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- 1000 memory settings (100ch x 10 memory banks)
- Easy menu-driven operation
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SR2000
Standard Accessories:
AC adapter, control cables



Authority on Radio Communications

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Software-Defined Radios par excellence

Just when you thought you had seen everything in shortwave, here come the WiNRADiO software-defined receivers, offering unparalleled performance, flexibility and richness of features. This award winning technology is now available to any demanding shortwave listener at incredible prices.

WR-G303i

The award-winning WR-G303i is the world's first commercially available software-defined shortwave receiver (9 kHz to 30 MHz). Based on a PCI card, it can easily be installed in most modern desktop PCs without the need of any interface cables or power supplies.

With its high sensitivity, high dynamic range and very low phase noise, this receiver will certainly impress even the most demanding user. Its quality characteristics also make it suitable for special applications such as VLF listening, DXing on LW, MW and SW, and DRM.



WR-G303e

The WR-G303e is an external version of the WR-G303i receiver. Featuring the same excellent performance and characteristics, this receiver offers portability and flexibility thanks to the USB interface. An optional serial interface is also available.

The Professional Demodulator Option (available for both the G303i and G303e models) includes many additional features, such as continuously variable IF bandwidth (1Hz - 15kHz), user adjustable filter selectivity, built-in test instruments and interactive block diagrams.



WR-G313

Internal and external WR-G313 models are professional software-defined shortwave receivers, for demanding monitoring and surveillance applications. The frequency range 9 kHz to 30 MHz is optionally extendable to 180 MHz, with a tuning stability of 0.5 ppm.

Numerous advanced features include continuously variable IF bandwidth, several spectrum analyzers (16 Hz resolution), noise blanker and notch filter, IF spectrum and audio recorder, signal measurement functions, calibrated signal strength meter and many others.



... and the experts agree:

World and TV Radio Handbook:

"Extensive tests and measurements coupled with a good deal of listening and comparative evaluation suggested that the G303i is a remarkably good performer despite its relatively low price."

"Indeed, the G303i's price/performance ratio is remarkable. The display is commendably clear and uncluttered, and for those who are used to interfacing with a PC, the receiver is remarkably easy to set up and use."

"The infinitely adjustable bandwidth is a delight, allowing the user to make the best of a wide variety of transmission quality."

"The G303i sets the new standard for PC-receivers and is the first to make extensive use of the power of the modern IBM-compatible computer."

We congratulate the manufacturer on a fine achievement."

"Overall rating: 5 stars"

Passport To World Band Radio:

"Excellent shortwave sensitivity... excellent dynamic range and third order intercept point...Phase noise excellent...Image rejection excellent... Spurious signals essentially absent..."

"WiNRADiO's G303i is the 'ne plus ultra' among tested PC controlled receivers for world band reception." (*Tested were WiNRADiO G303i, Ten-Tec RX-320D, Icom IC-PCR1000.*)

"The G303i provides laboratory-quality spectrum displays..."

"Superb stability, almost unexcelled."

"Superior and timely free factory assistance via email, seemingly seven days a week."

ShortWave Magazine:

"As far as I can remember I have never found any receiver, analogue or digital, which had such cleanliness, and the WR-G303i has set a new standard for others to emulate."

Radio Active:

"The G303 receiver software is truly excellent and you would probably need to add an extra nought to the price to get anywhere near these facilities in a conventional receiver!"

"The engineers at WiNRADiO have achieved a minor miracle in screening technologies to produce a top flight receiver with virtually no spurious pick-up from the computer."

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Cover Story

The Busiest Air Base in the US

By Ron Perron

Andrews Air Force Base outside Washington, DC, is home to around twenty military units. We covered the VIP Support Units in our March 2003 issue; this time we'll fill you in on the rest of the activity at Andrews. There's never a dull moment. Story starts on page 10.

On Our Cover: It's airshow season again! Spectators gape at a Blue Angels formation over Andrews Air Force Base; photographer, Kevin Burke, photoz01@netzero.com

C O N T E N T S

Air Show Schedules 13

The 2005 air show season gears up in March, so check the schedule for military flight demonstration teams coming to your area. Then turn to the Milcom column on page 52 for the most up-to-date frequency and monitoring information!

Making the Case for FM 14

By Ken Reitz

The FM band is in a state of flux, and there are at least four factors at work: the evolution of HD digital radio, increased use of boosters and translators, low power FM radio and pirates, and satellite radio. This article looks at each of these aspects to see what kind of impact it is having on FM.

Wireless Networking 17

By Lee Badman

Wireless networks are catching on everywhere. Even though they're part of an unlicensed service, they share frequencies with amateur radio, which may create increasing problems. Meanwhile, some hams are experimenting with the overlap to come up with innovative modes of operating. Here's a basic overview of what you should know about the popular 2.4 and 5 GHz bands.

Reviews:

Wavecom's W51LAN is an easy all-in-one solution for a professional-grade decoding system that's easily portable and doesn't require setting up or integrating the decoder/software and the computer (see page 70).

With some very specific criteria in mind, Eric Bryan set out to find his ideal portable shortwave radio. He found it in the very affordable Degen DE1103 (see page 66).

The Optoelectronics X-Sweeper is a professional-grade, hand-held test unit which sweeps the spectrum from 30-

3000 MHz, acquiring and memorizing active frequencies in that entire range in as little as one second. An acquired signal may be monitored by connecting the unit to specified receivers (see page 68).

Limited range is one of the primary frustrations of wireless networking. The WiNRADiO AX-37 UHF Beam comes in both passive and active models and is an effective solution to weak signals and interference issues (page 74).



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

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 Periodicals postage paid at Brasstown, NC,
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 Subscriptions: order@grove-ent.com

Subscription Rates: \$28.95 in US; \$39.50
 Canada; and \$58.50 foreign elsewhere,
 US funds. Label indicates last issue of sub-
 scription. See page 76 for subscription
Information.

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

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 Unsolicited manuscripts are accepted. SASE
 if material is to be returned.

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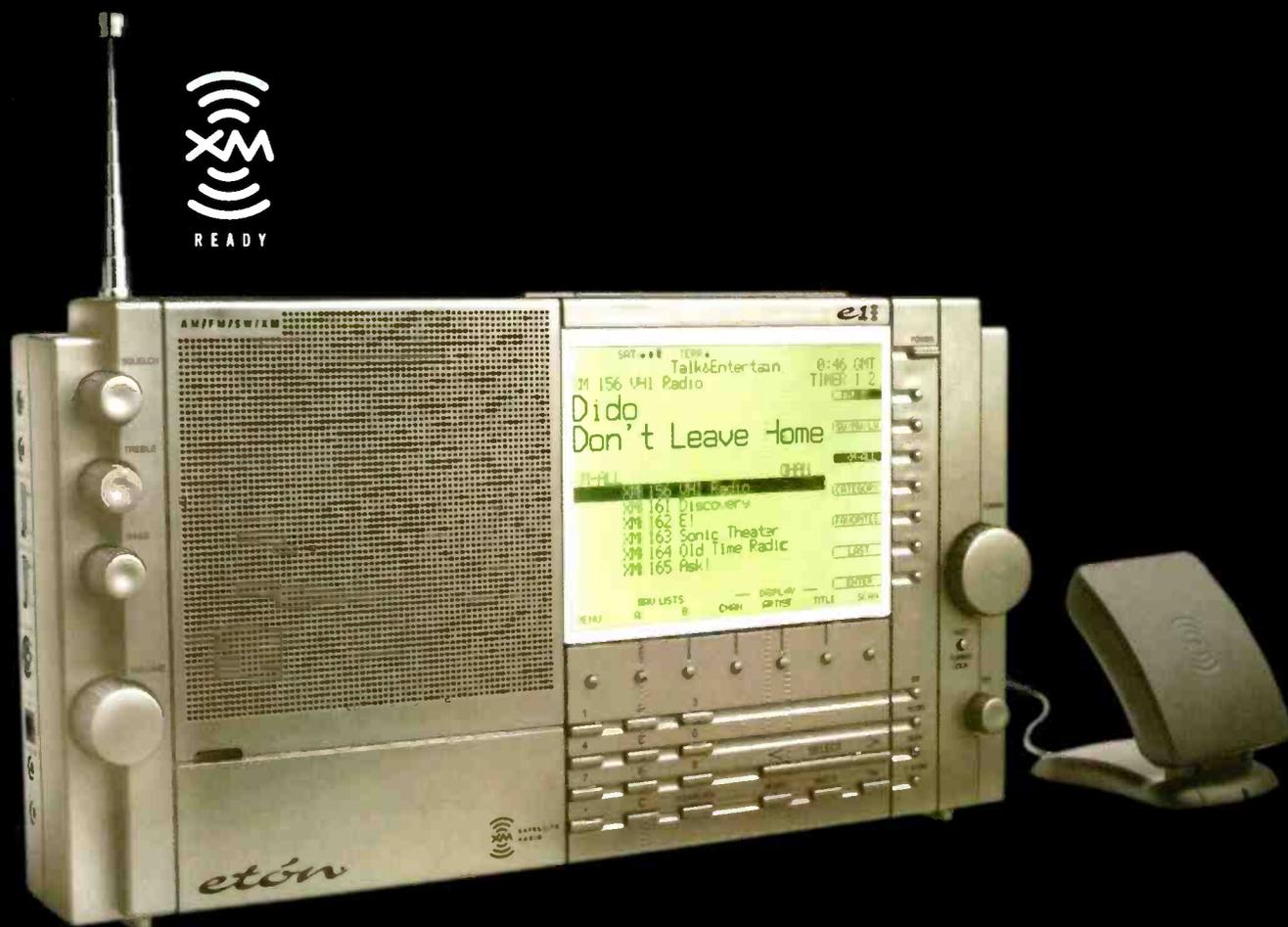
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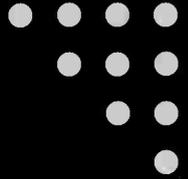
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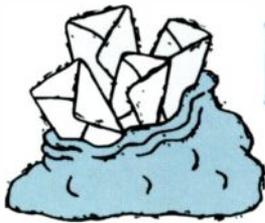
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LETTERS TO THE EDITOR

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

Antique, Used, Closeouts, and Demonstration Receivers

A sidebar to January's feature article "Beginner's Guide to Shortwave Listening" accidentally omitted a short list of companies which often have used equipment for sale. Since this type of one-of-a-kind inventory is very fluid, most companies do not include these products in their catalog, but only online. Therefore, the author only listed internet contact information.

Here are the links that take you straight to the used bargains:

Amateur Electronic Supply: <http://www.aesham.com/download.shtml>

C. Crane: Check out their "orphans & closeouts" list: <http://www.ccrane.com/orphans.aspx>

Grove Enterprises: <http://www.grove-ent.com/hmpgbbb.html>

Universal Radio: <http://www.universal-radio.com/alert.html>

For antique radios, try *Antique Radio Classified*, a magazine dedicated to the buying and selling of old radios. For a free sample contact Antique Radio Classified, P.O. Box 2-V75, Carlisle, MA 01741, TEL: (978) 371-0512 || FAX: (978) 371-7129. For information and links to related sites, go to <http://www.antiqueradio.com/>

Thanks for the Memories

(To publisher Bob Grove:) "The point to my email to you is to say *thanks!* I've been a subscriber since the early '80s and you have brought me a treasure chest of new things to listen to, kits to build, new areas to explore and information on my favorite hobby, listening to pirates. George Zeller is the king! ... My backyard looks like a military installation with all the dipoles and antennas as a result of my love of radio.

"I just thought it was time to thank you for the many years of putting out a great publication that has an exclusive focus on my favorite thing in the world, radio. I've been in love with radio since I was old enough to reach the old stand-up RCA my Dad had in the early '50s in our home.

"You know, I know all the theories, I even build radio stations, but it's still magic to me, that we can send these signals through the air and receive them at a distant location. It's just magic, I don't care what anybody says!

"I ... realized what a big part of this wonderful hobby you've been a part of. I'd dragged around an old Hammarlund HQ-200 for many years, until I started reading *Monitoring Times* back in the early '80s. Then I started seeing all the new radios I'd been missing out on. I bought my Kenwood R-5000 because of a review I'd seen in *MT*. ICOM R-7000, Universal M-7000, at least a dozen scanners and a slew of antennas, switchers and tuners and preamps, all because

of *MT*. So not only did you open my eyes to a way to improve my listening experience, you opened up many new areas of exploration for me.

"Thank you so much for what you've done for so many people like myself. No words can ever do justice to the appreciation I have. Best wishes for many more years of *MT* and your vigilance in making our hobby enjoyable."

A reader in Virginia

(To Larry and Gayle Van Horn and John Figliozi) "You ... provide awesome coverage of every part of the radio spectrum ... (and) make *MT* a better magazine. I tried another magazine, but it just doesn't approach the quality of *MT*. Whether it's coverage of military frequencies or international broadcasters, you guys provide the most comprehensive look at everything from shortwave to scanning. Keep up the great work!"

Chris Boyd KG6UFW, Redondo Beach, CA

(To Tom Sundstrom) "I just received the January issue of *Monitoring Times* today and was thrilled to see IRC get such a big mention in your 'Baudwalking' column! I've been very active with IRC since the early 1990s and have long thought that radio-related IRC activity is noticeably neglected. It was nice to see a radio-related publication provide so much information about IRC and how to get started. *Monitoring Times* is by far my favorite radio magazine of the five or six that I subscribe to, and contributions like yours are a big reason why."

Brad McConahay, N8QQ

Then and Now

"I have been reading *Monitoring Times* since it was a mere newspaper and looking back, I think it was a far better magazine then than it is now. You had diverse interesting columns including one from Bill Check (deceased) that taught us theory and practical radio. Havana Moon had an interesting one too. Jean Baker I enjoyed very much. And on and on. I see very little hands on bench construction articles, maybe readers don't ask for this sort of thing.

"Pardon me for my rant but I am starting to see a parallel to *Mechanix Illustrated* that showed you how to do a lot of things, now only a review of what is on the market."

"... I have been tinkering with radio etc. since 1945 and have been licensed since 1975. I have noticed that there has been a move from homebrew to appliance operator types in the ham world and think as far as the 'kid' generation, there are fewer home chemistry labs and radio/electronic home shops. Whether the kids have less time to do these sorts of things or maybe just a loss of interest, I don't know. But then we didn't have email or chat rooms, etc,

either. Anyway, I did enjoy the old format of *MT*. Hoping to keep reading your mag,"

- Bob Krueger, WB9UKQ

Thanks for your comments and observations, Bob. The audience is changing, the products are changing, and the listening targets are changing, so *MT* is bound to change also to stay relevant - but I disagree that we stray far from our beginnings: All the topics covered in the early years are still covered in *MT*, with very few exceptions (like communications satellites and RTTY). Receiver modification is another vanishing topic - The newer radios don't lend themselves to easy modification, and not many folks will hack into a several-hundred-dollar receiver. Mods for older models can either be readily found on the internet or are now illegal to write about.

One thing is as true now as it was years ago, and that is our dependence on freelance writing and readers' contributions. Perhaps some of the difference in today's magazine has to do with what hobbyists are (or are not) taking the time to write about. The most successful columns are generally those that experience a high level of reader input.

Who is writing articles for the shortwave DXer? Have you sent in your local area VHF/UHF frequencies yet? (Don't complain about your area's scanner frequencies not being covered if you haven't done your part!) Have you passed on to anyone else the tips you've learned to make your equipment set-up work better? In your tinkering did you come across a circuit that really helped reception for next-to-no-cost?

To grow this hobby, we need to pass along the excitement and love of radio, and help each other get more satisfaction out of each monitoring session. That's what *Monitoring Times* is about and always will be.

The ideal feature or technical article should meet one of the following criteria:

1. Give the reader a reason and desire to go to his/her radio.
2. Help the reader know what to do when he turns on his radio.
3. Help the reader better understand what he hears on the radio.
4. Help the reader improve his technique or his equipment.

If any of these categories sparks an idea for an article, email me at editor@monitoringtimes.com or write in care of the address in our masthead. All active hobbyists should frequently email the appropriate columnist (firstname.lastname@monitoringtimes.com) with loggings, experiences, observations, and questions, or write them in care of *Monitoring Times* (enclose a self-addressed, stamped envelope if a reply is needed). Let us know you're out there!

