by The Royal Ballet in London)
Life in China (a weekly magazine focusing on the lives of ordinary people in China)
Hard to Beat: The World of Sport (weekly report on German and European sport)
The Book and the Spade (archaeology and religion)
Pacific Correspondent (Dan Wiseman: regional correspondents talk issues in their respective Pacific countries)
Jazz Notes (Australian jazz presented by Ivan Lloyd)
Nordic Report (a monthly magazine on Scandinavia, 1st week)
Greenscan (Azariah Kiro: Swedish environmental awareness, 2nd week)
Heart Beat (Gaby Katz: monthly health and medical magazine, 3rd week)
The S-Files (Kris Boswell: Sweden behind the headlines, 4th week)

SATURDAY

0335 BBCWS(am)
R. Australia
R. New Zealand Int.
0330 BBCWS(am)
Deutsche Welle

The Hitch-Hiker's Guide to the Galaxy (this serialized account of the popular sci-fi classic continues)
Rural Reporter (ABC's rural reporters present news and stories from rural and regional Australia)
The Mix (interviews and live recordings from contemporary pop musicians)
Patterns of Faith (a global exploration of religious values and human wisdom)
German by Radio (a language lesson)

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

DAILY

0400 BBCWS(am) The World Today (the BBC's agenda-setting flagship global news program)

SUNDAY

0400 R. Vlaanderen Int. Music from Flanders (a half-hour of Flemish music, musicians and musical performances)
HCB Ecuador DX Partyline (Allen Graham hosts a weekly program for DXers and SWLs)
WBCQ Maine Tom and Darryl (discussing satellite TVRO, shortwave, low power FM and the Internet)
0405 R. Australia Pacific Focus-Arts (reports on culture and the arts in the Pacific region)
R. New Zealand Int. Playhouse (classic and contemporary radio drama)
China R. Int. In the Spotlight (Chinese arts and cultural magazine)
0420 BBCWS(am) Global Business (Peter Day charts the transformations sweeping through the world of work and commerce)
HCB Ecuador Saludos Amigos (HCB's program promoting international friendship)
R. Australia RA Arts with Julie Copeland (an arts-related interview and a film review)
0432 Voice of Russia Moscow Yesterday and Today (recalling the most interesting events in the history of the city)
0435 R. Habana Cuba The World of Stamps (This just might be the only program on radio on philatelic matters)
R. Netherlands Europe Unzipped (the events of the past week in Europe, some unusual)
0455 R. Netherlands Insight (Rob Green casts a critical and humorous eye on the past week's headlines)

MONDAY-FRIDAY

0400 WBCQ Amos 'n Andy (the classic radio comedy from America's radio past)
0405 R. New Zealand Int. In Touch with New Zealand (continues from 0205, this hour including a daily report from one of NZ's regions)
Margaret Throsby (a guest is interviewed and presents favorite musical pieces)
0410 R. Australia

MONDAY

0400 R. Vlaanderen Int. Radio World (Frans Vossen presents a weekly report about international radio)
WBCQ(7415kHz) Tom and Darryl (discussions about satellite, shortwave, LPFM and Internet communications)
HCB Ecuador Musical Mailbag (listener letters, food and the question of the week)
0410 R. Habana Cuba From Havana (a showcase of contemporary Cuban music and musicians)
0415 WBCQ Maine Radio Timtron Worldwide
0430 China R. Int. People in the Know (interviews with prominent Chinese who are shaping the nation's future)
R. Habana Cuba The Jazz Place (the very best of Cuban jazz) or Top Tens (contemporary Cuban hits)
0432 Voice of Russia The Jazz Show (recordings from the Russian world of jazz)
0435 R. Netherlands Sincerely Yours (Howard Shannon and Neville Powis host RNZ's listener response program.)
0455 R. Netherlands The Week Ahead (on RN the next seven days)

TUESDAY-SATURDAY

0410 HCB Ecuador Studio 9 (daily magazine with focused reports on Latin America)
0430 R. Netherlands Newslink (news, analysis and background reports)

TUESDAY

0411 Voice of Russia Moscow Mailbag (Joe Adamov answers listener questions and talks about the latest rumors and jokes sweeping Moscow)
Sports World (the sports scene in China and Asia)

WEDNESDAY

0411 Voice of Russia Science and Engineering (reports on the latest developments in science and technology)

THURSDAY

0411 Voice of Russia Newmarket (news about business in Russia and Russia's involvement in international business)
0420 HCB Ecuador Ham Radio Today (Graham Bulmer hosts a program for radio amateurs.)
0432 Voice of Russia Folk Box (music drawn from the traditions of the hundreds of nationalities that make up Russia and the CIS)

FRIDAY

0411 Voice of Russia Moscow Mailbag (See Tuesday's 0511 listing.)
0430 China R. Int. Life in China (a weekly magazine focusing on the lives of ordinary people in China)
0432 Voice of Russia Audio Book Club (readings from the best of Russian classic

SATURDAY

0400 WBCQ Amos 'n Andy (the classic radio comedy from America's radio past)
0405 R. Australia Pacific Focus-Environment (environmental news as reported on the weekday magazine, Pacific Beat)
R. New Zealand Int. Home Grown (Liz Barry plays contemporary Kiwi music)
0411 Voice of Russia Science and Engineering (reports on the latest developments in science and technology)
0415 HCB Ecuador Musica del Ecuador (Jorge Zambrano presents selections of Ecuadorian and Andean music)
0430 BBCWS(am) Assignment (documentaries that find out how news events affect people's everyday lives)
R. Australia The Buzz (the week's big technology news and issues presented by Richard Aedy)
R. New Zealand Int. Musical Chairs (the music and background of a featured NZ musician)
WHR(7580kHz) DXing with Cumbre (Marie Lamb with the hottest DX catches)
0432 Voice of Russia Timelines (Estelle Winters' variety show giving insight into life in Moscow through foreign eyes)

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

SUNDAY

0500 HCB Ecuador Inspirational Classics (a program of sacred classical music by Judy Gillen from New Zealand)
R. Netherlands Roughly Speaking (European youth lifestyles magazine)
WBCQ Maine Tom and Darryl (continues from D400 on 1st and 3rd Sun.)
WRM(7385kHz) Seldom Heard Radio (obscure folk, folk rock and psychedelic music)
WWCR(5070kHz) World Wide Country Radio
0505 Deutsche Welle Talking Point (European journalists discuss the week's events.)
R. Australia Pacific Focus-Business (reports on business and commerce in the Pacific region)
0510 R. Japan Pop! Goes Asia (cultures and lifestyles of Asian countries through their popular music)
R. New Zealand Feature on religion and spirituality in NZ
0515 Deutsche Welle Money Talks (DW's weekly financial magazine highlighting business in Europe)
0520 China R. Int. In the Spotlight (Chinese arts and cultural magazine)
0530 R. Australia Fine Music Australia (Australian classical artists with Charles Southwood)
0540 R. Habana Cuba DXers Unlimited (Arnie Caro presents a program from radio enthusiasts)

MONDAY-FRIDAY

0505 R. New Zealand Int. Checkpoint (RNZ National Radio's flagship evening news program)
0510 R. Australia Pacific Beat (daily current events and features magazine with focus on the Pacific island nations)
0515 R. Japan 44 Minutes (current affairs magazine about Japan and Asia)

MONDAY

0500 R. Habana Cuba Weekly Review (Cuba's perspective on current events)
R. Netherlands Dutch Horizons (Bertine Kral chronicles life in Holland)
WWCR(3210kHz) World of Radio (Glenn Houser's comprehensive review of the week in broadcasting)
0505 Deutsche Welle Religion and Society (an insight into religious events around the world)
0515 Deutsche Welle Cool (Erica Gingerich and Anke Rasper: youth magazine with reports on attitudes, music and style)
0530 China R. Int. People in the Know (interviews with prominent Chinese who are shaping the nation's future)
WWCR(3210kHz) The Old Record Show (vintage recordings)
0540 R. Habana Cuba The Mailbag Show (listener letters)
0545 R. Exterior de Espana Radio Club (a repeat of Saturday's program)
0550 R. Habana Cuba Breakthrough (Arnie Caro with a report on science)

TUESDAY-SATURDAY

0500 R. Exterior de Espana REE's News Service (featuring international, Ibero-American and national news in-depth)
0505 Deutsche Welle Newslink (daily current affairs magazine focused on Europe)

TUESDAY

0500 R. Netherlands The Research File (a magazine emphasizing the relevance of science to all our lives)
0530 China R. Int. Sports World (the sports scene in China and Asia)
Deutsche Welle Insight (a look at major international trends and developments)

WEDNESDAY

0500 HCB Ecuador The Book and the Spade (the latest discoveries and developments in Biblical archaeology)
R. Netherlands Music 52/15 (Martha Howley presents musical styles from around the globe)

Shortwave Guide

0530 Deutsche Welle Man and Environment (John Hay presents the human element in environmental issues)
 0540 R. Habana Cuba Diners Unlimited (Arnie Coro presents a program for radio enthusiasts.)

THURSDAY

0500 R. Netherlands The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)
 WBCQ Maine World of Radio (Glenn Hauser's comprehensive review of the week in broadcasting)
 0530 Deutsche Welle Living in Germany (people, places and events in Germany)

FRIDAY

0500 HCJB Ecuador Inspirational Classics (classical music selections inspired by religious and spiritual themes)
 R. Netherlands Aural Tapestry (David Swatling weaves threads from different cultures and periods of history to tell interesting stories)
 0530 China R. Int. Life in China (a weekly magazine focusing on the lives of ordinary people in China)
 Deutsche Welle Hard to Beat: The World of Sport (weekly report on German and European sport)
 HCJB Ecuador The Book and the Spade (archaeology and religion)
 R. New Zealand Int. The Pacific Report (a report on trends and events in the Pacific region)

SATURDAY

0500 R. Netherlands A Good Life (how development affects societies)
 WHRI Indiana DXing with Cumbre (Marie Lamb with the hottest DX catches)
 0505 R. Australia Pacific Focus-Sport (the week's sports news as reported on the daily magazine 'Pacific Beat')
 R. New Zealand Int. Home Grown (continues from 0405)
 0510 R. Japan Hello from Tokyo (listener letters, music and short features)
 0530 Deutsche Welle German by Radio (a language lesson)
 HCJB Ecuador Walkin' in the Sunshine (Ben Cummings with roots in country music from all over the world)
 R. Australia Lingua Franca (a program about language and its social, cultural and historical ramifications)
 0535 R. Exterior de Espana Radio Club (answering listeners' letters)
 0545 R. Exterior de Espana Radio Waves (a weekly program for radio enthusiasts)

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

SUNDAY

0600 WWCR(5070kHz) This Week in Americana (antiques and collecting)
 R. Australia The Europeans (historical and cultural perspectives on European societies.)
 R. New Zealand Int. Whenua! (people, issues and music in Aetearoa, with Henare Te Ua and Libby Hakarara)
 0610 R. Japan Weekend Square (various aspects of Japan with interviews, music and discussions.)
 0630 WHRI(5745kHz) DXing with Cumbre (Marie Lamb with the latest DX catches)
 WWCR(5070kHz) World of Radio (Glenn Hauser's comprehensive review of the week in broadcasting)
 0635 R. Australia Ockham's Razor (sharp commentaries on science issues)
 R. Habana Cuba The World of Stamps (This just might be the only program on radio on philatelic matters)

MONDAY-FRIDAY

0605 R. New Zealand Int. What's Going On? (daily NZ entertainment and arts calendar)
 0615 R. Japan Asian Top News (the day's major stories as reported by the region's radio stations)
 0620 R. Australia Pacific Focus (daily regional report concentrating each weekday on a different theme—business, health, environment, sport and culture)
 0630 R. New Zealand Int. Worldwatch (the stories behind international headlines)
 0645 R. New Zealand Int. Storytime (children's stories)

MONDAY

0600 WWCR(3210kHz) Spectrum (communications magazine)
 R. Habana Cuba From Havana (a showcase of contemporary Cuban music and musicians)
 0625 R. Japan Unforgettable Musical Masterpieces (Japanese pop songs written in the post war years as a means of explaining Japanese history and attitudes)
 0630 R. Habana Cuba The Jazz Place (the very best of Cuban jazz) or Top Tens (contemporary Cuban hits)
 0640 R. Australia The Australian Music Show (the latest rock music from the Triple J youth network of the ABC)

TUESDAY-SATURDAY

0600 WWCR(3210kHz) World Wide Country Radio (country music)

TUESDAY

0625 R. Japan Let's Learn Japanese (a Japanese language lesson for beginners)
 0640 R. Australia Music Deli (Australian performances of folk, acoustic, traditional and world music)

WEDNESDAY

0625 R. Japan Japan Music Log
 0640 R. Australia Blacktracker (Mal Honess presents contemporary Aboriginal music.)

THURSDAY

0625 R. Japan Brush Up Your Japanese (an intermediate course in Japanese)
 0640 R. Australia Oz Country Style (country music from Australia)

FRIDAY

0625 R. Japan Music Beat (contemporary Japanese popular music)
 0640 R. Australia Jazz Notes (Australian jazz presented by Ivan Lloyd)

SATURDAY

0605 R. Australia The Europeans (historical and cultural perspectives on European societies)
 R. New Zealand Int. Tagata o te Moana (Anita Purcell: weekly Pacific magazine with regional Pacific news, issues, and music)
 0610 R. Japan Pop! Goes Asia (the cultures and lifestyles of Asian countries through their popular music)
 0630 BBCWS(am) People and Politics (the week in Parliament)
 0635 R. Australia Ockham's Razor (sharp commentaries on science issues)

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

DAILY

1000 BBCWS(am) World Briefing (a comprehensive report on the latest news)
 VOA News Now (continuous rolling news service with analysis, sports, business reports and topical features)

SUNDAY

1005 R. Australia The Buzz (the week's big technology news and issues presented by Richard Aedy)
 1010 R. New Zealand Int. Mediawatch (analyses of recent media events and trends in NZ)
 1030 BBCWS(am) Agenda (ideas and trends shaping our world)
 1033 VOA News Now On the Line (US foreign policy discussed and debated)
 1035 R. Netherlands Wide Angle (a weekly in-depth look at a news topic)
 1055 R. Netherlands The Week Ahead (an RN the next seven days)

MONDAY-FRIDAY

1000 R. New Zealand Int. Late Edition (major domestic evening news magazine)
 WWCR(15825kHz) World Wide Country Radio
 1010 R. Australia Asia-Pacific (flagship current events and business report for and about Asia and the Pacific region)
 1030 BBCWS(am) World Business Report (a guide through the day's business issues)
 R. Australia The Health Report (Dr. Norman Swan's weekly report on health and medical issues)
 R. Netherlands Newslime (news, analysis and background reports)

TUESDAY

1030 R. Australia The Law Report (Domien Carrick: breaking legal stories in Australia and overseas)

WEDNESDAY

1030 R. Australia The Religion Report (Stephen Crittenden: the way religion and societies interact)

THURSDAY

1030 R. Australia The Media Report (Mick O'Regan: the latest developments in the communications industry)

FRIDAY

1030 R. Australia The Sports Factor (Amanda Smith: debate and celebrate the cultural significance of sport)

SATURDAY

1000 WWCR(5070kHz) The Old Record Shop (vintage recordings)
 1005 R. Australia Pacific Review (top reports from the past week's Asia Pacific magazine)
 1010 R. New Zealand Int. Deep Purple (relaxing, thoughtful and nostalgic music)
 1030 BBCWS(am) Reporting Religion (Trevor Barnes: how religion shapes major news events and analysis of religious and ethical issues)
 R. Australia In Conversation (Robin Williams talks not only to scientists and others about what it's meant to their lives)
 1033 VOA News Now Best of 'Talk to America' (excerpts from previous editions of this VOA listener phone-in)
 1035 R. Netherlands Europe Unzipped (the events of the past week in Europe, some unusual)
 1055 R. Netherlands Insight (Rob Green casts a critical and humorous eye on the past week's headlines)

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

DAILY

1100 BBCWS(am) World Briefing (a comprehensive report on the latest news)

SUNDAY

1100 R. Netherlands Aural Tapestry (David Swatling weaves threads from different cultures and periods of history to tell interesting stories)
 WWCR(5070kHz) Ken's Country Classics (classic country music)
 1105 R. Australia Correspondents Report (The ABC's overseas reporters give their interpretation and analysis of the week's major events)
 R. New Zealand Int. New Zealand Forces Program (a two hour package designed specifically for NZ military and civilian personnel stationed in East Timor and Papua-New Guinea)
 1110 R. Japan Hello from Tokyo (listener letters, music and short features)
 1130 R. Australia The Business Report (Norelle Hooper, a weekly round-up of the latest business news and information)
 BBCWS(am) Assignment (documentaries that find out how news events affect people's everyday lives)
 1130 R. Netherlands Dutch Horizons (Bertine Krol chronicles life in Holland)
 R. Sweden In Touch with Stockholm (Nidjo Hogstrom: interactive listener contact program, 1st weekend)
 Sounds Nordic (Gaby Kotz: youth music and trends magazine, every weekend but the first.)

MONDAY-FRIDAY

1105 BBCWS(am) Caribbean Report (the latest news in the Caribbean)
 R. Australia Asia-Pacific (flagship current events and business report for and about Asia and the Pacific region)
 1110 BBCWS(am) Caribbean Sport
 1115 BBCWS(am) Caribbean Magazine (a current affairs and feature program focusing on life in the region)
 R. Japan Asian Top News (the day's major stories as reported by the region's radio stations)
 1130 BBCWS(am) World Business Report (a guide through the main business issues of the day)
 HCJB Ecuador Morning in the Mountains (the longstanding breakfast program with news, sports, prayer, conversation and music)
 R. Australia Bush Telegraph (an entertaining look at rural and regional issues in Australia with Belinda Varischetti)
 1130 R. Sweden Sixty Degrees North (reports, interviews and analysis on the Nordic region)
 1145 R. Korea Int. Seoul Calling (daily magazine of Korean people, places and events)

MONDAY

1100 R. Netherlands EuroQuest (a magazine placing Europe in context)
 1105 R. New Zealand Int. Nine to Noon (a late morning domestic program featuring news stories and topics of interest)
 1125 R. Japan Unforgettable Musical Masterpieces (Japanese pop songs written in the post war years as a means of explaining Japanese history and attitudes)
 1130 BBCWS(am) Letter from America (commentary on America by Alistair Cooke)
 R. Netherlands The Research File (a magazine emphasizing the relevance of science to all our lives)
 1145 BBCWS(am) Sports Round-up (all the daily sporting news worldwide)
 R. Sweden Sports Scan (a weekly report on sports in the Nordic region)

TUESDAY

1100 R. Netherlands A Good Life (how development affects societies)
 1105 R. New Zealand Int. Nine to Noon (a late morning domestic program featuring news stories and topics of interest)
 1125 R. Japan Let's Learn Japanese (a Japanese language lesson for beginners)
 1130 BBCWS(am) Analysis (background to stories in the news)
 R. Netherlands Music 52-15 (Martha Hawley presents musical styles from around the globe)
 1145 BBCWS(am) Sports Round-up (all the daily sporting news worldwide)
 R. Sweden Close Up (profiles of people in Sweden from all walks of life)

WEDNESDAY

1100 R. Netherlands Dutch Horizons (Bertine Krol chronicles life in Holland)
 WWCR(15685kHz) Communications World (Kim Elliott reviews the week in global communications.)
 1105 R. New Zealand Int. Nine to Noon (a late morning domestic program featuring news stories and topics of interest)
 1125 R. Japan Japan Music Log
 1130 BBCWS(am) Analysis (background to stories in the news)
 R. Netherlands The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)
 1145 BBCWS(am) Sports Round-up (all the daily sporting news worldwide)
 1145 R. Sweden Money Matters (a weekly economic report on the Nordic region)

THURSDAY

1100 R. Netherlands The Research File (a magazine emphasizing the relevance of science to all our lives)
 1105 R. New Zealand Int. Nine to Noon (repeat of portions of a late morning domestic program featuring news stories)
 1125 R. Japan Brush Up Your Japanese (an intermediate course in Japanese)

Shortwave Guide



1130	BBCWS(am) R. Netherlands	From Our Own Correspondent (background to the news from BBC correspondents around the world) Aural Tapestry (David Swatling weaves threads from different cultures and periods of history to tell interesting stories)
1145	BBCWS(am) R. Sweden	Sports Round-up (all the daily sporting news worldwide) Nordic Report (a monthly magazine on Scandinavia, 1st week) Greenscan (Azariah Kiros: Swedish environmental awareness, 2nd week) Heart Beat (Gaby Katz: monthly health and medical magazine, 3rd week) The S-Files (Kris Boswell: Sweden behind the headlines, 4th week)
FRIDAY		
1100	R. Netherlands	The Weekly Documentary (RN's award-winning sound essays and in-depth investigations) The Big Backyard (Australian country music)
1105	R. New Zealand Int.	Sports Story (a sport profile or documentary)
1125	R. Japan	Music Beat (contemporary Japanese popular music)
1130	BBCWS(am) R. Netherlands	Analysis (background to stories in the news) A Good Life (how development affects societies)
1145	R. New Zealand Int. BBCWS(am) R. Sweden	RNZ1 Top Five (the best-selling music in NZ) Football Extra (global soccer news, reviews and interviews) A Report on the Nordic Newsweek (the week's main news stories)
SATURDAY		
1100	R. Netherlands WWCR(15685kHz)	Roughly Speaking (European youth lifestyles magazine) This Week in Americana (antiques and collecting)
1105	R. Australia R. New Zealand Int. WWCR(5070kHz)	Asia Pacific Weekend Edition (weekly current events and business report for and about Asia and the Pacific region) New Zealand Forces Program (a two hour package designed specifically for NZ military and civilian personnel stationed in East Timor and Papua-New Guinea) This Week in Americana (magazine about antique collecting)
1110	R. Japan	Pop! Goes Asia (the cultures and lifestyles of Asian countries through their popular music)
1130	BBCWS(am) R. Australia	Analysis (background to stories in the news) Fine Music Australia (Australian classical artists with Charles Southwood)
	R. Netherlands	Music 52-15 (Martha Hawley presents musical styles from around the globe)
	R. Sweden	Weekend (a magazine about Europe from the Radio E consortium, 1st week) Sweden Today (George Wood: voices of Sweden, 2nd week) Spectrum (Bill Schiller: Swedish cultural scene, 3rd week) Studio 49 (ideas and long-term trends in Sweden and the Nordic region, 4th week)
	WHRI(9495 kHz.)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
1135	R. New Zealand Int.	Dateline Pacific (Don Wiseman: major Pacific stories of the week, with background and reaction)
1145	BBCWS(am)	Sports Round-up (all the daily sporting news worldwide)

1200 UTC/ 8am E/5am P - Page 49 Freqs

DAILY		
1200	BBCWS(am)	Newshour (an hour of news and analysis from around the globe)
SUNDAY		
1200	R. Korea Int.	Multiwave Feedback (RKI's interactive program for DXers and SWLs)
1205	R. Australia R. Netherlands R. New Zealand Int. R. Sweden	Nocturne (a beautifully woven tapestry of sound presented by Mairi Nicolson) Sincerely Yours (RN's listener response program) New Zealand Forces Program (continues from 1105) In Touch with Stockholm (Nidia Hagström: interactive listener contact program, 1st weekend) Sounds Nordic (Gaby Katz: youth music and trends magazine, every weekend but the first.)
MONDAY-FRIDAY		
1200	HCB Ecuador R. Netherlands BBCWS(am)	Latin American and International News Newline (news, analysis and background reports) Caribbean Business (a report on regional commerce and economics) Sports Report
1210	HCB Ecuador R. New Zealand Int. BBCWS(am) HCB Ecuador	Late Edition (repeat of 1005 program) Caribbean Report (the latest news in the Caribbean) Morning in the Mountains (continues from 1130)
1210	R. Canada Int.	This Morning (Shelagh Rogers: lively mix of interviews, documentaries, music, and personal essays with Canada's finest writers, musicians, and artists)
1230	HCB Ecuador R. Sweden	Latin American and International News Sixty Degrees North (reports, interviews and analysis on the Nordic region)
1235	HCB Ecuador	Morning in the Mountains (continues from 1130)

MONDAY		
1205	R. Australia	Late Night Live (Philip Adams interviews the major newsmakers, philosophers, artists and trendsetters)
1230	YLE R. Finland	Finland This Morning (a breakfast program with news, a business report, sports, weather and interviews)
1245	R. Sweden	Sports Scan (a weekly report on sports in the Nordic region)
TUESDAY		
1205	R. Australia	Late Night Live (Philip Adams interviews the major newsmakers, philosophers, artists and trendsetters)
1230	YLE R. Finland	Finland This Morning (a breakfast program with news, a business report, sports, weather and interviews)
1245	R. Sweden	Close Up (profiles of people in Sweden from all walks of life)
WEDNESDAY		
1205	R. Australia	Late Night Live (Philip Adams: interviews the major newsmakers, philosophers, artists and trendsetters)
1230	YLE R. Finland	Finland This Morning (a breakfast program with news, a business report, sports, weather and interviews)
1245	R. Sweden	Money Matters (a weekly economic report on the Nordic region)
THURSDAY		
1205	R. Australia	Late Night Live (Philip Adams interviews the major newsmakers, philosophers, artists and trendsetters)
1230	YLE R. Finland	Finland This Morning (a breakfast program with news, a business report, sports, weather and interviews)
1245	R. Sweden	Nordic Report (a monthly magazine on Scandinavia, 1st week) Greenscan (Azariah Kiros: Swedish environmental awareness, 2nd week) Heart Beat (Gaby Katz: monthly health and medical magazine, 3rd week) The S-Files (Kris Boswell: Sweden behind the headlines, 4th week)
FRIDAY		
1205	R. Australia	Sound Quality (Tim Ritchie seeks out the interesting, the evolutionary, the inaccessible and the wonderful in music)
1230	YLE R. Finland	Capital Cafe (conversations with Finns from all walks of life)
1245	R. Sweden	A Report on the Nordic Newsweek (the week's main news stories)
SATURDAY		
1200	R. Korea Int. WHRI(6040kHz)	From Us to You (RKI answers listener mail and rewards its contest winners) DXing with Cumbre (Marie Lamb with the hottest DX catches)
1205	R. Australia R. Netherlands	The Spirit of Things (Dr. Rachael Kahn: values and beliefs as expressed through ritual, art, music, and sacred texts) Europe Unzipped (the events of the past week in Europe, some unusual)
	R. New Zealand Int.	New Zealand Forces Program (continues from 1105)
1230	R. Sweden	Weekend (a magazine about Europe from the Radio E consortium, 1st week) Sweden Today (George Wood: voices of Sweden, 2nd week) Spectrum (Bill Schiller: Swedish cultural scene, 3rd week) Studio 49 (ideas and long-term trends in Sweden and the Nordic region, 4th week) DXing with Cumbre (Marie Lamb with the hottest DX catches)
	WHRI(9495kHz)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
	YLE R. Finland	Finland This Week (the best reports and interviews from the weekday program, Finland This Morning)
1245	YLE R. Finland	Starting Finnish (a language lesson)

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

SUNDAY		
1300	Channel Africa	Channel Africa Extra (a weekend magazine and variety show with news, sports, music, regular reports and features)
1305	BBCWS(am)	Composer of the Month (the life stories and music of major composers in the Western classical tradition)
	R. Australia	Nocturne (continues from 1205)
1310	R. Canada Int.	The Sunday Edition (the more relaxed and reflective weekend edition of This Morning, hosted by Michael Enright)
1320	China R. Int.	In the Spotlight (Chinese arts and cultural magazine)
1330	BBCWS(am) R. Sweden	In Praise of God (diverse services of worship) In Touch with Stockholm (Nidia Hagström: interactive listener contact program, 1st weekend) Sounds Nordic (Gaby Katz: youth music and trends magazine, every weekend of the month but the first)
	WWCR(15825kHz)	The Old Record Shop (vintage recordings)
MONDAY-FRIDAY		
1300	R. Australia	RA News (a fifteen minute report with emphasis on significant events in Asia and the Pacific region)
1305	BBCWS(am)	Outlook (topical magazine of people, places and events)
1305	R. Canada Int.	This Morning (continues from 1210)