- Rachel Baughn, editor

The Future and the Past come together on your computer!

FUTURE ISSUES:

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RADIO HONOR ROLL

Amateur Radio

Once again amateur radio takes a bow for its response to a natural crisis in 2004 – the last in what was a year of disruptive events across the globe. Following the devastating tsunami of December 26, amateur radio operators played many important roles throughout the region, reporting on survivors to frantic relatives, communicating the extent of local damage, specifying relief needed to regional disaster agencies, and providing communications for authorities until their own systems could be restored.

In a particular bit of irony (or serendipity), for the first time since 1987 an amateur radio team had been granted permission to operate from the Andaman Islands (see March 2004 *On the Ham Bands*) and they were in their last days of operation from a hotel in Port Blair. Both the 1987 and the 2004 DXpeditions were led by Mrs. D. Bharathi Prasad, VU2RBI. Within hours of the tsunami, Bharti Prasad had her station back up with the use of a hotel generator, and she and her companions passed thousands of messages. They also set up additional stations with the help of the army and government who provided batteries and other gear. Two of the team were asked to man stations at commissioners offices on the islands.

Victor Goonetilleke, 4S7VK, president of the Radio Society of Sri Lanka (RSSL), reported that even Sri Lanka's prime minister had no contact with the outside world until Amateur Radio operators stepped in.

"Our control center was inside the prime minister's official house in his operational room," he recounted. Goonetilleke reports that even satellite phones failed, and only the Amateur Radio HF link remained open. Batteries were the biggest problem, with no generators to recharge them.

In addition to responding to the crisis with physical help, the Salvation Army Team Emergency Radio Network (SATERN) was extremely busy in its usual task of locating family and friends using their Echolink network which links amateur radio operators online. A family member with an inquiry calls or fills out an online request form with SATERN. The health and welfare coordinator in Atlanta then checks to see which ham radio operators are online in the areas he needs to contact to find the loved one.

Broadcasting

The Canadian Tamil Broadcasting Corporation serves more than 175,000 listeners in the Greater Toronto Area, hundreds of whom were anxious for news of their relatives. Local reporters for the station scoured temporary shelters for survivors with relatives in Canada. They emailed their information to the radio station, where staff read it over the air.

All India Radio's outlet at Port Blair suspended regular broadcasting to devote 16 hours daily to passing news related to aid

and missing and found persons. AIR has been distributing battery-free radios throughout the affected region. Deutsche Welle also announced its intentions to provide funds for the construction of up to nine new FM radio transmitters in northern Sumatra and, with the help of sponsors, plans to acquire roughly 1,000 radios for distribution to the refugee camps.

For additional coverage of the role of broadcasting in the aftermath, communication lessons learned from the disaster, and more, see *Global Forum, Programming Spotlight, and Utility World*.

Looking Ahead

For better coordination of amateur radio emergency communications in future crises, the first ever Global Amateur Radio Emergency Communication Conference (Garec-2005) is being sponsored by the International Amateur Radio Union (IARU) in Tampere, Finland, on 13 and 14 June 2005.

The 2003 World Radiocommunication Conference (WRC-03) revised international radio regulations to allow amateur stations to transmit messages outside the country on behalf of another person if it is a case of an emergency or disaster relief. However, the local country still determines if the circumstances apply.

Progress was furthered when the Inter-governmental Conference on Emergency Telecommunications (ICET-98) adopted the *Tampere Convention* on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations in June of 1998. That convention became effective January 8, 2005!

The Tampere Convention is the first treaty of its kind. It calls on signatory countries to facilitate prompt telecommunication aid to mitigate a disaster's impact. It covers both installation and operation of telecommunication services and waives regulatory barriers such as licensing requirements and import restrictions as well as limitations on the movement of humanitarian teams. The pact also grants immunity from arrest and detention to those providing disaster assistance, and exempts them from taxes and duties.

FCC

Powell to Step Down

Michael K. Powell will step down as chairman of the Federal Communications Commission after nearly four often-rocky years as the government's top media and telecommunications regulator. Powell, son of outgoing Secretary of State Colin L. Powell, is expected to depart in early March.

A likely successor to Powell is Republican FCC member Kevin J. Martin, whose wife formerly worked for Vice President Cheney. Kathleen Q. Abernathy is the commission's

other Republican; Democrats Michael J. Copps and Jonathan S. Adelstein round out the five-member commission.

Spectrum No Longer About Frequencies

The Aspen Institute – an international nonprofit organization – issued a report entitled *Challenging the Theology of Spectrum: Policy Reformation Ahead*. The report examines the assumptions and mythology surrounding the management and use of electromagnetic spectrum – how new technologies are challenging the conventional wisdom currently underlying spectrum management and policy. The report reflects the experience and insights of 26 leading telecommunications industry experts, senior government officials and scholars.

The Roundtable examined the prevailing views on spectrum policy with the fresh lens of new technologies affecting spectrum use. With the innovation of digital technologies and other new technological challenges to spectrum management, conferees found many of the traditional precepts no longer valid.

The basic assumptions challenged at the meeting included, for example: conceptualizing spectrum as "frequencies," whereas others now see it as a collection of codes; that spectrum is scarce, whereas if new technologies progress, that may be a relic of the past; that all interference is harmful, whereas it might be better to think in terms of interference temperatures, and see that some levels are tolerable; and that regulation of transmission is the way to address spectrum instead of placing emphasis, as new approaches do, on the receiving technology.

FCC fines KC radio station \$220,000

Johnny Dare's morning show has been slapped with a \$220,000 indecency fine by the Federal Communications Commission.

The four broadcasts aired on KQRC-FM, 98.9 the Rock, in Kansas City, and on KFHH-AM in Wichita, in 2002. Dare's show originates at the Kansas City station and was syndicated to the Wichita station. Both stations are owned by Entercom.

Dare's show is consistently the top-rated morning show in Kansas City. It's especially popular with young men.

The FCC, in a statement on the proposed fines, cited "repeated, graphic and explicit sexual descriptions" on the four broadcasts, three of which involved porn performers. Another broadcast featured strippers playing "Naked Twister."

The fines were the maximum the FCC can levy. The agency cited "the egregious nature of the violations and Entercom's history of prior indecent broadcasts."

continued on page 16

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The Busiest Air Base in the United States

By Ron Perron

Andrews Air Force Base, in Clinton, Maryland, just outside of Washington D.C., is probably best known for its VIP Airlift Support mission, including that of Air Force 1 and Air Force 2. In addition to these high-visibility operations, Andrews is also home to a large assortment of Air Force, Navy, Marine and other U.S. Government aviation units. The units run the gamut from active Air Force units to Air National Guard and Air Force, Navy and Marine Reserve units.

Just a personal note before I delve into the article. All information in this article is derived from my own monitoring and Internet research. To my knowledge all the information I have presented is available to the public and no classified information was knowingly used to prepare this article.

Now, with the disclaimers out of the way, let's take a look at who calls Andrews AFB home:

- 89th Airlift Wing (USAF)
- PPO (Presidential Pilot's Office-Air Force 1) (USAF)
- 1st Airlift Squadron- Air Force 2) (USAF)
- 99th Airlift Squadron (USAF)
- 1st Helicopter Squadron (USAF)
- 457th Airlift Squadron (USAF)
- Air Force Flight Standard Agency (AFFSA) (USAF)
- 459th Aerial Refueling Wing (USAF-Reserve)
- 121st Fighter Squadron (USAF-DC ANG)
- 201st Airlift Squadron (USAF- DC ANG)
- Naval Air Operations Detachment (AOD) (US Navy)
- VR-1 (US Navy-Reserve)
- VR-48 (US Navy-Reserve)
- VR-53 (US Navy-Reserve)
- VAQ-209 (US Marines-Reserve)
- VMFA-321 (US Marines-Reserve)
- Marine Aviation Support Detachment (MASD)
- U.S. Army Operational Support Aviation Command (OSACOM) Detachment
- Remote Sensing Laboratory (RSL)-East (Dept of Energy)
- Maryland State Police (MSP) Aviation Unit

As you can imagine, with such a lineup, the listening at Andrews is varied and interesting. An article I wrote for the March 2003 issue of *Monitoring Times* covered the VIP Support Units including the 89th Airlift Wing, Presidential Pilot's Office, 1st Airlift Squadron (Air Force 2 support) and 99th Airlift Squadron.

So, in this article, for your listening pleasure, I'll give you a rundown on each of the other units operating out of Andrews.

1st Helicopter Squadron

This unit is comprised of about 22 UH-1s. The UH-1 is an old aircraft, but these birds are very well maintained and look like new. Their mission is to transport military and other Government VIPs in and about the Washington DC area. They also transport personnel to/from the major USAF communications sites in the Washington area and nearby Maryland.

On September 11, 2001, we got an insight into another of their missions, perhaps their most important one. After the terrorist hijacked aircraft crashed into the Pentagon, 1st Helicopter Squadron aircraft were dispatched from Andrews to the Pentagon to pick military VIPs and transport them out of harm's way, to their relocation sites.

1st Helicopter aircraft use the callsign "Mussel." Yes, that's right, it's *Mussel* not *Muscle*. Their squadron frequencies are 141.7 (AM) and 292.2 and their base callsign is "Mussel Control."

457th Airlift Squadron (AS)

The mission of this C-21equipped unit is to provide VIP and liaison airlift transportation for local USAF personnel. The unit's eight C-21s support the Joint Operational Support Airlift Command (JOSAC).

When flying JOSAC missions they use the usual JOSA ### callsign. However, when they fly local training and pilot proficiency missions, they use the callsign "Pacer."

Air Force Flight Standards Agency (AFFSA)

This unit's mission is to establish and verify aircraft landing systems' standards for the USAF. They fly two C-21's, #84-0132 (callsign "Track 32") and # 84-0066 ("Track 66"). In late August 2004 they added another aircraft "Track 01."

Their mission takes them to most of the USAF airbases so you may see and hear them at a base near you. Since their job is checking out airfield landing systems they generally can be found on standard VHF ATC frequencies.

459th Air Refueling Wing (ARW)

The Air Force Reserve Command (AFRC) added its second air refueling unit in less than a year when the 459th Air Refueling Wing at Andrews Air Force Base, Maryland, officially began operations on 1 October 2003. Prior to the change in mission, the 459th was an airlift wing flying C-141C Starlifters. The Air Force is in the process of retiring its fleet of C-141s, making it necessary for the 459th to switch to a different aircraft. The unit was redesignated a refueling wing.



Flight engineers and loadmasters who had been assigned to the C-141 retrained to become boom operators since a tanker crew doesn't include either position. Pilots attended training to learn the new airframe, and members of the wing's aeromedical evacuation squadron trained to become certified on the KC-135 as well. When certified, the 459th ARW will be the first unit to fly KC-135 medevac missions on the East Coast.

On refueling missions the 459th aircraft use the callsign "DC" (pronounced Dee Cee). On medical evacuation mission they use Evac #####. Their Ops frequency is 351.2.

121st Fighter Squadron (FS)-DC Air National Guard

The 113th Wing's mission statement says it all, "Our mission is to be Capital Guardians who provide our nation fighter, airlift and support forces capable of global employment, to provide air sovereignty forces to defend the Nation's Capital, to employ our forces with mastery and lethality, if required, and to enhance the com-

munity with support and good will."

These guys take those words seriously. Fighters from the 121st FS were among the first aircraft to provide Combat Air Support (CAP) over Washington during the events of September 11, 2001. One of the more sobering moments in my monitoring occurred that morning when, shortly after the attacks, I heard the Andrews tower controller broadcast on his ATC frequencies that the airspace around Andrews was closed and that any unauthorized aircraft in their airspace would be shot down. Shortly thereafter, the leader of a section of 121st FS F-16s announced that he and his wingman were flying "weapons free" and that they were authorized to shoot down any civilian aircraft penetrating the restricted areas.

The "Capital Guardians" are comprised of F-16C/D's. The unit normally uses the following callsigns: Wild; Bully; Angry; Scary; and Ravage. At times I've also heard them use Budman; Bandit; Noble; Chosen; Guns and Cleat. When "traveling" cross country they use the callsign Caps. Their special activity (Combat Air Patrol, etc) callsign is Brave. The 121st Supervisor of Flying (SOF) uses callsign Senate and the Squadron Operations callsign is Watergate.

121st FS presets: (NOTE- These excitations are based on my own monitoring/analysis and may not exactly represent the actual squadron preset frequencies.)



unit to receive and employ the aircraft. Both these types were acquired to replace the unit's aging C-22Bs. However, while the C-22Bs have been "officially" retired, I believe that at least one of them is still being used for pilot proficiency and crew training.

The unit uses the callsign "Boxer ###" with the number suffix corresponding to a particular mission number. The 201st's Operations uses the callsign "Boxer Ops" on a frequency of 314.25 MHz.

Naval Air Operations Detachment (AOD)

This unit's primary mission is to provide liaison and passenger airlift support to the Naval Air Facility (NAF) at Andrews. The Navy, however, officially refers to this unit as NAF Washington or Navy Andrews.

They fly C-12Ns (buno 161307 and 161309). Their callsign is either Navy ### or their USN modex 7N### where the numbers are usually the last three digits of the aircraft bureau number. They will sometimes use numbers that do not correspond to their bureau numbers. In these instances I believe the suffixes represent particular airlift mission numbers.

They normally use the standard Andrews VHF ATC frequencies and their Operations, callsign Navy Ops, uses frequencies 122.85 and 386.8.

VR-1 ("Starlifters"-US Navy Reserve)

This unit provides liaison and passenger airlift support to VIP US Navy personnel stationed at the Pentagon, USN members of the Joint Chiefs of Staff & the Secretary of the Navy. They fly two C-20Ds (buno # 163691 & 163692). The flight callsign is usually Navy 691 or 692.



VR-48 ("Capital Skyliners"-US Navy Reserve)

This unit provides liaison and passenger airlift support to senior US Navy personnel stationed at the Pentagon who are not part of the Joint Chiefs or SecNav's office. They fly two C-20G's (buno # 165093 & 165094). The flight callsign is Navy 093 or 094.

VR-48 is one of two operational C-20G squadrons in the United States Navy. The squadron is operationally scheduled by Joint Operational Support Airlift Center (JOSAC)

201st Airlift Squadron-DC Air National Guard

The 201st Airlift Squadron shares the name "Capitol Guardians" with the 121st Fighter Squadron. This unit's primary mission is to provide short notice worldwide air transportation for the executive branch, congressional members, Department of Defense officials and high-ranking U.S. and foreign dignitaries.

The unit has two C-38s (Astra jets) and three new, C-40Cs. The 201st is the only Air Force National Guard unit to have these special aircraft, and were the first Air Force

	VHF	UHF
1-139.9	234.8	SOF/OPS
2-127.55	393.1	Clearance delivery
3-121.8	275.8	Ground control
4-118.4	349.0	Tower
5-127.275 (tactical)	348.725	Potomac approach/departure
6-139.35 (tactical)	257.2	Potomac approach/departure
7-138.45 (tactical)	281.4	Washington (ZDC) ARTCC
8-139.75 (tactical)	317.425	Potomac approach/departure
9-143.15 (tactical)	281.8	Patuxent Approach
10- Unknown	238.1	Giantkiller (FACSFAC, Virginia Capes)
11- Unknown	249.8	Giantkiller
12-139.625	286.2	Warren Grove (PA) range
13-122.9	349.1	Dare (NC) Range
14- Unknown	358.0	Dare (NC) Range
15- 41.3	237.2	Kiowa (PA) range
16- Unknown	277.4	Washington (ZDC) ARTCC
17- Unknown	323.0	Potomac approach/departure
18- 124.0	270.275	Potomac approach/departure
19-119.3	335.5	Potomac approach/departure
20-113.1	251.05	Andrews ATIS

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for Continental U.S. flights and by the Navy Air Logistics Office (NALO) while operating overseas.

VR-53 ("Capital Express"-US Navy Reserve)

Fleet Logistics Support Squadron 53 routinely deploys one C-130 aircraft, two five-person aircrews and maintenance personnel for two-to-four weeks in support of operations worldwide. VR-53 detachments based out of NAS Sigonella often support the entire European theater. According to their official "history," VR-53 has been involved in various airlift support missions including: carrying supplies to help establish a Marine F/A-18 squadron in Tazsar, Hungary; they were a major carrier of mail for the sailors stationed within the Adriatic Sea.



Hours after the terrorist bombing of U.S. embassies in Africa, the Navy's Sixth Fleet was tasked by EUCOM to transport 50 Marines of the Fleet Anti-Terrorist Security Team (FAST) from Naples, Italy, to Dar es Salaam, Tanzania. Naval Reservists in the Med responded immediately and flew the mission.

This unit flies C-130Ts. Their callsign is Navy AX ### where the digits correspond to the last digits in their bureau numbers.

VAQ-209 ("Star Warriors"-US Marines-Reserve)

This unit flies probably some of the last EA-6Bs in the USMC inventory. Their mission is to provide ECM/ECCM support to other flying units at Andrews. I've heard them working with both the 121st FS and VMFA-321 in the Giant-killer (FACSFAC, Virginia Capes) controlled warning areas off the coasts of New Jersey, Delaware, Maryland and Virginia.

Their real-world mission came to light in 1999 when aircraft from VAQ-209 deployed to Aviano AB, Italy, to support Operation Allied Force. Flying an aircraft in high demand and short supply, the squadron's EA-6Bs and personnel were needed. The "Star Warriors" joined a large force of regular Navy air crews, flying two EA-6B Prowlers that provide jamming and Anti-Radiation Missile support for striking NATO aircraft. The squadron was also deployed to Prince Sultan Air Base in Saudi Arabia in 2001.



Their callsign is Cobra and their Ops frequency is 280.2 (Cobra Base).

VMFA-321 ("Hell's Angels"-US Marines-Reserve)

This unit was officially disestablished on 1 October, 2004. But for nostalgic reasons, I'm going to profile them anyway, just in case they reappear. This unit flew the F/A-18 Hornet and

was a very active Reserve unit.

VMFA-321 was originally established in 1943. After the war they transitioned through various aircraft including the F-8 Crusader and the F-4 Phantom. They received their F-18s in 1991 and, according to their history, they transitioned to the Hornet six months faster than any active duty squadron.

Their callsign, up until a few years ago, was Combat. However, legend has it that one of the West Coast F-18 units, also using the Combat callsign, took exception the VMFA-321's use of "their" callsign. I'm not sure how it all transpired, but soon thereafter the VMFA-321 birds changed their callsign to Angel, obviously a reference to their squadron moniker.

They used the following tactical frequencies (243.6; 272.4; 280.45; and 310.35) and their Base Ops frequency was 302.6.



Marine Aviation Support Detachment (MASD)

This unit provides liaison and personnel airlift support to Marine Corps personnel in the Washington DC area. They fly C-12s and a couple of newly-acquired UC-35s. One of the UC-35s is the personal aircraft of the Marine Corps Commandant and uses the callsign, Marine 101.

Other than the Commandant's aircraft, the other MASD birds use the callsign Marine ### where the last three digits of the callsign correspond to an airlift support mission number for that particular flight.

U.S. Army Operational Support Aviation Command (OSACOM) Detachment

This unit provides airlift support to military personnel in the Washington DC area. They are part of the Joint Operational Support Airlift Command (JOSAC). They fly a variety of aircraft including C-20s (C-20E #87-0140; C-20F #91-0108); UC-35s (#97-0103; #97-0104; #97-0105; #0-1052; #0-1053) and a VC-37A (#97-0049).

They either use the JOSA ### callsign or sometimes Army ###. When they use the JOSA callsign, the digits refer to that particular JOSAC mission number. However, when they use the Army callsign, the digits are the last three digits of the aircraft registration number.

Dept of Energy Remote Sensing Laboratory (RSL)

The Remote Sensing Laboratory at Andrews AFB is part of the Department of Energy's Remote Sensing Laboratory operations. The Department of Energy operates a similar RSL unit at Nellis AFB, Nevada.

The Andrews-based RSL has served for over 20 years as the United States' eastern base for nuclear emergency response and environmental remote sensing operations. Key to its success has been its innovative and adaptive approaches to solutions to complex nuclear monitoring and

surveillance problems, and the application of related advanced and emerging technologies.

The unit's technical assets include testing and fabrication laboratories and an extensive collection of highly sophisticated state-of-the-art equipment used for emergency searches, as well as specialized scientific applications. Fixed-wing and rotary-wing airborne platforms based at Andrews can perform specialized radiological detection and monitoring.

The RSL aircraft, two King Air 200s and a helicopter, use the callsign WAMO ##, taken from the earlier name for the Laboratory which was the Washington Area Measurement Office.

Maryland State Police Aviation Unit

The Maryland State Police (MSP) Aviation Unit has one helicopter based at Andrews. It is part of a 12-aircraft unit strategically deployed around Maryland to provide rapid response police and medical evacuation support.

The helicopter based at Andrews is located at "the Bear's Pad" and uses the callsign Trooper 2.

Andrews AFB ATC Frequencies

If you are interested in listening to activity at Andrews AFB, here are the published Air Traffic Control (ATC) frequencies used at the airfield (all frequencies in MHz):

Tower: 118.4/349.0
Clearance Delivery: 127.55/393.1
Ground: 121.8/275.8
Approach: 119.3/335.5

Other ATC frequencies used by aircraft arrivals/departures from Andrews AFB:

Potomac Approach: 124.2/119.85/121.05/270.275/281.475/279.575
Potomac Departure: 118.95/125.65/126.55/350.275/348.725/346.725
Washington Area helicopter control: 120.75

Complete information on Andrews' ground and trunked system frequencies is available on the *Grove Military Frequency CD-ROM*.

Speaking of ATC frequencies, in 2002, Andrews was incorporated into the Potomac TRACON area of responsibility. For more detail on this TRACON, I point you to Jean Baker Hubbard's excellent article on the Potomac TRACON in the July 2004 issue of *MT* (p.17).

Resources

Even in the post 9/11 environment there are some good web sites for information on units based at Andrews. If I've piqued your interest, you can find more detailed information, especially on the backgrounds of many of the units, at <http://public.andrews.af.mil> and <http://www.globalsecurity.org/military>

In closing I hope you've enjoyed these thumbnail sketches, and if you are taking a trip or vacation to the Washington DC area, by all means bring along a scanner. There's a wealth of interesting listening to be had from one of the busiest airbases in the United States.

Let's Go to an

Air Show!

photo credit: Kevin Burke

The 2005 air show season starts in the second week of March, so this month *MT's Milcom* column (page 52) presents our annual frequencies to monitor for the upcoming air show season. For space constraints, the military flight demonstration team schedules (Table One) are printed below instead of with the remainder of the article.

Remember to check the *Monitoring Times* website at <http://www.monitoringtimes.com> before you attend an airshow for the latest frequency updates, and be sure to report changes or confirm active channels to keep the list current.

Note: If security levels increase to Threat Condition "Bravo" or above, many military installations will not have public air shows. Consequently, demonstration schedules dates listed below are subject to change or cancellation without notice.

Demonstration Group Abbreviations:

BA Navy Blue Angels
 BD Army Black Daggers
 GK Army Golden Knights
 SB Canadian Snowbirds
 TB Air Force Thunderbirds

Base Abbreviations

AB Air Base
 ACC Air Combat Command
 AFAB Air Force Auxiliary Field
 AFB Air Force Base
 ARB Air Reserve Base
 CFB Canadian Forces Base
 JRB Joint Reserve Base
 MCAS Marine Corps Air Station
 NAF Naval Air Facility
 NAS Naval Air Station
 TBD To Be Determined

Dates Group: Locations

Mar 11-12 BD: NAF El Centro, CA
 Mar 12 BA: NAF El Centro, CA
 Mar 15 TB: Indian Springs AFAB, NV
 Mar 19 BD: Dunn, NC
 Mar 19-20 BA: Punta Gorda, FL; TB: Luke AFB, AZ
 Mar 20-26 GK: Spring Break - Panama City, FL/South Padre Island, TX
 Apr 2-3 BA: NAS Fort Worth, TX; TB/GK: Davis-Monthan AFB, AZ
 Apr 7 BD: Myrtle Beach, SC
 Apr 9-10 BA: NAS Corpus Christi, TX; TB: MacDill AFB, FL
 Apr 16 TB: Laughlin AFB, TX; BD: Fayetteville, NC
 Apr 16-17 BA: Wilmington, NC/GK: Fiesta San Antonio - San Antonio, TX
 Apr 17 TB/GK: Holloman AFB, NM

Apr 22 GK: Carlisle, PA
 Apr 23 TB: Shaw AFB, SC
 Apr 23-24 BA/BD: Vidalia, GA; GK: Open House - Patrick AFB, FL
 Apr 24 TB: Open House - Patrick AFB, FL
 Apr 30 BA: Charleston AFB, SC
 Apr 30-May 1 TB/GK: Fort Lauderdale, FL/ GK: Charleston AFB, SC; BD: Florence, SC
 May 6-8 BD: Millville, NJ
 May 7 GK: John Hopkins University, Baltimore, MD
 May 7-8 BA: MCAS Cherry Point, NC; TB: Smyrna, TN
 May 14-15 BA/BD: Barksdale AFB, LA; TB/GK: Langley AFB, VA; SB/GK: Tyndall AFB, FL
 May 18 SB: Wilmington, NC
 May 20-22 TB: Open House - Andrews AFB, MD
 May 23 BD: Jackson, MS
 May 24-25 BA: U.S. Naval Academy, Annapolis, MD
 May 25 SB: TBD
 May 26-30 BD: Columbia, MO
 May 27 BA: U.S. Naval Academy Graduation Flyover, Annapolis, MD
 May 28 GK: Open House - Pope AFB, NC
 May 28-29 BA: Willow Grove, PA; TB/GK: Wantagh/Jones Beach, NY; SB: Open House - Pope AFB, NC
 May 29 GK: NASCAR Coca Cola 600 - Charlotte, NC
 Jun 1 TB: U.S. Air Force Academy, CO; SB: Theiford Mines, PQ
 Jun 4 TB: Peterson AFB, CO; BD: Somers Point, NJ
 Jun 4-5 BA/GK: McGuire AFB, NJ; SB: Leamington, ON
 Jun 5 TB: Malmstrom AFB, MT
 Jun 11-12 BA/GK: Janesville, WI; TB: Rochester, NY; SB: CFB Winnipeg, MB
 Jun 12 GK: NASCAR Pennsylvania 500 - Pocono, PA
 Jun 15 SB: The Pas, MB; GK: Twilight Tatto - Washington, DC
 Jun 18 GK: New York, NY
 Jun 18-19 BA: Open House - North Kingstown, RI; TB: La Crosse, WI
 Jun 19 SB: Trenton, ON
 Jun 22 SB: Oshawa, ON
 Jun 24-26 SB: London, ON
 Jun 25-26 BA/GK: Evansville, IN; TB/GK: Davenport, IA
 Jul 2 TB: Tinker AFB, OK; BD: Cedar Bluff, AL
 Jul 2-3 BA: Pensacola Beach, FL; SB: CFB Bagotville, PQ
 Jul 3-4 TB: Battle Creek, MI
 Jul 4 SB: Battle Creek, MI
 Jul 8-10 BD: Cape Girardeau, MO
 Jul 9-10 BA: Fargo, ND; TB: Pittsburgh, PA; SB: CFB Moose Jaw, SK
 Jul 16-17 BA/BD: Milwaukee, WI; TB/GK: Dayton, OH; GK: Gary, IN
 Jul 23-24 BA/GK: Muskegon, MI; TB: Terre Haute, IN; SB: Grande Prairie, AB; GK: Fairchild AFB, WA

Jul 27 TB/GK: Cheyenne, WY; SB: Fort St. John, BC
 Jul 30-31 BA: Kalispell, MT; TB/BD: McCord AFB, WA; SB: Lethbridge, AB; GK: Oswego, NY
 Aug 3 SB: Westlock, AB
 Aug 5-7 BD: Perry, IL
 Aug 6-7 BA: SeaFair - Seattle, WA; SB: CFB Comox, BC; GK: Elkhart, IN/Open House - Scott AFB, IL
 Aug 9 SB: White Rock, BC
 Aug 12-14 SB: Abbotsford, BC
 Aug 13 GK: Elmendorf AFB, AK/Hermeston, OR
 Aug 13-14 BA: Grand Junction, CO; TB: Abbotsford, BC
 Aug 20-21 BA: Weekend off; TB/GK: Chicago, IL; SB: Saskatoon, SK
 Aug 24 SB: Thunder Bay, ON
 Aug 27-28 BA: Indianapolis, IN; TB/GK: Westfield, MA; SB: St. Catherines, ON; GK: Duluth, MN
 Aug 31 TB/GK/BD: Atlantic City, NJ; SB: Brantford, ON
 Sep 3-4 BA/GK: NAS Patuxent River, MD
 Sep 3-5 TB/GK: Cleveland, OH; SB: Toronto, ON
 Sep 10-11 BA: NAS Brunswick, ME; TB: Portland, OR; SB: Halifax, NS; GK: Cannon AFB, NM/Hillsboro, OR; BD: Winston-Salem, NC
 Sep 16-17 TB: Reno, NV
 Sep 16-19 BD: Springfield, IL
 Sep 17-18 BA: NAS Oceana, VA; SB: Reno, NV/GK: Mountain Home AFB, ID
 Sep 18 TB: Mountain Home AFB, ID
 Sep 21 SB: Ridgecrest, CA
 Sep 24-25 BA: Gainesville, FL; TB/SB/GK: Fort Worth (Alliance), TX; GK: McConnell AFB, KS
 Sep 28 SB: Tucumcari, NM
 Oct 1-2 BA/SB: Millington, TN; TB: Solinas, CA; GK: Washington, DC/Corpus Christi, TX
 Oct 5 SB: TBD
 Oct 8-9 BA: San Francisco Fleet Week - San Francisco, CA; TB: Little Rock AFB, AR; SB: Houston, TX; GK: El Paso, TX
 Oct 15-16 BA/GK: MCAS Miramar, CA; TB: Travis AFB, CA/ GK: Ft. Worth, TX; BD: West Chester, PA
 Oct 22-23 BA: NAS Pt. Mugu, CA; TB/GK/BD: NAS/JRB New Orleans, LA; GK: Edwards AFB, CA
 Oct 26 TB: La Aurora, Guatemala
 Oct 29-30 BA: Chattanooga, TN; TB: Ilopango AFB, El Salvador
 Nov 2 TB: Acapulco, Mexico
 Nov 5 SB: Keesler AFB, MS
 Nov 5-6 BA: Jacksonville Beach, FL; TB/GK: Randolph AFB, TX; GK: Dallas, TX
 Nov 11-12 BA: Blue Angels Homecoming - NAS Pensacola, FL
 Nov 11-14 GK: Ft. Bragg, NC
 Nov 12-13 TB: Nellis AFB, NV
 Dec 3 GK: Army-Navy Football Game, Philadelphia, PA

Making the Case for FM

By Ken Reitz

The FM band provides a number of interesting monitoring opportunities from random E-skip openings to colorful local pirates. But, dramatic changes are sweeping the band which will have a direct and lasting effect on how you listen in the future.

State of the FM Band

Today, America's FM band is in a state of flux. We are on the brink of the introduction of digital FM or HDFM as insisted upon by iBiquity, the company which received the FCC's blessings to inaugurate "High Definition FM" digital broadcasting on the band.

The band is currently involved in a war of frequencies in which existing FM broadcasters, both commercial and non-commercial, are snapping up all remaining open FM frequencies to install endless lists of boosters or translators which re-broadcast their signal supposedly to get into difficult-to-reach areas of their broadcast territory.

There is an increased presence of FM pirates who aren't awaiting word from the FCC on their frequency allocations.

There is a low-power FM revolution attempting to take place in which local communities reclaim their right to broadcast from the few remaining broadcast giants which are gobbling up small town radio stations faster than a rat eating popcorn off a theater floor.