1320	R. Australia	The Planet (Lucky Oceans, a/k/a Reuben Gosfield: music from around the world with a rich mix of jazz, blues, folk styles, art music)
1330	R. Sweden	Sixty Degrees North (reports, interviews and analysis on the Nordic region)
1345	BBCWS(am)	Off the Shelf (abridged serialized readings of novels, stories and other literature)
MONDAY		
1330	China R. Int.	People in the Know (interviews with prominent Chinese who are shaping the nation's future)
1345	R. Sweden	Sports Scan (a weekly report on sports in the Nordic region)
TUESDAY		
1330	China R. Int.	Sports World (the sports scene in China and Asia)
1345	R. Sweden	Close Up (profiles of people in Sweden from all walks of life)
WEDNESDAY		
1345	R. Sweden	Money Matters (a weekly economic report on the Nordic region)
THURSDAY		
1345	R. Sweden	Nordic Report (a monthly magazine on Scandinavia, 1st week) Greenscan (Azariah Kiros: Swedish environmental awareness, 2nd week) Heart Beat (Gaby Katz: monthly health and medical magazine, 3rd week) The S-Files (Kris Boswell: Sweden behind the headlines, 4th week)
FRIDAY		
1330	China R. Int.	Life in China (a weekly magazine focusing on the lives of ordinary people in China)
1345	R. Sweden	A Report on the Nordic Newsweek (the week's main news stories)
SATURDAY		
1300	Channel Africa	Channel Africa Extra (a weekend magazine and variety show with news, sports, music, regular reports and features)
1305	BBCWS(am)	World Football (a lively and forthright look at the world's favorite sport)
	R. Australia	The Science Show (one of the longest running programs on ABC Radio)
1310	R. Canada Int.	The House (Jason Moscovitz presents a review of the week in Canadian national politics)
1330	BBCWS(am)	The Music Feature (features and documentaries providing insight into current popular music genres)
	R. Sweden	Weekend (a magazine about Europe from the Radio E consortium, 1st week) Sweden Today (George Wood presents the voices of Sweden, 2nd week) Spectrum (Bill Schiller covers the Swedish cultural scene, 3rd week) Studio 49 (conversations on ideas and long-term trends in Sweden and the Nordic region, 4th week)

1400 UTC/ 10am E/7am P - Page 50 Freqs

SUNDAY		
1400	Channel Africa	Channel Africa Extra (continued from 1300)
1405	BBCWS(am)	Talking Point (live, global phone-in where listeners and internet users can share their views on the issues of the day and put questions to expert guests)
	R. Australia	Books and Writing (Ramona Koval conducts in-depth discussions focusing on books, ideas and writing)
	R. Canada Int.	The SUNDAY Edition (continues from 1310, usually with a feature documentary)
1410	R. Japan	Roundup Asia (interviews and reports highlighting various aspects of the rapidly changing Asian region)
1420	China R. Int.	In the Spotlight (Chinese arts and cultural magazine)
1430	WHRI(6040 kHz.)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
1435	R. Netherlands	Sincerely Yours (RN's listener response program)
1455	R. Netherlands	The Week Ahead (on RN the next seven days)
MONDAY-FRIDAY		
1405	R. Australia	The Planet (continues from 1320)
1405	R. Canada Int.	This Morning (continues from 1210)
1415	R. Japan	44 Minutes (current affairs magazine about Japan and Asia)
1430	R. Netherlands	Newline (news, analysis and background reports)
MONDAY		
1405	BBCWS(am)	Meridian-Masterpiece (critical examinations of creative endeavors)
1430	BBCWS(am)	Charlie Gillett (presents his selection of music from around the globe)

Shortwave Guide



China R. Int.
1445 R. Canada Int.
People in the Know (interviews with prominent Chinese who are shaping the nation's future)
Out Front (a place for new ideas, new ways of making radio and new voices from across Canada)

TUESDAY

1405 BBCWS(am) Meridian-Screen (interviews, documentaries, features and discussions on the film arts)
1430 BBCWS(am) UK Top Twenty (music from the British rock and pop charts)
China R. Int. Sports World (the sports scene in China and Asia)
1445 R. Canada Int. Out Front (a place for new ideas, new ways of making radio and new voices from across Canada)

WEDNESDAY

1405 BBCWS(am) Meridian-Writing (Harriett Gilbert explores fiction and non-fiction, plays and poetry, lyrics and letters)
1430 BBCWS(am) Revolver (popular musicians select and present five current musical releases)
1445 R. Canada Int. Out Front (a place for new ideas, new ways of making radio and new voices from across Canada)

THURSDAY

1405 BBCWS(am) The Music Biz (Mark Coles with a weekly look at the global music industry)
1430 BBCWS(am) John Peel (with his own unique and eclectic mix of new music)
1445 R. Canada Int. Out Front (a place for new ideas, new ways of making radio and new voices from across Canada)

FRIDAY

1405 BBCWS(am) Arts in Action (architects, playwrights, musicians and poets explain the ideas which shape our worlds)
1430 BBCWS(am) Jazzmatz (Alyn Shipton with the best new releases, interviews with modern artists and tributes to the jazz greats)
China R. Int. Life in China (a weekly magazine focusing on the lives of ordinary people in China)
1430 R. Canada Int. C'est La Vie (Bernard St.-Laurent presents a program about life in Quebec and French-speaking Canada)

SATURDAY

1400 Channel Africa Channel Africa Extra (continued from 1300)
1405 BBCWS(am) Sportsworld (live commentary on major sports events worldwide, reports and results from around Britain and Europe)
R. Australia New Dimensions (intimate conversations with many of this century's leading thinkers and social innovators)
R. Canada Int. The Vinyl Cafe (Canadian humorist and storyteller Stuart McLean plays music he's found at a mythical record store and weaves tales centered around the store's neighborhood)
1410 R. Japan Weekend Square (various aspects of Japan in a friendly and relaxed atmosphere with interviews, music and discussions)
1435 R. Netherlands Europe Unzipped (the events of the past week in Europe, some unusual)
1455 R. Netherlands Insight (Rob Green casts a critical and humorous eye on the past week's headlines)

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

DAILY

1530 R. Austria Int. Report from Austria (a daily magazine focusing on Austria and central and eastern Europe)

SUNDAY

1500 R. Netherlands WHRI(15105 kHz.) Dutch Horizons (Bertine Krol chronicles life in Holland)
DXing with Cumbre (Marie Lamb with the hottest DX catches)
1505 BBCWS(am) Concert Hall (classical music recitals and performances; the last program of the month is reserved for listeners' requests)
R. Australia Encounter (a highly acclaimed series exploring the connections between religion and life while reflecting on the religious experience of multicultural Australia)
The Sunday Edition (continues from 1310)
1530 R. Canada Int. Aural Tapestry (David Swattling weaves threads from different cultures and periods of history to tell interesting stories)
R. Netherlands Radio E (A weekly magazine on Europe jointly produced by the BBC and other European broadcasters.)
1535 R. Austria Int.

MONDAY-FRIDAY

1505 R. Australia Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)

MONDAY

1500 R. Netherlands The Research File (a magazine emphasizing the relevance of science to all our lives)
1505 BBCWS(am) One Planet (stories about the environment, development, agriculture and human impact on the natural world)

1530 BBCWS(am)

R. Australia

R. Netherlands

TUESDAY

1500 R. Netherlands Music 52-15 (Martha Hawley presents musical styles from around the globe)
1505 BBCWS(am) Science in Action (Richard Black reports on the fascinating worlds of science and technology)
1530 BBCWS(am) Essential Guide (the biggest developments, issues and names in global affairs)
R. Australia The Law Report (Damien Carrick presents breaking legal stories in Australia and overseas.)
R. Netherlands A Good Life (how development affects societies)

WEDNESDAY

1500 R. Netherlands The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)
1505 BBCWS(am) Health Matters (reports on research explaining where medicine is going)
1530 BBCWS(am) Everywoman (the BBC's international magazine for women)
R. Australia The Religion Report (Stephen Crittenden examines the way religion and societies interact)
R. Netherlands Dutch Horizons (Bertine Krol chronicles life in Holland)

THURSDAY

1500 R. Netherlands Aural Tapestry (David Swattling weaves threads from different cultures and periods of history to tell interesting stories)
1505 BBCWS(am) Go Digital (technology journalist Tracey Logan explains the latest in IT)
1530 BBCWS(am) Omnibus (a weekly documentary) [Early this month, Jolyon Mitchell reports from Ghana on the country's thriving film industry]
R. Australia The Media Report (Mick O'Regan: the latest developments in the communications industry)
R. Netherlands The Research File (a magazine emphasizing the relevance of science to all our lives)

FRIDAY

1500 R. Netherlands A Good Life (how development affects societies)
1505 BBCWS(am) Discovery (in-depth exploration of ideas and discoveries in science and technology)
1530 BBCWS(am) Sports International (the issues and personalities behind the headlines)
China R. Int. Life in China (a weekly magazine focusing on the lives of ordinary people in China)
R. Australia The Sports Factor (Amanda Smith: debate and celebrate the cultural significance of sport.)
R. Netherlands The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)

SATURDAY

1500 R. Netherlands Music 52-15 (Martha Hawley presents musical styles from around the globe)
1505 BBCWS(am) Sportsworld (continues from 1405)
R. Australia Nocturne (a beautifully woven tapestry of sound presented by Mairi Nicolson)
R. Canada Int. Quirks and Quarks (what's new and next in science)
1530 R. Netherlands Roughly Speaking (European youth lifestyles magazine)

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

SUNDAY

1605 BBCWS(am) Sunday Sportsworld (live commentary on major sports events and fixtures, reports and results from around Britain and Europe, and news of all the day's sporting action from around the world)
R. Australia The National Interest (Terry Lane's round-up of the week's major issues)
R. Netherlands Wide Angle (a weekly in-depth look at a news topic)
1645 WWCR(15825kHz) New Horizons (award-winning science and technology report from London Radio Service)

MONDAY-FRIDAY

1600 BBCWS(am) Europe Today (news, analysis and comment on issues and events on the continent)
R. Netherlands Newline (news, analysis and background reports)
WWCR(15685kHz) World Wide Country Radio (country music)
1630 BBCWS(am) World Business Report
1645 BBCWS(am) Sports Roundup (all the daily sporting news worldwide)

TUESDAY

1605 R. Australia The Comfort Zone (Alan Saunders: the cultural significance of architecture and design, landscape and gardens, and food)

WEDNESDAY

1605 R. Australia Verbatim (a program that charts the story of the 20th

People and Places (a forum for the exchange of views and experiences on a global scale)
The Health Report (Dr. Norman Swan's weekly report on health and medical issues)
EuroQuest (a magazine placing Europe in context)

1630 R. Australia

THURSDAY

1605 R. Australia Hindsight (Australian social history through the broad themes of institutions, popular culture, health and the environment)

FRIDAY

1605 R. Australia Away! (Produced and presented by Aboriginal broadcasters, national indigenous arts and culture program)

SATURDAY

1600 BBCWS(am) News
1605 BBCWS(am) Sportsworld (continues from 1405)
R. Australia Nocturne (continues from 1505)
R. Netherlands Europe Unzipped (the events of the past week in Europe, some unusual)
1645 WWCR(12160kHz) Eco-Watch (global environmental report from London Radio Service)

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

DAILY

1700 R. Japan News (a round-up of Asian and world news)

SUNDAY

1700 Voice of Greece All Greek to Me (Greek traditional and popular music)
1705 R. Australia The Spirit of Things (Dr. Rachael Kahn: contemporary values and beliefs expressed through ritual, art, music, and sacred texts)
VOA Africa Reporters Roundtable (Ashenaf Abedje: roundtable of VOA journalists; analysis of the major news in Africa)
1710 R. Japan Hello from Tokyo (listener letters, music and short features)
1730 VOA Africa Music Time in Africa (Rita Rochelle: the best of traditional and modern African music)[part two airs at 1930]

MONDAY-FRIDAY

1705 R. Australia Bush Telegraph (Belinda Varischetti hosts an entertaining look at rural and regional issues around Australia)
VOA News Now Talk to America (Carol Pearson: call-in show featuring American decisionmakers, personalities and experts)

MONDAY

1710 R. Japan Pop! Goes Asia (cultures and lifestyles of Asian countries through their popular music)

TUESDAY-SATURDAY

1715 R. Japan 44 Minutes (current affairs magazine about Japan and Asia)

SATURDAY

1700 Voice of Greece Hellenes Around the World (Greeks and Greek culture and influence in the world)
1705 R. Australia New Dimensions (interviews with leading thinkers and social innovators)
VOA Africa Hip Hop Connections (Rod Murray: latest US hip hop music, interviews, information of interest to African youth)

2000 UTC/ 4pm E/1pm P - Page 52 Freqs

SUNDAY

2000 WWCR(15825kHz) Eco-Watch (global environmental report from London Radio Service)

THURSDAY-SUNDAY

2000 WBCQ Maine Radio Caroline (music and more from the legendary British pirate radio station)

THURSDAY

2030 WWCR(15825kHz) World of Radio (Glenn Hauser's comprehensive review of the week in broadcasting)

FRIDAY

2045 WWCR(15825kHz) New Horizons (award-winning science and technology report from London Radio Service)

SATURDAY

2000 WHRI(5745kHz) DXing with Cumbre (Marie Lamb with the hottest DX catches)
2030 WWCR(15825 kHz) Presidential Radio Address/Democratic Response

2100 UTC/ 5pm E/2pm P - Page 53 Freqs

SUNDAY

2100 WBCQ Maine Radio Free Euphoria (Captain Ganjo's unique form of "va-

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riety" show)
 WHRI(5745kHz) DXing with Cumbre (Marie Lamb with the hottest DX catches)
 WRMI(15725kHz) Viva Miami (Radio Miami International's listener magazine program)
 2105 BBCWS(am) Global Business (Peter Day charts the transformations sweeping through the world of work and commerce)
 2110 R. Australia AM (ABC Radio's flagship morning news magazine)
 2130 R. Australia Educational series (documentary programs dealing with Asia or Pacific history, politics or communications.)
 2145 BBCWS(am) Write On (Dilly Barlow and Penny Vine sift through the listener mail)

MONDAY-FRIDAY

2100 WWCR(12160kHz) World Wide Country Radio (country music)
 2105 BBCWS(am) World Business Report

MONDAY

2100 WBCQ(7415kHz) Jean Shepherd (the noted humorist's classic radio programs from the 60s and 70s)
 2110 R. Australia AM (ABC Radio's flagship morning news magazine)
 2130 R. Australia The Health Report (Dr. Norman Swan's weekly report on health and medical issues)
 2145 BBCWS(am) Analysis (background to the stories in the news)

TUESDAY

2110 R. Australia AM (ABC Radio's flagship morning news magazine)
 2130 R. Australia Innovations (a program showcasing Australian invention, enterprise and ingenuity)
 WBCQ Maine International World Beat Music with DX Merlin
 2145 BBCWS(am) Analysis (background to the stories in the news)

WEDNESDAY

2110 R. Australia AM (ABC Radio's flagship morning news magazine)
 2130 R. Australia The Religion Report (Stephen Crittenden examines the way religion and societies interact)
 2145 BBCWS(am) From Our Own Correspondent (the background to international events from BBC correspondents)

THURSDAY

2110 R. Australia AM (ABC Radio's flagship morning news magazine)
 2130 R. Australia Rural Reporter (ABC's rural reporters present news and stories from rural and regional Australia)
 2145 BBCWS(am) Analysis (background to the stories in the news)

FRIDAY

2100 WBCQ Maine WHRA(17650kHz) Juliet's Wild Kingdom
 DXing with Cumbre (Marie Lamb with the hottest DX catches)
 2105 R. Australia Feedback (Roger Broadbent answers listener questions and provides regular updates about RA)
 2130 R. Australia Oz Sounds (Australian new music releases)
 2130 WBCQ Maine Pab Sungenis Project (stand-up comedy and sketches)
 2145 BBCWS(am) Analysis (background to the stories in the news)

SATURDAY

2100 WBCQ Maine HarvZaver (a personal selection of contemporary music)
 2105 R. Australia Australia All Over (Ian McNamara—aka "Mocco"—hosts this celebration of Australian values)
 2130 WHRA(17650kHz) DXing with Cumbre (Marie Lamb with the hottest DX catches)
 2145 BBCWS(am) Patterns of Faith (a global exploration of religious values and human wisdom)

2200 UTC/ 6pm E/3pm P - Page 54 Freqs

DAILY

2200 BBCWS(am) The World Today (the BBC's agenda-setting flagship global news program)

SUNDAY

2200 R. Canada Int. The World This Weekend (CBC weekend news magazine)
 WRMI(15725kHz) Viva Miami (continues from 2100)
 2210 R. Australia AM (ABC Radio's flagship morning news magazine)
 2230 BBCWS (am) Agenda (ideas and trends shaping our world)
 R. Canada Int. The Inside Track (anthologies and documentaries about sports and those who compete in them)
 R. Vlaanderen Int. Radio World (Frans Vossen presents a weekly report about international radio)
 2240 R. Australia The Australian Music Show (the latest rock music from the Triple J youth network of the ABC)

MONDAY-FRIDAY

2200 R. Canada Int. The World at Six (the CBC's flagship evening newscast)
 2230 R. Canada Int. As It Happens (Barbara Budd and Mary Lou Finley interview newsmakers eyewitnessing news in the making)

MONDAY

2210 R. Australia AM (ABC Radio's flagship morning news magazine)
 2240 R. Australia Music Deli (Australian performances of folk, acoustic, traditional and world music)

TUESDAY

2210 R. Australia AM (ABC Radio's flagship morning news magazine)
 2240 R. Australia Blacktracker (Mal Holmes presents contemporary Aboriginal music)

WEDNESDAY

2210 R. Australia AM (ABC Radio's flagship morning news magazine)
 2240 R. Australia Oz Country Style (country music from Australia)

THURSDAY

2210 R. Australia AM (ABC Radio's flagship morning news magazine)
 2230 WBCQ Maine Uncle Ed's Musical Memories
 2240 R. Australia Jazz Notes (Australian jazz presented by Ivan Lloyd)

FRIDAY

2205 R. Australia Asia-Pacific Weekend Edition (regional news and business report)
 2230 BBCWS(am) People and Politics (insight and analysis on British politics)
 R. Australia AM Saturday (ABC Radio's weekend morning news magazine)
 WBCQ Maine Wanton Display of Control and Disruption

SATURDAY

2200 R. Canada Int. The World This Weekend (CBC weekend news magazine)
 WBCQ Maine Radio Timtron Worldwide
 2205 R. Australia Correspondents Report (overseas reporters give their interpretation and analysis of the week's major events)
 2230 BBCWS(am) From Our Own Correspondent (background to the news from BBC correspondents around the world)
 R. Australia The Business Report (Narelle Hooper: a weekly round-up of the latest business news and information)
 R. Canada Int. Madly Off in All Directions (satire and comedy)
 R. Vlaanderen Int. Music from Flanders (a half-hour of Flemish music, musicians and musical performances)
 WHRI(9495kHz) DXing with Cumbre (Marie Lamb with the hottest DX catches)

2300 UTC/ 7pm E/4pm P - Page 54 Freqs

SUNDAY

2300 BBCWS(am) The World Today (the BBC's agenda-setting flagship global news program)
 WBCQ Maine Le Show (Harry Shearer with a tour-de-force variety show)
 2305 R. Canada Int. Global Village (Lew Taylor fields reports and music from global venues)
 2310 R. Australia Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
 2320 China R. Int. In the Spotlight (Chinese arts and cultural magazine)
 2330 BBCWS(am) Pick of the World (Daire Brehon with highlights from the past week's WS programs)
 R. Australia Earthbeat (Alexandra DeBlies presents a program on environmental science)
 2330 WHRI(5745kHz) DXing with Cumbre (Marie Lamb with the hottest DX catches)
 2335 R. Netherlands Sincerely Yours (RN's listener response program)
 2355 R. Netherlands The Week Ahead (an RN the next seven days)

MONDAY-FRIDAY

2305 BBCWS(am) Outlook (topical magazine of people, places and events)
 2305 R. Canada Int. As It Happens (continues from 2230)
 2330 R. Netherlands Newline (news, analysis and background reports)

MONDAY

2310 R. Australia Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
 2330 China R. Int. People in the Know (interviews with prominent Chinese who are shaping the nation's future)
 R. Australia The Buzz (the week's big technology news and issues presented by Richard Aedy)
 2345 BBCWS(am) Write On (Dilly Barlow and Penny Vine sift through the listener mail)

TUESDAY

2310 R. Australia Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
 2330 China R. Int. Sports World (the sports scene in China and Asia)
 R. Australia RA Arts with Julie Copeland (an arts-related interview and a film review)
 2345 BBCWS(am) Heart and Soul (global religious and spiritual experiences)

WEDNESDAY

2310 R. Australia Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
 2330 R. Australia Rural Reporter (ABC's rural reporters present news and stories from rural and regional Australia)
 2330 WBCQ Maine World of Radio (Glenn Hauser's comprehensive review of the week in shortwave and international broadcasting)
 2345 BBCWS(am) Westway (drama serial)

THURSDAY

2310 R. Australia Asia-Pacific (Radio Australia's flagship current events and business report for and about Asia and the Pacific region)
 2330 R. Australia The Media Report (Mick O'Regan takes a critical look at the latest developments in the communications industry)
 2345 BBCWS(am) What's the Problem (a panel of experts offers advice to listeners who write in with their problems)

FRIDAY

2300 WBCQ Maine The Lost Discs Radio Show (spinning obscure oldies and "B" sides from 1955-70)
 2305 R. Australia Lingua Franca (a program about language and its social, cultural and historical ramifications.)
 2330 China R. Int. Life in China (a weekly magazine focusing on the lives of ordinary people in China)
 R. Australia The Sports Factor (Amanda Smith presents reports which debate and celebrate the cultural significance of sport.)
 2345 BBCWS(am) Westway (drama serial)

SATURDAY

2300 WBCQ Maine The Real Amateur Radio Show
 2301 BBCWS(am) Play of the Week (classic and contemporary drama for radio)
 2305 R. Australia All in the Mind (the mind, brain and behavior—everything from addiction to artificial intelligence—presented by Natasha Mitchell)
 2305 R. Canada Int. Quirks and Quarks (what's new and next in science)
 2330 R. Australia Innovations (a program showcasing Australian invention, enterprise and ingenuity)
 WBCQ Maine Fred Flintstone's Music Show
 2335 R. Netherlands Europe Unzipped (the events of the past week in Europe, some unusual)
 2335 R. Netherlands Insight (Rob Green casts a critical and humorous eye on the past week's headlines)

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Larry Basinger, KY; Harold Frodge, Midland, MI; Alokesh Gupta, New Delhi, India; Glenn Hauser, Enid, OK; Michael Murray, UK; Nigel Holmes/Radio Australia; Michael C. McCarty, Plain City, OH; Adrian Sainsbury, Radio New Zealand Intl; Harold Sellers, Joe Squashic, Wake Forest, NC; Robert E. Thomas, II, Bridgeport, CT; Larry Van Horn, Brasstown, NC; *BBC On Air*; *BCL News*; *BCDXC*; *Cumbre DX*; *DXA*; *DX Listening Digest*; *DX Ontario*; *Fineware*; *Hard Core DX*; *HFCC*; *ILG*; *NASWA*; *World of Radio*; *Worldwide DX Club*.

Software for the Shortwave Listener...

Radio Listener's Database NOW FREE
 SWBC Schedules - Broadcast frequencies and programs, updated monthly+ NOW FREE
 Smart R8 Control - for the Drake R8/R8A/R8B \$60
 Smart Icom Control - for IC-R75 \$60
 Smart NRD Control - for NRD-535/545 \$60
 Smart Kenwood Control - for R-5000 \$60
 Smart Audio Control - Scope, spectrum analyzer \$35

Fineware

11252 Cardinal Drive • Remington, VA 22734-2032
 fineware@fineware-swl.com • www.fineware-swl.com



Our Digital Future

When this publication appears, the launch of the next NOAA polar orbiting weather satellite (WXSAT) – NOAA-M – should be very close. Back in October 1978, TIROS-N was launched, followed less than a year later by NOAA-A (6). At yearly intervals, NOAA-B followed, then NOAA-C (7) in June 1981. More recently, NOAA-L (16) was launched in September 2000.

NOAA-M is the latest in the advanced TIROS-N (ATN) series built by Lockheed Martin Space Systems Company (LMSSC). Additionally, NOAA-M is the third in the series to support dedicated microwave instruments for the generation of temperature, moisture, surface and hydrological products in cloudy regions where visible and infrared instruments have decreased capability. The new WXSAT is scheduled for a morning orbit launch on June 24, and is eagerly awaited by APT enthusiasts, particularly since NOAA-16 – the early afternoon WXSAT – lost its APT facility.



Fig 1: Artist's impression of NOAA-M in orbit – courtesy NOAA-NASA

NOAA supports two Polar-orbiting Operational Earth Observation Satellites (POES), with sun-synchronous orbits separated so that everywhere on earth is observed at least twice in 12 hours. In practice, NOAA has not switched off all the older satellites, so we are able to monitor APT from NOAA-12, NOAA-14 and NOAA-15, rather than just the two “officially” operational WXSATs. NOAA-16 does provide HRPT (high resolution imagery) – only the actual APT transponder (or switch) failed.

❖ Future launches

After NOAA-M, we have just two years before NOAA-N, its launch currently scheduled

for June 2004, for which an evening orbit is planned. Launch of NOAA-N is currently scheduled for 2008.

❖ Our digital future

Looking at the timetable for future WXSAT launches, we can see that the era of digital transmissions is rapidly approaching. Later this year, EUMETSAT and ESA (European Space Agency) oversee the launch of the MSG-1 (Meteosat Second Generation-1) WXSAT into geostationary orbit. This will provide the new digital versions of WEFAX and PDUS – known as Low Rate Information Transmission (LRIT) and High Rate Information Transmission (HRIT).

The good news is that data transmissions will provide unprecedented quality imagery, together with other data streams. I suspect commercial companies will eventually provide decoding facilities for many of these at ‘amateur’ prices. The not-so-good news is that at a stroke, European amateurs lose their low-cost access to near-real-time image transmissions that have provided such a legacy of hobbyist interest. Prices for the new systems that will be required to directly receive and decode imagery are likely to be prohibitive at first. I hope I may be proved wrong!

Although NOAA’s polar orbiting WXSATs are scheduled to continue providing worldwide users with ongoing high-quality imagery, later in this decade, substantial changes will be made to both NOAA constellations – polar orbiting and geostationary satellites. Such future changes are inevitable given the need to implement new technologies, the need to acquire additional and different data, and the need to achieve a cost effective US environmental satellite program.

The change that occurs soonest is the replacement of the GOES analog WEFAX transmission service with the digital Low Rate Information Transmission (LRIT) during the period 2002 to 2004. By early 2004, it is expected that NOAA will have completed this transition, and WEFAX will no longer be transmitted from the NOAA GOES satellites.

LRIT data will continue to be transmitted on the same 1691.0 MHz frequency, so users will need to upgrade or replace both receiving hardware and processing software to access LRIT. This new format will become the world-

wide standard for the low data rate image transmission service from geostationary satellites by all meteorological/environmental satellite operators during the next several years.

❖ Earlier NOAA WXSATs

NOAA WXSATs have a long record of active service, and this is illustrated by noting that NOAA-10 was only deactivated as recently as 0952 UTC on August 30, 2001. At that time, low rate instrument data (the *Tiros Information Processor*, or TIP) was being transmitted, and the *Search and Rescue* facility was still being used for global search and rescue. NOAA-10 was launched back in September 1986.