And, to top it off, FM radio finally has some real competition, this time coming from the two satellite radio companies which are attempting to leap frog FM's big problems: limited range, limited programming, limited news, and an average of 12 to 16 minutes out of every hour eaten up with commercials.

Harris' All digital MiniHD LPFM transmitter uses iBiquity standard with 10-600 watts out and could be the choice of LPFM HDFM broadcasters. (Courtesy Harris)



ISSUE #1 DIGITAL FM:

Doomsday or progress?

iBiquity, the D.C. area based technology company charged by the FCC with bringing the FM band into the digital age, couldn't be happier. It's the sole developer and licensor of HD Radio technology and is owned by some of the biggest heavy-weights in the broadcast business: ABC, Clear Channel, Cox Radio, Radio One and Viacom, to name a few.

Using its own system of digital compression, iBiquity plans to convert the thousands of AM and FM radio stations in the U.S. to digital broadcasting. Promising enhanced sound quality and improved reception, the new digital stations will broadcast "in band on channel" (IBOC) on essentially the same frequency as their analog channel and, once we all have our digital tuners, the analog services will be turned off.

Consumers shouldn't panic, though, because there's no exact timetable for the conversion and it's early days in this business. Despite the hurried urgency of iBiquity's press releases, there are likely to be many years before the analog services are turned off. In fact, the Kenwood Corporation (one of few early receiver manufacturers) in comments to the FCC said, in part: "...we expect that there will still be a significant number of analog-only products in the field well past 2014..."

John Holt, Director of Engineering at WAMU-FM, a Washington, D.C. public radio station in the forefront of HDFM broadcasting, explains the system this way: When in full HDFM mode, the system allows the transmission of 96 kb/s on a station's carrier and that a full fidelity stereo signal can be produced on 64 kb/s leaving an additional 32 kb/s for various audio channels.

Advantages to digital FM transmissions include no more multi-path or "picket fencing" in the audio, the ability to transmit supplemental audio channels in stereo, the

transmission of program information data which will appear on the tuner face, and the possibility of Dolby® 5.1 surround sound audio.

Industry Reaction

So, what do those in the FM broadcast industry say? Marv Southcott, head of Fanfare, a company manufacturing high-end FM tuners is dubious, to say the least. "Everyone assumes HD Radio will be made mandatory," he says, adding that, "there is absolutely no market information showing a desire from the listening public for HDFM."

"The broadcast industry is looking for a miracle," Southcott says of FM's dwindling audience among competing interests, "...they're hoping HDFM is going to renew their market. It isn't."

Deborah Proctor, Chief Engineer and General Manager of classical music giant WCPE-FM in North Carolina, is taking a wait-and-see approach. Citing the additional \$100,000 outlay the station will incur in order to make the switch, Proctor asks, "Where's the 'wow' factor?" Noting the amazing changes between AM and FM audio and vinyl to CD sound quality as examples, she continues, "...I'd like to see a more compelling reason to push for digital."

She explains that when analog FM stations take advantage of their entire bandwidth, the audio is hard to beat. Marv Southcott agrees, pointing out that even 5.1 Dolby® Surround Sound can be done in an analog format without making current receivers obsolete. That prospect of delivering 5.1 audio to her audience of classical music listeners has Ms Proctor intrigued. And, since HD Radio has just announced an HD/IBOC 5.1 standard, she may have found her "wow" factor.

WAMU's Holt is very much upbeat about the progress of digital FM. WAMU is primarily a talk radio format and has two Subsidiary Communications Authorization

ISSUE #3 LOW POWER FM RADIO:

A legal soap opera

Low Power FM (LPFM) broadcasting was an attempt by the FCC to provide an option for local voices from the religious, educational and local communities to be heard on the air. The cast of characters in what has become a legal soap opera includes the down-trodden, the idealistic, the evil forces of globalization, lumbering bureaucracies and intransigent lawyers on all sides.

The FCC issued its first LPFM licenses in January '00 and by April of that year, at the urging of media giants claiming potential interference, Congress quickly stepped in to stall LPFM progress while hundreds of applications piled up at the Commission. A year later in April '01, the Commission finally

got around to announcing new rules (some of which were later overturned in court) and began testing in nine markets to address the interference claims raised by the commercial radio industry through the NAB (National Association of Broadcasters). Finally, by February of 2004 the research showed that interference was not as bad as feared. This June Senators McCain and Leahy introduced a bill to undo the previously passed legislation and to allow the Commission to grant the LPFM licenses, but the legislation was not resolved before the end of the 108th Congress.

While all this was happening, various groups were rallying their own troops to secure frequencies by filing applications for the new LPFM permits. These included highly organized and well financed religious organizations eager to expand their broadcast



Bext's Lex FMR 25 watt frequency agile FM translator or booster takes your signal to new listeners (Courtesy Bext)

(SCA) channels transmitting news and features in two different languages. The station has been testing their IBOC digital signal since June of this year and is in the forefront of HDFM broadcasting. The station has hosted a number of national demonstrations of the HDFM system, including a broadcast this past June of the first live event (a piano concert) in stereo on the digital channel while the analog channel carried normal programming.

Implementation of HD Radio may also change the way SCA channels are heard. Kenwood also addressed this issue in its comments to the Commission, "...We support radio reading service digital deployment in ways that can be integrated into mass-market products for little or no additional cost...It is possible that the average digital radio can have reading services as a standard feature in a few years."

ISSUE #2 Boosters & Translators:

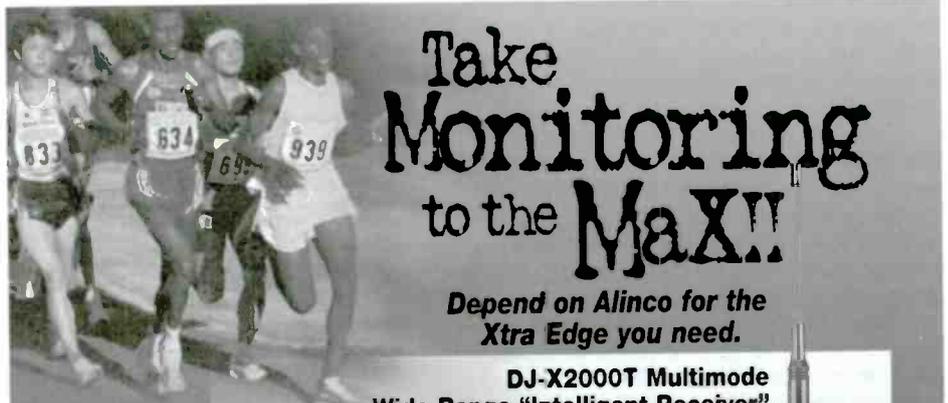
Is this frequency in use?

FM radio stations have always been concerned with increasing their coverage. Initial boosts gained by increasing power, getting space on a taller building or tower or just tweaking the efficiency of the radiators have always helped. But, as metro areas sprawl and as stations try to follow the migration of their most affluent listeners, a new tactic has taken over like poison ivy.

For decades the FCC has allowed retransmission of FM signals via *translators* and *boosters*, lower power stand-alone transmitter/antenna combinations which typically pick up programming content from the originating station via microwave relay and rebroadcast it via the translator or booster. These broadcasts are made on frequencies different from the original license.

The translator/booster transmissions allow the signal to reach into valleys and canyons where listeners have been waiting, sometimes years, to be able to hear the broadcasts. Compared to setting up a full broadcast station, translators and boosters are an incredibly cheap investment and pay huge dividends by allowing the home station to "tap" affluent listeners in a different community.

In September of 1990, there were a total of 1,847 translators and boosters in operation and at the time there were just under 5,800 commercial and non-commercial FM radio stations. Today, there are two thousand more FM translators and boosters and nearly 8,700 FM radio stations. With roughly 12,500 FM frequencies occupied, it's becoming harder to tune in distant FM radio stations.



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and lucrative donation base; earnest community activists, hoping to add a little color and flavor to the exceedingly corporate sound emitting from most local FM powerhouses; and educational institutions trying to expand their influence in their own small communities. When, and if, the Commission is finally allowed to issue the new licenses, there will be a fairly immediate change in the sound of the FM band and it will be harder still for FM DX enthusiasts to hear beyond their own municipality.

Avast, Mateys!

The colorful image of radio pirates floating off-shore and beaming their uncensored programming to the mainland is mostly a thing of the past. Today's FM pirates operate downtown in storefront buildings right under the ears of the FCC and enjoy a sort of quasi-approved status. They're taken for granted by listeners and competitors alike and, so long as they don't squat directly on the frequency of a legally authorized station, there are few complaints.

The hottest action for FM pirates is California where stations such as Free Radio Santa Cruz and San Francisco Liberation Radio operate in the open and have even garnered local government support. Such activities have encouraged others like WNFC-FM in Oakland to begin their own effort.

Despite the widespread press coverage, the FCC doesn't seem to be interested unless there are serious challenges from legitimate broadcast interests in the area. Tune in while you can, because once the issues with LPFM are resolved many of these pirates may themselves turn legit. And be assured that Harris, maker of iBiquity's HDFM, gear is ready and waiting to ship their new low power HDFM units to the new license holders.

ISSUE #4 SATELLITE RADIO WARS:

The XM-Sirius Threat

By the end of last year more than 3 million Americans were paying to listen to satellite radio in their cars and homes. It's no wonder that the busy lawyers at the NAB have been billing overtime to set up whatever road blocks they can to the continued penetration of the FM audience by XM and Sirius satellite radio. Operating in the L-band (1 GHz), neither service has anything whatsoever to do with the FM band. However, the fact that they provide over a hundred channels of commercial free music and eighty or more channels of news and entertainment programming has sent shivers of panic throughout the entire FM radio industry.

The first effort to restrict satellite radio was to try to block the construction of the hundreds of L-band repeaters stationed throughout the major cities of the U.S. These repeaters are necessary to fill in the gaps caused by the loss of line-of-sight reception blocked by tall buildings in large cities. That attempt failed.

Then they petitioned the Commission

to deny the two satellite services the right to program local traffic and weather information in major cities. Again, the FCC refused. Until now, satellite radio had not touched radio's most sacred cow: play-by-play sports broadcasts. That ended last fall, however, with the introduction of NFL football play-by-play coverage of the entire NFL regular season, select preseason and playoff games, as well as Division 1 college football and basketball games. When added to their coverage of Major League Baseball and ice hockey games, satellite radio sports channels could have an impact on the local radio audience.

What are the subscription limits to satellite radio and what effect will it have on terrestrial FM broadcasters? Well, corporate annual reports often have a dream-like quality to them and should be read with great skepticism, but, barring unforeseen cosmic intervention, it's possible that by the time HDFM is firmly in place there could be tens of millions of paying listeners out there. At any rate, there should be no doubt that satellite radio will have a profound effect on the future of programming on the entire FM radio band.

FM Resources

HD-FM

iBiquity HD Radio: <http://www.ibiquity.com/hdradio>

National Public Radio's Tomorrow Project. This



Fanfare's FT-1 a high-end analog stereo FM tuner. How much of a future? (Courtesy Fanfare)

well funded project plans to use HDFM as an integral part of NPR's network of 714 radio stations nationwide. <http://www.npr.org/about/press/030110.tomorrowradio.html>

Low Power FM Radio

Prometheus Radio Project <http://www.prometheusradio.org> Successfully stopped FCC's push to deregulate cross-ownership of radio stations by multi-media conglomerates in Federal Court. They are currently pushing the McCain-Leahy bill to expand the number of community media outlets in the U.S.

Media reports on pirate radio

"Activists to launch pirate radio station" *The Oakland Press* 6-1-04

"Pirate radio station claims new channel" *The Santa Cruz Sentinel* 5-22-04

"Supes support pirate radio 93.7 FM" *San Francisco Examiner* 8-15-03

Satellite Radio

Sirius Satellite Radio <http://www.siriusradio.com>

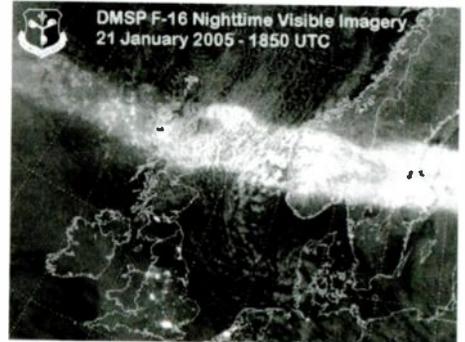
XM Satellite Radio <http://www.xmradio.com>

Communications continued from page 8

Solar Unrest

Giant sunspot 720 erupted on Jan. 20th, hurling a coronal mass ejection (CME), which swept past Earth Jan 21 and sparked a severe geomagnetic storm that lasted for several hours. High above Earth, a US Air Force DMSP satellite snapped this picture of the auroras spreading across Europe.

The sun's 27-day rotation has carried the sunspot around to the far side of our star; however, big sunspots sometimes last for months. If sunspot 720 holds together, it will turn back toward Earth in early February.



Solar storms can obliterate the HF band and disrupt polar signal paths, but it can also enhance AM broadcast band reception from the southern hemisphere and produce long distance FM reception. Contrary to a suggestion by talk show host Art Bell, such unsettled conditions are neither unusual for the downside for the solar cycle, nor are they the result of HAARP (High frequency Active Auroral Research Project), whose puny energy emissions don't begin to compare with that of the sun.

BULLETIN BOARD

Baudwalking: Special Update

A special edition of *Baudwalking* by Tom Sundstrom to focus on alternative information sources on the terrible tsunami and the aftereffects has been posted at <http://www.monitoringtimes.com>. A regular column will appear in the near future.

Winterfest

Winter Shortwave Listeners Festival, March 11 and 12, Kulpville, PA. (All aspects of radio, not just SW; several MT staff and subscribers among participants. Registration forms, directions and information at <http://swlfest.com/>)

"Communications" is compiled by editor Rachel Baughn KE4OPD from newscippings submitted by our readers. Heartfelt thanks go to this month's reporters: Anonymous, Howard Bailen, Ian G3ZHI, Norman Hill, Stephen Newlyn, Jerry None, Art Rae, Clive Ridpath, Doug Robertson, Brian Rogers, Doug Smith, James Stellema, Robert Thomas, Larry Van Horn, Barry Williams, Robert Wyman, Ed Yeary, and the ARRL

Wireless Networking

Lee Badman

Though wireless networking isn't exactly new, the notion of running Ethernet networks through the air is relatively fresh for many radio hobbyists. Even if you have yet to personally take advantage of the dirt-cheap, feature-packed "Wi-Fi" hardware available at the local mall, there are many reasons to be aware of the overlap between wireless networking and the various shadings of amateur and hobby radio.

Whether used in home networks, in radio club project endeavors, or as "last-mile" broadband service by Wireless Internet Service Providers (WISPs), the incredible power of wireless networking is within reach for all of us. The possibilities are many – and most are good. One thing's for sure, all radio hobbyists and licensed hams should be savvy enough about wireless networking to know the many ways it may impact us.

So What Exactly is It?

Born more or less in the mid '90s, wireless networking takes the World War II notion of Spread Spectrum technology and plops it down in a couple of today's Industrial, Scientific, and Medical (ISM) and Unlicensed National Information Infrastructure (UNII) frequency bands. Standardizing aspects like modulation parameters, channel center frequencies, and hardware specs bring an almost global compatibility to wireless networking for those who

Table 1: Wireless Network Protocols

Technology	Max Data Rate	Interoperability	Spectrum
802.11b	11 Mbps	Can work with 802.11g	2.4 GHz ISM band
Presence: Most globally widespread		laptops, handhelds, WISPs, bridging	
802.11g	54 Mbps	Can work with 802.11b	2.4 GHz ISM band
Presence: Gaining market share		fast-laptops, some bridging and WISPs	
802.11a	54 Mbps	None	5 GHz UNII Bands
Presence: Smaller cells and lack of compatibility with 802.11b		mean limited deployment. Good choice when wanting to avoid busy 2.4 GHz band.	

choose to play by the guiding standards.

Low-power wireless networks are in use in businesses, hospitals, educational settings, and even in farming. Large scale wireless network design, security, and administration is a fast growing career specialty, with an increasing number of training certifications available. The consumer-class wireless market is nothing short of explosive – and prices continue to fall as the technology becomes almost "routine" for home users who typically don't share quite the same bag of concerns as commercial wireless environments.

In IEEE-speak, wireless networking (for the purposes of this article) is the 802.11 series of standards, with 802.11a, 802.11b, and 802.11g being current choices. (The original 802.11 standard has long been superseded by a, b, and g, but legacy hardware is still kicking around at hamfests and similar events, and is often incompatible with current wireless hardware.)

Each technology has its own characteristics of data rates, range, compatibility and advan-

tages. 802.11b and g operate in the 2.4 GHz ISM band, while 802.11a plays in the 5 GHz ISM band (and also the 5 GHz UNII band). These spectrums are all unlicensed, so anyone can buy and use the hardware. See table 1 for a summary of 802.11a, b, and g.

In the Shack and Around Town

The very essence of wireless networking is to extend the wired network. This premise pays off big for a variety of radio-related activities. EchoLink or Internet Radio users can move a laptop to different parts of the house, or even outside if their wireless access point has sufficient range. Sitting in my truck in the driveway, I have programmed my Yaesu FT-90R, while researching the frequencies on the internet using my laptop connected wirelessly to the Internet. Likewise, I've sat by the pool with my Sony 2010 and my wireless-equipped HP iPAQ handheld computer displaying shortwave directories, compliments of my Cisco 340 wireless access point.

It's not uncommon for users to take a single broadband feed (like cable modem or DSL) and get creative with wireless networking components to provide Internet service to everyone on a lakeside camp road. I've also seen hams use wireless bridging to extend the network from their homes to outbuildings better suited for radio operations: The possible applications are endless when cutting the cord is the goal. Consumer-class wireless gear tends to be far cheaper from both a cost and quality standpoint when compared to commercial-quality components, but even the mall-grade stuff has mind-boggling capabilities at low prices.

In the commercial realm, wireless networks can be found everywhere from Home Depot to Harvard University. More cities are getting wirelessly networked end to end, and many provide free access to anyone who can use it.

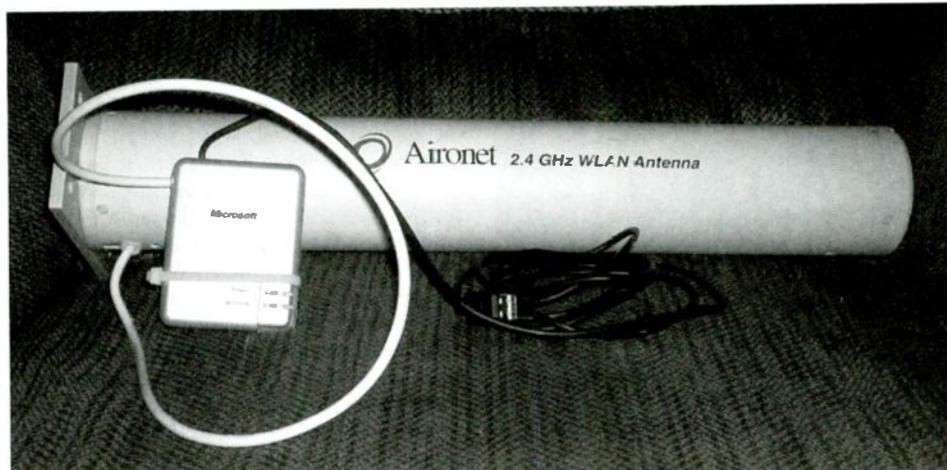


Figure 1: A low cost USB Wi-Fi Adapter modified with 13 dBi Aironet Yagi antenna.

More police departments are starting to leverage wireless networks – Imagine watching the live scene of a bank holdup from inside a patrol car that can see the images from a bank surveillance camera via wireless network feed!

As a minimum, the transmission speeds of wireless networks are much faster than legacy radio data links used by law enforcement and other agencies. For colleges, cafes, and airports, having wireless is a huge marketing tool. And in agricultural settings, farmers can more cost-effectively bring automation to fields and buildings through the airwaves. These sorts of “grand scale” networks – at least the more successful ones – tend to be designed and installed by trained wireless experts who understand networking, RF principles, security, and sometimes billing/chargeback systems.

Interference? Overlap? Confusion?

So what do we in the SWL and amateur radio communities need to worry about from an interference perspective from wireless networks? And how might those of us active in ham bands that overlap wireless spectrum impact these networks? These answers are many, and sometimes clear as mud.

Remember, the 2.4 GHz ISM band is considered an experimental slice of spectrum. 802.11b and g “Wi-Fi” users don’t have to be licensed, though all wireless network components are supposed to be pre-sale certified by the FCC. Wi-Fi gear plays by FCC part 15 rules, whereas Amateurs are guided by part 97 rules – both in the same frequency range! Boil it down to this: by the “letter of the law,” amateur operations should not be disrupted or interfered with by wireless network ops, whether the wireless transmissions are private (residential) or commercial,

such as a wireless Internet Service Provider.

Part 15 has strict constraints on power output and antenna use. By contrast, licensed hams using the 2.4 GHz neck of the woods are allowed virtually any antennas they can dream up and power outputs that are several orders of magnitude larger than the Wi-Fi community is permitted. Though the FCC has sided with amateurs in the past when wireless networks have caused them problems in the same spectrum, the fickle Commission has also played the other side of the fence as well, often seeming to ignore its own rules. Expect this almost bi-polar enforcement mentality to continue well into the future as wireless use grows exponentially in all markets.

Many hams have begun ferreting out the details of how the spectrum overlap for radio operators might be leveraged. Individual operators and a handful of radio clubs have taken the plunge, both interpreting the FCC’s guidance and modifying off-the-shelf consumer Wi-Fi components for part 97 operation.

When this hardware is used beyond the limits of part 15, we find ourselves in the realm of High Speed MultiMedia ham ops, or HSMH. Even the ARRL has formally addressed the potential to use Wi-Fi hardware in the amateur radio community, under its “High-Speed Digital Networks and Multimedia” initiative, found at <http://www.arrl.org/hsmh/project.html>. Vendors like HyperLink Technologies sell amplifiers and other components for use beyond part 15 Wi-Fi networking. From the HyperLink web site (<http://www.hyperlinktech.com>): “Hyperlink 802.11b / 802.11g amplifiers are also available as individual products for export, military and Ham radio applications.”

Because the gray area between Wi-Fi and hobby radio has the interest of the ARRL, those in the radio community, and also the radio indus-

try, it’s safe to say that the HSSM door is cracked open and there will be no turning back.

No discussion of wireless networking and unlicensed frequencies is complete without a reminder of all the other devices that are likely to compete for the same airwaves. From cordless phones to microwave ovens, from parking lot light ballasts to security systems – there are a lot of devices and systems that also play in this unlicensed spectrum. These devices tend to be more prevalent in populous areas – cities and towns can be more of a challenge for both hobbyists and Wi-Fi network users. The high potential for interference is a limiting factor for both part 15 and part 97 users – but directional antennas and other techniques can help each group meet its goals.

Hobby Opportunities Abound

Whether hobby radio or Wi-Fi use is the goal, wireless networking appeals to many of us on several levels. We’ve already mentioned many of the advantages of wireless links from a connectivity standpoint, but just as noteworthy are the endless opportunities for tinkering with antennas, scouting out “open” networks, and generally fooling around with technology. The Internet abounds with W-Fi antenna plans, utility software, and frequently updated forums and interactive maps of available wireless networks around the US and around the world. Let’s look at examples.

One of the more popular antenna designs is the “cantenna,” which has largely come to symbolize the quest for home-brewed higher gain wireless. Fashioned from a Pringles potato chip can, a soup can or a Pepperidge Farms’ cookie can, the cantenna is made on the cheap, and when built right, pays off with higher signal strength on both transmit and receive that can ever be recognized from stock antennas. (Unfortunately, these antennas sometimes violate part 15 rules for output EIRP, but most adventuring Wi-Fi hacks don’t tend to worry much about the FCC’s thoughts on the matter.) One example of this sort of antenna can be seen at <http://www.cantenna.com>.

I’ve found USB wireless adapters to be instrumental in overcoming one of the biggest challenges of wireless networking – the fact that most wireless network adapter “cards” tend to be hard to attach an external antenna to. Even if you find a wireless card that will accommodate an external antenna, it may be hard to build or buy a pigtail for an external antenna that has acceptable line loss at a sufficient length to make the antenna practical. Wireless USB adapters, however, push the radio out further away from the PC. The USB cable can be extended several feet, without adding loss to the radio signal. To boot, these adapters tend to be easy to modify for external antenna attachment (see figure 1), and can provide a reliable alternative to card-style adapters with flimsy pigtail connectors.

There are certain consumer-grade wireless access points that have been found to be firmware-modifiable for greater radio output. These modifications are well documented on the Internet, and can help those with technical savvy squeeze more output power from their Wi-Fi components. There is one such widely-



Figure 2: HP iPAQ 4155, one of many “hand-held” computers that are quite handy for wireless work. (Thumb drive and Blue Baby shown for size comparison.)

distributed mod to a certain series of Linksys access points that will boost the default output from around 30 mW to almost 100 mW – if you are willing to risk corrupting your device. But that is one silver lining to virtually all experimentation in the Wi-Fi space – the pricing of these components is such that even a total loss because of carelessness might mean that you're only out a hundred dollars or less.

“War driving” is a term that has gotten a lot of media attention over the last couple of years. An activity that can be done from a vehicle, an airplane, on foot, or even on a bicycle, war-driving is essentially hitting the streets with the goal of finding wireless networks. With today's very small wireless devices, War driving is even easier to pull off. My HP iPAQ is small enough to take on walks through the neighborhood (see figure 2), and I can find wireless networks from the palm of my hand.

Once a network is found, it's characterized as “open” or “closed.” Open networks have not been secured, and can usually be used or exploited by anyone within radio range. Closed networks have had security parameters enabled, and are not as palatable a target for those looking for a free ride. War driving has a huge following, and has resulted in many Wi-Fi adventurers simply getting free Internet access. It has also been the launch pad for plenty of criminal activity, and each state has its own rules covering what constitutes illegal wireless activities. Remember: when the network is in the air, it's a whole new ball game.

Final Word: Security

Wireless networking is here to stay. It is touching our lives and our radio hobbies now, and will continue to affect us in ways that we are just now starting to imagine. For those of us active under part 97 rules, we are faced with the challenges of abiding by the same old rules of station identification, no obscuring of signals, and more. But these challenges are being met already, by making our call sign part of the broadcast network name or putting it into periodic “ping” packets. Also, we can use wireless encryption for security, as long as we make the key and encryption type publicly known (like on a web site). It gets a bit complex, but is certainly worth the effort to reap the benefits of higher-powered wireless.

For anyone using wireless, especially day-to-day part 15 users (like wireless in the home), security is paramount. Every Wi-Fi product manual will tell how to enable basic wireless security parameters, which are disabled by default in the name of “ease of use.” It is worth the pain to read this section in the manual, and learn how to protect your network. To not enable wireless security is to invite intrusion from any one within radio range.

Have fun with wireless networking – but do your homework. There are plenty of resources on the Internet, and a growing cadre of knowledgeable radio folk on the air. Stay legal, stay secure, and most importantly – stay current on this rapidly evolving technology.

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Getting Started in Digital SW Reception

The shortwave bands are bursting with interesting signals: Morse code (CW), Radio Teletype (RTTY), Slow Scan TV (SSTV), WeFAX, ASCII, AMTOR, PSK-31 and many more. But, how do you tune them in? What equipment do you need?

There are a number of ways to decode the various digital modes: some cheap, some expensive and a couple of ones in between. Here's a look at digital SWLing.

❖ The Silicon Miracle

Those of us in the various electronics hobbies should just get down on our knees and thank our lucky stars for the tremendous progress in the area of silicon chips, without which very little of what we're all doing now would be possible. Not only are our transceivers dependent on those little jewels, but so are our computers and everything else right down to the clocks on the wall.

While digital modes have been around for fifty years, it's only since the advent of the cheap chipset that we've all had the chance to join in the fun. Before then, digital modes entailed working with Rube Goldberg-style contraptions featuring tubes, rotating drums and light beams. It worked, but it required a dedication bordering on the obsessive.

Today, the combination of ultra sensitive receivers, tiny radio interfaces, and very sophisticated software turns any listening post into an ear on the world worthy of a character out of an Ian Fleming novel.

❖ Abundance of Choices

There is an amazing assortment of equipment for digital reception available. Some units are "stand-alone," which means that all the hardware and software for reception is packed into one piece of equipment. Others require a computer with a sound card and one of many different computer/radio interfaces. These little devices are fairly simple in construction and there are even widely available plans to homebrew your own.

Stand-alone units range from about \$50 to several hundred dollars, depending on what features they have and the variety of formats they are capable of decoding. Here's a look at just a few on the market, their capabilities in a nut shell, and listed retail price. This list is alphabetical by manufacturer:

MFJ Enterprises

Makers of an amazing catalog of handy products for SWLers and hams, MFJ Enterprises offers a wide variety of products for digital reception and, if you have your ham ticket, transmission as well.

Their cheapest multimode interface is the MFJ-1213 (\$49.95) which plugs into the speaker jack of your radio and a standard com port on your computer. These units do not feature a transmission mode. They were very popular years ago and run on widely available JVFAX and HamComm software. The problem is that those programs don't work well in a Windows® environment, but do very well in DOS. So, if you have an old DOS machine around, this is a great way to have a cheap stand-alone FAX/SSTV, ASCII, AMTOR, NAVTEX and CW reader for your listening post.

The MFJ-462B Multi-Reader® decodes RTTY, ASCII, CW and AMTOR. This stand-alone reader has a number of interesting built-in features and is a snap to use. Just plug the patch cord from the speaker of your radio into the input of the Multi-Reader. Tune the signal until the green "lock" LED lights, and scroll through the options. Once you have the signal locked in and the correct digital format selected, you will see characters scrolling across the 3/4" by 2-1/4" LCD screen.



MFJ Enterprises Multi-Reader 462B is a stand-alone multi-reader able to tune in RTTY, CW, ASCII and AMTOR for \$179.95 no computer needed! (Courtesy MFJ-Enterprises)

There are a number of optional accessories for this unit. A printer cable (\$9.95) will allow you to print out what the Multi-Reader received. You can power the unit with your radio's separate 12 volt power supply or, if you don't have one, a wall adaptor is available for \$14.95. If you're like me, you already have several such adaptors in a drawer which will do nicely. Just remember to observe the correct pin polarity.

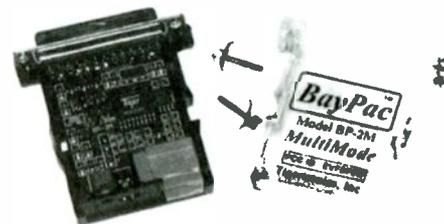
The unit has a built-in speaker so that you can monitor the frequency you're listening to

with the patch cord in place or you can shut off the speaker via a switch on the back of the Multi-reader. This is a good feature, because in order to lock the signal you might have to turn the audio up to the point of irritation if you're listening to it.

The 462B can store several pages of text for later review or print-out if you wish. It has no transmission capability. The best thing about this unit is that it doesn't require a computer, it is entirely self-contained, but it does require an S5 signal for best results.

Tigertronics

Tigertronics also makes a similar inexpensive interface for use with the old JVFax and HamComm programs, called the BayPac. This unit works great in a DOS environment and also allows you to transmit in the various modes.



Tigertronics' BayPac BP2-M plugs directly into your computer and your radio and does it all in DOS for \$50. (Courtesy: Tigertronics)

But, their best product by far is the Signalink Model SL-1+ (\$79), which is designed to work with the Windows platform and packs a real all-mode punch. This tiny, well-built unit comes with a CD ROM containing useful software with updates available on their web site: <http://www.tigertronics.com>. It decodes all the



Tigertronics' Signalink SL-1+ a dynamo of digital modes in a well-designed, tiny package. Add your sound card equipped computer and tune 'em all in for \$70. (Courtesy: Tigertronics)

popular modes, works with your computer, and is simple to use. The Signalink and the software are extremely sensitive and can copy weak signals very well. I used the included HamScope 1.54 software with this and had outstanding results during very poor band conditions. I'll have a full review of this product in a future issue of MT.