NOAA-11 can still be heard via its VHF beacon, but also transmits TIP data on an HRPT frequency. Stored TIP is being retrieved for its *Solar Backscatter Ultra-Violet* instrument data.

Chuck Vaughn continues to provide images from FengYun-1C on his website. His latest picture came with his comments: “This FYIC image of NW Canada is really a color image even though it almost looks grayscale. Most everything in this image must be frozen.”



<http://www.aa6g.org/>

Fig 2: Northwest Canada from Fengyun-1C April 2, 1642UTC from Chuck Vaughn

Frequencies:

NOAA-14 transmits APT on 137.62 MHz
NOAA-12 and -15 transmit APT on 137.50 MHz
Meteor 3-5 transmits APT on 137.30 MHz when in sunlight
Meteor 2-21 may transmit APT on 137.85 MHz when Meteor 3-5 is off.
GOES-8 and GOES-10 use 1691.0 MHz for WEFAX

Satellite Service Guide

Robert Smathers

roberts@nmia.com

www.monitoringtimes.com/mts.sg.html

All Frequencies MHz

SES Americom Satcom C3 - C-Band

131 degrees West longitude

1(V)	3720	ABC Family - West / National Geographic Channel / Fox Sports World / Health Network / Fox Movie Channel (digital)
2(H)	3740	The Learning Channel - East (VC2 +)
3(V)	3760	In-Demand PPV (digital)
4(H)	3780	Lifetime - West (VC2 +)
5(V)	3800	Hallmark Channel (digital and analog)
6(H)	3820	CourtTV East / CourtTV West / Northwest Cable News (digital)
7(V)	3840	CSPAN-1 5.20 CSPAN Audio 1 - C-SPAN Radio 5.40 CSPAN Audio 2 - BBC World Service
8(H)	3860	Style Channel / ESPN Classic / Toon Disney / Soapnet / ESPNNews / Bloomberg Television / WE: Women's Entertainment TV (digital)
9(V)	3880	MusicChoice (digital)
10(H)	3900	America's Store (analog) / Home Shopping Espanol (digital)
11(V)	3920	Fox Cable Networks (digital)
12(H)	3940	History Channel - East (VC2 +)
13(V)	3960	The Weather Channel (VC2 +) 7.78 Weather Channel background music
14(H)	3980	New England Sports Network / Boston Catholic TV / Red Sox Extra (digital)
15(V)	4000	MTV Specialty Networks / VH-1 Specialty Networks / Nickelodeon Specialty Networks (digital)
16(H)	4020	Showtime HDTV (East)
17(V)	4040	The Movie Channel - East (VC2 +)
18(H)	4060	TV Land East / TV Land West (digital)
19(V)	4080	Showtime - East, The Movie Channel - East, Flix - East, Sundance-East / Showtime (Central), The Movie Channel - Central (digital)
20(H)	4100	Jones Space Segment / Product Information Network / Great American Country (digital)
21(V)	4120	Comedy Central - East (digital)
22(H)	4140	Discovery Networks (digital)
23(V)	4160	E! Entertainment TV - East (VC2 +) / E! Entertainment TV - West (digital)
24(H)	4180	Oxygen Network (VC2 +)

Panamsat Galaxy 1R - C-Band

133 degrees West longitude

1(H)	3720	Comedy Central - West (VC2 +)
2(V)	3740	Univision - East / Univision - West / Telefuturo - East / Telefuturo - West (digital)

3(H)	3760	Encore Services: Love Stories - East / Westerns - East / Mystery - East / Action - East / True Stories - East / Love Stories - West / Westerns - West / Mystery - West / Action - West / True Stories - West (digital)
4(V)	3780	TV Food Network / Do-It-Yourself Network / Fine Arts Network (digital)
5(H)	3800	Classic Arts Showcase
6(V)	3820	The National Network (TNN) - West (VC2 +)
7(H)	3840	Disney Channel - West (VC2 +)
8(V)	3860	Cartoon Network (VC2 +)
9(H)	3880	ESPN Blackout (digital)
10(V)	3900	MSNBC (VC2 +)
11(H)	3920	Eternal Word Television Network (EWTN) 5.40 WEWN - Worldwide Catholic Radio 1 (English) 5.58 WEWN - Worldwide Catholic Radio (Spanish) 7.38 WEWN - Worldwide Catholic Radio 2 (English)
12(V)	3940	ShopNBC
13(H)	3960	Encore Networks: STARZ! - East / STARZ! Theater - East / Black STARZ! - East / Encore - East / WAM - East / STARZ! - West / STARZ! Family - East / STARZ! Cinema - East / Encore - West / STARZ! Cinema - West
14(V)	3980	ESPN Blackout (VC2 +)
15(H)	4000	Turner Broadcasting services (digital)
16(V)	4020	Turner Broadcasting services (digital)
17(H)	4040	INSP - the Inspirational Network (analog and digital) 5.58 Genesis Communications Radio Network 7.92 WNMX-FM Waxhaw, NC - variety
18(V)	4060	HBO Comedy - East / HBO Zone - East / WMax - East / @Max - East / HBO Comedy - West / HBO Zone - West / ThrillerMax - East / OuterMax - East / ThrillerMax - West / 5-Star Max - East (digital)
19(H)	4080	Cinemax - East (VC2 +)
20(V)	4100	Home and Garden Network (VC2 +)
21(H)	4120	USA Network - West (VC2 +)
22(V)	4140	Good Life TV Network (VC2 +)
23(H)	4160	HBO - East / HBO 2 - East / HBO Signature - East / HBO Family - East / HBO Latino - East / HBO - West / HBO 2 - West / HBO Signature - West / HBO Family - West / HBO Latino - West / Cinemax - East / MoreMax - East / ActionMax - East / Cinemax - West / MoreMax - West / ActionMax - West (digital)
24(V)	4180	Trio / Newsworld International / Crime (digital)

SES Americom Satcom C4 - C-Band

135 degrees West longitude

1(V)	3720	American Movie Classics (VC2 +)
2(H)	3740	AT&T HITS 4 (digital)
3(V)	3760	Nickelodeon - East (VC2 +)
4(H)	3780	Telefuturo - Mountain / Univision - Mountain / Galavision - East / Galavision - West (digital)
5(V)	3800	STARZ! Plex - East / STARZ! Plex - West / STARZ! Cinema - West / STARZ! - East / STARZ! - West / STARZ! Theater - West / Black STARZ! - West / STARZ! Family - West / Encore - West / WAM - West (digital) California Channel (digital)
6(H)	3820	History Channel - West (VC2 +)
7(V)	3840	Bravo (VC2 +)
8(H)	3860	TV Guide Channel (digital)
9(V)	3880	QVC Network
10(H)	3900	Home Shopping Network (HSN)
11(V)	3920	Speed Channel (VC2 +)
12(H)	3940	techtv
13(V)	3960	Travel Channel (VC2 +)
14(H)	3980	Video services (digital)
15(V)	4000	Animal Planet (VC2 +)
16(H)	4020	AT&T HITS 12 (digital)
17(V)	4040	MTV - East (VC2 +)
18(H)	4060	In-Demand PPV (digital)
19(V)	4080	C-SPAN 2 (analog) / C-SPAN 3 (digital)
20(H)	4100	Sundance Channel (VC2 +)
21(V)	4120	Discovery - East (VC2 +)
22(H)	4140	Flix - East (VC2 +)
23(V)	4160	VH-1 - East (VC2 +)
24(H)	4180	Country Music Television (VC2 +)

SES Americom Americom-7 - C-Band

137 degrees West longitude

1(H)	3720	Occasional video
2(V)	3740	KMGH-TV, Denver, CO - ABC affiliate (VC2 +)
3(H)	3760	(none)
4(V)	3780	Data Transmissions
5(H)	3800	KDVR-TV, Denver, CO - FOX affiliate (VC2 +) 5.58 Colorado Talking Book Network 7.50 WOKIE Satellite Radio Network
6(V)	3820	KCNC-TV, Denver, CO - CBS affiliate (VC2 +)
7(H)	3840	fx - East (VC2 +)
8(V)	3860	8.00 Cable Radio Network NBC East, Central, Mountain and Pacific (digital)
9(H)	3880	Data Transmissions
10(V)	3900	(none)
11(H)	3920	(none)
12(V)	3940	(none)
13(H)	3960	(none)

14(V)	3980	KUSA-TV, Denver, CO - NBC affiliate (VC2 +)
15(H)	4000	(none)
16(V)	4020	(none)
17(H)	4040	(none)
18(V)	4060	Data Transmissions
19(H)	4080	FoxNet (VC2 +)
20(V)	4100	(none)
21(H)	4120	(none)
22(V)	4140	(none)
23(H)	4160	KWGN-TV, Denver, CO - WB affiliate (VC2 +)
24(V)	4180	(none)

SES Americom Americom-8 - C-band

139 degrees West longitude

1(V)	3720	Data Transmissions
2(H)	3740	Data Transmissions
3(V)	3760	Analog SCPC Audio Services / Digital SCPC Audio Services 1404.60 55.40 Wyoming News Network / Northern Ag Network 1396.60 63.40 Kansas Info. Network / Kansas AgNet 1396.20 63.80 Missouri / Cardinals MLB Radio Network 1395.90 64.10 Western Montana Radio Network / Red River Farm Net 1395.70 64.30 Missouri / Royals MLB Radio Network 1386.40 73.60 Learfield Communications 1383.80 76.20 Liberty Works Radio Network 1382.10 77.90 Missouri
4(H)	3780	Data Transmissions
5(V)	3800	Data Transmissions
6(H)	3820	Data Transmissions
7(V)	3840	Data Transmissions
8(H)	3860	Data Transmissions
9(V)	3880	Data Transmissions
10(H)	3900	Data Transmissions
11(V)	3920	Data Transmissions
12(H)	3940	Data Transmissions
13(V)	3960	Data Transmissions
14(H)	3980	Data Transmissions
15(V)	4000	Westwood One Radio / CBS Radio / CNN Radio (digital)
16(H)	4020	Data Transmissions
17(V)	4040	Learfield Communications (digital)
18(H)	4060	Data Transmissions
19(V)	4080	Data Transmissions
20(H)	4100	Data Transmissions
21(V)	4120	Premiere Radio Networks (digital)
22(H)	4140	Data Transmissions
23(V)	4160	ABC Radio Satellite Services (digital)
24(H)	4180	Alaskan Rural Communications Service (digital)

Metro Fed Monitoring: NYC

Readers have often asked for a profile of federal frequencies for their specific locations. Until recently I have resisted doing such summaries in this column, but now I am in a position to accommodate those requests. So, starting with this issue of *The Fed Files*, we will do a series of federal frequency profiles for each of the top 50 cities in the U.S.

These area profiles will not be complete, but will be a representative survey of what frequencies are available in each area, based on the best information we have from open sources. We cannot personally visit every area we cover in this column, so I am relying on those of you who live in the areas we profile to update us on what you are hearing. Coming issues will cover Los Angeles, Chicago, Houston, and Philadelphia. Readers in those areas are invited to submit reliable information to share with your fellow monitors.

We will not cover any Department of Defense (DoD) frequencies in these profiles. Complete nationwide coverage of those frequencies are available for purchase on CD-ROM – *Grove Military Frequency Directory*. You can find out more information about that product on the Grove website at <http://www.grove-ent.com>

❖ The Big Apple Fed Frequencies

We will start our series on federal metro monitoring with the largest city in America – New York City.



NYPD Helicopter and Police Cruiser

HF (frequencies kHz, mode single sideband)
 Federal Bureau of Investigation 2332 2810 5060 5390 6954
 7905 9185 9240 9313 10500 10915 11075 11492.5
 12140 14460 14532 15955 16174 16341 18171 18581
 18666 19131 19346 20350 20604 23404 23805 24205
 24775 26569 27785
 Federal Communications Commission 2110 4483 7603 7790
 10655 13830 13990 18050 19230 22964 23035
 Federal Emergency Management Agency 2320 2360 2377
 2445 2658 3341 3379 3388 4780 5211 5821 5961
 6049 6106 6151 6176 7348 10493 11721 11801
 11957 12129 12216 14450 14776 14836 14885 14899
 14908 18483 20027 20063
 Immigration and Naturalization Service 5911 5911.5 5912.5 9433.5
 National Weather Service 2773 2776 3360 3363 6976 6979
 9946 9949

VHF/UHF (frequencies MHz, mode narrowband FM)

Agriculture Department 170.475
 Alcohol, Tobacco and Firearms 165.2875 166.4625 166.5375
 169.550 170.100
 Animal Plant and Health Inspection Service 170.525 171.575
 411.225 415.225
 Bureau of Prisons 170.650 170.875 170.925 407.950 408.550
 408.750 409.250 409.750 413.650 413.725 417.750
 418.550
 Commerce Department 123.050 166.150 169.075
 Customs Service 165.2375 165.4875 166.125 166.4375
 166.5625 169.450 171.075
 Drug Enforcement Administration 162.7875 411.125 411.175
 413.750 413.975 414.000 414.075 414.125 414.150
 414.175 414.325 414.425
 414.525 414.600 416.050
 416.200 416.275 417.025
 417.075 417.100 417.175
 417.400 417.450 417.500
 417.550 418.625 418.675
 418.750 418.825 418.925
 418.950 418.975 419.000
 419.250 419.275 419.375
 419.400
 Energy Department 171.200
 171.950
 Federal Aviation Administration
 162.350 164.050
 165.7625 166.175
 169.250 169.325 169.375
 172.175 172.850 172.925
 407.175 408.825 410.300
 410.900 416.875 419.025
 Federal Bureau of Investigation
 41.990 148.675 150.700
 160.305 160.695 162.250
 162.7375 163.050

163.725 163.750 163.8625 163.9125 164.150 164.525
 164.600 164.775 165.5375 165.875 165.925 165.975
 166.075 166.850 167.150 167.2375 167.2875 167.3375
 167.5375 167.5625 168.075 168.100 168.150 168.225
 168.300 168.650 168.700 168.825 170.025 170.375
 170.425 170.450 170.550 170.625 170.825 170.900
 171.550 172.325 172.425 172.475 172.525 173.050
 173.150 412.400 412.500 412.575 414.275 414.475
 414.550 414.600 419.150 419.525
 Federal Communications Commission 167.050 172.800
 Federal Emergency Management Agency 139.825 139.925 142.950
 143.000 173.7875
 Federal Reserve System 170.975 171.3875 172.225 411.250
 413.925
 General Services Administration 413.875 415.200 417.200
 Housing and Urban Development 408.400
 Immigration and Naturalization Service 162.825 163.625 163.675
 163.725 163.775 165.825 168.900 168.950
 Internal Revenue Service 163.125 164.100 165.950 166.000
 167.000 167.100 411.550 414.700 414.900 415.000
 415.100 415.425 415.800 418.175 418.225 418.725
 419.575
 Justice Department 411.025
 Labor Department 406.200 411.350
 Marshal Service 162.7125 163.200 163.8125 170.800 408.525
 411.050 411.100 412.700 419.650
 National Ocean Service 156.800 157.125
 National Oceanic and Atmospheric Administration 410.725 410.825
 410.850 410.875 416.175 416.900 416.975
 National Park Service 151.205 151.340 151.355 151.370
 155.535 155.565 166.875 166.925 167.950 168.550
 National Weather Service 162.550 163.300 171.025 412.775
 Secret Service 164.400 164.8875 165.375 165.6875
 165.7875 166.400 166.4625 170.000
 Smithsonian Institute 154.570 168.275
 State Department 165.6125 165.7125 166.100 170.575
 407.200 408.100 408.600 409.150 409.625 409.700
 416.425
 US Information Agency 406.575 406.625 406.725 410.000
 410.025 412.025 412.375 416.5375 416.6125 416.6875
 419.150
 US Postal Service 163.375 164.200 166.200 166.375 169.000
 169.375 169.850 169.1125 169.175 169.275 169.850
 170.125 170.175 171.000 172.300 173.6125 406.325
 406.350 407.150 407.550 407.650 407.725 407.775
 408.025 408.050 408.150 408.175 409.025 409.375
 409.550 410.200 410.325 411.150 411.275 413.700
 414.725 414.750 415.050 415.550 415.950 416.225
 416.775 416.950 417.650 418.100 418.300 418.350
 Veterans Affairs 164.700 164.9375 164.9625 165.1875
 165.5625 166.675 168.525 169.1125 170.350 408.125
 409.175 409.275 409.300 409.325 409.400 411.425
 415.400
 White House Communications Agency 162.6875 164.650 165.375
 165.7875 166.5125 167.025 169.925 171.2875 407.850

415.700

Wireless: Mikes 169.445 169.505 170.245 170.305 171.045
171.105 171.845 171.905

❖ NYC FAA Air Traffic Control Frequencies

As part of our metro profiles I will also include FAA Air Traffic Control allocated frequencies for major airports in the area we are covering. In the New York City area there are three major airports: John F. Kennedy, La Guardia, and Newark.

John F. Kennedy International Airport (JFK)

Tower Audio Website: <http://www.jfktower.com/>

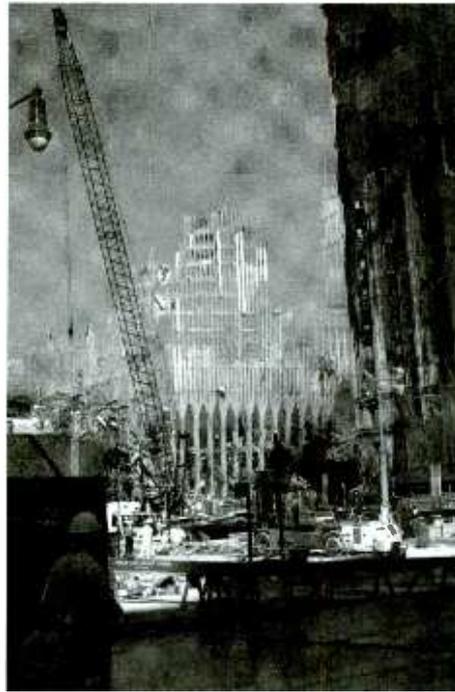
ATIS	115.100 (Departure) 115.400 (Arrival-SW) 117.700 (Arrival-NE) 128.725 (Arrival)
Pre-Taxi Clearance	135.050 348.600 (North and South)
Clearance Delivery	135.050 348.600 (North and South)
Gate Hold	125.050
Kennedy Ground	121.650 121.900 348.6 (North and South)
Kennedy Tower	119.100 (Runways 04R/22L and 13L/31R) 123.900 (Runways 04L/22R and 13R/31L) 281.550
Unicom	122.950
Emergency	121.500 243.000
Class B Airspace	125.250 281.550
New York Approach	118.400 123.700 126.800 127.400 132.400 134.35
New York Departure	123.700 124.750 134.250 135.900
FAA VHF assignments	162.350 165.7625 169.250 169.325 172.175 172.925
ILS assignments	330.800 332.150 332.600 332.900
Airway Maintenance	410.300/407.175
Security Net	416.875/408.825 410.900/408.825
Wind Shear Alert System	416.875

La Guardia Airport (KLGA)

ATIS	125.950 (Arrival) 127.050 (Departure)
Pre-taxi Clearance	135.200
Clearance Delivery	121.875
La Guardia Ground	121.700 121.850 263.000
La Guardia Tower	118.700 263.000
Helicopter	135.200
Unicom	122.950
Emergency	121.500 243.000
Class B Airspace	119.950 (North) 126.050 (South) 263.000
New York Approach	118.000 120.800 124.950 127.300 128.800 (Final) 132.700
New York Departure	120.400 124.450 127.050
FAA VHF assignments	165.6625 169.250 169.325 172.175 172.925
ILS assignments	329.600 329.900
Wind Shear Alert System	409.175

Newark International Airport (KEWR)

ATIS	115.700 (Arrival) 132.450 (Departure) 134.825(South Arrival)
Pre-taxi Clearance	118.850
Clearance Delivery	118.850
Gate Hold	126.150
Newark Ground	121.800
Newark Tower	118.300 134.050 257.600
Unicom	122.950
Emergency	121.500 243.000
Class B Airspace	125.500 127.850 257.600



New York, NY, September 14, 2001 — Rescue workers and equipment surround the remaining facade of one of the twin towers of the World Trade Center in downtown Manhattan. Photo by SFC Thomas R. Roberts/ NGB-PASE

New York Approach	127.600 128.550 132.700 132.800
Final Vector	125.850
New York Departure	119.200
FAA VHF assignments	162.275 164.050 166.175 169.350 172.175 172.950
ILS assignments	330.050 330.500 331.250
FAA UHF assignment	411.450
Wind Shear Alert System	419.025

❖ Western New York INS

This month we received an anonymous submission regarding the Immigration and Naturalization Service frequencies in use in western New York state. Here is that bandplan. Thanks to our anonymous contributor.

Channel	Transmit	Receive	PL tone
1	162.825	163.625	100.0
2	162.925	163.625	100.0
3	163.625	163.625	100.0
4	163.675	163.675	123.0
5	162.825	163.675	123.0
6	162.925	163.675	123.0
7	162.825	163.725	151.4
8	162.825	163.625	151.4
9	166.4375	165.2375	100.0

❖ NTSB Frequencies

With all the recent investigations of railroad and aircraft accidents, we have had several requests for the frequencies used by the National Transportation Safety Board (NTSB).

Channel 1	166.750
Channel 2	165.7625
Channel 3	166.175

❖ Civilians Authorized Frequencies in the Federal Spectrum?

In February 2002, the Department of Defense submitted its long-awaited report to Congress regarding the feasibility of sharing the 138-144 MHz band with public safety users. A DoD Joint Spectrum Center engineering study identified ways sharing would be possible without interfering with DoD operations.

Deputy Assistant Secretary of Defense for Spectrum and C3 Policy Steven Price said, "We believe it is possible to share portions of the 138-144 MHz band with public safety users on a limited, coordinated basis. DoD is willing to work with National Telecommunications and Information Administration (NTIA), state and local governments and first responders on a case-by-case basis to explore sharing the band for the common good."

While the 138-144 MHz band continues to be critical to DoD operations, the department has found it helpful in emergencies to share communication systems with other first responders. A small number of channels may be shared on a regional basis when it is to the mutual benefit of DoD and public safety officials.

DoD operations that would be affected if this band were interrupted through heavy use of too many channels would include air-surface-air, air traffic control and ground support functions at military airfields, tactical communications for close air support, land mobile radios for sustaining installation infrastructure support and land mobile radios and specialized equipment for training and test range support. Other systems that would be affected include fire and security alarms, and hydrology and utility controls.

And that wraps up this month's edition of *The Fed Files*. I would like to thank all our contributors for the information they have shared with our MT readers. Until next month 73 and good hunting.

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EDACS Systems and Palm Programs

With the anticipated release of a digital scanner from Uniden in a few months the issue of encryption has taken on a much greater importance among scanner listeners. What would the point be in purchasing a digital-capable scanner if all of the voice traffic were encrypted, making it unintelligible? And what about other forms of encryption now available to radio system operators?

❖ EDACS Encryption

Dear Dan,

I would like to see more information on the EDACS Security Key mentioned in your April 2002 Monitoring Times article, "Encrypting EDACS". I don't see the point in encrypting the control channel data; can't anyone still listen to the analog voice communications on any scanner in a non-trunk-following mode, like we used to do before trunk tracking scanners? Why can't the agency just switch to digital mode to keep scanner listeners from listening to sensitive voice traffic, no scanner is capable of tuning these digital EDACS communications. Don't EDACS systems also offer the option of encrypting voice traffic? I don't see the security advantage "ESK" has over digitizing or encrypting voice communications.

Thanks, David

For those readers that missed the April column, the EDACS Security Key (ESK) is a new product that M/A-COM is promoting as an add-on to their EDACS and ProVoice trunked radio systems. ESK encrypts the messages carried on the control channel, allowing only those radios programmed with the proper decryption key to operate on the network. This would have the added side effect of preventing trunk-tracking scanners from following EDACS conversations.

EDACS systems come in several different varieties. The standard system uses analog voice transmissions, which can be overheard on almost every scanner on the market. To actually follow a conversation you would need a trunk-tracking scanner capable of understanding the EDACS control channel. Some popular EDACS-capable scanners include the Radio Shack Pro-92, Pro-93 and Pro-94 as well as the Uniden Bearcat 245XLT and 780XLT. These and other trunk-tracking scanners work well on the "normal" EDACS systems.

Instead of analog voice transmissions, EDACS systems can be upgraded to carry voice traffic in digital form. The first digital voice

format for EDACS was called "Voice Guard" and was introduced in the mid-1980s. The second-generation product, initially available around 1990, was called AEGIS and provided a large improvement in voice quality over Voice Guard. The current digital voice product is called "ProVoice" and uses an IMBE (Improved Multi-Band Excitation) voice encoder/decoder. (Even though APCO Project 25 also uses the IMBE vocoder, it is not interoperable with ProVoice.)

Each of these three digital voice products can additionally be encrypted in one of two ways. The first is called "VGE" and is a homegrown encryption method developed during the Voice Guard days. The second and probably more secure method uses the Data Encryption Standard (DES) as specified by the U.S. Federal Information Processing Standard (FIPS). DES and Triple-DES, a more secure variation of DES, have recently been replaced by the Advanced Encryption Standard (AES) as the recommended commercial cryptographic standard. DES is more than 20 years old and with the tremendous increase in computing power since then it has been shown to be vulnerable to "brute force" attacks on its relatively short 56-bit key.

So, an EDACS system may have analog, AEGIS digital or ProVoice digital voice traffic. If it has digital voice traffic, that traffic might be unencrypted (so-called "in the clear"), encrypted with VGE or encrypted with DES.

VGE and DES encrypt only the voice channel traffic. The ESK product will encrypt the control channel, and can be used independently of whether the voice traffic is analog or digital, encrypted or not.

Although ESK would prevent trunk-tracking scanners from following EDACS conversations, the primary purpose of this product is to tightly control the two-way radios that can use the system. Without ESK, anyone with an EDACS two-way radio and the proper equipment can program the radio to access the system, whether authorized or not. With ESK, only those radios containing the secret security key can decrypt control channel messages from the repeater, and more importantly, transmit properly encrypted control channel messages to the repeater. ESK will prevent "rogue" radios from making use of a protected EDACS system.

❖ Sample EDACS Systems

Lake and Will Counties, Illinois

In northeastern Illinois, Lake and Will Counties operate EDACS radio networks but so far

have not shown a great deal of interest in encryption.

Lake County, bordering Wisconsin and Lake Michigan, contracted for an eight-channel, four-site simulcast system in 1999 to replace a hodgepodge of 20-year-old conventional radio systems. Assigned frequencies are 866.2500, 866.3000, 866.6375, 866.6875, 867.1250, 867.7250, 867.8125 and 868.5625 MHz.

Will County, just south of Chicago, has been operating EDACS since 1998. It serves well over 600 users on nearly 1,000 trunked portable and mobile radios. Besides the Sheriff's Office, a number of county and municipal agencies use the system, including the Office of Emergency Management, Animal Control, County Forest Preserve, Highway Department, Adult and Juvenile Detention facilities and the State's Attorney's Office. AEGIS encryption is in use on a few talkgroups.

The system uses the following frequencies: 866.2750, 866.7625, 867.1500, 867.7000, 868.2500, and 868.6000 MHz.

Illinois State Police

Sandwiched between Lake and Will Counties is Cook County, home to two simulcast EDACS systems, each with 10 channels. The Illinois State Police, who bought the first EDACS system in 1989, operates these systems as two zones, North and South. Some talkgroups are encrypted, primarily for detectives and covert operations.

The North system uses 866.8875, 866.4625, 867.3875, 866.9625, 867.4625, 867.8875, 868.3875, 868.4625, 868.8875, and 868.9625 MHz. North transmitter sites are Chicago (top of the Sears Tower), Des Plaines, East Dundee and Elgin.