Universal Radio

If you've got deep pockets and simply have to be able to decode any mode, any band, even on satellites, the Universal M8000v7.5 from Universal Radio should be yours. It would take the rest of the space in this column to detail what this piece of software packed, stand-alone hardware can do. You'll just have to check out their web site for all the details. Sure, it copies RTTY in four alphabets including Cyrillic. Yeah, it can pick up FAX transmission in high resolution! Five ASCII shifts, no waiting! Piccolo, probably even flute. Six Baudot shifts! (Does anyone even need six? I don't know, but it's ready when you are.) Better check your bank balance before ordering; it comes in at just under \$1,400. (For an even more pricey and professional solution, see this month's MT review of the Wavecom W51LAN decoder on page 70 - ed.)



The granddaddy of all multimode readers Universal Radio's Universal M-8000v7.5 packs the top price of all: just under \$1,400. Add a color monitor and you're set! (Courtesy Universal Radio)

Other Shortwave Digital Sources

Aside from the widespread action in the ham bands, there are other shortwave sources for additional digital monitoring. The world of digital transmissions is covered in detail each month in MT in Mike Chace's column *Digital Digest* on page 31. Look through your back issues to catch up on what you've been missing and, if you have the other years of MT on CDROM, you can pore over the back issues' other columns and features on this subject using the search mode.

Another place to look in this magazine is John Catalano's *Computers & Radio* (page 72), where he regularly reviews software, hardware and other computer/radio related topics. Check out the Index to Articles on the MT web site for a complete list of relevant articles at: <http://www.monitoringtimes.com/html/indexes.html>.

Last Word

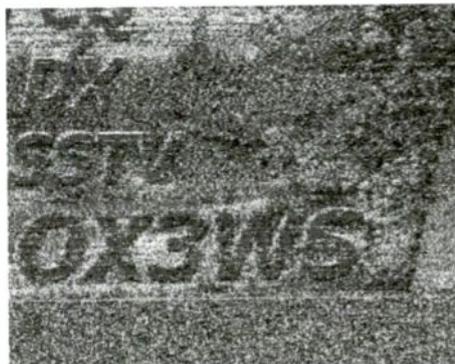
For hams, the digital modes present a welcome diversion from the current doldrums on the HF bands. At a time when the solar cycle is dismally low, these modes, particularly PSK31, offer a chance to operate on otherwise dead bands. Even operating on reduced power (35 to 50 watts), great contacts can be made when received signals aren't even moving the signal strength meter. When voice contacts would be out of the question, it's still possible to have solid contacts even with DX stations.



Detail, color and creative design play a large part in SSTV transmissions. Unlike all other digital transmissions, voice is also allowed on the frequency so you often hear other hams discussing the pictures just sent. That's why SSTV is only allowed in the phone portions of the ham bands and not at all on 30 meters.

I found that all units copy Morse code (CW) well, and it's a real help for new hams when trying to work DX stations who are working pile-ups. You can watch the action on the screen, follow the protocol of the DX station and avoid making on-air beginner mistakes.

I found the MMSTV software worked brilliantly with the Tigertronics Signalink automatically copying whatever esoteric slow scan mode was sent. Slow Scan TV (SSTV) really is slow, it takes about 30 seconds to send one still image, but many hams are creative and make use of new digital cameras to send interesting shots.



This screen from a ham in Greenland (OX3WS) shows the capabilities of DX SSTV. Many have earned their DXCC (100 countries worked and confirmed) using this mode. The software captures the images and allows you to build a file for later viewing. You can set the receiver up on an SSTV frequency and let it run for a couple of hours. Come back later and see what you've "caught."

Digital modes present all kinds of opportunities for beginners as well as old hands. Not only are there new modes to explore, but there are construction opportunities as well. There are a number of plans for building small computer/radio interfaces which will work with easily available software. And, PSK31 is made to order for operating QRP (low power: 5 watts and under).

Table 1: Resources

Where to buy multi-mode readers

MFJ Enterprises
300 Industrial Park Road
Starkville, MS 39759
800-647-1800
<http://www.mfjenterprises.com>
Ask for their free catalog.

Tigertronics
198 West Woodside Street Unit "B"
Grants Pass, Oregon 97527
Voice: (541) 474-6700
FAX: (541)-474-6703
<http://www.tigertronics.com>
Tell them you read about their products in MT.

Universal Radio
6830 Americana Parkway
Reynoldsburg, OH 43068
(Orders) 800-431-3939
<http://www.universal-radio.com>
(FAX) 614-866-2339
(Info) 614-866-4267

Table 2: Digital Frequencies

Here are some places to start looking for digital action. I've listed the highlights for each band. You'll find even more by just tuning around.

BAND	(Meters)	(kHz & MHz)
160	RTTY: 1800-1810, PSK31 is found around 1809, CW: 1810-1840
80	RTTY DX window 3590, PSK31 3580-3620, SSTV: 3885
40	RTTY DX window 7040, PSK31 7080, SSTV: 7171
30	RTTY: 10.130-10.140, PSK31 10.13715, no SSTV allowed.
20	RTTY: 14.095-14.0995, SSTV: 14.230, PSK31 14.070, NCDXF Beacons: 14.100.
17	RTTY & PSK31: 18.105-18.110 not a popular band for either of these two modes.
15	RTTY & PSK31: 21.070-21.100. Popular DX band. Look for SSTV at 21.340
12	RTTY: 24.890-24.930. Look for PSK31 around 24.925
10	RTTY: 28.070-28.189. Look for PSK31 around 28.120 and SSTV around 28.680 - A great DX band when propagation is good.

IR REMOTE RADIO CONTROL

Remote control your Shortwave Receiver, Scanner, or ICOM Transceiver from your easy chair with the SWL IR Remote and a Universal TV Remote control.

- ♦ SWL IR Remote for Drake R8/A/B \$89.95
- ♦ SWL IR Remote for Yaesu FRG-100 \$79.95
- ♦ SWL IR Remote for Yaesu FRG-8800 \$79.95
- ♦ SWL IR Remote for ICOM Transceiver ... \$69.95
- ♦ SWL IR Remote for ICOM IC-R75. \$79.95
- ♦ SWL IR Remote for JRC NRD-535, NRD-545. \$89.95
- ♦ SWL IR Remote for Lowe HF-150, HF-225. \$79.95
- ♦ SWL IR Remote for Kenwood R-5000 \$79.95
- ♦ SWL IR Remote for Uniden Scanners \$89.95

www.swl-remotes.com

Q. I would like to use an outdoor antenna on my shortwave receiver, but it must not be visible. What are my alternatives? (Many inquiries)

- A.** There are several possibilities:
1. Select a 25 to 50-foot roll of small-gauge wire with insulation color that matches your siding, and run it from one window to another distant window. Connect the near end to your receiver.
 2. Select a 25 to 50-foot roll of small gauge wire with gray insulation color and run it from a window or an eave to a tree limb. Connect the near end to your receiver.
 3. With a rock connected to one end of an unrolled, 25 to 50-foot length of insulated wire, throw the rock as high as possible over a tree limb. Bury small-diameter coax (RG-174/U, RG-58/U) in the ground between your house and the tree; solder the center wire of the coax to the bottom of the vertical wire. Connect the near end to your receiver.
 4. Bury 25 to 50 feet of insulated wire, running in any direction away from your window. Solder the center wire of a length of coax to the close end of the wire, and connect the near end of the coax to your receiver.

Q. I have a frequency counter that shows 158.853 and 156.208 MHz on local transmitters when it should be 158.850 and 156.210 MHz. Does this mean my counter needs calibration? (Bradley Brandenburg, Lexington, NE)

A. More likely, the two transmitters need calibration! Check the frequency of a local AM broadcaster; they are required by law to maintain very tight frequency tolerance. Another test is to use a shortwave receiver, assuming your counter uses a 10 MHz time base. Tune in the 10 MHz WWV time/frequency standard station, then hold the frequency counter close to the radio antenna.

The time-base oscillator signal from the frequency counter should be detected by the radio, perhaps even swamping the WWV signal. If you hear a tone or a flutter, then the frequency counter needs calibration.

Q. I have an old radio in my kitchen with a very "scratchy" volume control. Whenever I turn

on my gas stove, the sparks from the igniter can be heard as a loud "tick-tick-tick" on the radio which bring back the sound! What are the causes of the scratchy audio, and are there any fixes? (Ed Cummings, N3KOW, Philadelphia, PA)

A. Old potentiometers often suffer disintegration of their resistive element; they can also develop film deposits from grease, salt air, tobacco smoke, even dust on their elements which cause erratic contact, resulting in scratchy audio. The voltage spike from the igniter is detected by the radio and may cause an abrupt speaker-cone excursion that shakes the tenuous setting of the wiper on the pot, or it may even realign the disintegrated particles of the resistance. If the merest gentle tap on the volume control resets the volume, either of these is a likely culprit.

There are essentially three fixes:

1. Rotate the control back and forth a dozen or so times. If that doesn't improve the situation, then:
2. Spray a small burst of contact or tuner cleaner (available from Radio Shack), or drops from an electrical contact cleaning liquid into any access hole of the potentiometer, then rotate the shaft as in 1 above; you can even try a drop or so of the cleaner into the shaft, hoping it will wick down through the bushing to the wiper and element. If that doesn't do it, then:
3. Replace the pot!

Q. Does a "permanent" magnet eventually lose its magnetism? I have an old compass and a magnet, both of which have aged, yet both still work. (Mark Burns, Terre Haute, IN)

A. "Permanent," as used in this is a comparative reference to electromagnets which work only so long as current is passing through their coils. So-called permanent magnets retain magnetic properties, gradually diminishing, for various periods of time depending on their composition and treatment. You can easily demagnetize a magnet with an AC field, just as you can magnetize ferrous materials with a DC field or another magnet.

The earth itself is a giant magnet, most likely powered by its rotating, iron/nickel core (geomagnetism). Layers of iron-bearing rock can be dated by their paleomagnetism, the residual magnetic field imparted to them: by

the earth's geomagnetism. These imprints are billions of years old.

But the magnetic alignment of atoms is contrary to its normal electrostatic alignment, and the torque between the two fields will gradually diminish the magnetic alignment.

Then why doesn't that hostile interplay between fields also reduce the electrostatic charge among the atoms? Darned if I know! Any chemists or physicists out there who would like to explain that?

Q. I would like to mount a 6m & combo 2m/70cm antenna on the rear peak of my home. What would the minimum spacing be to avoid interaction? (Kevin P. Fairclough, Sr., WA1KPF)

A. The rule of thumb for spacing between resonant elements next to one another is that they should be separated by at least a quarter wavelength at the lowest frequency of interest; for six meters, then, that would be about five feet. But since the elements of the adjacent antennas are not resonant in that range, it's not that critical; however, the third harmonic of 50 MHz is 150 MHz, so they are harmonically related, and the 6 meter antenna may have some influence on the pattern of the 144 MHz antenna any closer than a quarter wavelength.

Q. I would like to use a multicoupler to combine a variety of whip antennas into my scanner. Is this practical? (Les Ford, Davison, MI)

A. Yes, but with some important caveats. Depending on their separation, two antennas will have phasing characteristics, providing nulls some directions and gain in others. You are essentially constructing a beam.

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

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Last month, I reviewed the best way to use *Police Call 2005* to your advantage. Getting your money's worth I called it. Well, I could not fit everything into one monthly column, so here are some more tips.

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You need to get out a detailed map of your local county, or region. Using a ruler, start at the top, and drag it down across the map slowly. You are looking for very small towns that you don't always associate with being a real "city." Perhaps you have never even heard of these little burbs before. Look for every small village or township name.

Now check these names against the alphabetical listings for your state in *Police Call*. I did, and found some very small towns that typically had just one or two frequencies listed. One for local government, and perhaps a second for the volunteer fire department. Probably not much traffic, but nice to know anyway. Perhaps it will prove to be one of your otherwise "unidentified" signals. It is this attention to detail that separates the monitoring pros from the newbies.

14

Here is another method of ferreting out new or hidden frequencies. Again using a ruler, start with the *Police Call* (PC) pages that give the frequencies in order. This section is in the middle of the PC book, and starts around 30 MHz. I use the ruler to move down looking in the right hand column for the state (ST). I look for the state I am researching. They are in alphabetical order so it does not take me long to find Washington (WA). I use the ruler to move down the list looking for anything "new."

Watch for "brand names" such as A-1 Ambulance, Medstar Flight Services, Colorado Mounted Rangers, Community Ambulances SVC Inc., Washington State Fire Chiefs Association, or 4X4 Rescue Council, etc. I use a highlight pen for anything interesting.

As I did my research, I noticed that the FCC has assigned many new frequencies outside the standard "Public Safety" allocations, most notably in the 150, 151, 153, 452, and 456 MHz frequency ranges. More of the 7.5 kHz splinter frequencies are also evident. This is a case where I find the book format a better tool than the quick CD ROM search.

15

If you use the *Police Call* CD often (daily), consider getting a second CD drive dedicated to holding the *Police Call* CD. It will save a lot of tray shuffling. Internal drives are cheap if you have an open bay in your desktop. For laptops, you can buy an external CD drive with USB connections. Add an

icon on your desktop or program tray for the *Police Call* CD, and you are all set.

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Browse the PC CD to print out maps or radio codes. If you have found any other tricks to using *Police Call*, please drop me an email.

17

GPS technology has made some real progress. Reader Bryan wrote to report that he used the FCC records to get the exact latitude and longitude of the transmitter. He used this information to point a Yagi directional antenna. Combine that with the car test.

For those of us that are single, we can recruit a buddy to assist on this and all other antenna projects. Always watch for those electrical lines!

18

A couple months back, I wrote that I had discovered some HO model train sets in the garage. I had bought these trains several years ago, hoping to get into the model railroading hobby. But I never had the room nor the time to get it going. I have the trains now in the house on static display.

I am busy reading up on the many magazines and books that cover this great hobby. Naturally, I wanted to listen to the local rail traffic. I programmed in all the railroad radio frequencies listed in the back of PC and started listening. Like police radio traffic, it takes a while before it makes sense. The many railroad mergers and acquisitions have changed the radio assignments a bit. I think I have all the local ones, but I will leave a couple of banks in my scanner with the standard RR frequencies.

Naturally, I used Google™ to perform an internet search for RR frequencies, and found many interesting frequencies, as well as railfans living in my area. When we have a nice sunny afternoon, I plan on taking my trusted Scout™ Frequency Finder down to the Spokane Yard and drive the perimeter a few times. We are blessed with a large yard here in Spokane, and a new BN&SF refueling station in Rathdrum, Idaho, just over the state line. I can't wait to take pictures of trains. Just stay off of their right of way!

19

Speaking of taking pictures, I have another branch hobby that goes hand in hand with monitoring police and fire traffic. I carry my new Canon digital camera with me in the car. Every time I see a fire truck or police car, I try to take a picture. Sometimes it is not the right conditions, too dark, wrong sun angle, or perhaps the vehicle is filthy from snow and mud. I prefer pristine shots.

I stop by police and fire stations or if I see something interesting parked along the road.

Maybe I will start my own photo collection of "every police agency car in the county," or "every state's highway patrol cars," etc. Maybe we could exchange e-photos of police/fire vehicles? Hmmmm.....

Luckily, this is a cheap adventure, because there are no film or processing fees. I just save the best pictures and delete the others. So far I just save them to my hard disk. I will print them out after I devise a good method of displaying the actual pictures. Hey, it is cheaper than collecting the little matchbox cars!



20

If you take photos for any hobby, you should read the "photographers rights" at this website: <http://www.krages.com/bpkphoto.htm>. The police can take a dim view of anyone photographing just about anything public these days, but you do have rights! Be discrete, and keep your distance. A zoom lens is very helpful!

21

These photos are special one time only situational shots, so I back them up to my desktop and my laptop. Speaking of saving things on my hard drive, I continue to periodically back-up everything up to my ZIP drive disk, and really important files to a 256 MB memory stick. As the prices fall, how you can you afford not to have one?

22

The 2005 Communication Academy happens April 2-3rd in Seattle, Washington. More information at <http://www.commacademy.org>. Watch for the big guy with the AB7NI cap.

I want to thank all those who write, I try to respond all those that write, or email. My email filters or my own actions my have deleted your email. Please put "Bright Ideas" in the comment section so I can catch all these inquiries, and no, I don't know any secret frequencies. You can review all of last year's bright ideas by ordering the *MT 2004 Anthology*. Only \$14.95 for regular subscribers (order@grove-ent.com or call 1-800-438-8155). Previous year Anthologies are also available.

Making a Good Scanner Match

With so many different radio systems out there, how do you know whether your scanner will work successfully on the ones you're interested in? This month we answer a couple of questions about what scanner might be appropriate to monitor various radio systems. We also report on upgrades going on in Maryland and Michigan and give a few details on a new digital scanner coming out soon.

Dan,

I am a new scanning enthusiast just getting back into the hobby after 15 years of dormancy. I got a great buy on a BC895XLT (\$150-New in box). But, before I open it I have a question.

Is there really a key reason to own the Uniden BC898T versus the 895XLT? I understand that it only tracks Motorola but is that enough for a scanner hobbyist? In other words, by not being

able to get those other two trunking systems, am I really missing out? Is software worth getting?

Thanks for your time.

Daniel in the Pacific Northwest

By way of background for our readers, the BC895XLT is a first-generation trunk-tracking scanner introduced in September 1997. It is a 300-channel base model that only trunk-tracks Motorola analog systems. The BC898T was introduced last August and is capable of tracking analog Motorola, EDACS and LTR (Logic Trunked Radio) systems. It has a 500-channel memory and tunes as high as 1.3 GHz.

You didn't mention exactly where you live, but whether the BC895XLT will be adequate for your needs is going to depend on what you want to monitor. If your interest is in public safety radio and you're anywhere near a large city, then it's likely to be trunked and the BC898T would be a better choice. If the city uses digital voice, such as the version in APCO-25, then neither scanner will be able to monitor it. For instance, Seattle and Tacoma in Washington State have APCO-25 systems that necessitate the use of a digital scanner. To learn what type of trunked system is being used in your area, the best source is Lindsay Blanton's site at <http://www.radioreference.com>

On the other hand, if you're not close to a large city or don't care to listen to such systems, the BC895XLT may still be useful to monitor the large number of analog radio transmissions that are out there. Weather, utilities and many small town departments continue to rely on their "old" analog radio equipment and do not have the money or the desire to upgrade to digital. For locating these types of systems I would encourage you to pick up a copy of *Police Call* or similar frequency list for your area.

Being a software developer myself I may be biased, but I think using a computer with a scanner makes things much easier to manage. You can easily build scan lists and upload them to the scanner, saving the time and effort of tediously entering them via the keypad. You can also use software to remotely control the operation of the scanner, and log the results for later review. Before you purchase a program, you might want to check

<http://www.strongsignals.net/access/content/software.html>

which lists available software packages for most scanners.

Table 1: Trunked Scanner Comparison Chart

Compiled by Dan Veeneman and Larry Van Horn

Manufacturer Model	Type	APCO-25	Motorola	EDACS	LTR	MilAir LMR Band
Optoelectronics OptoCom	Base	No	Yes	Yes	No	Yes
Radio Shack						
PRO-90 (Uniden)	Handheld	No	Yes	No	No	No
PRO-91 (Uniden)	Handheld	No	Yes	No	No	No
PRO-92 (GRE)	Handheld	No	Yes	Yes	Yes	Yes
PRO-93 (GRE)	Handheld	No	Yes	Yes	No	No
PRO-94 (Uniden)	Handheld	No	Yes	Yes	No	No
PRO-95 (GRE)	Handheld	No	Yes	Yes	No	No
PRO-96 (GRE)	Handheld	Yes	Yes	Yes	No	No
PRO-97 (GRE)	Handheld	No	Yes	Yes	Yes	Yes
PRO-2050 (Uniden)	Base	No	Yes	No	No	No
PRO-2051 (Uniden)	Base/Mobile	No	Yes	Yes	Yes	No
PRO-2052 (Uniden)	Base	No	Yes	Yes	No	Yes
PRO-2053 (GRE)	Base	No	Yes	Yes	No	No
PRO-2066 (Uniden)	Mobile	No	Yes	No	No	No
PRO-2067 (GRE)	Base	No	Yes	Yes	No	Yes
PRO-2096 (GRE)	Mobile	Yes	Yes	Yes	No	No
Uniden						
BC235XLT	Handheld	No	Yes	No	No	No
BC245XLT	Handheld	No	Yes	Yes	No	No
BC246T	Handheld	No	Yes	Yes	Yes	No
BC250D	Handheld	Yes*	Yes	Yes	Yes	Yes
BC296D	Handheld	Yes**	Yes	Yes	Yes	Yes
BC396T	Handheld	Yes	Yes	Yes	Yes	Yes
BC780XLT	Base	No	Yes	Yes	Yes	Yes
BC785D	Base/Mobile	Yes*	Yes	Yes	Yes	Yes
BC796D	Base/Mobile	Yes**	Yes	Yes	Yes	Yes
BC895XLT	Base	No	Yes	No	No	Yes
BC898T	Base	No	Yes	Yes	Yes	Yes
BCT8	Base/Mobile	No	Yes	Yes	Yes	No
WinRadio						
1500/3000 series	Base	No***	Yes	No	No	Yes

*(with BCi25 card)

** (with BCi96 card)

*** Will also track MPT-1327 trunk systems

NOTE: There is no scanner in the marketplace nor is one anticipated soon that can decode and/or trunk track the following digital systems: Motorola ASTRO-VSLEP, and iDEN; M/A-COM's ProVoice, Open Skies, and EDACS Aegis systems; TETRA and Tetrapol, SmarTrunk, and EF Johnson's LTR Multi-Nets.

❖ Downriver Mutual Aid

Dan,

Will the Uniden BC80XLT or BC92XLT scanners work with the Downriver Mutual Aid System?

Greg

The Downriver Mutual Aid radio system is trunked radio network serving more than a dozen towns in the suburban area south of the city of Detroit in southeast Michigan. It is based on Motorola equipment and carries both analog and APCO-25 digital voice transmissions.

The Bearcat BC80XLT is a 50-channel scanner with 800 MHz coverage, but it is not capable of automatically following trunked conversations. The BC92XLT is a 200-channel scanner with Uniden's "Close Call" technology and covers 800 MHz, but it also lacks trunk-tracking capability. So, you may be able to catch snippets of conversation while scanning in conventional mode, but you'd probably be much happier with a scanner that can track both analog and digital transmissions. You can get more information about trunking scanners, including the new digital models, on my website at <http://www.signalharbor.com>

The Downriver Mutual Aid network is a large system that operates on the following twenty frequencies: 866.5750, 866.6000, 866.6250, 866.8250, 867.0500, 867.1250, 867.2000, 867.2625, 867.5750, 867.7750, 867.8000, 867.8250, 868.0750, 868.1000, 868.1250, 868.3375, 868.5875, 868.6500, 868.7500 and 868.8375 MHz. Four repeaters provide coverage for this network and are located in the towns of Ecorse, Flat Rock, Riverview and Taylor.

The network is divided into two regions, North and South. The following is a list of some of the system-wide talkgroups:

Decimal	Hex	Description
36000	8CA	County Sheriff 1
36032	8CC	County Sheriff 2
45552	B1F	Police (South Secondary)
48016	BB9	Downriver Mutual Aid 1
48048	BBB	Downriver Mutual Aid 2
48080	BBD	Downriver Mutual Aid 3
48720	BE5	Fire (North Primary)
48752	BE7	Fire (South Primary)
49744	C25	Police (North Primary)
49776	C27	Police (South Primary)
50576	C59	SWAT 1
50608	C5B	SWAT 2
50648	C5D	SWAT 3
53040	CF3	Fire (North Secondary)
53072	CF5	Fire (South Secondary)
64000	FA0	Health EMS 1
64032	FA2	Health EMS 2
64064	FA4	Health EMS 3
64096	FA6	Health EMS 4
64128	FA8	Health EMS 5
64160	FAA	Health EMS 6
64192	FAC	Health EMS 7
64224	FAE	Health EMS 8

Individual towns and townships have their own local talkgroups. In general, each is assigned six talkgroups, three for fire and three for police. The first talkgroup for each service is usually used for dispatching. The second fire talkgroup is usually for emergency medical services and the third police talkgroup often carries car-to-car activity.

Decimal Hex Description

48112	BBF	Allen Park Fire 1 (Dispatch)
48144	BC1	Allen Park Fire 2 (EMS)
48176	BC3	Allen Park Fire 3
48208	BC5	Allen Park Police 1 (Dispatch)
48240	BC7	Allen Park Police 2
48272	BC9	Allen Park Police 3
48304	BCB	Brownstown Fire 1 (Dispatch)
48336	BCD	Brownstown Fire 2 (EMS)
48368	BCF	Brownstown Fire 3
48400	BD1	Brownstown Police 1 (Dispatch)
48432	BD3	Brownstown Police 2
48464	BD5	Brownstown Police 3
48528	BD9	Ecorse Fire 1 (Dispatch)
48560	BDB	Ecorse Fire 2 (EMS)
48592	BDD	Ecorse Fire 3
48624	BDF	Ecorse Police 1 (Dispatch)
48656	BE1	Ecorse Police 2
48688	BE3	Ecorse Police 3
48784	BE9	Flat Rock Fire 1 (Dispatch)
48816	BEB	Flat Rock Fire 2 (EMS)
48848	BED	Flat Rock Fire 3
48880	BEF	Flat Rock Police 1 (Dispatch)
48912	BF1	Flat Rock Police 2
48944	BF3	Flat Rock Police 3
48976	BF5	Gibraltar Fire 1 (Dispatch)
49008	BF7	Gibraltar Fire 2 (EMS)
49040	BF9	Gibraltar Fire 3
49072	BFB	Gibraltar Police 1 (Dispatch)
49104	BFD	Gibraltar Police 2
49136	BFF	Gibraltar Police 3
49168	C01	Grosse Ile Fire 1 (Dispatch)
49200	C03	Grosse Ile Fire 2 (EMS)
49232	C05	Grosse Ile Fire 3
49264	C07	Grosse Ile Police 1 (Dispatch)
49296	C09	Grosse Ile Police 2
49328	C0B	Grosse Ile Police 3
49360	C0D	Lincoln Park Fire 1 (Dispatch)
49392	C0F	Lincoln Park Fire 2 (EMS)
49424	C11	Lincoln Park Fire 3
49456	C13	Lincoln Park Police 1 (Dispatch)
49488	C15	Lincoln Park Police 2
49520	C17	Lincoln Park Police 3
49552	C19	Melvindale Fire 1 (Dispatch)
49584	C1B	Melvindale Fire 2 (EMS)
49616	C1D	Melvindale Fire 3
49648	C1F	Melvindale Police 1 (Dispatch)
49680	C21	Melvindale Police 2
49712	C23	Melvindale Police 3
49808	C29	Riverview Fire 1 (Dispatch)
49840	C2B	Riverview Fire 2 (EMS)
49872	C2D	Riverview Fire 3
49904	C2F	Riverview Police 1 (Dispatch)
49936	C31	Riverview Police 2
49968	C33	Riverview Police 3
50000	C35	River Rouge Fire 1 (Dispatch)
50032	C37	River Rouge Fire 2 (EMS)
50064	C39	River Rouge Fire 3
50096	C3B	River Rouge Police 1 (Dispatch)
50128	C3D	River Rouge Police 2
50160	C3F	River Rouge Police 3
50192	C41	Rockwood Fire 1 (Dispatch)
50224	C43	Rockwood Fire 2 (EMS)
50256	C45	Rockwood Fire 3
50288	C47	Rockwood Police 1 (Dispatch)
50320	C49	Rockwood Police 2
50352	C4B	Rockwood Police 3
50384	C4D	Southgate Fire 1 (Dispatch)
50416	C4F	Southgate Fire 2 (EMS)
50448	C51	Southgate Fire 3
50480	C53	Southgate Police 1 (Dispatch)
50512	C55	Southgate Police 2
50544	C57	Southgate Police 3
50672	C5F	Trenton Fire 1 (Dispatch)
50704	C61	Trenton Fire 2 (EMS)
50736	C63	Trenton Fire 3
50768	C65	Trenton Police 1 (Dispatch)
50800	C67	Trenton Police 2
50832	C69	Trenton Police 3
50864	C6B	Taylor Fire 1 (Dispatch)
50896	C6D	Taylor Fire 2 (EMS)
50928	C6F	Taylor Fire 3

50960	C71	Taylor Police 1 (Dispatch)
50992	C73	Taylor Police 2
51024	C75	Taylor Police 3
51056	C77	Wyandotte Fire 1 (Dispatch)
51088	C79	Wyandotte Fire 2 (EMS)
51120	C7B	Wyandotte Fire 3
51152	C7D	Wyandotte Police 1 (Dispatch)
51184	C7F	Wyandotte Police 2
51216	C81	Wyandotte Police 3
51248	C83	Woodhaven Fire 1 (Dispatch)
51280	C85	Woodhaven Fire 2 (EMS)
51312	C87	Woodhaven Fire 3
51344	C89	Woodhaven Police 1 (Dispatch)
51376	C8B	Woodhaven Police 2
51408	C8D	Woodhaven Police 3

Apart from the trunked radio system, you can hear Health Emergency Medical Services ambulance activity on 155.340 MHz and 155.400 MHz. Medical channels are in UHF on 467.950, 468.000, 468.050 and 468.075 MHz.

❖ New Uniden Scanner

Just six months after their announcement of the BC246T scanner, at the Consumer Electronics Show in January Uniden introduced a new handheld digital scanner, the Bearcat BCD-396T. This scanner will be capable of monitoring unencrypted APCO Project 25 systems, as well as trunk-track Motorola, EDACS and LTR analog systems. It will have 5,500 channels, enough to make computer-based frequency download software a necessity. Coverage will be from 25 MHz up to 1.3 GHz, with the usual cellular blocks. The scanner will also have Uniden's trademarked "Close Call" technology, which automatically detects and tunes to nearby radio transmissions.

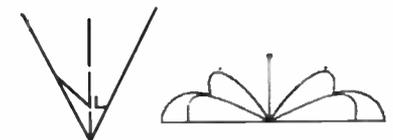
Uniden also claims to have corrected some of the shortcomings and annoyances of their earlier models. The new scanner will not have a proprietary battery pack, allowing the use of regular batteries. The APCO-25 decoder board is now built-in and the keypad is backlit.

Uniden expects to have the model available for sale near the end of this summer.

❖ Bristol, Tennessee Update

Hi Dan,

In regard to your January 2005 scanning report concerning Bristol, Tennessee, going dig-



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ital and all transmissions now being encrypted, unless all of my scanners have been upgraded overnight without me knowing it, Bristol Police still can be heard where they were (along with Sullivan County and Kingsport) ever since going to 800 MHz in 2000. I have been listening every day since I picked up the copy of Monitoring Times in the last week or so. So far, I have not noticed any change in communications.

I also have been listening with great interest on 856.4875, 857.4875, 858.4875, 859.4875 and 860.4875 MHz for any transmissions here in Kingsport on these frequencies. In the last two weeks or so I have had heard nothing on any of those. The same ones were listed in the Police Call book as far back as 2000. I had to do a trunk search that only took about a minute or so to find the right ones.

Also, the Tennessee Highway Patrol has been transmitting on 451.600 MHz for dispatch, also on 45.620 MHz dispatch-to-car recently. I'm not sure if they are planning on switching frequencies in the future, doing testing, or if main dispatch on 42.420 MHz is down for some reason.

I listen on a Realistic Pro 2004 and a Uniden Bearcat BC895xlt trunk tracker scanner. I enjoy Monitoring Times a lot, including your section. Keep up the good work.

Tom in Kingsport, Tennessee

Thanks for the local update. Apparently the user reports I received were premature, or they were monitoring during system testing.