The South frequencies are 866.4125, 866.4375, 866.9375, 867.4125, 867.9375, 867.9125, 868.4375, 868.4125, 868.9375, and 868.9125 MHz. Transmitter sites are Chicago (also at the top of the Sears Tower), Argonne and Chicago Heights.

Midland, Texas

The city of Midland, Texas, operates a two-site EDACS system from downtown and out at the airport. Frequencies are 856.7125, 857.7125, 858.7125, 859.7125, 860.7125, 856.2625, 857.2625, 858.2625, 859.2625 and 860.2625 MHz. Police, Fire, Water, Parks and the Emergency Operations Center are all on the system, as well as Airport Operations and the Airport Police. The Midland Fire and Police

Department vehicles also have mobile data terminals (MDT) that communicate with the computer aided dispatch (CAD) system using the EDACS system.

Camden, New Jersey

Just outside Philadelphia, the city of Camden, New Jersey, runs a five-channel EDACS system on 856.9875, 857.9875, 858.9875, 859.9875, and 860.9875 MHz. So far, monitors have reported police transmissions with some AEGIS digital activity.

Toronto, Ontario, Canada

Pearson International Airport (identifier CYYZ) in Toronto, Ontario, has an EDACS system operating on 857.6375, 857.8875, 859.3875 and 859.6375 MHz. While you're listening, you can hear the north control tower on 118.7 MHz and the south tower on 118.35 MHz (remember that aircraft transmissions are in AM mode).

❖ Palm Scanner Control Software

Dan,

In reference to your article in the April issue of Monitoring Times, can you point me to the website(s) that have software for Palm handhelds? Thanks, James

Personal Digital Assistants have been in common use for several years now, and with an add-



Fig 1: With an additional serial data cable a PDA can be used to control a number of different radios.

on serial data cable they can be used to control a number of different radios. Most PDA software applications are written for devices that use the Palm Operating System (PalmOS), a list that includes the various Palm devices, the HandSpring Visor, IBM's Workpad, the Sony Clie, and similar handheld units. The small size and portable nature of the Palm makes it a very convenient tool for accessing and controlling scanners while on the road or away from larger laptops and personal computers.

ICOM PCR-1000

One of the earliest applications was for the ICOM PCR-1000, a very capable computer-control-only radio that initially could be controlled only via ICOM software running under Windows on a PC. Unfortunately, ICOM stuck to their shortsighted policy of not releasing the specification for the control commands that the radio understood, insisting that their "official" software was the only way to use the radio. This situation resulted in a number of individuals "reverse-engineering" the commands by eavesdropping on data cable between the radio and the computer. Unofficial command lists soon circulated on the Internet and a number of third-party control programs were developed.



Fig 2: One of the earliest PDA control applications was for the ICOM PCR-1000, but it required reverse-engineering.

One problem that a handful of early users experienced was the corruption of the internal calibration data stored in an EEPROM (Electrically Erasable Programmable Read-Only Memory) inside the PCR-1000. Apparently it is possible to corrupt this data with some series of commands, causing the radio to "go deaf" and no longer operate correctly. It would be a prudent idea to back-up the contents of this EEPROM prior to experimenting with third party control software. I have used a program called BackPCR, available at <http://www.mahy.demon.co.uk/backper/backper.htm> with good results, although I've never had an EEPROM corruption problem.

For controlling the PCR-1000, one popular choice is Geoff Wicks' PCR Pilot software, available on his website at <http://www.users.bigpond.com/geoffwicks/PCRPilot.htm>

Bearcat 245XLT

Control software on the Palm for the Uniden Bearcat BC245XLT can be found at <http://www.bc245xlt.com/sp245.htm>

This is a smaller version of the commercial ScanPro software. You can download the Palm program for free, but registration will cost \$10. I have not tried this software, but the description indicates that you can "edit frequencies, set trunking channels, and trunking system type here. Click on the Status display to show the scanner mode and squelch status anytime. Page through the entire bank to edit any frequency." There are also selections for priority, data skip and attenuation.

Bearcat 780xlt

Similarly, a scaled-down version of ScanPro for the Uniden Bearcat BC780XLT is advertised at <http://www.bc780xlt.net/sp780.htm> where you can order it for \$14.95. The 780XLT does have more features on the front panel than the 245XLT but is not nearly as portable.

Optoelectronics OptoCom

The OptoCom is a nifty computer-control-only receiver that was the result of collaboration between Florida-based Optoelectronics and scanner manufacturer GRE. There is a small demonstration control program at <http://www.optoelectronics.com/files.htm> which will load OptoCom frequencies into the Palm and then instruct the radio to scan them, allowing lockout and skip. It's pretty rudimentary, but the OptoCom instruction set is well documented and available for download on the Optoelectronics website.

TenTec RX-320

This is not directly related to trunk tracking, but if you have the TenTec RX-320 short-wave receiver you can use a Palm program written by Michael Newell, WB4HUC, to control your radio. The software can be found at <http://wb4huc.home.texas.net/rx320/>

❖ Other Software

Other radio-related software for the Palm can be found on Peter K. Hodgson's website at <http://www.qsl.net/va3pkh/palm-ham.html> You'll find a variety of things, from DXing aids to satellite tracking.

Mike Agner, KA3JJZ, maintains a very comprehensive list of computer software for radio monitoring and control at <http://www.strongsignals.net/access/content/software.html> His list includes numerous DOS, Windows, Mac and UNIX software programs.

That's all for this month. Get out and enjoy the summertime (here in the Northern Hemisphere), if you can, and let me know what you're monitoring via electronic mail at dan@signalharbor.com. As always, my website at <http://www.signalharbor.com> has additional information and links. Until next month, happy monitoring!

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

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- Computer control
- Flexible dynamic memory
- Optional CTCSS & Extra memory boards

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HF ACARS and Sydney Airport

Welcome aboard everyone! It's summer and time to take our handheld scanners outdoors to picnics, airshows, places where we can do some airplane spotting and all kinds of fun things. If you decide to put up a new outdoor antenna or perform preventive maintenance, please be very careful climbing up and down ladders. You're all very important to us!

◆ A High Frequency ACARS Decoder

It was just about this time last year that we talked about VHF ACARS Decoders. I received a lot of email from readers asking if there was ever going to be any HF ACARS and if there was going to be a decoder for it. Well, I knew that HF ACARS transmission was in its infancy; however, as far as a decoder, I wasn't sure it was possible. Guess I was wrong, because there is now a software program just for that purpose – the HFDL ACARS Decoder!

At present, the program is a beta version and freeware; however, its author, Charles Brain, says the new version, which will soon be available, will have all the bells and whistles, i.e., a slightly better demodulator, disk logging, a DDE interface so it can talk to other programs (such as AirNav ACARS decoder) and a link into DxAtlas, using OLE automation to

allow plotting of aircraft positions. There will be a charge for the complete software, although Charles says that the freeware program will continue to be available for those who want it.

Equipment needed to use the decoder is minimal. A receiver with SSB capabilities, a reasonably fast (500MHz+) computer, and a good sound card. The sound level is controlled through the Windows Mixer controls. Charles mentions that the modem software includes AGC, so it should be fairly tolerant of level; however, he adds "Do not overdrive your soundcard!"

Of course, you will also need an audio cable (easily obtained from Radio Shack) hooked up between your computer sound card and your HF receiver, just as you do with a VHF ACARS decoding setup.

To cut to the chase, to get the software go to <http://communities.msn.co.uk/ACARS> and visit the Documents section. There, you'll find the program and manual ready to download. While you're there, check out the community. It's for VHF/HF ACARS enthusiasts worldwide and is one of the most interesting and informative websites I've seen on the subject. I joined a while back and have learned more about ACARS from the others who are members than I knew in the past 20 years. Mark Avey is the website manager and is a very knowledgeable chap.

If anyone wants more info on the ins and outs of the program and more tips on reception, please email me personally. Also see last month's *Utility World* column and next month's *Digital Digest* column. As you can tell, Charles Brain's HFDL Decoder program is the hottest news in the hobby!

◆ Sydney Airport ATC

Many thanks to Will Tidmarsh, Webmaster, Editor & Author, Sydney Airport Enthusiasts WWW Site for permission to use the following information (and for being a fan of *Monitoring Times*!) Pay them a visit at <http://www.acay.com.au/~willt/yssy> See you all in August with some of the company frequencies used at Sydney Airport.

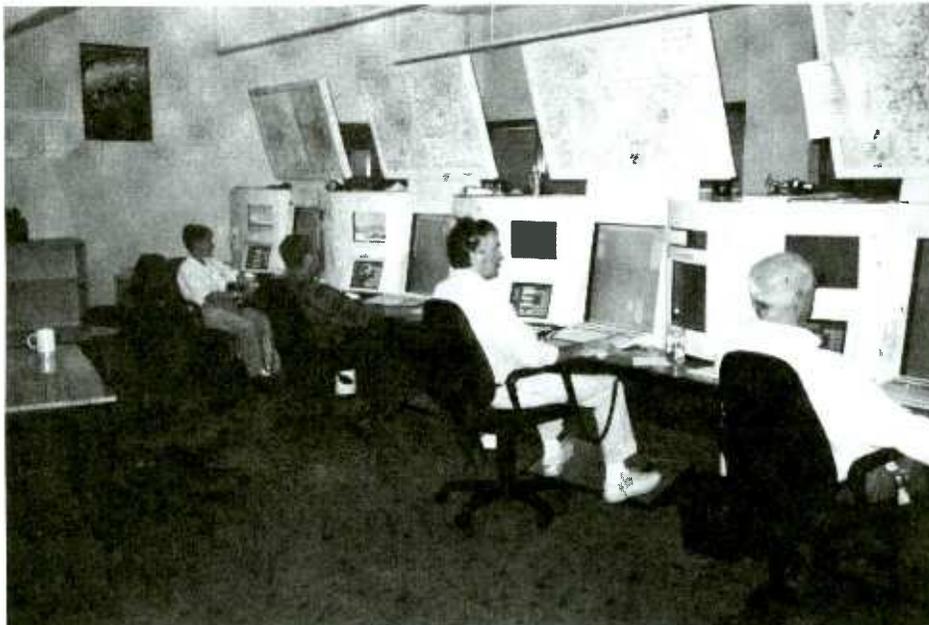
SYDNEY AIRPORT FREQUENCIES

ATIS: 428 kHz, 112.100, 118.550, 126.25
Approach: 124.400 (Between 40 NM N & 20 NM N)
128.300 (Between 30 NM S & 10 NM N)
135.900/363800 (Richmond CTR)
PRM: (Precision Approach Radar Monitoring)
133.250 (Parallel Approach Radar-East)
119.450 (Parallel Approach Radar West)
Departures: 123.000 (N&E)
129.700 (S, W & NW)
118.400 (S, W & NW)
Clearance Delivery: 133.800
Ground Control: 121.700 - East
126.500 - West
Terminal: 135.100 (Inbound Clearances)
Radar: 124.55 (Directed Traffic Information) S&W
125.800 (Directed Traffic Information) N&E
Tower: 120.500 (RWYs 16R/34L, 07/25)
124.700 (RWYs 16L/34R)

Sydney Air Traffic Control

Sydney has two Air Traffic Control nerve centers. The familiar Tower, with its unique external spiral staircase, looks after aerodrome surface traffic and local airborne traffic. The Terminal Control Unit (TCU) looks after the terminal airspace (TMA) out to 45 miles (*akin to the TRACON here in the US – jb*). This captures both Sydney-based traffic and also aircraft operating in controlled airspace to and from nearby airports, and helicopters and sight-seeing flights operating around the metropolitan area. These other flights are controlled to make sure they remain separated from the aircraft using Sydney Airport.

Controlled airspaces outside the TMA, i.e., the more distant, higher steps and the inter-city



The Sydney Terminal Control Unit

bridges, are controlled by one of the two ATC centers – Melbourne Centre for flights operating in the southern half of the continent and Brisbane Centre for those operating to the north.

The tower and TCU are manned 24 hours a day. In the tower there are seven positions which can be combined in various configurations to suit traffic and workload: two surface movement controllers, two aerodrome controllers, a coordinator, an Air Data Systems Officer and a supervisor. On a night shift, between 11pm and 6am, these functions are combined and manned by two controllers.

In the TCU there are a number of controllers, but in the main there are six who feed traffic to or accept traffic from Sydney Airport. As in the tower, positions can be combined and staff reduced during periods of low traffic density.

Surface Movement Control ("Sydney Ground")

The surface movement controllers (SMC) provide the Ground function: control of taxiing aircraft, vehicles, and pedestrians on the surface of the aerodrome. SMC West on 126.5 controls the taxiways west of the main north-south runway and movements into and out of the international terminal. SMC East on 121.7 controls taxiways east of 16R/34L and entry to/exit from the domestic terminals.

Actual gate allocation is done by the airline companies for the domestics and by the Federal Airports Corporation's Terminal Operations Controller for the internationals, and that information is fed via computer links to the tower so that the Ground controllers can organize taxi routes and pushback approvals.

Ground Control

The Ground Controller's job is done mostly visually, and by keeping a traffic picture in his head with the help of some memory aids. A Surface Movement Radar (the rapidly rotating antenna on top of the tower) provides a picture of ground traffic; attached callsign tags are colored to indicate arrivals, departures or vehicles. The arriving callsign tags also show the gate to which the aircraft is headed.

The other memory aid is what's known as a

'flight strip'. Formerly a strip of paper in a plastic holder, they became fully computerized with the introduction of The Advanced Australian Air Traffic System (TAAATS), and comprise one 'strip' for each flight, containing information drawn by another computer from the flight plan. As the flight progresses the strip is digitally 'passed' from controller to controller, each recording essential control data, clearances, and other useful information.

Aerodrome Control ("Sydney Tower")

The Aerodrome Controllers (ADC) provide the tower function – control of landing and departing traffic and of aircraft, vehicles and personnel entering or crossing active runways. ADC West (120.5) controls runway 16R/34L and runway 07/25 (the east-west) when it is active. When RWY 07/25 is not active it is released to the Ground Controllers so they can use it as a taxiway. ADC East (124.7) controls the third runway, 16L/34R and also the taxiways immediately associated with his runway.

The parallel runways are a little over 1km apart and the airspace between them is a "no-go zone." Procedures and normal clearances are designed to make each controller's traffic turn away from the no-go zone and in this way, each controller operates totally independently from the other, allowing each to maintain the highest possible movement rate. Exceptions are helicopters operating to and from the west into the main heliport located almost directly under the approach/departure path controlled by ADC East; these movements must be coordinated between the ADCs.

Like the Ground Controllers, the ADC's job is mostly visual, but rapidly becomes radar-based when clouds drop below about 2000ft and visibility below about 6km.

There are two radar sensors – for redundancy and for coverage. Primary terminal area radar coverage comes from the Terminal Area Radar (TAR) located in the no-man's land between the parallel runways. Long range coverage of Sydney traffic for the Melbourne and Brisbane centers is provided by a secondary surveillance radar unit at Mt Boyce in the Blue Mountains. The radar coverages overlap in the terminal area, so that if the Sydney TAR fails, Mt Boyce can provide a backup.

The labels on the controllers' radar displays show aircraft callsign, weight category (for wake turbulence considerations), ground speed and altitude and, of course, the radar return will show how far out from the airport the next arrival is. Among many other considerations, the controller will use this information to help him decide whether or not to clear the next departure for take-off or authorize a slow-moving tug with an aircraft under tow to cross the runway.

The Terminal Control Unit

The TCU in Sydney is responsible for the airspace in the Sydney Basin out to 45 NM and

up to FL280 (28,000 ft). As mentioned earlier, in the TCU there are primarily six controllers who feed traffic to or accept traffic from the airport.

Non-controlling positions in the TCU include Flow Control, whose job it is to monitor and 'regulate' the flow of traffic into Sydney (by use of holding, speed restrictions and runway allocations); Planner, who mans the 'Sydney Terminal' frequency (the general frequency used for clearances into Sydney controlled airspace); and the Centre Coordinator, who among many other things, liaises with the tower supervisor to determine active runways, based on the weather conditions and the traffic demand at the time. All controllers in the TCU are able to communicate with each other and with other enroute, terminal, and tower controllers through a series of 'hotlines' (leased line and dedicated satellite connections) accessed through a touch-screen.

It's useful to try to visualize the air route structure. There are defined northbound, southbound, eastbound and westbound routes. En-route controllers in the Melbourne and Brisbane ATC Centres handle aircraft in these "freeways," and solve the en-route high-altitude cross-overs.

For any terminal area the freeways effectively become one-way in-bound and one-way out-bound routes. To help ATC provide a smooth traffic flow there may also be "slow lanes" for non-jet aircraft, and "fast lanes" for jet aircraft – both inbound and outbound. The TCU's job is to solve all the cross-overs that are involved in getting arriving aircraft off the arrival routes, over or under the departures and onto the runways and also getting the departing aircraft off the runways, under or over the arrivals and onto the departure routes.

There are various tools and procedures to assist with this – STARS (STandard Arrival Routes) and SIDs (Standard Instrument Departures) and also standardized procedures, methods and airspace allocations within which each controller must work his or her traffic.

The segregated airspace described earlier means that generally controllers handling inbound traffic and those handling outbound traffic do not need to interact, except in unusual circumstances such as thunderstorms which force diversions from standard procedures or flights that cannot comply with normal route structures.

Condensed from text by Frank Patterson & Mark Dowsett, Air Traffic Services Centre, Sydney

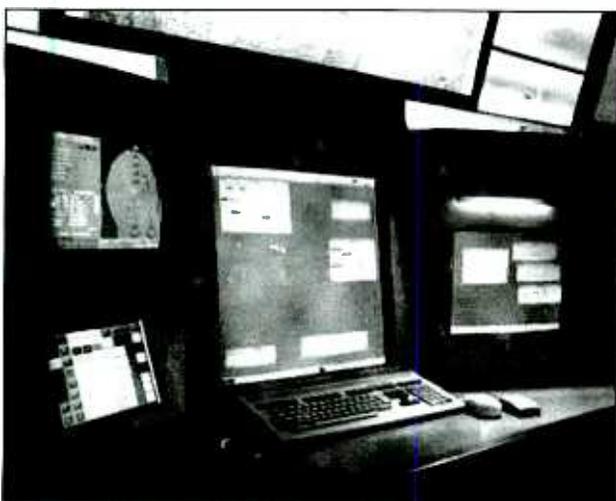
from our readers...

I am a disabled radio hobbyist and MT reader. I have recently created the "Disabled American Radio Hobbyists" group. I created DARH to bring together disabled Americans who are in the radio listening hobby. With this in mind I'd like to welcome disabled American readers to visit DARH at:

<http://groups.yahoo.com/group/DARH> and consider joining this upstart and what I consider unique group.

Thank you :).

73,
Ryan



The Advanced Australian Air Traffic System (TAAATS) made paper flight strips obsolete

24 Hours on 1030 kHz

Back in April, I mentioned my "AutoDX" software, which allows me to record a given frequency across the top of each hour, hopefully catching the station identification announcements. Ralph Craig AJ8R in western Ohio has tried another kind of recording, with interesting results.

Ralph has an Icom R-71 and a 50-foot wire antenna. He also has a Radio Shack 22-805 digital voltmeter with computer interface. He connected the voltmeter across the R-71's S-meter, then hooked up a 486 computer running the Radio Shack interface software under Microsoft Windows 3.11. He then tuned the R-71 to 1030 kHz and let it run for 18 hours. The result was this strip chart. The limitations of the printing process make some of the details on this chart a bit difficult to read. Which is unfortunate; Ralph provided valuable notes.

The chart starts at 1700 local (Eastern) time and runs through 1100 the next morning. The vertical axis corresponds to S-meter reading, with the strongest signal recorded during this period being just over S9+20dB. The weakest signal, on the right side of the chart, is just under S1. (Ralph has a very quiet location!)

WBZ Boston is already in as the recording begins. You see its signal build over the next hour – and then promptly weaken. A bit after 1800, the signal strength builds again, but this time, the station is KCTA Corpus Christi. (You can't tell that from the chart, but Ralph was listening on the speaker) KCTA was heard for about 20 minutes, before WBZ returned and dominated the channel.

WBZ continues to come in at strengths between about S9 and S9+20dB all night, though with wild fluctuations. Of course, fading has been

a problem for AM broadcasters for 80 years... At 0600, WBZ is fading, and WWGB near Washington signs on. WWGB "owns" the frequency until about 0700 when it becomes a mess of interference. By about 0745, KCTA Corpus Christi returns. But it's past sunrise, and signals are fading fast. By 0900, KCTA is gone and 1030 kHz is empty.

We all know that AM propagation improves at sunset and deteriorates at sunrise. This chart is graphic proof. It also shows just how deep fading can be. There are a few other phenomena I'm not going to try to explain!

❖ Mailbag

We had an unexpected "DX Feast" in mid-March. WFAN-660 and WCBS-880 share a common antenna on High Island in the Bronx. Work on a standby antenna at the site forced one or both stations to sign off the air for several hours overnight on several consecutive nights. On 660, DXers heard CFFR Calgary and XEDTL Mexico City; some were lucky enough to catch St. Lucia. On 880, stations heard included CHQT Edmonton, CKLQ Brandon, and two unidentified stations – one from Latin America and the other with English-language preachers (probably either WCBW in Illinois or KGHT near Little Rock). I'm afraid all I landed here were CHQT and the religious station.

Another unexpected and unusual bit of DX has been present on 1510 kHz. A number of Midwestern DXers have been reporting an unidentified gospel music station on this frequency at night. Then, Eric Loy in Champaign, Illinois, reported logging KGA Spokane, Washington, on the same

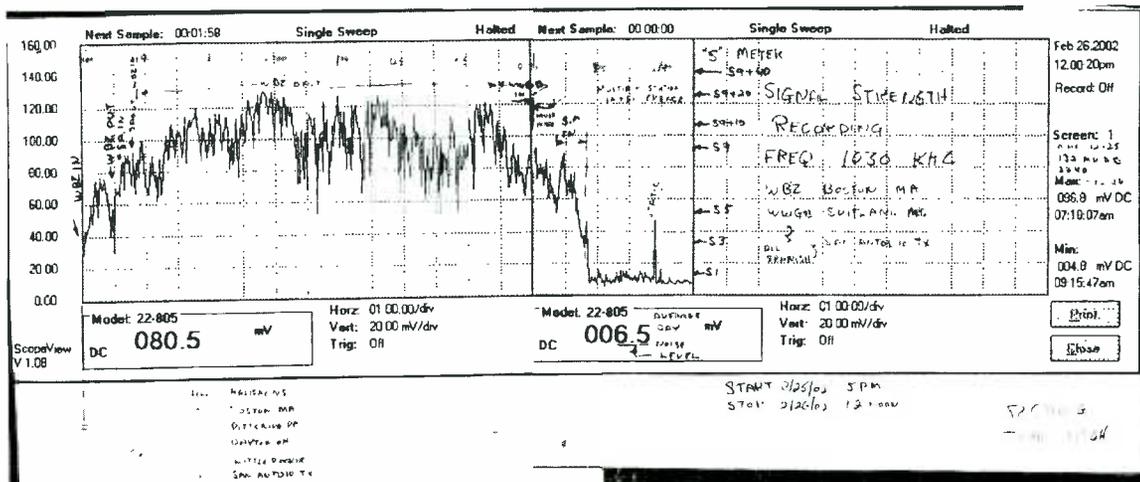
frequency. I'm not all that far from Champaign, so I decided to give it a try. And much to my surprise, I succeeded – landing my first Pacific Northwest DX ever. There's a recording on <http://audio.w9wi.com/kga-1510-022802-0700z.mp3>. I'm 18 miles from the 50,000-watt WLAC transmitter, on the same frequency!

It should be noted that WLAC has a "null" in its antenna pattern to protect KGA from interference, and I live in the middle of that null. Their effective power in my direction is only 633 watts. Still, that's more than enough power to cover 18 miles. And, KGA also uses a directional antenna to protect WLAC – they should be putting only 79 watts in my direction. Something strange is going on, and DXers should keep an ear on 1510.

Patrick Griffith near Denver recommends radio fans check out the website of Crawford Broadcasting, <http://www.crawfordbroadcasting.com>. Click on the "stations" link to see basic information about each of Crawford's stations; some of these links have further links to photos of the transmitter sites. The "engineering" link has more photos, and some interesting technical information on their Chicago stations' plans to adopt IBOC digital transmission this summer. Patrick is wondering what the creature in the microwave in the St. Louis photos is!

Also from Patrick, a couple of decent DX loggings. KVOZ-890 Laredo, Texas, gave an ID for KUBR-1210 San Juan, followed by nearly 30 more stations listed by call, frequency, and city. Many of these stations are FM, and I've heard this same ID on one of the FM stations via E-skip. (We're at the peak of E-skip season. Many of you are with skip range of this network's Texas FM stations; I'm sure some of you will be hearing this 30-station ID too!) Some DXers are reporting hearing this announcement on 1530 kHz; unfortunately, none of the stations mentioned are on 1530! Patrick has also heard KNMX-540 Las Vegas, New Mexico.

Do you do any unusual record-keeping of your DX? Write me at Box 98, Brasstown NC 28902-0098, or by email to w9wi@w9wi.com. Good DX!



Ralph Craig made this strip chart recording of signal strengths on 1030 kHz in western Ohio.

North American Pirates Shifting Frequencies

As we note every month in this column, most North American pirates have been transmitting on or near 6955 kHz for several years now. But, lately the percentage of stations using nearby frequencies such as 6925 and 6950 kHz has increased considerably. Some stations operate using AM modulation, but the majority of North American pirates currently transmit in upper sideband mode.

❖ Pulaski County, KY, Sheriff Killed

In an astonishing development, Pulaski County, Kentucky, Sheriff Sam Catron was shot dead on March 13 by a sniper with a high powered rifle while he was leaving a political fish fry in Shoptsville, KY, a community several miles west of Somerset, KY, the former home of KSMR shortwave. The fish fry was associated with the late sheriff's re-election campaign.

This shooting took place literally minutes after Sheriff Catron's taped appearance on a Fox TV edition of *America's Most Wanted* that covered the disappearance of Steve Anderson of the Kentucky State Militia. As the television program reported, Anderson formerly operated the USA-based shortwave clandestine KSMR on 6900 kHz.

At the time of *MT's* column deadlines, the Kentucky State Police had arrested a suspect in the shooting, Danny S. Shelley, aged 31, of Eubank, Kentucky. But, the police initially maintained that they had no reason to believe that there was any connection between the apparent assassination and either Anderson or the Kentucky State Militia.

❖ Carl McIntyre Dies

Newcomers to the radio hobby may not remember the name of Carl McIntyre. Rev. McIntyre, a fundamentalist evangelist, passed away in March in Voorhees, NJ, at the age of 95. McIntyre's blend of Christian preaching and militaristic patriotism was a forerunner of similar approaches that are widespread on the radio today. He once was heard over a network of hundreds of radio stations, including a **Radio Free America** pirate ship off the New Jersey coast in 1973 that was a response to a dispute with the Federal Communications Commission.

Rev. McIntyre was certainly an important pioneer on the free radio scene. Larry Magne of *Passport to World Band Radio* said of Rev. McIntyre, "I think we agreed on the time of day and little else, but still managed to get along splendidly. A true character and utterly incorruptible."

❖ Numbers Station Court Case

According to numerous press sources including the *Washington Post*, Ana Belen Montes, the Defense Intelligence Agency's senior analyst for Cuban issues, pleaded guilty in Federal District Court to one count of conspiracy to commit espionage on March 19. A plea bargain with the FBI is supposedly being negotiated on the charges that she spied for Cuba. Montes claimed that she received her instructions from Cuba via shortwave radio, decoding numbers stations transmissions by listening to them on shortwave radio and then hand keying them into decoder software on a laptop computer. The *Post* reported that she communicated back to Cuba through pay phones using coded numbers sent to a pager.

❖ What We Are Hearing

As noted above, North American pirate stations usually operate near 6955 kHz, but frequencies can vary. Our readers heard all of these broadcasters this month:

Alfa Lima Radio International- Here's a Europirate whose transmissions on 15070 have been widely heard recently in North America. (Uses alinter@rendo.dekooi.nl e-mail, plus try their <http://www.alfalima.net> web site at for both station information and general shortwave news)

Borderhunter Radio- This Dutch pirate has been heard fairly regularly on weekends in North America. They normally use 15795 kHz for their pop music shows. (Ytterby; also uses borderhunter@hotmail.com e-mail)

DX Free North America- Many pirate radio DXers have reported a variety of odd transmissions in and near the citizens band, including this one on 27555 kHz using upper sideband modulation. (None known)

KIPM- Alan Maxwell's elaborate psychological dramas are an unusual format on shortwave, or anywhere else. His signal has been getting out across all of North America. (Elkhorn)

Lubavitcher Radio- Last month's *MT* suggestion that this new one might be in Ontario may have been premature. Harold Frodge of *Free Radio Weekly* suggests that their "Chassidic Radio" slogan means that they might claim a location in Brooklyn, NY. Has anybody else been hearing this one on 1710 kHz? (None known)

Oxycontin Radio- This relatively new one is being heard with some regularity. Their rock music has been supplemented by interviews with DXers such as Jay Smilkstein, as well as pornographic sound tracks. (None)

Psyco Radio- They remain one of the most active North American pirate radio stations, with rock music, pirate radio sketches, and original jingles. (Uses psycoradiohd@yahoo.com

e-mail, but rarely replies)

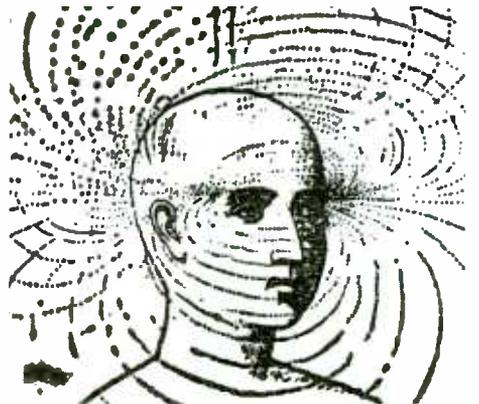
Radio Bingo- Not to be confused with **United Patriot Militia Bingo**, the original pirate bingo game continues to repeatedly enrich perennial winner John T. Arthur. (Merlin)

Radio Mazda- This Dutch Europirate joins the crowd of Euros who have been finding their way into North American receivers. (None)

Radio Urantia- It's hard to classify the programming on this new one, which mixes rock music with phonetic spellings of "are we having fun yet, bob?" (Unknown)

Seattle Free Radio- This new one brings back memories of the **Voice of Bob**, with its advocacy for the Church of the Subgenius. They have also been featuring rock music and relays of old time radio shows. (Uses seattle4166@yahoo.com e-mail)

United Patriot Militia Bingo- Steve Anderson's United Patriot Radio is long gone, but its pirate parody survives. (Merlin)



The Purple Nucleus of Creation- This unusual new age music station has been sending out some of the most unusual QSLs ever seen in shortwave radio. Our picture here this month does not really do justice to the beauty of the elaborate folding purple hexagon design of these QSLs. (Elkhorn)

United Patriot Militia Bingo- Steve Anderson's United Patriot Radio clandestine is long gone (see above), but the pirate parody of Steve's station lives on, sometimes with programming from Jimmy the Weasel. They are among the stations moving down to 6950 kHz at times. (Merlin, also uses Yahwa6955@hotmail.com e-mail)

Voice of the New World Order- This one has reactivated with announcer Bill Berger and his interviews with politicians such as Ronald Reagan. (None)

Voice of the Night- Lad's formerly hyperactive station is occasionally returning to the airwaves via the magic of tape. (Former addresses probably invalid, but Lula worth a try)

WBNY- Commander Bunny at The Voice of the Rodent Revolution, one of the classic clandes-

continued on page 83

Treasure Hunting

What's your favorite old-time receiver? When I'm feeling nostalgic, I enjoy firing up my National RBL-5 (circa 1943) for a little DXing fun. Although the set was made 20 years before I was born, I enjoy spinning the dials, getting the regeneration set just right, and hearing the signals come through loud and clear. For some DXers, an early solid state rig might be their favorite, reminding them of their beginnings in the radio hobby.

Whether your interests lie in old or new radios, June is the perfect time to check out regional hamfests and swap meets for radio bargains. The RBL-5 mentioned above was purchased at a flea market for the lofty sum of \$40 a few years ago. Not only are these events good for finding radios, but also books, parts and supplies to keep you going in your hobby. You will find hamfest schedules listed in many club newsletters, and also on the web. If you don't know where to start, simply type "hamfests" into your favorite search engine, and you should be rewarded with a long list of returns.

Do you have a favorite rig that you've restored, or enjoy using on the longwave band? If so, send a picture and a short description to *Below 500 kHz* and I'll try to fit it in a future issue of *MT*. Photos are welcome via postal mail, or electronically, via the e-mail address shown in the masthead (200 dpi minimum resolution, please).

June is also the month of the annual ARRL Field Day event (June 22-23). If you plan to work the event this year, why not set aside a

little time for longwave monitoring, as well? Field Day sites are often located in remote areas, where man-made noise is at a minimum, and your chances of adding some new loggings are excellent. This year, I will be operating Field Day with my 8-year old son, Bryan. Listen for us on all bands, 80 through 10 meters, CW and SSB modes.

◆ Longwave Loggings

Mike R. (Bantam, CT) wrote via e-mail to share a fine list of loggings (see Table 1) made with his Sony 2010 receiver and Kenwood TS-440S transceiver. One logging, HS/165 kHz, stands out as a mystery. Mike sent me a .WAV sound file of this station to verify the callsign, and to see if I had any clues to its identity. Thus far, I have been unable to find the station listed in any of my resources.

I believe it is a low frequency experimental radio station (LOWFER), but since these stations are not licensed, they are not required to register their IDs with anyone. While most "Lowfers" voluntarily list their information with the *Lowdown* journal or other online locations, there is no guarantee of finding a particular station listed. I will continue to research the identity of this station and report any findings in a future issue.

Mike currently uses Ken Stryker's 1990 *Aero-Marine Beacon Guide* and wonders what other resources exist today. Besides a scattering of semi-complete web sites, there really aren't that many choices for the longwave listener. The

shortage of up-to-date guides led me to develop the *BeaconFinder* directory in 1998. It focuses squarely on North America, with continuous coverage from 0 to 535 kHz, as well as some "top end" listings between 1700 and 1800 kHz. A "stop press" section at the back of the guide shows updates and last-minute changes to the listings. Ordering information for the *BeaconFinder* and the companion *Sounds of Longwave* audiotape is provided elsewhere in this issue.

Table 1. Longwave Loggings

Freq.	ID	Location
165	HS	Unidentified
265	SXD	Springfield, VT
278	BST	Belfast ME
317	R	Trenton, ON
326	FC	Fredericton, NB
328	BZJ	Indiantown Gap, PA
338	DE	Detroit, MI
340	YY	Mont Joli, PQ
373	ZQ	Mont-Laurier, PQ
382	LQ	Boston, MA
384	F8	Victoriaville, PQ
386	GMA	Dalton, NH
388	NXX	Willow Grove, PA
450	PPA	Puerto Plata, PR
524	HEH	Newark, OH

◆ Averted Hearing?

One of my most memorable childhood vacations was spent with my Dad at our summer cottage in Upstate NY. Each night, we'd look up at the sky while lying on the dock, and wonder at the constellations and the satellites trekking across the sky. This formed a perfect backdrop for my Dad's stories of the early days of the space program — an interest I've maintained to this day.

When scanning the sky, I noticed that in some cases, a particular group of stars would appear brighter if viewed from the corner of my eye, rather than looking straight on. I didn't think much of it at the time, but many years later in an astronomy class, I learned that this is the result of something called *averted vision*. The theory is that there is a blind spot in everyone's eye at the point where the optic nerve is connected. When looking directly at an object, the image falls directly on that blind spot and the sensitivity is reduced.

Could *averted hearing* be a possibility as well? Dan Wanchic (WA8VZQ) wrote with a fascinating account of his attempts to hear XCR/404 kHz which was extremely weak at his location. Rather than concentrating directly on the signal, Dan tried listening to something else, and only half-concentrated on the signal at hand. Using this technique, the ID seemed to pop out of the noise, enabling him to make a positive ID.

Has anyone else used this technique successfully? I'd be interested in hearing from readers who use this method, or any other special techniques for hearing extremely weak signals, or for separating "dueling" IDs from two or more beacons.

Enjoy the nice weather. See you next month.



Hamfests can be a treasure trove for vintage and collectable gear. Be sure to wear a good pair of walking shoes! Photo by Kevin Carey.

GROVE

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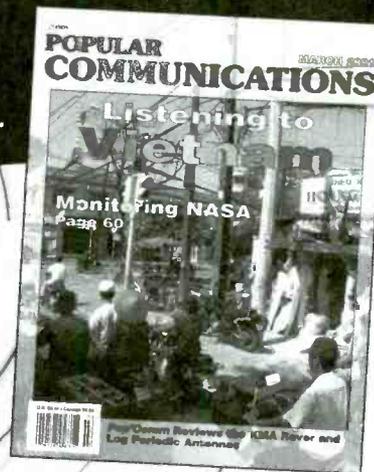
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MOONSTRUCK

Back in 1976 when I was a newly minted ham (WN2GHA), like many folks, I started up my subscription to the American Radio Relay League (ARRL) journal *QST*. I was still trying to figure out this ham radio thing and I was only beginning to get a notion of all the amazing modes of communication available to amateurs.

The first issue of *QST* to show up in my mailbox was the September 1976 issue featuring, of all things, an article about Allen Katz K2UYH and his successful completion of the first Worked All Continents (WAC) Award on 432 MHz by way of *Moonbounce*.

Back then, the very concept of sending a signal to the Moon and having it reflect back to earth in a manner that anyone could actually hear it was almost too much to take in. At least for a "wet behind the ears" kid with minimal engineering background. I didn't know at the time that the first Earth-Moon-Earth (EME) experiments were conducted just after World War II by the US Army Signal Corps. The US Navy maintained an RTTY moonbounce link between Washington, DC, and Hawaii during the 1950s. Remember, too, that the government allows itself the option of using significantly higher power levels than they authorize to the amateur radio community. We might get kilowatts but they get megawatts!

The first two amateurs to complete a moonbounce "one way" transmission were W4AO and W3GKP in 1953. The first actual two-way ham QSO occurred in 1960 between the Eimac Radio Club W6HB and the Rhodendron Swamp VHF Society W1BU.

Well, even over all these years and with many advances in technology, EME communication remains one of the more exotic modes, practiced by only a small number of hams. It remains one of the true frontiers of communication where a curious and tenacious ham can still make headlines just as Allen Katz did back in 1976.

Now let me state from the start that my personal experience with EME has been limited to monitoring the signals of some of the more powerful stations. As we will see further down the column, the antennas that produce reliable EME communication are a bit larger than most neighbors will tolerate. However, if you have an interest and aren't afraid of doing a bit of homebrewing, a modest but successful moonbounce system can be developed by any dedicated ham.

Let's start by looking at the things you need to pay attention to in order to get your signal up to the Moon and back in a condition good enough to be heard by someone else.

To begin with, there is the distance itself. The Moon orbits the earth on an elliptical path that ranges between 221,463 miles and 253,710 miles. It takes a radio signal about two and one half seconds to traverse the path. From an understanding of the vast distances involved we can begin to look at the *path losses* associated with EME communication. Right off the bat, the difference between the Moon being at apogee or perigee represents about 2 dB of loss. Dedicated moonbouncers will often look for each other at perigee for obvious reasons. But 2 dB is nothing compared to the overall path losses. They amount to around 216 dB at 50 MHz and rise as frequency increases up to around 244 dB for 1296 MHz.

And there is yet another significant loss to deal with. The Moon itself, while acting as only a passive reflector, exacts an enormous toll. A full 93% of the signal sent to the surface of the Moon is absorbed. The remaining 7% is reflected back and further diffused throughout space in the process. Simple translation...Great big enormous, powerful, earsplitting, earth shaking, neighborhood-light-dimming signal up...Little bitty, teeny weeny, "so close to the noise floor you can barely make it out" signal back.

But wait...there's more. Sending a signal to and from the Moon can rotate its polarization a number of times. This effect is known as *Faraday Rotation* which causes fading that makes signals hard to copy. There is also *Libration Fading* which further affects the signal returned from the Moon.

Now these are significant challenges, but as we have seen, hams have conquered them all. It may not be easy, but few great challenges are.

So let's give some thought to what a well-dressed EME station might look like.

❖ A Model EME Station Power:

To begin with, an EME station needs to be operated at as close to the legal power limit as possible. Full Gallon VHF and UHF amplifiers are rare and expensive commercially. And it is well nigh impossible to muster a full legal limit RF power above 432 MHz. A ham looking to play with these power levels is more likely to build their own power amplifiers.

High power VHF/UHF RF components have become more available on the surplus market, so getting close to the maximum legal power is possible for relatively reasonable costs if you know what you are doing or can obtain the assistance of other hams who do. It is possible to operate with as little as 500 watts at 432 MHz,

but reliability drops off and you need to make up for the lower power in other parts of the system such as the antenna array.

Antenna:

Speaking of antennas, it is the antenna array that very often dictates your frequency choices for EME work. Antenna gain for reliable EME communication is achieved by either combining a number of already high gain antennas into an array or by using a parabolic dish style of antenna.

A 50 MHz antenna array with sufficient gain to get out will be very large. 50 MHz operation is often restricted in many other countries so it remains the least desirable of the EME bands.

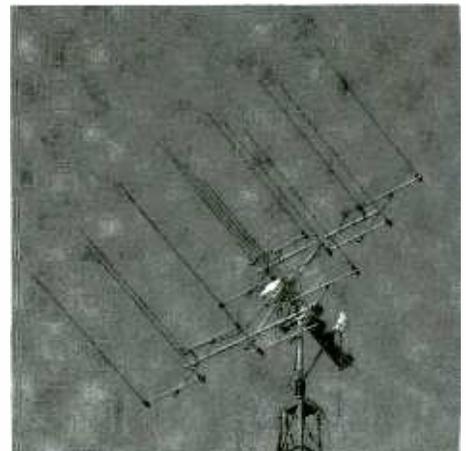
144 MHz is perhaps the easiest band to get started on because, if you can muster full legal power, a relatively modest array of four long boom Yagi antennas can get the job done.

222 MHz has a lot of potential similar to 144 MHz but there is a lack of activity on this band because its use is limited to hams in ITU Region 2.

432 MHz is very popular because parabolic dish antennas begin to become manageable in size. Also, larger arrays of 16 or more Yagis become very manageable.

902, 1296 and even 2300 MHz all benefit from parabolic dish designs which can often be adapted from commercial satellite television dishes.

If you follow any of the articles in the ham radio press or on the Internet related to EME communication, you will see some truly amazing antenna systems. You can keep stacking Yagis as long as your real estate holds out. Like-



The incredible 16 14-element Yagi array owned by Tom Tatomi JASOVU for working 70 cm EME

wise, some very large parabolic dishes have been constructed or purchased surplus. The antenna Katz used in 1976 for his 432 MHz WAC was a 28 foot diameter dish. I'm sure he had very understanding neighbors.

Okay, you've got yourself this big antenna, but it's only going to do you some good if you can get it accurately pointed at the Moon. This means being able to move the antenna along both azimuth and elevation axis. This can be accomplished by electric rotators or the "Armstrong" method. Aiming is often done by something as simple as a small sighting tube mounted on the antenna array itself (Look for the Moon... Listen for signals).

Of course, modern computer controlled rotator systems coupled with Moon tracking programs can solve these problems as well. Remember that very high gain antenna arrays have a very narrow beamwidth. When you actually start trying to aim at the Moon you will realize that the earth's rotation causes the Moon to shift its position in the sky (and out of the path of your antenna system's beamwidth) rather rapidly. Chances are you will need to re-aim your antenna system on the order of every 15 minutes or so to keep things working as they should.

Lead-in:

So you've got your big signal and you've got it pointed at the Moon, what else needs to be considered? How about transmission line losses? Remember that at VHF frequencies line losses can build dBs rapidly. You need every milliwatt of power you can muster spitting out of that antenna. Turning the odd watt into heat along a transmission line is a definite no-no in the moonbounce world.

Most moonbouncers put their transmitters as close to their antennas as possible and make their cable runs using hardline and at least type "N" connectors. And while you are scrounging the surplus houses for those type "N" connectors, you'll want to pick up a couple of UHF relays. The reason for this will become clear with our moving on to discuss the receiver system you will use.

Preamp:

Remember we talked about that teeny weeny signal coming back from the Moon? Well the only way you have any hope of copying such a signal out of the noise is to use a high performance, low noise figure receiver with an antenna mounted preamplifier. You have to grab for every remaining dB coming back from the Moon's surface. The good news here is that gallium arsenide field-effect transistor (GaAsFET) based preamplifiers have become reasonable in cost and construction in recent years. GaAsFETs are susceptible to damage from RF, so such preamps need to be switched in and out of the circuit to prevent any problems.



JA7BMB's 6m dish with water-cooled preamp!

◆ EME Etiquette

EME communication is not as simple as turning on your rig in the evening and calling CQ. The moonbounce community has developed protocols over the years to facilitate success.

Almost all EME contacts are arranged as skeds. In the good old days this was done by way of HF nets but the Internet has become the way to go plan your moonbounce activities. One site to look at to see how this is done would be <http://www.dxworld.com/emesked.html>.

By the way, it may be obvious but I feel obliged to remind folks that, in order to

achieve a successful EME contact, your station and the other station need to agree on a time when the Moon is visible to both QTHs. (Duh!) Access to a Lunar almanac is important here for equally obvious reasons.

An example of a common protocol for CW (the most common EME mode) would be for the two stations to synchronize their clocks using WWV or CHU etc. Then, beginning at the agreed-upon time, one station (usually the Easternmost station on the map) transmits for two minutes while the second station listens. Then for the next two minutes the two stations reverse roles. This two minute transmit/receive process continues for an hour. To develop the basis for an accurate and full QSO the process used is for a station to send

its callsign for the first minute and a half and any signal report for the last half minute. Other protocols prevail for other modes of operation.

Getting an EME station up and running is a heck of a lot of work and it sure looks like it's going to cost quite a bit more than your average ham station. Well, yeah... sure. But, there are more than a few ways to skin the cat. Many moonbounce operations are club efforts. The cost of a competitive EME station would not be out of line with that of setting up a local FM repeater. Also, given the nature of the antenna systems and getting (and keeping) them pointed would naturally seem to indicate that many hands (or is that, many hams?) make for light work. Such a set-up might really be a great club challenge, so why not "go for the moon" in June?

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Powering Up Your Command set

The command set restoration project we've been working on over the past few months seems to have generated more reader interest than almost any of the other restorations undertaken to date. Even so, enough is enough, and those of you who would just as soon we moved on to something else will be pleased to know that this column is the wrap-up.

At the conclusion of last month's column, we had finished work on the R-23A, or Navy, version of the 190-550 kHz command set and were just about to apply power. I was a little apprehensive about that step because of the extensive work that had to be done reversing the previous owner's mods. There was a lot of room for error. However, I'm pleased to report that I got lucky. The set worked as soon as power was hooked up, and the alignment procedure was carried out without problems, using the procedures described for the BC-453 version of the set outlined in the March column.

❖ Practical Power For Your Command Set

This time, I'd like to take care of the last loose end. Up to now, I've been using a conventional power supply lashed up from parts in my workshop junkbox. However, "conventional" parts are not always easy to get and I think it's important to suggest a power supply that an interested reader can put together using commonly-available Radio Shack parts as a foundation. The unit I came up with had its inspiration from early command set conversion articles using a voltage doubler circuit.

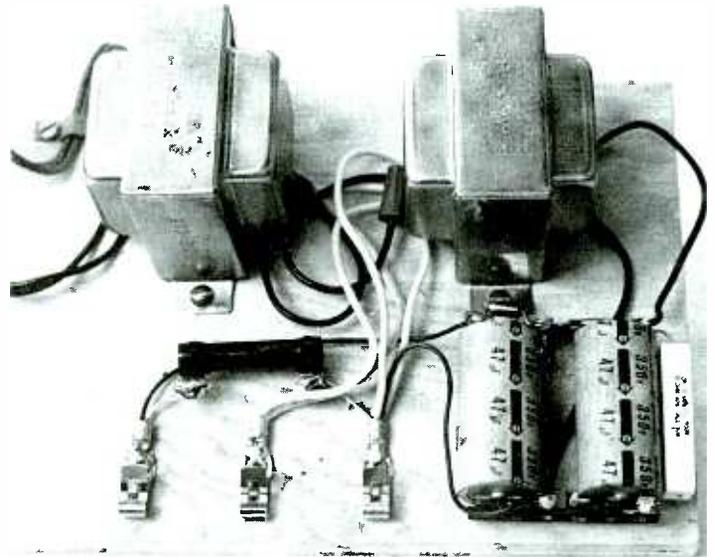
With a voltage doubler rectifier hooked up to the 120-volt line, one could easily obtain the nominal 250-volts required for the receiver's B-plus. Add an appropriate transformer to supply 6, 12 or 24 volts for the tube heaters (depending on the nature of your conversion), and

you were in business. In those un-safety conscious days, the voltage doubler was frequently connected directly to the a.c. line, resulting in a very serious electric shock hazard. My version uses two commonly-available transformers to provide B-plus that is isolated from the a.c. line and also 24 volts to light the tube heaters. To see how it works, refer to the generic voltage doubler circuit shown in Fig. 1.

Notice that the a.c. input for the rectifier circuit comes from a power transformer. In our application, this will be an isolation transformer, which neither steps up nor steps down the a.c. voltage coming in, but merely provides that all-important isolation from the a.c. line. If 120 volts goes into the primary, 120 volts comes out of the secondary.

❖ Parts and Sources

Isolation transformers are available from full-service electronics parts houses, but are expensive, especially when one factors in shipping costs and minimum order requirements. Instead, I chose to use two Radio Shack 25.2-volt center-tapped, 2.0 ampere transformers (Cat. No. 273-1512) with their 25.2-volt secondary windings wired together (the center taps are not used). When one of the primaries is



For convenience, the power supply circuit was built on a scrap of plywood. Fahnestock clips (from left) are B-plus, 25.2 V.a.c., common ground. Dark-colored resistor above clips is the bleeder.

connected to the 120-volt line, 120-volts appears across the other one. Voila! An isolation transformer.

Readers who have been following these restoration articles for awhile will recall that I suggested just such an arrangement for putting together a repair-bench isolation transformer that could be used to power up those dangerous, transformerless, "a.c.-d.c." sets. That unit used a pair of 12-volt secondary transformers that I happened to have on hand. This time I used 25.2 volt transformers. The reason, in case you haven't already guessed it, is that the nominal 24 volts required to power the command receiver heaters (assuming they haven't been rewired for a different voltage) can be picked off at the junction where the two secondaries are wired together. If 25.2 volts seems a little high for the heaters, know that government specs call for a low-voltage input of 27.5 volts.

Resistor R1 on the schematic of Fig. 1 is there primarily to keep the rectifier diodes from being burned out by the inrush of current caused by the initial charging of C2. I used a Radio Shack 10-ohm, 10-watt resistor (Cat. No. 271-132). For the two diodes, I used 400-volt, 3-amp units from my junkbox. Radio Shack carries 1N5404 diodes with similar ratings (Cat. No. 276-1144) that should

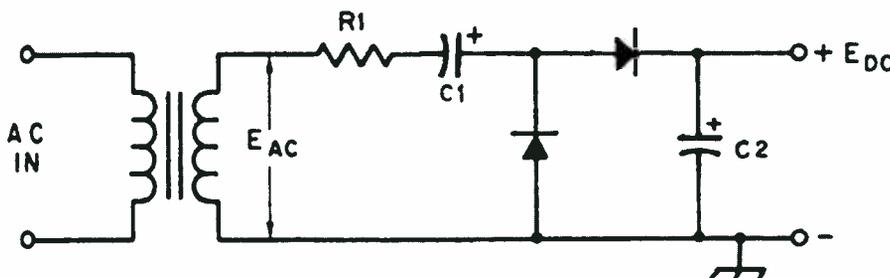


Fig. 1. Generic voltage doubler circuit. From 1973 *Radio Amateur's Handbook*, Courtesy American Radio Relay League.

work just fine.

Unfortunately, higher-voltage electrolytic caps are not available from Radio Shack, though they are readily available at electronics swap meets and from a variety of mail-order sources. Use units rated between 30 and 50 mfd. C1 should be rated at 175 volts min.; C2 at 350 volts min. I used two 350-volt, 47-mfd units from the junkbox.

Not shown in the schematic is a bleeder resistor I wired across the output of the supply (between the points marked "+Ede" and "-") to improve voltage regulation. Unfortunately Radio Shack can't help you here either. Search your junkbox for a power resistor of about 10,000 ohms and 15-watts dissipation (I used a 6,000-ohm unit I happened to have).

❖ Trying it Out

Besides the heater voltage, this little power supply puts out about 270 volts of B plus when just operating into the bleeder resistor. With the receiver connected and operating, this drops to 250 volts. Government specs call for 230-250 volts.

My command sets purr along very nicely on this power supply. And I don't detect an undue amount of a.c. hum on the signals even though there is no filter choke. Apparently, the 10-ohm inrush protection resistor provides all the choke action that is necessary. However, if desired, a small filter choke salvaged from an old radio or TV set could be placed in series with the B-plus lead ("Ede").

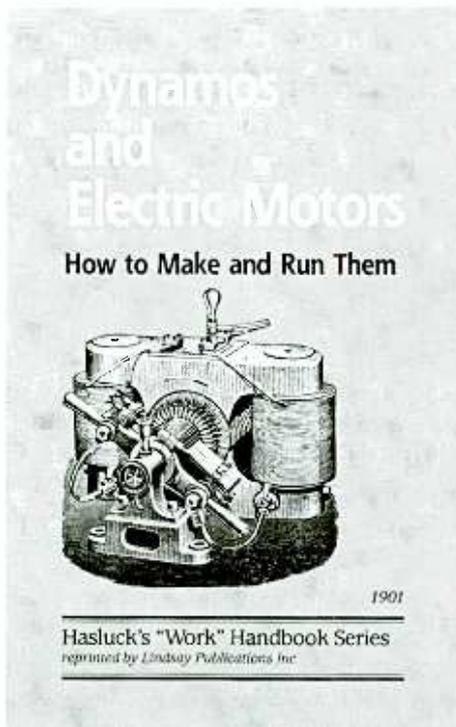
Before closing this subject, I'd like to acknowledge an e-mail from *Jack Roos* (Bellevue, WA). As a boy, he and his dad converted three command sets covering different frequency ranges to a.c. operation, installed them in a surplus rack mount, and operated them from a common power supply. He used his BC-453 to enhance the selectivity and image rejection of his Hallicrafters S-38 using a hookup known to hams of the '40s and '50s as the "Q-Fiver."

The 455-kHz i.f. output of the S-38 was fed to the BC-453, which was tuned to that frequency. All of the i.f. transformer rods of the BC-453 were pulled out for maximum sharpness (see alignment issues discussed in March column) and the signals were listened to at the output of the BC-453 as the S-38 was tuned. In effect, this turned the S-38 into a double-conversion receiver. The scheme was used routinely to enhance the performance of receivers that were much more sophisticated than the S-38, and we may well discuss the "Q-Fiver" hookup in a future column.

❖ Recent Books from Lindsay

Looks like we have enough room to mention a couple of recent books released by Lindsay Publications, PO Box 538, Bradley, IL 60915: <http://www.lindsaybks.com>. If you've never looked over a catalogue of Lindsay reprints, you're in for a fun experience. Be sure and write for a free copy.

Impoverished Radio Experimenter Vol 2 (5-1/2" x 8-1/2", soft cover, 48 pages, \$5.95).



The thrust of Volume 1 was to serve as a tutorial on vintage radio receiver circuits, with emphasis on recreating and powering them with modern, easily-obtainable components. This sequel continues the tutorial on a more advanced level, with emphasis on designing and testing tuned circuits. There's a complete discussion of grid-dip oscillators that includes instructions on how to build your own or, if you prefer, what to look for in buying a used one. Other projects include a one-tube short-wave converter for AM broadcast sets, a 7.5-to-1 vernier drive, and a low-cost coil winding machine. Unlike most books in the catalogue, this is not a reprint but, like Volume 1, was authored by Lindsay himself.

Dynamometers and Electric Motors, How to Make and Run them (5-1/2" x 8-1/2", soft cover, 160 pages, \$9.95). Originally printed over one hundred years ago, this book reflects the excitement of a time when electricity was cutting-edge technology. Because generators (then called dynamos) and motors were very expensive, this collection of articles provided methods and details for building one's own. Some of the devices are small tabletop machines would be great fun to recreate. Or if you're not mechanically handy, just read and enjoy!

Simple Scientific Experiments (5-1/2" x 8-1/2", soft cover, 69 pages, \$8.95). Another reprint of a century-old book, this volume outlines forty-six simple demonstrations – many of which could be recreated at home today. These include an electromagnetic gun, pea suspended in air, high frequency currents, decomposition of steam with an induction coil, fiery or flaming vortex ring, thermo-electric currents and more. If you're stuck for an idea for a science fair project or just want to amaze your friends, this little book could do the trick.

❖ Next Time

In the next issue, I'll pick up a topic that I had planned to cover ever since first publishing material on properly equipping a restoration workbench: the maintenance, calibration and use of a vacuum-tube voltmeter (VTVM). At that time, I mentioned that every workbench should eventually include one of these most useful instruments, though I saw no need to make it a first priority. And, indeed, we've done quite a lot of work already without having to make use of a VTVM. But I'd be remiss if I didn't cover this ground for you.

I've kept my eyes open at the last few radio meets I've attended, and have managed to pick up examples of each of the two instruments that would be on my highly recommended list. These are the RCA Voltohmist Senior and the RCA Voltohmist Junior VTVMs. Either one will serve you nicely. I haven't so much as opened the case of either one; I'm saving that for us to do together. We'll go through each instrument to be sure it is in serviceable condition, correcting (hopefully) any problems we may find and recalibrating as necessary.

See you then! In the meantime, let me hear from you. I not only enjoy feedback from our readers, I feel it is absolutely necessary if I am going to conduct this column so that it is interesting and useful to as many people as possible. Tell me what you like, what you don't like, and fill me in on your own adventures in restoration.

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Fun with Real-Antenna Modeling

Most antennas we use today are resonant antennas. A resonant antenna, by its design, is tuned to its frequency or band of operation. Halfwave dipoles, Yagi-Udas, cubical-quads, the various groundplanes, most loops, and almost all other common antenna designs are resonant antennas. Exceptions are simple untuned whips, random-length wires, and Beverages.

No matter what frequency a resonant antenna is designed for, that antenna's characteristics remain the same in terms of such factors as radiation and reception (R&R) patterning, feedpoint impedance, polarization, and gain. Because of this we can model an antenna we want to learn about at a frequency higher than the frequency we are really interested in.

The higher-frequency antenna will be smaller than our desired antenna, but we can use it as a model of that larger, lower-frequency antenna. A model of a 14 MHz antenna constructed for 140 MHz would be only one tenth the size of the 14 MHz antenna! Due to their smaller size, models can be built more quickly, easily, and inexpen-

sively than the larger antennas they model, and yet models allow us to explore the antenna-performance characteristics we would get with the full-sized antenna.

❖ No Special Equipment Needed!

Antenna engineers frequently utilize antenna models, and check their performance with sophisticated equipment. Even without any special equipment you can make informative, if informal, checks on models for directivity (R&R patterning), polarity, and relative gain.

To check the antenna's horizontal (azimuth) directivity, tune in a weak station, then note changes in the quality of received audio or video as you rotate the antenna in the horizontal plane. If your receiver has a signal-strength meter you can get even more precise results. Tilt its boom up and down from horizontal to check vertical directivity.

To check the model's polarization, rotate the model so that the element orientation changes from horizontal to vertical. Note changes in the received audio or video to de-

termine best reception. Generally, if reception is best when elements are vertical then polarization is vertical; best reception when elements are horizontal means horizontal polarization, and so forth. Circular polarization gives equal strength in all orientations.

Relative gain of the model can be found by comparing its performance with that of other models. Models giving the greatest output for the same signal when positioned in the same spot have the highest gain. Admittedly, this is a rough-and-ready test because, without matching between the antenna, feedline, and receiver input, such comparative-gain measures may not be too accurate. But, for our purposes, any of the antennas in fig. 1 can be fed directly with 50 or 75-ohm coax without a matching device. Except for the groundplane antenna, this may result in mismatching, but it's simple, and for our informal testing it works reasonably well. We'll discuss matching in an upcoming column.

A non-conductive (wooden or plastic) stand is useful to hold the antennas for these tests. Keep the models as much in the clear as possible. For quick, less accurate tests,

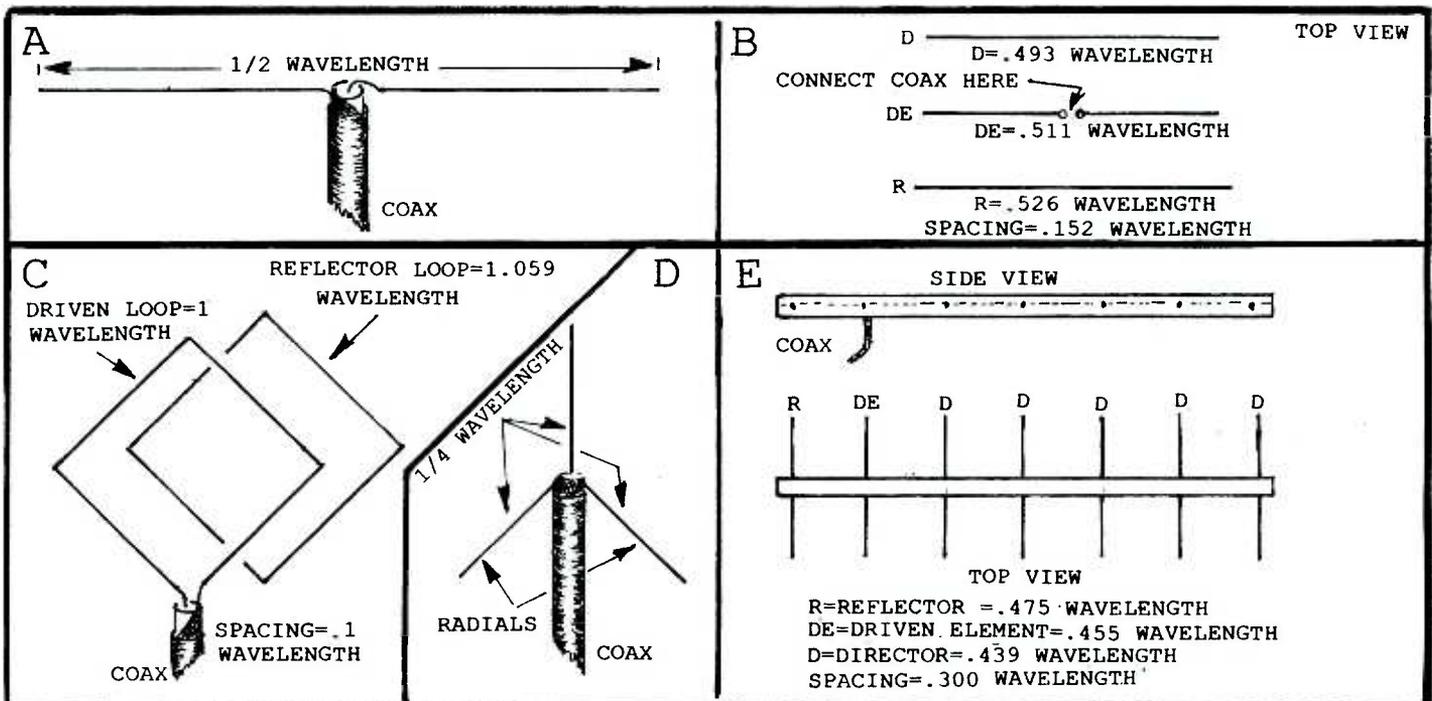


Fig. 1. A halfwave dipole antenna (A), a simple Yagi-Uda beam antenna (B), a cubical-quad beam antenna (C), a quarterwave groundplane antenna (D), and a 7-element Yagi-Uda beam, with higher-gain and more directivity than the simple Yagi-Uda (E).

This Month's Interesting Antenna-Related Web site:

For an interesting online book about microwave antennas try:

<http://www.qsl.net/n1bwt/contents.htm>

holding a model by a short insulating handle such as a large plastic clamp will work.

Often when using a model inside a building we get confusing results. That's because inside buildings there are so many objects that can reflect or block radio waves. If you use your model inside, try to keep it in the clear as much as possible. If the building in question is metal, metal reinforced, or has lots of wiring and metal pipes, you may get insufficient signal and/or very confusing results. But in some buildings testing inside works okay.

For the present we're overlooking the effect of the earth on antenna performance. But it is important, especially in determining vertical directivity. We'll discuss ground effects in a future column.

❖ Scaling Down to Size

Below are equations you can use to find the physical length of a wavelength in wire (for determining element length), and length of a wavelength in air (for determining spacing between elements). You can use these equations to design your models as well as your full-size antennas.

One wavelength in wire (in feet) = $936/\text{Frequency(MHz)}$

One wavelength in wire (in meters) = $285/\text{Frequency(MHz)}$

One wavelength in air (in feet) = $984/\text{Frequency(MHz)}$

One wavelength in air (in meters) = $300/\text{Frequency(MHz)}$

For example, the quarterwave elements for a 100 MHz groundplane vertical element would be (1/4 of 936/100) feet long. That's 2.34 feet at 100 MHz for a model, and 23.4 feet at 10 MHz. Using 1000 MHz for the modeling frequency would reduce the length to .234 feet, or 2.8 inches. A .1 wavelength spacing between beam elements at 100 MHz would be (.1)(984/100) feet = .984 feet, or 11.8 inches. At 1000 MHz, this spacing would be reduced to .0984 feet or 1.2 inches.

❖ Building Your Own Miniature Antenna Farm

First, obtain a set of directions for building the antenna designs that interests you. These directions must tell you the dimensions of the elements and spacing between elements in wavelengths as is done in fig. 1.

Copper house-wiring wire and aluminum grounding wire make good self-supporting elements for models designed for the higher VHF or UHF range. Plastic or dry wood can serve as insulators. Models don't have to be as sturdy as antennas intended for regular service. You can use your ingenuity to make them quickly and simply.

The model in fig. 1E was constructed for UHF-TV channel 54 at 713 MHz. At that frequency the driven element was 7-1/8 inches, the reflector was 7-1/2 inches, and

the directors were 6-15/16 inches. Spacing was 4-3/4 inches, so the length from the first to last element was slightly over 28-3/8 inches. Horizontal and vertical directivity as well as polarity were obvious when the model was turned, tilted and rotated. Of course, gain was quite high compared to the rabbit-ear dipole it was compared to.

The feedline in figure 1E is 50-ohm coax. With the short feedline used (about 14.5 feet, or 4.4 meters) the antenna worked well with no matching device. The center and braid conductors were separated and fed through holes leading through the bottom of the boom to the element ends. These conductors were then wrapped around the element ends. The element halves were laid in grooves cut across one of the two boom pieces.

A thin piece of plastic was put between the ends so they could not touch and short the feedpoint. Then rubber bands were used to hold the two boom pieces together. The other elements were then slid through similar grooves. The pressure of the rubber bands held the boom together and all the elements in place. With this simple construction it is easy to remove, or to change spacing of the directors and/or the reflector to see the effect on performance.

❖ Happy Modeling!

I've had lots of fun with my miniature antenna farm. Why not try a few models, and see for yourself?



Last Month:

I said: "OK, so near-vertical radio waves can be returned to earth under the proper conditions, and they can support communications. What about near-horizontal waves that travel out to the horizon, and then head on out toward the ionosphere and outer space? Do they punch through the ionosphere to be forever lost in space, or what?"

Well, such low vertical-angle waves may indeed end up in outer space if they are VHF or higher in frequency. But at HF and even MF, such low-angle waves can often hop between ionosphere and earth to support long-haul DX communications when the "skip is in."

This Month:

OK, we can make functional model antennas. Can we make functional, model feedlines too?

You'll find an answer for this month's riddle, another interesting, antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Pointed Humor from the Scan-DC Newsgroup:

I WANT TO KNOW THE FREQUENCY OF EVERYTHING THAT CAN FLY IN WASH DC

According to "The Hummingbird Website," <http://portalproductions.com/h/>. "Hummingbird wing-beats are about 80 per second in forward flight and up to 200 per second in courtship. The heart rate for a hummingbird is about 1260 beats per minute."

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Tk545 Software Project

My radios are located in the basement but I also want to use them while I am upstairs. Receiver control software running on my computer enables me to scan, search, configure, and perform other important operations remotely.

Most receiver control and cloning software require a Microsoft Windows operating system. I set a personal goal of moving from Windows to the free, more stable Linux operating system and wrote open source software to control and clone some of my receivers.

My first two projects, named tk545 and tk8500, are programs for the Japan Radio Co. NRD-545 DSP and ICOM IC-R8500 receivers. I described tk8500 in April 2002 *MT* and will discuss tk545 here. Both programs work on Linux, MacOS X, Windows, and perhaps other operating systems.

Tk545 and tk8500 are open source software (<http://www.opensource.org>), licensed under the GNU General Public License. You can download, use, and modify the software free of charge from my web page at <http://members.core.com/~parnass>. Making the source code available permits you to learn by reading the design, make changes to suit your needs, and fix bugs yourself.

I use the Tcl (Tool Command Language) and Tk tool kit, known collectively as Tcl/Tk, because it's a powerful scripting language which works on several operating systems and costs nothing. Tk545 uses no "secret" algorithms or cryptic data file formats. I don't warrant the software, but neither will it cost you anything.

❖ Designing Software for the NRD-545

Developing software for the NRD-545 is straightforward. The radio communicates with the computer using ASCII character strings documented in the NRD-545 instruction manual. Programming for the ASCII protocol is easier than designing software for ICOM's binary CI-V protocol, which requires decoding and message collision logic.

Radio hardware manufacturers often skimp on knobs and buttons to lower costs. They overload two or more functions onto a single knob or force you to navigate multi-level menus to make one adjustment. This, of course, makes the radio more difficult to use.

Software is not limited by "knob costs." Therefore, program screens don't need to look identical to the radio's front panel. Space per-

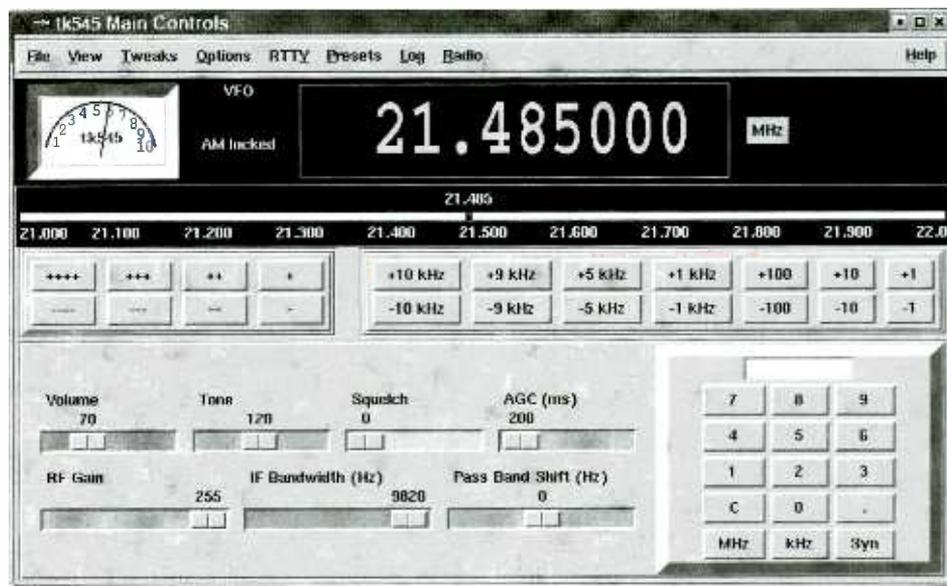


Figure 1. Tk545 Main Controls Window

mitting, we can create separate controls for important functions.

Software Advantages

The NRD-545 LCD display is limited to a 10 Hz frequency resolution, but the radio stores an extra digit internally. The extra 1 Hz digit is fully functional and software like tk545 can display frequencies with full 1 Hz resolution (fig 1).

Tk545 "liberates" most of the radio settings by providing a separate widget (software icon) for each control which makes them easier to use (fig 2). Tk545's pulldown menus may be "torn off" with a single mouse click and they become separate control windows.

The NRD-545's front panel provides a single pushbutton for both the Noise Reduc-

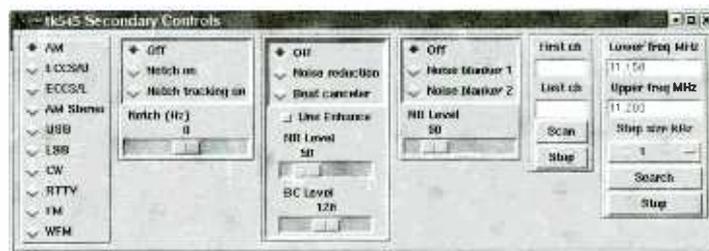


Figure 1. Tk545 Secondary Controls Window

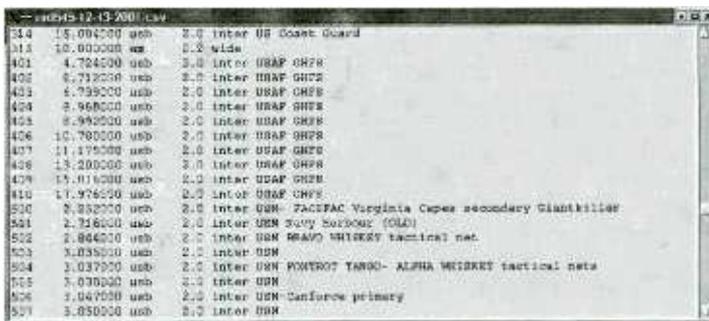


Figure 3. Memory Channel Window

tion and Beat Canceler controls. The NR Level and Line Enhance adjustments are relegated to menu settings which take a long time to adjust, so it's difficult to optimize the NR controls while listening to a signal.

The software interface gives you separate controls so you can tweak them quickly and hear their effect immediately. Likewise, you can choose between sharp and loose DSP filter skirts while observing the impact.

Tuning Via Software

I prefer to tune a radio using a physical tuning knob, but I can't do that if the radio is in a different room.

The tk545 software provides several ways to adjust the NRD-545's frequency. Users can press a mouse button, sweep across the main frequency display, then type in a frequency either in MHz or kHz (ending in M or K).

Richard Suchenwirth published a simple Tcl/Tk calculator program on the Internet and I reused part of it to create tk545's frequency keyboard widget. You can use mouse clicks to "tap" a frequency into tk545's keyboard widget or use your physical keyboard to type a frequency into the associated entry box widget.

The NRD-545's front panel contains Up and Down arrow keys which tune the radio based on the current step size. Tk545 provides two categories of button widgets, single step and slew (autotune). You can tune the radio up or down in different steps. If you click on a slew button, the tk545 software enters a loop, sending the NRD-545 commands to simulate pressing the radio's < and > keys.

I'm fond of the slide rule type tuning dials found in old radios, so I created a simulated analog frequency dial in tk545 using a slider widget. The Volume and Squelch controls are slider widgets, too, but they have a different color scheme and no marks.

Tk545 programs the NRD-545's memory channels from a file in csv (comma separated values) format. I can use either a simple text editor to create, change, and print memory files or any one of a number of spreadsheet programs which "understand" csv files. Tk545 can also read the radio's memory channels (fig. 3) and store them in a file. The program logs the frequency, date, time, mode, and strength of signals.

Controlled Scanning and Searching

Tk545 implements the searching and scanning entirely within the computer.

This differs from tk8500 which lets the IC-R8500 radio hardware and firmware perform the scanning at its full speed of about 40 channels/sec. Tk8500 polls the radio repeatedly, requesting the current squelch status, an indicator of whether the IC-R8500 found a signal.

Tk545's original scanning algorithm requested the radio's frequency often, but my NRD-545 mutes briefly each time it is polled for a frequency (using the F command). Repeated frequency polling causes a "chuffing" type noise, so I abandoned the polling approach in favor of the current explicit scanning algorithm.

Though reading the radio's frequency

temporarily mutes the audio, reading other parameters does not. Therefore, tk545 updates its S-meter widget, AM lock status, and stereo detection status several times each second without interfering with reception.

Summary

There's a need for radio software that works on Linux and MacOS X systems. Developing cross platform, open source software helps to spread knowledge, gather new ideas, and improve software quality.

The nature of open source software lets other programmers make changes and improvements. Ben Mesander read my original code, then provided changes which permit tk545 to run on his MacOS X laptop computer. Ben

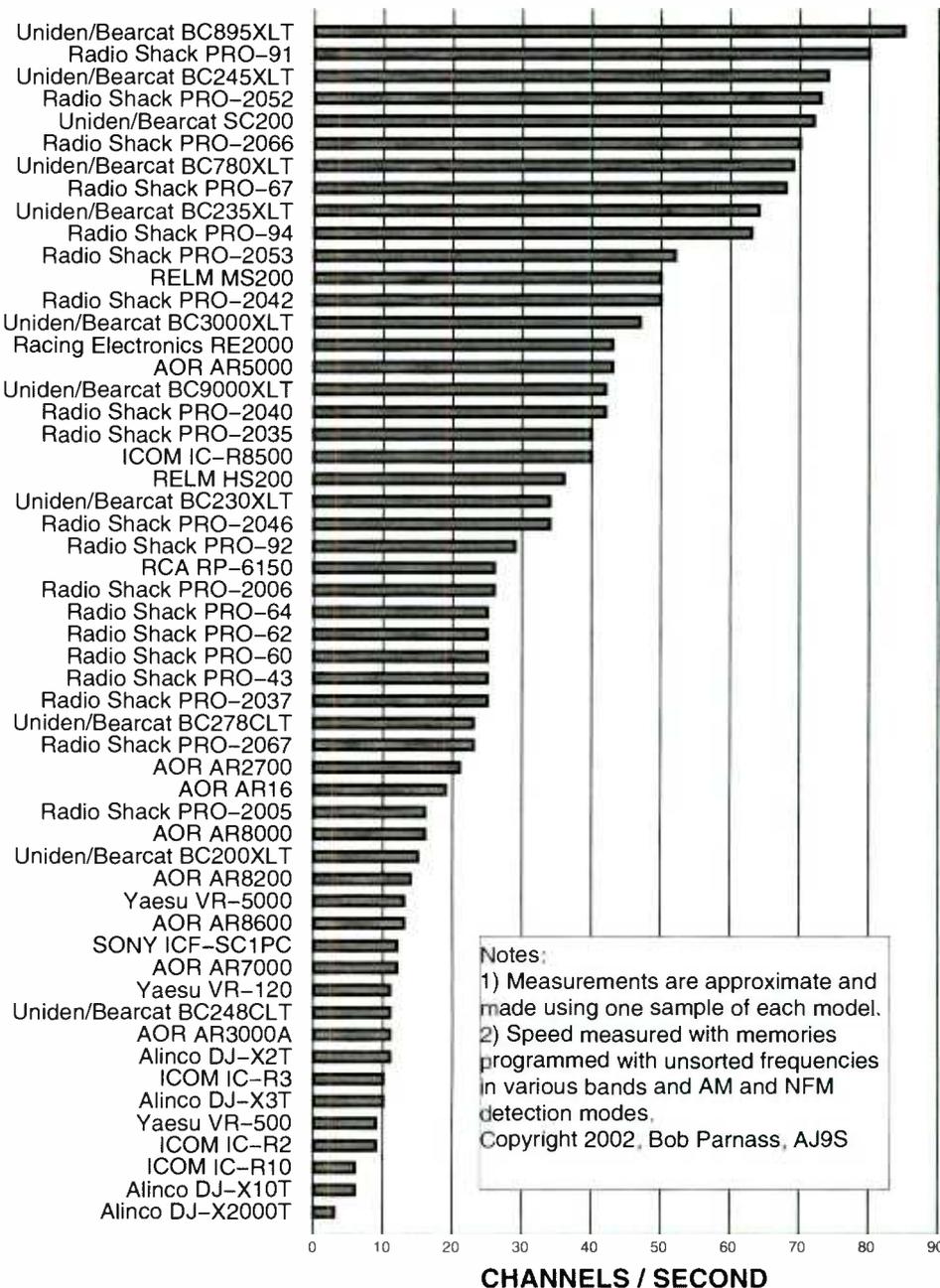
also suggested the tk545 feature which synchronizes the NRD-545's internal clock with the computer's clock.

Steve Walker sent several improvements. They include a pulldown menu of preset frequencies, the ability to unlock the front panel, tune the radio using the padded knob, then resync tk545's frequency display with the actual frequency.

Comparing Scan Rates

I've measured the practical memory scan rate of most of the scanners reviewed in this column since 1995 and compiled a comparison chart. The results are often at odds with the advertising literature, which sometimes refer to a "maximum" rate.

PRACTICAL MEMORY SCAN SPEED



Freeware Signal Fingerprinting: Xmit_ID

Xmit_ID 2.61 is a freeware program that is available for download on the Internet at <http://xmit.penguinman.com/down.html>. Although its method of identification is similar to MoTron's (see April issue), it takes a very different approach in its use of hardware. MoTron is very hardware intensive, supplying a separate microprocessor "box" for capture and manipulation of signals under analysis.

Xmit_ID, on the other hand, requires only a PC with a sound card. A simple two-resistor level circuit is required to interface between the receiver's discriminator output and the sound card input. Clearly, Xmit_ID utilizes a very different and less expensive software-intensive signal capture and analysis method. But does Xmit_ID do the job? Let's see.

❖ Xmit_ID Requirements

Xmit_ID is a DOS based program first written in the mid 1990s with very modest PC requirements. As its Readme file states, "A 386SX 16 MHz or better with 640K of ram and a large hard drive for unattended use. About 80 megs a day is needed on large systems. If you are going to keep a fingerprint on each user you will need about 30K of hard drive space per user to cover multiple rigs." With 20 to 40 Gig hard drives now commonplace, its reference to "large hard drives and 80 meg (0.08 Gig) reminds us of how far computer hardware has come since this program was first written.

A file called Hardware.txt (Figure 1) is included which gives very clear construction instructions for a very simple, two component attenuator. This is required to connect the receiver to the computer's sound card. The hardware file also contains a circuit for carrier-operated relay using the joystick port and built-in Xmit_ID software. I did not try the COR operation.

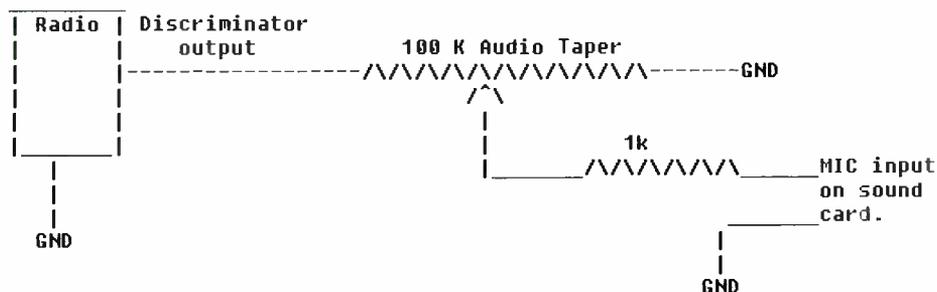


Figure 1 Attenuator Circuit – Interface between Radio and Computer's Sound Card

❖ Running DOS Programs Under Windows 95

I ran Xmit_ID under Windows 95 and 98. As per the Readme file, the Desktop shortcut that I made required that its Properties be changed in order to start this DOS program correctly under Windows. This is a simple matter of first creating the shortcut.

Right click with your mouse on the shortcut icon and select Properties at the bottom of the menu that appears. The result will be a new screen with six menu tabs across the top. With a left mouse click choose the second "Program". Then choose the "Advanced" box near the bottom of the screen. Finally, select (with a check next to them) the "Prevent MS-DOS programs from detecting Windows" and "Suggest MS-DOS mode as necessary". A few clicks of the "OK" boxes and the Xmit_ID software is ready to behave under Windows.

❖ Where Are the &*#! Instructions??

Xmit_ID comes with a file Xhelp.exe, which I anticipated would provide the new user with an overview of its operation, command keystrokes and advanced info. How about two out of three?! The Help file gives good information about individual commands and keystrokes. However, I could not find a clear concise step-by-step guide to actually capture and compare signals!

In my opinion this makes the use of Xmit_ID a labor of love, which may discourage all but the very determined, experienced users. I can tell you it took hours for me to dig through the jungle of keys, command, files types and terms ... and I'm still not sure if I am doing it right. For some reason I could not get the F1 key to bring up the Help file as per the Readme file instructions.

Another impediment was the fact that Windows would not print out DOS screens. So I could not print out the Help file. This did not help matters. But remember to keep Xmit_ID in perspective as a Freeware program trying to compete with MoTron's near \$1000 price tag! With that in mind I pressed on.

❖ Trying Xmit_ID

Just like MoTron, Xmit_ID captures the signal from the discriminator of a receiver. The similarities end right there. Instead of requiring extensive external hardware to interface between the radio and the computer, Xmit_ID just requires that the discriminator output be connected to the computer's microphone input.

❖ Grabbing Signals

The main screen of Xmit_ID is broken into four sections: two text sections and two signal graphs. See Figure 2.

After proper adjustment of the level using the homemade attenuator and the receiver's squelch, Xmit_ID begins to "listen" for a new signal by pressing the "R" key. Once a transmission is detected a list appears on the screen. The list shows the number and duration of each transmission. Remember that Xmit_ID attempts to "fingerprint" the transmitter by looking very carefully at the first milliseconds of each transmission. It is trying to capture a characteristic turn-on graph that is not a simple on/off. Instead it is a complex function which is the product of many factors, including the frequency generating methodology, electrical components, component tolerances and mechanical component operation.

The list is actually a continuous graph of the discriminator signal from a known transmission source. Each entry indicates another identifiable turn-on cycle. The capture continues until the Esc key is pressed. Then the graph is stored as a unique file with a file extension of ".raw"; for example File012.raw.

These "raw" files can be played back over the computer's speakers and they can be displayed on Xmit_ID's main screen.

❖ The Wheat from the Chaff

Now that we have raw data, the next step is to scan through the graph and pick out the all important turn-on parts of the transmitter's signal. This is performed via a number of keystrokes clearly detailed in the Help file under the sec-

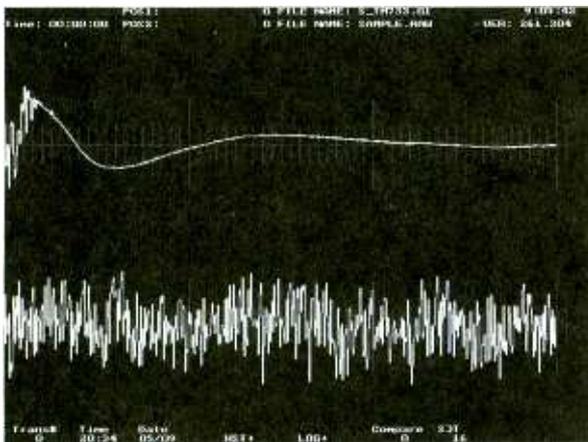


Figure 2 Main display with unknown signals ".raw" file on the bottom of the screen.



Figure 3 Pressing F3 key results in positioning to first SOT on bottom display.

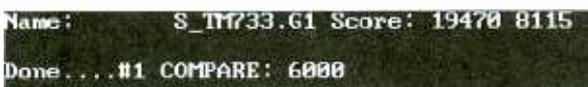


Figure 4 Screen displaying Compare results and listing ".G" file(s) which have similar signal "fingerprints" to ".raw" file SOT position.

tions Moving Screen View and Finding Start and End of Transmissions (SOT and EOT).

Once the start and end points are defined we then store the resulting piece of graph as a "fingerprint" and identify it by a name for later comparison. This is done using the "S" key to save the start portion of the transmission, and the "T" key to save the end part. Then the F11 key will begin the file naming process. F11 produces automatic compare files that have filename extensions beginning with "G".

❖ Comparing "Fingerprints"

After all the very manual "finding" and "saving" we just went through, I think you'll agree that the Auto Compare function of Xmit_ID is a bit of a misnomer. However, now we can capture new transmitters and compare their SOT (start of transmission) with our saved ".G" files. Lining up the SOT of the new transmission and then pressing the "G" key performs this compare. A list of files, which have high comparison scores with the unknown signal, is then displayed.

❖ Instructions According To John

The full actual step-by-step procedure, which I could not find documented in a simple manner anywhere in the instructions, is as follows:

- Capture signal(s) — see above.
- Save as a file with an extension of ".raw"
- Pick out start/end of transmissions from ".raw" file
- Make ".G" files from each SOT/EOT piece in step 3.
- Capture unknown signal(s) and save as new ".raw" file
- Display the unknown ".raw" file on the bottom of the screen — Figure 2
- Press F3 to find first SOT in unknown ".raw" file — Figure 3
- Press G key to compare unknown SOT to your previously saved ".G" files
- New screen will appear with a list of ".G" file(s) which have similar "fingerprints" — Figure 4
- Press Tab key to re-position ".raw" file to next signal
- Go to Step 7 and repeat for each signal captured in ".raw" file

This procedure was used using the discriminator output of an FRG-9600 and a Pentium II 300 MHz laptop computer running Windows 98. The same three FRS transceiver units used in the MoTron review were again used. However, the included Figures have been produced using the Xmit_ID's sample files so new Xmit_ID users can follow on their computers.

❖ Finally, We Have A Winner(s)!!?

I found that a number of factors were critical in obtaining a clear "winner" in matching transmitter fingerprints. Using the attenuator, the signal level has to be very carefully set. Then the SOT and EOT files must be carefully positioned and saved. Finally, the F2 key must be used to set a useful compare level.

If the user is very careful in performing all these steps (The XHELP file provides some additional information on many commands) then Xmit_ID can really be useful.

After a few days of use I was able to get about a 73% valid identification rate. Although very impressive, this was lower than achieved using the expensive MoTron system. Xmit_ID required far more operator training, judgment and keystrokes.

However, even with fine tuning the Compare threshold value, in most cases two or more files resulted as possible matches. Taking the file with the highest compare value usually resulted in the correct ID.

❖ That's It, Watson!

For anyone who wants to try his or her hand at signal fingerprinting I heartily recommend giving Xmit_ID a try. The price is right and your time and patience will be rewarded.

Outer Limits continued from page 71

tive parodies of all time, returned to active duty at Easter as is usually the case. This year they announced a new alliance with Generalissimo Groundhog. (Former maildrop closed and defunct)

WHYP- The James Brownyard station, memorializing an old medium wave outlet in North East, PA, remains very active on the pirate bands. Look for his temperature reports in Lake Erie area cities, which may or may not be current. At times they have been using **WBZO** call letters during their shows. (Providence; also uses various e-mail addresses such as)

WMFQ- The QSL promotion station is still with us. (Providence)

WPN- The World Parody Network has returned, but recent shows have announced an obsolete maildrop. (Apparently now using wpn_sw@yahoo.com e-mail)

Wreckin Radio- Programming on this relatively new pirate has primarily been classic rock music so far. (None known)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses: PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 69, Elkhorn, NE 68022; PO Box 24, Lula, GA 30554; and Ostra Porten 29, 44254 Ytterby, Sweden.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for sending pirate loggings, in hopes that pirates might QSL them, remain *The ACE*, with sample copies \$2.00 US via the Belfast maildrop and the e-mailed *Free Radio Weekly*, still free to contributors via yukon@tm.net. Martin Schoech of Germany recommends the following internet resources for discovering current Europirate addresses: SRS News at <http://www.srs.pp.se> and Dr. Tim's News at <http://www.doctortim-news.de.vu/> as well as Martin's own lists at <http://www.schoechi.de/pwdb-pir.html> and <http://www.schoechi.de/pwdb-ema.html> that are quite useful.

❖ Thanks

Your loggings and news are always welcome via 7540 Hwy 64 West, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: John T. Arthur, Belfast, NY; Jerry Berg, Lexington, MA; Ralph Brandt, Tinton Falls, NJ; Ross Comeau, Andover, MA; David Crawford, Titusville, FL; Alan Davies, Surabaya, Indonesia; Gerry Dexter, Lake Geneva, WI; Bill Finn, Philadelphia, PA; Ullis Fleming, Glen Burnie, MD; Garth Doetzel; Harold Frodge, Midland, MI; Paul Gustafson, Holden, MA; William Hassig, Mount Prospect, IL; Harry Helms, Ridgecrest, CA; Chris Lobdell, Stoneham, MA; Larry Magne, Penn's Park, PA; Greg Majewski, Oakdale, CT; Bill McClintock, Minneapolis, MN; John Morris, Whidbey Island, WA; Lee Reynolds, Leppster, NH; Mike Rutkaus, Winchester VA; Martin Schoech, Merseburg, Germany; Tom Sevart, Frontenac, KS; Lee Silvi, Mentor, OH; Bud Stacey, Setsuma, AL; Tom Sundstrom, Vincentown, NJ; Niel Wolfish, Toronto, Ontario; and Mike Wolfson, Ashland, OH.

Storm Detection by Radio

By Michel Berlie-Sarrazin

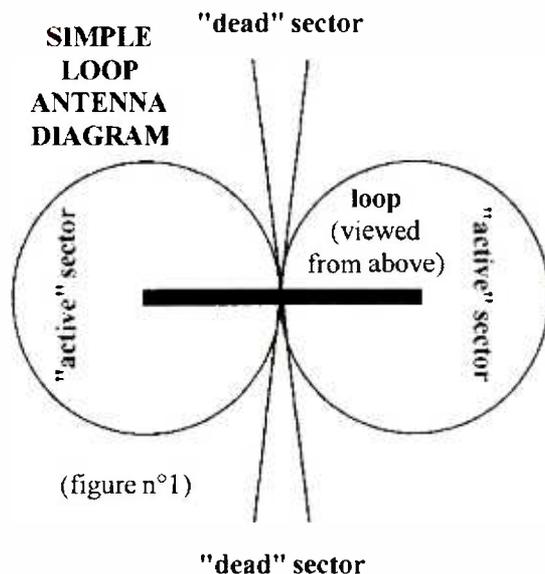
All of you know 162 MHz NOAA weather channels, but your long wave (LW) and/or medium wave (MW) receiver can also help you to determine if storms or lightning are approaching your house. The following technique is a rule of thumb, since static levels depend on a wide number of things, including time of day, frequency, intensity of the storm, sensitivity of the radio, the antenna being used, etc.

If you can receive the LW band, choose an empty channel around 150 kHz, and listen to it for one minute. Can you hear faint static? If not, there are no storms within a 200 km (125 miles) radius. Should the opposite occur, there is at least one. If static becomes louder, set your radio to a long or mediumwave station of a known distance from your location. If the static continues to be audible, the storm belt continues to approach. You can choose successively closer stations and track the storm as it approaches.

Once you hear distinct static from a station less than 50 km (30 miles) away, the storm will be visible on the horizon. It is high time to disconnect your external antenna if you use one. Do not forget that a direct lightning on this antenna could destroy your receiver, reduce your home to ashes, and badly injure or kill you. Be very careful.

◆ Local Storm Bearing

If you have a frame antenna or a ferrite one,



you can try to take a bearing of the position of the source of static as you do when rotating the receiver or the frame antenna to eliminate an unwanted signal. Do not forget, however, that: (1) Storm clouds are rather wide phenomena; (2) It is more difficult to goniometer (direction-find) sporadic sounds than continuous signals. So, don't expect more than a coarse locating, although still useful. Do not forget the remaining 180 degree directional ambiguity.

◆ Other Weather Phenomena

Storms are not the only meteorological phenomena you can pick up with your receiver. Here are other ones to detect on long and medium waves:

Strong creaking sounds [like breaking twigs]: nearby storms

Slight whistling: hailstorm in the proximity.

Sharp crackings [like a whip; quite faint and not very frequent]: spring frost or notable temperature lowering

Numerous crackling [like a wood fire; together with repeated loud and burning out creaking sounds]: large atmospheric depression and storms

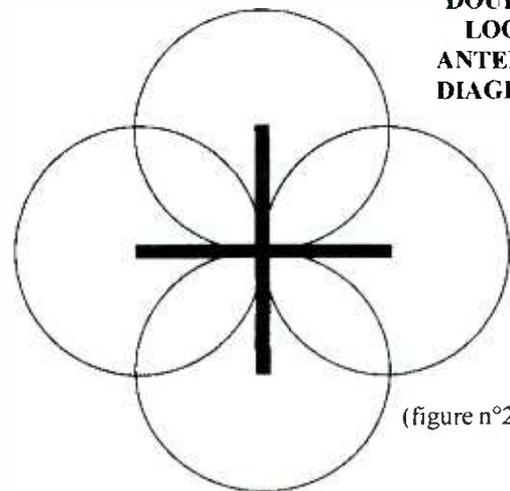
Propagation improvement: approach of rain, fog, or snow.

◆ Distant Storm Detection

The applications we have discussed so far can be enjoyed by users of low or medium-priced portable LW/MW receivers. The following part deals with very long distance detection and requires good to excellent VLF tabletop receivers, plus a loop antenna which is a project for experienced experimenters.

Your receiver must include the VLF band (or the addition of a Datong or Palomar VLF converter), with good sensitivity and quiet internal circuitry (including the display). You should live away from man-made static such as high voltage cables and neon or fluorescent lighting. Your home should be as free as possible from uncontrolled jamming devices as dimmers, TV sets and VCR, re-

COAXIAL DOUBLE LOOP ANTENNA DIAGRAM



(figure n°2)

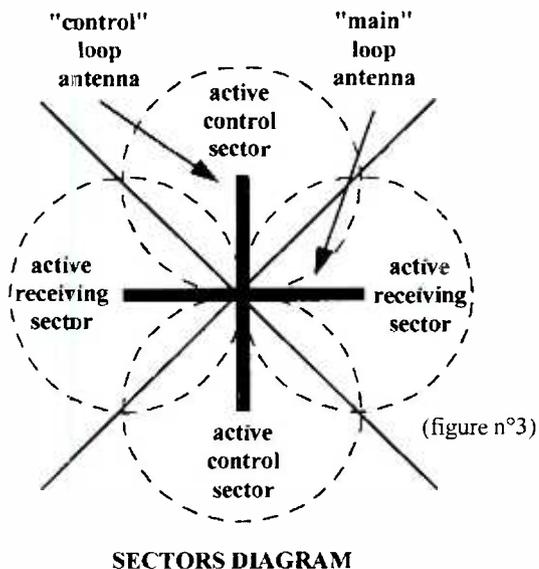
frigerator and air-conditioner with questionable suppressors. Above all, turn off personal computers and especially their video monitors.

Before we start hunting storms up to halfway around the world, just few useful reminders:

Lightning strokes are powerful natural transmitters. Their continuous electromagnetic waveband extends from ultraviolet radiations to VLF, including visible light, infrared light, EHF, SHF, UHF, VHF HF, MF, LF. Each element of the electromagnetic pulse propagates more or less a long way according to its wavelength: a few kilometers or tenth of kilometers with the visible light and VHF to EHF radio components; hundreds of kilometers with HF and MF; and all around the earth with specific VLF frequencies.

Electromagnetic pulses can travel so far because at these wavelengths the ground and the lower ionosphere layers (E and D layer) make up a natural electromagnetic duct with a specific low pass filter effect. The season (winter or summer) and the presence or absence of the sun (day or night) play a variable part concerning the tuning of this low pass filter (according to the frequency under consideration).

It is possible to detect, to locate, to date, and to measure the intercontinental lightning activity using a good VLF receiver, a special antenna, and a recorder (graph plotter or computer). From France it is an easy job to listen to storms taking place in Africa, North America (central and south), Central America, South America



(north of the Equator, Amazonian basin) and West India sea areas, to take their bearing and estimate their distance.

If you live in the eastern half of the USA, intercontinental results will most likely be similar. From the western coast of the U.S. you should expect to detect South American, Indochinese, Malay and Australian storms.

The sensitivity of the pair (receiver and antenna) must be at least 300 to 100 microvolts. The best working frequency will be around 30 kHz. A total range between 10 kHz and 100 kHz will be useful. The antenna directivity will be as narrow as possible.

◆ The Highly Directional Loop Antenna

You probably will not be surprised that the heart of the system is a special antenna. How is it special? As you know, the standard frame antenna is a directive one with two narrow "dips" (at right angles with the frame plane) where sensitivity is sharply reduced. Over most of the 360 degrees the sensitivity remains nearly unchanged.

This time this is the opposite: two narrow receiving sectors and two huge "dead" sectors. Furthermore, you have the ability to set the width of the receiving sectors. Interesting, isn't it? With a few modifications the antenna is also usable in LW/ MW broadcast DXing.

First, let me note that I found the information in a very old French Meteorological Services memo dated from 1936 and published by the Air Department. This pamphlet details the theory and the practical use of static receiving and recording devices, the results of their use, and their interpretation. Of course, back then the receivers all used tubes.

The core principle is the use of two coaxial loop antennas arranged at right angles. Connected as specified they interact in such a way that the two "active" sectors of the receiving loop are very narrow and under the control of the auxiliary loop. By playing with the auxiliary loop, you control the width of the active sectors of the first one. This width of sectors is also de-

pendent on the intensity of the incoming signal.

This kind of aerial is known under the name of "Bellini & Tosi" radiogoniometer, or Cranwell system, both derived from early Robinson or Jeance systems dating from 1918.

◆ How Does It Work?

As a sketch is better than a hundred words, I invite you to glance at figure 1. This is the diagram of directivity of an ordinary loop antenna with very wide active sectors and two narrow "blind" or "dead" sectors. The latter are useful to suppress unwanted signals and to find the direction of a transmission.

Now, if we superimpose another diagram of directivity – one of a new loop antenna, set axially at right angles to the first – we get the result in figure 2. Let us suppose the horizontal loop is the main (receiving) antenna and the vertical one is the control (auxiliary) loop. If we (electronically) subtract the signals picked up with the control loop from the signals picked up with the main loop, we define two narrow receiving sectors (figure 3).

How is this possible? Figure 4 provides a straightforward explanation. If a signal is in the S1 position it is both in the middle of a dead sector of the control loop and in the middle of an active sector of the main loop. When you subtract 0 (the intensity level of the signal in the control loop) from 1 (intensity level of the signal in the main loop), you get 1. So it is received perfectly without attenuation.

With the S2 signal, the situation is the exact opposite. This signal is in the middle of a dead sector of the main loop, also in the middle of an active sector of the control loop. When you subtract 1 (intensity level of the signal in the control loop) from 0 (intensity level of the signal in the main loop), you get 0 (arithmetically but not algebraically speaking). The signal is zapped totally.

Between these two extremes you will find all the intermediate degrees of signal attenuation.

◆ Inevitable Mathematical Formulas

It is possible to predict these attenuations mathematically. Let us begin with the simplest (single loop antenna).

$$\rho = M \times \text{Cos } \theta.$$

If a signal is rated 100 μV when arriving in the plane of a loop antenna, it is rated only 86.6 μV when arriving at 30° off this plane (Cosine 30° \approx 0.866). A 13.4 % attenuation (about –

1.25 dB).

The same signal is only 70.7 μV when arriving at 45° off the plane of the loop antenna (Cosine 45° \approx 0.707). A 29.3 % attenuation (about – 3 dB).

When a dual loop antenna is used, two choices are possible to combine the signals:

- Subtract one signal from the other before the detection.
- Subtract one signal from the other after their detection.

The corresponding formulas are:

$$\rho = M \times \text{Cos } \theta - M \times \text{Sin } \theta = M \times (\text{Cos } \theta - \text{Sin } \theta) = M \times \sqrt{2} \times \text{Cos } (\pi/4 + \theta).$$

$$\rho = M \times |\text{Cos } \theta| - M \times |\text{Sin } \theta| = M \times (|\text{Cos } \theta| - |\text{Sin } \theta|).$$

If a signal is rated 100 μV when arriving in the plane of a double loop antenna, it is rated only 36.6 μV when arriving at 30° off this plane (Cos 30° minus Sin 30° = 0.866 – 0.5 = 0.366). That provides a 63.4 % attenuation (about – 8.7 dB). Compare this with the single loop antenna (13.4 % of attenuation, or – 1.25 dB).

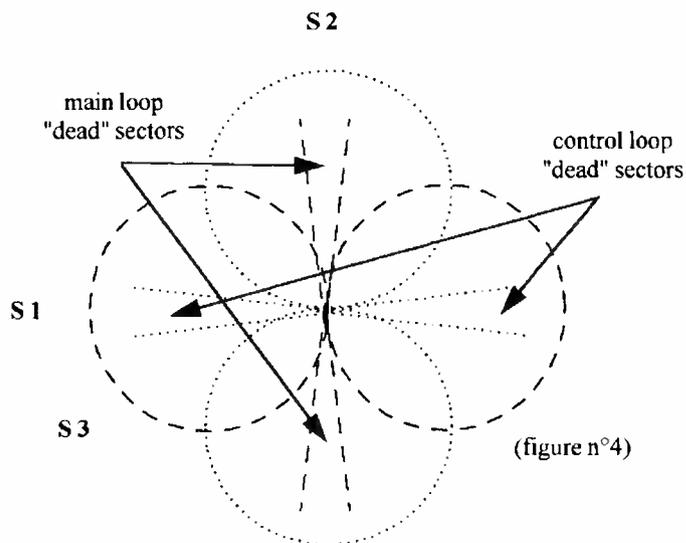
The same signal is rated 0 μV when arriving at 45° off the plane of the loop antenna (Cosine 45° minus Sine 45° = 0.707 – 0.707 = 0), for a 100 % attenuation. Again, compare this with the single loop antenna (only 29.3 % of attenuation, or – 3 dB).

◆ Adjustable Selectivity

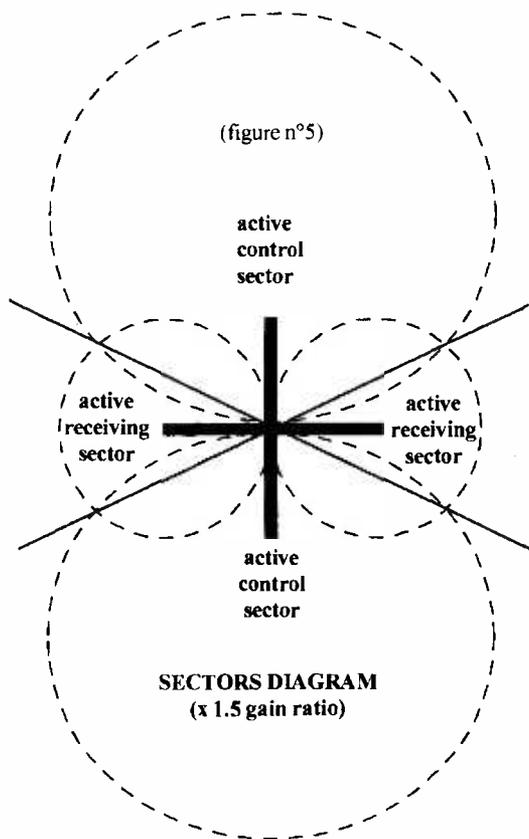
So, what do you think? A rather impressive performance, in my opinion. But it can do more! Up to this point we have considered two identical (sensitivity, size, gain...) loop antennas. But if we begin to modify parameters, things change greatly.

Let the control loop gain be 1.5 times the main loop gain. Let's use the first formula, always with a 100 μV signal arriving 30° off the plane of the double loop antenna.

$$100 \times [(\text{Cos } 30^\circ) - (1.5 \times \text{Sin } 30^\circ)] = 11.6 \mu\text{V gain, or 88.4 \% attenuation (more than - 18 dB)}$$



THREE CASES OF RECEPTION



Once again, compare with the single loop antenna (13.4 % of attenuation, or - 1.25 dB). The active sector of the main loop has been narrowed definitely by the increase of the control loop gain.

Obviously, you can widely modify the performance of such an antenna according to the respective gains of the two loops (control and receiving). The end result will vary according to their sizes, the amplifying power of auxiliary electronic circuitry, and the ratio factor of the mixing stage.

To sum up, there are different scenarios, according to the electronic circuitry used. Let's cite a few of them:

If you increase the gain of the control loop you narrow the active sectors of the main loop (you increase the selectivity). In other words, to be received as well, a signal with a given level must be in a more acute angle from the main loop plane than before the increase.

If you reduce the gain of the control loop you widen the active sectors of the main loop (you reduce the selectivity), and an incoming signal needs a less acute angle of arrival to be received.

If you increase the gain of the main loop, you increase its sensitivity to faint signals (up to the limit of the internal or local noise floor). Indirectly you have also widened its active sectors (you have reduced its selectivity). It resembles figure 2, but with a better maximum sensitivity.

If you decrease the gain of the main loop, you decrease its sensitivity to faint signals. Indirectly you have also narrowed its active sectors (you have increased its selectivity).

ity). It resembles figure 1, but with a lower maximum sensitivity.

If you increase simultaneously and equally the gain of the two loops, you increase the sensitivity of the main loop without modifying its selectivity.

If you decrease simultaneously and equally the gain of the two loops, you decrease the sensitivity of the main loop without modifying its selectivity.

You can also decrease or increase each gain independently, according to your receiving needs and with a wide range of results.

Author's Note: All the data and performance put forward are those claimed by the quoted book, or supplied by theoretical calculations. To confirm the results, however, will require building the loop and performing on the air tests. However, it is not unreasonable to expect reality to come close to theory.

◆ Notes for Construction

Construction requires basically the same precautions as other high performance loop antennas. The two loops and their respective circuitry need to be shielded perfectly each against the other. An absolute balancing of the loops must be made. The output of each loop needs to be connected to true symmetrical electronic input circuitry, with the help of a balanced/unbalanced/balanced (symmetrical/asymmetrical/symmetrical) link if necessary.

The book quoted provides some data but no complete electronic diagram: the square loop is 1.3 m (4 feet 1/4") on each side, wound with 80 turns of copper wire, and coupled with a 2000 pF (yes: 2 nF) capacitor.

Thanks to the appropriate formula (see loop antennas chapter in *ARRL Antenna Book*), we can calculate its inductance: $L \approx 20$ mH (selected coil length = 15 cm, side length = 130 cm, 80 turns). Distributed capacitance is $C = 78$ pF.

Coupled with its 2 nF capacitor (the distributed capacitance being omitted), the working frequency is: 25 kHz. With an adjustable capacitor $C = 2/0.2$ nF, we get a VLF frequency range $\Delta F = 25/80$ kHz. With a 1/2 nF adjustable capacitor the VLF frequency range becomes: $\Delta F = 10$ kHz/25 kHz.

We can also calculate the resistance of the coil $R \approx 12 \Omega$ (monostrand 24 AWG), then the theoretical Q factor at the resonance ($F = 30$ kHz) $Q = 263$.

If we consider this Q factor = 263, a working frequency $F = 30$ kHz, and a standard receiver bandwidth $\Delta f = 2$ kHz, the theoretical sensitivity will be $S = 0.56 \mu\text{V/m}$. Even with a Q factor = 10 (a poor one), the theoretical sensitivity will be $S = 2.8 \mu\text{V}$. The formulas necessary for these calculations are explained in *Loop antennas design and theory*, a National Radio Club publication.

In practice (given shielding and link coupling losses, not to mention other ones) the real sensitivity will be 3 times to 10 times lower

than calculated: between $2 \mu\text{V}$ and $6 \mu\text{V}$ ($Q = 263$) and between $9 \mu\text{V}$ and $30 \mu\text{V}$ ($Q = 10$). The fact remains that these new values are acceptable.

It seems to me the best way to get the subtraction between the signal from the main and the control loop is to use operational amplifiers capable of handling dynamic and frequency (10 kHz to 100 kHz) ranges. As regards coil winding, multistrand (Litz) wire is worth a try.

Although succinct, the information included in this chapter gives you sufficient clues to make your experimental VLF/LF highly directional antenna provided that you have some loop antenna and operational amplifier experience. Otherwise, just wait a bit; I am sure that other readers of this text will not take a long time to fill in the gap and present us their product in a forthcoming *Monitoring Time* issue!

◆ Some Applications

What are some applications of the highly directional loop antenna? Of course, to DX elusive stations in spite of blockbuster signals and various interference. Also to use goniometric techniques to locate transmitters (with the help of another receiving station equipped in the same way).

Using a personal computer, suitable freeware or shareware polar printing utility, and remote control of the bearing of the antenna, you can make a panoramic receiver. If the loop antenna is made to rotate 360 degrees with a small motor, you can get a radar-like picture on the screen of your computer where bearings of transmitters (on a given frequency) are directly displayed. Better yet, you can make your receiver and the loop antenna automatically tunable on a given frequency range, and get the true bearing of all the transmitters currently on the air in this waveband.

Returning to the storm warning application, with the same equipment (with or without the sweep ability) you have a panoramic VLF/LF radio analyzer of natural transmitters - lightning and thundershowers.

A last tip to solve the mechanical problem of a 360 degree rotating loop antenna and its four connections (two for each loop). The book suggests using circular concentric channels filled with mercury and traveled by loop contacts. But mercury is a highly poisonous chemical element, and probably prohibited. Instead of mercury, why not make the whole setup (loop antennas, electronic circuitry, receiver...) rotate as one unit instead, and use a UHF (or infrared) low power data link to the personal computer port?

If the performance put forward in this article is confirmed by readers and future users, this loop antenna deserves good care. Its main advantage compared with other well-known loop antennas lies in its narrow and controllable receiving sectors - an important criterion in the opinion of expert DXers. Through the modification of its coil impedance, the loop can be adapted to wavebands from ELF (a few kHz) up to MF (500/1700 kHz BCB).

Magellan's Slick GPS Receiver - Part 1

This month and next I'll be testing one of the coolest pieces of gear that a radio enthusiast might want to add to his or her arsenal of equipment – the Magellan MAP 330 GPS Receiver which is equipped with WAAS capability. But, frankly, most of this month's column will be spent "setting the scene" and explaining the technology.

GPS refers to the Global Positioning System, a constellation of 24 satellites that orbit the Earth twice a day at an altitude of about 12,000 miles. Twenty-four hours a day, these satellites continuously broadcast high-frequency radio signals containing position and time data, enabling anyone with a GPS receiver to determine their location anywhere on Earth. The GPS signals are available to an unlimited number of users simultaneously.

Every point on Earth can be identified by a specific address. By using two sets of numbers, referred to as coordinates, which represent the exact spot where a horizontal line (latitude) crosses a vertical line (longitude), you can represent any location precisely. GPS receivers report and record your current position – or the position of any place you've been or would like to be – with latitude/longitude coordinates. GPS receivers also produce other critical navigation information, including heading, bearing, distance-to-go, time-to-go, and more – anytime, anywhere, in any weather.

The basis of GPS technology is precise time and position information. Using atomic clocks (accurate to within one second every 70,000 years) and location data, each satellite continuously broadcasts the time and its position. A GPS receiver uses signals from three or more satellites at once to determine the user's position on earth.

By measuring the time interval between the transmission and the reception of a satellite signal, the GPS receiver calculates the distance between the user and each satellite. Using the distance measurements of at least three satellites in an algorithm computation, the GPS receiver arrives at an accurate position fix. Information must be received from three satellites in order to obtain two-dimensional (latitude and longitude) fixes, and four satellites are required for three-dimensional (latitude, longitude and altitude) positioning. The position information in a GPS receiver may be displayed as longitude/latitude, Universal Transverse Mercator, Military Grid or

other system coordinates.

The U.S. Department of Defense began development of the \$12 billion GPS satellite navigation system in the 1970s to provide continuous, worldwide positioning and navigation data to U.S. military forces around the globe. However, GPS has even broader civilian applications. Position and navigation information is vital for many professional and personal activities, including boating, surveying, aviation, vehicle tracking and navigation, and more.

To meet these different needs, there were previously two levels of GPS services, one for civilian access and the second encrypted for exclusive military use. The civilian GPS signals were subjected to Selective Availability (SA) interference by the United States Government, which meant there were random errors in the data transmitted by the satellites to reduce the civilian GPS signal accuracy to 100 meters. However, on May 1, 2000, the U.S. government removed SA from GPS signals, which resulted in ten times greater accuracy for public users of GPS – position fixes that are usually within 10 meters.

Users can further increase the overall accuracy of GPS receivers with correction signals from

technology called differential GPS (DGPS) and from satellite systems, such as the Wide Area Augmentation System, developed by the United States government. WAAS satellites calculate errors in the GPS signal, then the satellites transmit correction messages to WAAS-capable GPS receivers. The result is a position reading that is as accurate as three meters or better.

And that brings us to a conversation I had with a friend. We were having lunch at a restaurant when I pulled the Magellan Map 330 out of my pocket. At first he assumed it was a cell phone since it was the same general shape and size. "No, it's a GPS receiver," I said.

"What does it do?" he asked.

"It tells me where I am," I replied.

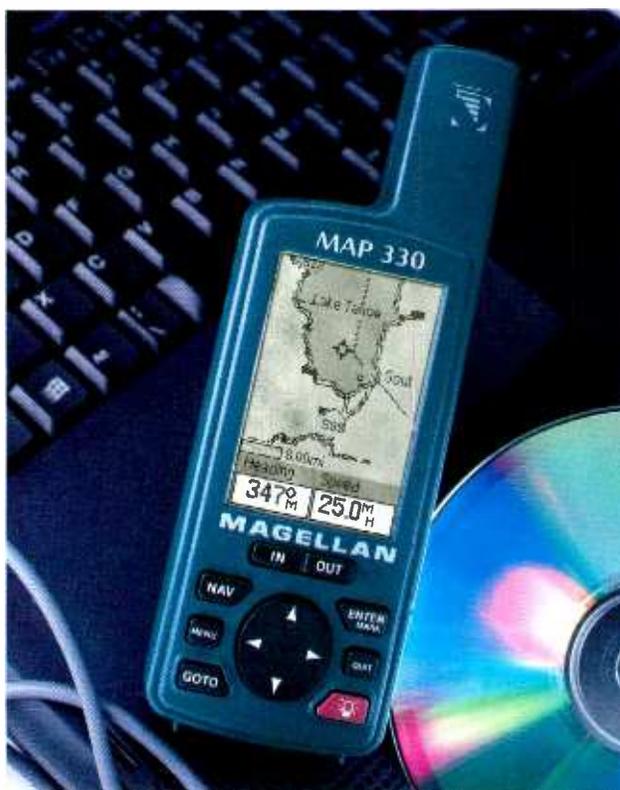
He gave me a fatherly smile, patted my hand, and said, "Why, you're right here."

After I got done chuckling, I explained that the MAP 330 would pinpoint my location anywhere the unit could "see" the sky. Further, it would show my coordinates on a map on the built-in 1-3/8 in. x 2-1/4 in. liquid crystal display. Further, the unit has 16 MB of memory, including a built-in database of worldwide political boundaries, US cities, highways, major roads, national parks, waterways, and railways.

Even better, using a cable that is included with the MAP 330, it is possible to download detailed street or topographic maps to the MAP 330. I chose the topographic maps, Magellan's MapSend™ Topo for the United States. It includes nationwide street maps, trails, lakes, rivers, topographic points of interest, Woodall's® Campgrounds database and a true digital elevation model (DEM) database derived from U.S. Geological Survey DEM data.

MapSend Topo for the United States simplifies route planning and navigation during outdoor activities, with features that help users determine the terrain along routes, or find alternate routes when the terrain is too steep or impassable. Users can access a graph profiling the vertical line of elevation along routes, roads, trails or other linear map features. In addition, users can search the database using names, addresses or coordinates to pinpoint streets, campgrounds, trails, rivers, lakes and 50 other categories of topographic points of interest from parks and oilfields to summits and caves.

Next time, we'll see what kind of fun we can have with the Map 330.



What's NEW

Tell them you saw it in *Monitoring Times*

KIWA Audio Upgrade Kits

Kiwa Electronics has recently expanded its product line of Audio Upgrade Kits for improving the audio clarity and intelligibility of radio receivers. Current Audio Upgrade Kits now include the following receivers: Yaesu FRG100, Sony ICF2010, CC Radio Plus, Sangean ATS909/Radio Shack DX398, Sangean ATS818/Radio Shack DX390-392, Icom R75. All kits are designed for easy installation and include step-by-step instructions, or can be performed by the factory.

The audio upgrades replace key components in the audio signal path to improve the audio quality. The result is improved audio definition where consonants like c's, k's and q's sound clearer, and music will sound more dynamic. Cost for most kits is \$20 plus \$2 shipping.

The audio upgrade for the CC Radio is available only for the Plus version. Other upgrades available for the CC Radio include installation of a switchboard to allow choice between a 6.2 kHz and 3.7 kHz filter, and a front end alignment.

In addition to the audio upgrade for the ATS909/DX398 receivers, Kiwa also offers a new tuning knob upgrade, which must be performed at Kiwa. This involves removing the detent to the tuning knob providing a smoother feel to frequency tuning. Kiwa also offers an upgrade to the narrowband filter and instructions on how to disable the mute when using scan mode.

In addition to the improved audio clarity provided by the kit for the Sony 2010, an upgrade is included for the memory backup. This requires the installation of a capacitor across the AA memory back-up batteries, allowing removal of the AA batteries for up to ten minutes without loss of installed memory information (a combined \$22 dollar value). Other modifications available for the Sony 2010 include filter replacements for wide or narrow bands.

Several upgrades are available for the Icom R75; however, all re-

quire that you send your receiver to Kiwa for installation. In addition to the new audio upgrades, Kiwa can also change filters to improve AM performance and improve the performance of the synchronous detector to better "lock" onto the desired station.

For more information on upgrades for these and other receivers contact Kiwa Electronics, 612 South 14th Avenue, Yakima, WA 98902 USA; 509-453-5492; <http://www.kiwa.com>; kiwa@wolfenet.com

Nil-Jon Super-M Upgrade

The top-of-the-line mobile scanning antenna from Nil-Jon has been made even better. The antenna whip (of which there are three) is now stainless steel instead of a painted black whip. The end of each whip is threaded to screw into the base fixture instead of being held in place by setscrews, which sometimes loosened up, causing loss of the whip.



The base is formed of aircraft grade aluminum; a rubber gasket between the base and the magnetic mount provides a waterproof seal with the hefty magnetic mount.

The Nil-Jon's unique, tilted, three-element design uses harmonic patterning to improve VHF/UHF reception. Twelve feet of cable with BNC connector are provided. The Nil-Jon Super-M is available from Grove Enterprises for \$79.95 plus shipping; call 1-800-438-8155, visit <http://www.grove-ent.com>, email order@grove-ent.com, or write Grove Enterprises, 7540 Hwy 64 West, Brasstown, NC 8902 for more information.

Quick Upgrade for your Duckie!

A quick and easy way to add miles to the range of your handheld radio is to add a ground plane to the antenna. Grove Enterprises now sells an exclusive magnetic base mount designed to accept your duckie or any antenna with a BNC connector for mounting outdoors on top of your vehicle, or indoors on top of a metal file cabinet, etc. The 3-inch magnetic mount Grove Range-Extending Mobile Mag Mount comes with 18 feet of RG-58/U coax with BNC connector to attach to your handheld scanner, handi-talkie, or other portable radio. At \$24.95, this is an upgrade you can afford! Call 800-438-8155 for information or to order.



The Tech Junkie's Ultimate Vest!

I can't believe I found this tech-friendly garment before Gary Webbenhurst did! The Scott eVest is designed for today's wired-but-wireless, on-the-go population. It adapts equally to youngsters who carry their music and communications gear wherever they go, to mobile professionals who carry their "office" with them, to emergency and communications workers with

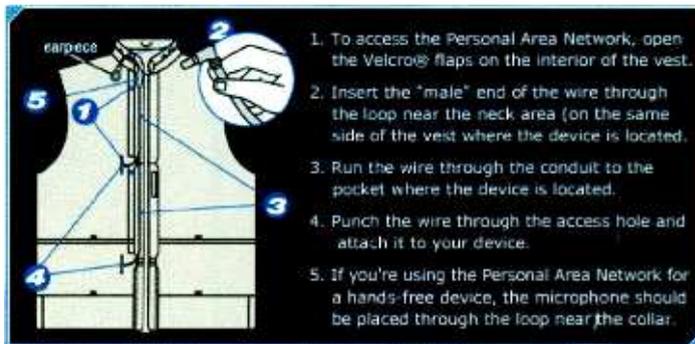
their radios, mics, GPS etc., to photographers with all their gear.

The outstanding feature of the jacket or vest (Version 2.0 comes with zip-out long sleeves) is that it looks like an ordinary jacket without making the wearer look like a geek or revealing expensive equipment. Channels in the lining allow equipment to be connected without becoming tangled or revealing cords; an opening near the collar is at the proper level for a microphone for two-way communications.

Version 1 was a vest only and is still available in limited quantity. Version 2 comes in two models: 2.0s-Sport is a summer-weight jacket with no lining. The eVests are made of a soft, water-repellent microfiber (to protect your electronics). Version 2 comes with 17 pockets including a large back pocket, which is reachable from the side pockets, and inside eyeglasses pocket. Pockets zip open from the inside.



Current sale prices range from \$90 to \$129.99. You may order online at <http://www.scottevest.com> or via these contact points: sales@scottevest.com; 1-866-909-8378 (toll-free in US); Fax: (208) 975-1186; SCOTT eVEST L.L.C., 1456 North Dayton Street, Suite 304, Chicago, Illinois 60622.



What's NEW

Tell them you saw it in Monitoring Times

ARRL Repeater Directory

For VHF amateur radio operators, few publications are as handy as this pocket-size directory of ham repeaters in the U.S. and Canada. Listed alphabetically by state and city, nearly 600 concise pages cover coordinated repeaters in the 29.5-29.7, 51-54, 144-148, 222-225, 420-450, 902-928, and 1240-1300 MHz bands.

Voice, amateur television (ATV), and digital modes are included, along with access details to utilize the repeaters.

An excellent set of introductory pages provides details on types of repeaters, protocols, and operating hints.

The *ARRL Repeater Directory* is available from leading amateur radio stores for \$9, and from the American Radio Relay League (add \$4 shipping), 225 Main St., Newington, CT 06111-1494.

TV Station Guide

The Worldwide TV-FM DX Association has announced the release of the *2002 WTFDA TV Station Guide*, written and compiled by WTFDA TV News editor and *MT* columnist, Doug Smith, W9WI.

The *TV Station Guide* debuted in the spring of 2000 and immediately proved to be a hit with both casual and hard-core television DXers and amateur radio hobbyists, especially for identifying stations during skip conditions.

The 400+ loose-leaf pages are divided into two sections – station data and maps. Data provided for each station includes location, call letters, radiated power, antenna height and type (directional, polarization, beam tilt and offset), geographical coordinates, station status, and programming source. All digital TV stations are listed, as are all low power TVs.

The channel maps show all full power television stations plus digital TV outlets and LPTV stations

for the entire United States and most of Canada and Mexico.

The *2002 WTFDA TV Station Guide* is \$23 for members of WTFDA, IRCA, NRC, ODXA and ANARC affiliated clubs; \$25 for all others. Please note the name of your club on your order. All checks and money orders must be made payable to club treasurer David Janowiak. Send your check or money order to: John Ebeling, 9209 Vincent Avenue South, Bloomington, MN 55431-2157. For more information, visit <http://fmdx.usclargo.com/tvg.html>

Sounds in the Night: All-Night Radio in American Life

By Michael C. Keith

"A personal book about a very good personal medium" would be an accurate way to describe this fast-paced, entertaining, and well-documented account of a uniquely American communications phenomenon. The tone is set by Larry King's foreword,

which contains the moving story of Danny Kaye and how he sang a song for a caller to the Larry King Show. The caller had lost her son in the Korean War and wanted to tell the entertainer what a great fan her son had been. The whole crew was in tears by the time Danny Kaye finished his song.

The book maintains its personal approach by devoting large segments of each chapter to quotes from "The Night People," whom the author interviewed because they had been or still were associated with All-Night Radio. Some are well known, such as Art Bell, Jim Bohannon and Rollye James, while others are less known. Their comments, woven into the author's narrative, provide the reader with a wide perspective on the subject.

The characteristics of the all-night radio audience are described. Surveys have shown that although

there are fewer of them than daytime listeners, the all-night-radio fan tunes in for one to one and a half hours, rather than for 20 minutes in the daytime. We learn of radio's first post-midnight transmissions in the 1920s and the types of programs presented. Most were remote broadcasts from hotel ballrooms.

One chapter covers "Distant Signals" and recounts how clear channel stations originated, how "silent nights" were observed to allow distant stations to be received and how the Federal Radio Commission functioned in the early days.

Tributes to the pioneers of all-night radio such as Barry Gray, Jean Shepherd and Long John Nebel are of interest to those who did not experience the radio world of the 1940s, 1950s and 1960s. The author describes commercial underground radio, between 1966-1972, having written a previous book on the subject (*Voices in the Purple Haze*) and devotes a chapter to "The Ladies of the Night" such as Jean King, Alison Steele and Yvonne Daniels. Trucker's radio with such personalities as Dave Nemo, Bill Mack and Dale Sommers rate part of a chapter, as do the conservative talk shows, which emerged after the "Fairness Doctrine" was eliminated in 1987.

The consolidation of the broadcast industry and increased national syndication of All-Night Radio programs have led to an environment which is certainly less diverse and interesting than was the case during the "Golden Age." Larry King claims that radio greats such as Arthur Godfrey and Edward R. Murrow made radio classy. Radio is not classy now and King maintains much of what is broadcast is "predictable" and "just tripe."

In spite of such comments from Larry King and others, there are voices from among "The Night People" who are optimistic that All-Night Radio will survive and continue to inform and entertain the legions of loyal folk who stay awake after the midnight hour.

Sounds in the Night is published in Ames, IA: Iowa State University, 2001; ISBN 0-8138-2981-X; cover price \$34.95. If the retail price of the book is a deterrent to

purchasing, ask your public or college library to buy it.

One glaring typo persists throughout the book. The 50kW AM station in San Antonio is WOAI not WOAL.

– Martin Gallas, reviewer

Advanced Digital Suite

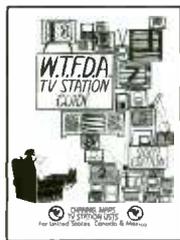
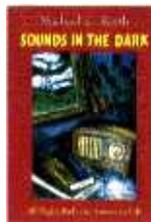
The WinRADiO Advanced Digital Suite is a soon-to-be-released, optional software package that can be used with any type of WinRADiO receiver. This collection of digital signal processing modules upgrades the original \$85 Digital Suite; owners of the early version should enquire about special upgrade pricing.

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For pricing and availability in the U.S., contact Grove Enterprises at 800-438-8155. <http://www.grove-ent.com>, or at address listed above. For additional screen shots and product information, visit <http://www.winradio.com>

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to mtditor@grove-ent.com.



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EDITORIAL STAFF

Correspondence to columnists may be mailed c/o Monitoring Times; any request for a reply should include an SASE.

Frequency Manager	Gayle Van Horn	gayle@webworkz.com
Frequency Monitors	Mark J. Fine	mark.fine@fineware-swl.com
Program Manager	John Figliozzi, KC2BPU	jfiglio1@nycap.rr.com
American Bandscan	Doug Smith, W9WI	w9wi@bellsouth.net
Antenna Topics	W. Clem Small, KR6A	clemsmall@hotmail.com
Ask Bob	Bob Grove	bgrove@grove-ent.com
Beginner's Corner	Ken Reitz, KS4ZR	ks4zr@firstva.com
Below 500 kHz	Kevin Carey, WB2QMY	wb2qmy@arrl.net
Bright Ideas	Gary Webbenhurst	ab7ni@arrl.net
Closing Comments	Bob Grove	bgrove@grove-ent.com
Communications	Rachel Baughn	mteditor@grove-ent.com
Computers and Radio	John Catalano	j_catalano@conknet.com
Digital Digest	Stan Scalsky	sscalsk@mail.ameritel.net
	Mike Chace	mike@chace-artiz.org
Easy Access Radio	Jack Elliott KB2GOM	lightkpr@nycap.rr.com
Fed File	Larry Van Horn, N5FPW	larry@grove-ent.com
Letters to the Editor	Rachel Baughn	mteditor@grove-ent.com
Milcam	Larry Van Horn, N5FPW	larry@grove-ent.com
On the Ham Bands	T.J. Arey, N2EI	tjarey@tjarey.com
Outer Limits	George Zeller	georgez@nacs.net
Plane Talk	Jean Baker, KIN9DD	jeanieandbob@earthlink.net
Programming Spotlight	John Figliozzi, KC2BPU	jfiglio1@nycap.rr.com
QSL Corner	Gayle Van Horn	gayle@webworkz.com
Radio Restorations	Marc Ellis	mfellis@enteract.com
Satellite Radio Guide	Robert Smothers	roberts@nmia.com
Scanning Canada	John Corby, VA3KOT	johndavidcorby@yahoo.com
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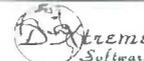
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Can Shortwave Broadcasting Be Saved?

by Bob Zanotti

Last March, I attended the Kulpville Winterfest for the first time. It was wonderful to be among old and new friends, most of whom had been drawn there by the magnet of shortwave radio. Technically, I was attending as a "civilian," just having taken early retirement from Swiss Radio International after 32 years on the air. I had not been sent officially to an SWL event for more than a decade. And there was a reason. My early retirement from "swissinfo/SRI" is linked to the fact that this once top-rated shortwave broadcaster now sees its future in a mainly text-based presence on the Internet, with all SRI shortwave transmissions ceasing in 2004. It was time to go.

As I mingled among the shortwave faithful at Kulpville (which includes me), I couldn't help but ask myself, how long will this last if other stations follow SRI's example? Personally, I believe that shortwave still has a lot of life left in it as a viable international medium. But how can the decision-makers be convinced of this at a time of budget cuts and cost-effectiveness?

In a nutshell, this is what happened to shortwave in the last decade: Until the dramatic events that led to the fall of the Berlin Wall, international broadcasting via shortwave was a self-maintaining institution with a bright future. Virtually every nation of any significance had its international radio voice. There was plenty of justification in the minds of the politicians and strategists for spending the massive amounts of money to keep international broadcasts filling the airways.

But on November 9th, 1989, the world awoke to the sights and sounds of jubilant East and West Berliners breaking down *Die Mauer*, piece by piece. The borders were open, the Iron Curtain was disintegrating, and the Cold War was coming to an end. The world heaved a sigh of relief.

But when the dust settled and the euphoria subsided, the traditional shortwave broadcasters – or more specifically, their managements – began to be asked very pointed and uncomfortable questions about their future plans. Many, if not most of them, were simply not prepared with an answer. Quick-fix panaceas included local rebroadcasting, satellite, cable, and now...the Internet.

The political upheaval coincided with the advent of "shareholder values" and "market-orientation," which became two of the most repeated buzzwords in the management offices of international broadcasting. A horde of technocrats, consultants and media gurus popped up. Few had any experience of shortwave broadcasting. But many of them did have a stake in promoting new technologies. A scapegoat had to be found, and shortwave was it.

One of the most common arguments against traditional shortwave broadcasting is its alleged high cost. But closer examination shows this to be a false argument. First of all, there's the problem of mobility. There is no widely available and affordable technology today that can compete with shortwave for portability and signal accessibility. There is no receiver technology currently available, besides shortwave, that can be thrown into a suitcase or carried in a pocket or backpack.

Then, there are the issues of market penetration and acceptability. There are millions upon millions of shortwave radios in

use today. They are cheap, easy to operate, and they require no heavy infrastructure investment.

Getting online with the Internet, on the other hand, is costly, and special knowledge is required. Once the hardware is in place, accessing the Net is another financial burden. The USA, Canada and Australia have flat-rate telephone service – most of the rest of the world does not. In other words, consuming a lot of information via the Internet is an expensive proposition in most parts of the world. And then there's the human factor. How many people are really prepared to sit still for long periods in front of a computer for the duration of a "Netcast"?

Who was it who once said "Tell me anything, but don't confuse me with the facts"? Very apropos! Managements have made decisions, and others are in the process of doing so. And from what I've been hearing, the survival of big time shortwave broadcasting is in peril. We've all heard the tired refrain: "Shortwave is dead." No it's not, I say, but it may become a sadly self-fulfilling prophecy as more and more decision-makers *think* it is!

For those of us who want to save shortwave, I see only one course of action: protest. In international broadcasting management circles, even a small number of complaints and protests can have a very significant impact on decision-making. I am personally convinced that the BBC miscalculated the level of protest that would result from its curtailment of shortwave transmissions to North America and Australia. Thanks to the dedicated and concerted efforts to protest against that decision, I have a gut-feeling that a face-saving solution may be in the offing. (I'm a hopeless optimist). I think it is also important to send copies of protest messages to the government agencies responsible for external communication – usually a country's foreign ministry.

I can't emphasize enough that management has no patience with QSL-card hunters. I can assure you that there is no redder flag for management, and no more classic excuse for curtailing shortwave than listeners who only write in for a QSL. Unfortunately, the QSL-hunter has become the stereotype image of the shortwave enthusiast in the perception of management, and is used as a prime excuse to regard shortwave as a thing of the past.

What management and program-makers want and need to hear are your comments about their creative efforts. Bob Thomann and I realized this years ago, when we started appealing to the SWL/DXer community on the "Merry-Go-Round" to start paying attention to "program content" and forget QSLing. We made some enemies back then because of it. But time has proved that message to have been correct.

As was pointed out during the Broadcasters Forum at Kulpville, many stations take their cue from the almighty BBC. London's decision to curtail shortwave service to North America and Australia could create a domino effect. There can be no complacency here. Every well-thought-out and well-written letter to management *can* have a significant impact. But as the old adage goes: "An ounce of prevention is worth a pound of cure."

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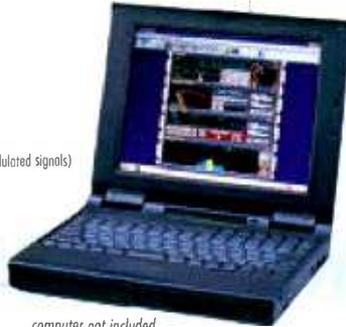


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