The City of Kingsport was granted FCC license KNNV775 in 2001 for use by city employees. There is one repeater location, listed as 225 West Center Street in Kingsport. The five frequencies, 856.4875, 857.4875, 858.4875, 859.4875 and 860.4875 MHz, are listed as carrying analog voice traffic. Please keep them programmed in your scanners and let me know if anything turns up!

❖ Cambridge, Maryland

The town of Cambridge, Maryland, located along Route 50 on the Eastern Shore, has vacated their old conventional frequencies and joined the Dorchester County trunked radio system. The county recently replaced their old E. F. Johnson Multinet system with a Motorola Type II system. It operates on 855.9875, 856.2625, 857.2625, 858.2625 and 859.2625 MHz from four repeater sites: two in Cambridge, one in Trappe and one in Vienna. The system carries both analog and APCO-25 digital voice traffic.

The Cambridge police channel on 453.300 MHz has been replaced with three talkgroups on the county system:

Decimal Hex	Description
34400 866	Police Dispatch
34416 867	Police 1
34432 868	Police 2



The old fire and emergency medical dispatch frequency of 46.06 has been moved to 151.070 MHz. 150.995 MHz is a simulcast from the 800 MHz system.

A few of the monitored talkgroups are analog, as listed here:

Decimal Hex	Description
1616 065	County Highway Department
7600 1DB	County Calling
7632 1DD	County "A"
7664 1DF	County "B"
7696 1E1	County "C"

Most fire, medical and law enforcement activity is APCO-25 digital:

Decimal Hex	Description
11200 2BC	County Fire Dispatch
11216 2BD	County Tactical 2
11232 2BE	County Tactical 3
11248 2BF	County Tactical 4
11264 2C0	County Tactical 5
11280 2C1	County Tactical 6
11296 2C2	County Mutual Aid
11312 2C3	County Medical Calling
11328 2C4	County Medical "C"
11344 2C5	County Medical "D"
11360 2C6	County Training 1
11376 2C7	County Training 2
32000 7D0	County Sheriff Dispatch

❖ Allegan County, Michigan

Allegan County in southwest Lower Michigan is moving from their VHF frequencies to a new Enhanced Digital Access Communication System (EDACS) in the 800 MHz band. The transition process began in January and will continue until all law enforcement agencies are on the new system. More than 60 sheriff's vehicles also must have new radio equipment installed.

The new EDACS network carries both analog and digital ProVoice traffic on the following frequencies, listed in Logical Channel Number (LCN) order:

01 857.9375
02 858.2375
03 858.2625
04 858.4375
05 858.4875
06 858.9375
07 859.2375
08 859.2625
09 859.4375
10 859.9375

The system uses four repeater sites, located in the towns of Allegan, South Haven, Wayland and Zeeland.

Allegan County was dispatching on



155.550 MHz, and using 155.370 MHz and 156.150 MHz for law enforcement communication. Their talkgroups on the new system are reported to be 2046 and 2047 decimal (in Agency-Fleet-Subfleet format, those talkgroups would be 15-156 and 15-157). Unfortunately for scanner listeners, there is no currently available consumer scanner that can decode ProVoice signals, so these transmissions are effectively out of reach. In addition, a press release from Allegan County announced that police traffic will be encrypted.

I do not have any reports on what will happen with the Sheriff Department's Mobile Data Terminals (MDTs) that currently operate on 856.4875 MHz.

For now, fire departments will stay on the VHF system. County fire dispatch can be heard on 153.890 MHz and fireground operations on 154.220 MHz. I also have a fire department frequency listing on 153.770 MHz.

The Department of Public Works can be heard on 155.820 MHz.

The State has two repeater sites in Allegan County for the Michigan Public Safety Communications System (MPSCS). MPSCS is a fully digital APCO-25 network linking public safety agencies across the state. The Fenville site in the west-central part of the county transmits on 866.0125, 866.4875, 866.7000, 866.9625, 867.1000, 867.8125, 867.9125 and 868.3875 MHz. The Wayland site, located in the northeast corner of the county, operates on 866.0125, 866.2875, 866.4125, 866.9125, 867.3500, 867.4125, 868.1625, 868.2750 and 868.9125 MHz. You will need one of the APCO-25-capable scanners in order to monitor MPSCS, such as the Uniden BC296D or the Radio Shack PRO-96.

Allegan County is part of State Police District 5, which the following talkgroups:

Decimal Hex	Description
3001 BB9	Emergency All Call
3005 BBD	Statewide
3007 BBF	Law Enforcement Information Network
3012 BC4	Car-to-Car
3067 BFB	North Dispatch
3068 BFB	South Dispatch
3073 C01	County Narcotics Detail
3068 BFB	South Dispatch
3163 C5B	Wayland Police
3245 CAD	Canine Unit

That's all for this month. More information is available on my web site at <http://www.signalharbor.com>, including a trunked scanner comparison chart and listings of APCO-25 frequencies. I welcome your questions, comments, and frequency reports via electronic mail at dan@monitoringtimes.com. Until next month, happy scanning!



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Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner.....	\$84.95
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New US Coast Guard Frequencies

On January 1, 2005, the United States Coast Guard changed all five of its upper-sideband (USB) calling and distress frequencies. The new ones are 4125.0, 6215.0, 8291.0, 12290.0, and 16420 kilohertz (kHz). After initial callup, the USCG shore station will assign a working frequency for any additional communication.

The biggest difference from the old setup is that all frequencies are simplex, meaning the vessel and the coastal station transmit on the same frequency. The old calling frequencies were duplex, meaning that the shore station would answer on the opposite frequency in the pair, and all communication would be "split."

All but 8291, a longtime safety frequency, have always been in duplex pairs themselves, but simplex calling and safety use is authorized under international rules. 4125 and 6215 are traditionally busy frequencies, where all kinds of interesting activity can turn up. They're monitored by many of the world's coast guards. In addition, fishing fleets often show up on 4125. Therefore, this change is a logical one, and it brings the US into line with a common international practice.

There is no more mandatory voice radio watch in the maritime service, but several frequencies are still guarded 24 hours a day. The new Coast Guard schedule is in Table 1. Table 2 lists the station locations, and Table 3 has the working frequencies. All times are Coordinated Universal Time (UTC).

Table 1: 2005 US Coast Guard USB Calling & Distress Watch Schedule

kHz	NMN, NMA, NMF, NMG	NMC	NMO	NOJ	NRV
4125.0	2300-1100	24 hr	0600-1800	24 hr	None
6215.0	24 hr	24 hr	24 hr	24 hr	0900-2100
8291.0	24 hr	24 hr	24 hr	By request	None
12290.0	1100-2300	24 hr	1800-0600	By request	2100-0900
16420.0	By request only - All stations				

Table 2: US Coast Guard Station Locations

NMN	CAMSLANT Chesapeake, VA.....	Communication Area Master Stn., Atlantic
NMA	Miami, FL.....	(Remote to NMN)
NMF	Boston, MA.....	(Remote to NMN)
NMG	New Orleans, LA.....	(Remote to NMN)
NMC	CAMSPAC Pt. Reyes, CA.....	Communication Area Master Stn., Pacific
NMO	Honolulu, HI.....	(Remote to NMC)
NRV	Apro, Guam.....	(Partial remote to NMC)
NOJ	Kodiak, AK	

Table 3: US Coast Guard USB Working Channels (kHz)

Channel #	Ship Transmits	Coast Transmits
424	4134.0	4426.0
601	6200.0	6501.0
816	8240.0	8764.0
1205	12242.0	13089.0
1625	16432.0	17314.0

❖ Tsunami Frequencies

Relief operations for South Asia's catastrophic Richter 9.0 earthquake and resulting sea surge will undoubtedly be required for months, if not years.

There has actually been quite a bit of activity on shortwave utility bands, though propagation at the bottom of the solar cycle hasn't always allowed many loggings in our hemisphere.

In South Africa, old-time listener Bob Hall has a great shot at this region, and indeed he picked up hours of Indian Navy emergency traffic on 8297.7 kHz Baudot radioteletype (RTTY). Along with several regional dialects, English was used, and there were also many coded messages in 4 and 5-letter groups. This frequency should still be active, if considerably less frantic now that a few months have passed. The Indian navy also uses 6507.1.

Just as an aside, the very first tsunami warning came from an Indian Navy aircraft, on good old high-frequency radio. So much for HF being obsolete!

The Malaysian Navy is also using plain old RTTY on 8191.7 kHz and straight Morse telegraphy on 5064.0. Along with emergency messages, the stations are reporting the scores of British football (soccer) games. Even in times of disaster, life goes on.

The USB regional air route control frequency of 11285 kHz is being used by many relief flights, both civilian and military. The German Air Force was logged worldwide, evacuating tourists from affected areas. Other aircraft have been heard on 3470, 5670, 6556, 8879, 8897, 10066, 13318, and 179078. Most of these are established frequencies which should still have some activity.

The amateurs have set up an Internet site for their various radio operations, at <http://www.tsunamireliefnet.com/>. There is a list of frequencies in amateur bands, and a live audio stream. Bands used are 40, 20, and 15 meters. 20 probably has the best signals, when both ends are in daylight.

❖ Is WWV's Voice Dead?

At the end of 2004, a sad story made the rounds of the ham radio press. Death, it was said, had taken the male voice of WWV, the National Institute of Standards and Technology standard time and frequency station in Fort Collins, Colorado. He had thus joined the late Jane Barbe, WWVH's female voice, in electronic immortality, preserved forever like an auditory fly in amber by countless digitized voice clips.

The only thing wrong with the story is that it's not true. While Marty Edwards, the former Mutual Radio news anchor, did pass away last November 30, Edwards never had anything to do with WWV. Instead, his truly majestic announcing voice was used for the telephone "Master Clock" of the United States Naval Observatory in Washington, DC. It maintains the official time standards for the US military, including the Global Positioning System, but it hasn't had any radio broadcasts in a very long time.

While our sympathies go out to Edwards' family, we are happy to report that, at press time, the voice of WWV is very much alive - both of them. Most knowledgeable old-timers associate WWV with Don Elliott Heald, better known as just Don Elliott. He was recorded on an analog drum system, similar to the ones then in use at the phone company. When WWV converted to digital audio in 1991, the voice was done over by John Doyle. Both of these two highly regarded Atlanta broadcasters worked part-time for the same automatic voice announcement company that had employed Barbe.

WWV's amplitude-modulated (AM) broadcast is on 2500, 5000, 10000, 15000, and 20000 kHz. The Naval Observatory time tick is a DC local call, at (202) 762-1401 or (202) 762-1069. There's also an Internet audio stream, though it seems to be down at press time.

Hope you have good spring propagation, and see you next month.

ABBREVIATIONS USED IN THIS COLUMN

AFB.....	Air Force Base
ALE.....	Automatic Link Establishment
AM.....	Amplitude Modulation
ARQ.....	Automatic Repeat Request teleprinting system
ASCII.....	American Standard Code for Information Interchange
AWACS.....	Airborne Warning And Control System
CAMSPAC.....	Communication Area Master Station, Pacific
CAMSLANT.....	Communication Area Master Station, Atlantic
Coq-8.....	Coquelet-8, French & Algerian teleprinting code
CW.....	Morse code telegraphy ("Continuous Wave")
DEA.....	US Drug Enforcement Administration
DSB.....	Double sideband, suppressed carrier
DSC.....	Digital Selective Calling
E3.....	British 5-figure female voice, musical callup
EAM.....	Emergency Action Message
EOC.....	Emergency Operations Center
FAX.....	Radiofacsimile
FEC.....	Forward Error Correction teleprinting system
FEMA.....	US Federal Emergency Management Agency
FSK.....	Frequency-Shift Keying
HFDL.....	High-Frequency Data Link
HF-GCS.....	High-Frequency Global Communications System
ICE.....	US Immigration and Customs Enforcement
JSTARS.....	Joint Surveillance Target Attack Radar System
LDOC.....	Long Distance Operational Control
LSB.....	Lower Sideband
MARS.....	Military Affiliate Radio System
Meteo.....	Meteorological
MFA.....	Ministry of Foreign Affairs
MXI.....	Russian single-letter navigational beacon cluster
PACTOR.....	Packet Teleprinting Over Radio
PR.....	Puerto Rico
RSA.....	Republic of South Africa
RTTY.....	Radio Teletype
SAR.....	Search And Rescue
SHARES.....	SHARed RESources, US Federal net
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 "Atencion!" callup & 5-figure groups

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

- 129.1 DCF49-EFR ("European Radio Telecontrol"), Germany, sending short FSK ASCII bursts with an identification packet every 15 minutes, at 1645. (Day Watson-UK) [A German consortium for transmitting power company load control signals via low-frequency radio. -Hugh]
- 139.0 DCF39-EFR, Germany, with ASCII bursts at 1637. (Watson-UK)
- 292.5 "BA"-Spanish non-directional beacon, Estaca de Barres, CW at 2240. (Patrice Privat-France)
- 2182.0 VCO-Canadian Coast Guard, NS, announcing upcoming Marine Information Broadcast on 2749, at 0041. VCP-Canadian Coast Guard, NFD, announcing upcoming weather broadcast on 2698, at 0049. NMN37-US Coast Guard Group Fort Macon, GA, announcing upcoming broadcast on 2670, at 0103. (Rick Baker-OH)
- 2187.5 ECDE-Vessel BOA Deep C, DSC distress calls at 0504. (Watson-UK)
- 2579.0 IPB-Bari Radio, Italy, warnings in Italian at 2205. (Privat-France)
- 2600.0 IQQ-Mazaro del Vallo Radio, Italy, warnings in Italian at 2205. (Privat-France)
- 2628.0 IQA-Augusta Radio, Italy, warnings in Italian at 2205. (Privat-France)
- 2810.0 Turku Radio-Finnish Maritime Administration, weather at 0640. (Privat-France)
- 3455.0 New York-Caribbean air traffic control with LTU 901 and Red Comet 914, at 0113. (Ron Perron-MD)

- 3700.0 "Yosemite Sam"-Very strange pirate beacon, probably northern NM, repeating a DSB cartoon sound-track loop every 10 seconds, in a 4-frequency cycle also including 4300, 6500, and 10500, at C425. (Hugh Stegman-CA)
- 4469.0 Southeast CAP 47-US Civil Air Patrol net control, checking in Southeast CAP 30, Southeast CAP 43, Tennessee CAP 120, Little John 1030, Goldenrod 181, and Georgia CAP 461, at 0107. (Mark Cleary-SC)
- 4479.0 Cuban Spanish female AM "numbers" (V2), in progress at 0225. (Jeff Seale-KY)
- 4604.0 Red Robin 401-Michigan Civil Air Patrol, working Blue Mound 2 (Wisconsin CAP), at 0C01. (Perron-MD)
- 4724.0 Area Code-US military, with a two 28-character EAMs simulcast on 8992, at 2247. (Jeff Haverlah-TX)
- 5066.5 USAIS1012-US Army Intelligence and Security Command, VA, calling USAMD1010, US Army Missile Defense Command, VA, ALE at 1528. (Perron-MD)
- 5211.0 NMN-US Coast Guard CAMSLANT, checking in with WGY912 (FEMA, Mount Weather, VA) at 2325. (Cleary-SC)
- 5500.0 AA1-Israeli Air Force, Ben Gurion, calling ACC in ALE, at 0201. (Watson-UK)
- 5696.0 Sector San Juan-US Coast Guard, SAR with helicopter CG 2102, at 2316. (Cleary-SC)
- 5708.0 Sentry 50-US Air Force E-3 AWACS, ALE-initiated patch to Tinker AFB Meteo, at 2123. (Cleary-SC)
- 5717.0 Halifax Military-Canadian Forces, passing SAR traffic from Rescue Coordination Center to Rescue 328, at 0114. Halifax, working warship Kingston, went to secure voice, at 0112. (Baker-OH)
- 5732.0 6042-US Coast Guard helicopter, working CAMSLANT, at 1105. 6010, working CAMSPAC, at 1135. (Baker-OH)
- 5850.0 OXT-Copenhagen Meteo, Denmark, fuzzy ice chart FAX at 0943. (Watson-UK)
- 6450.0 PWZ33-Brazilian Navy, RTTY navigation warnings in English and Portuguese, parallel on 8582 and 12711, at 0415. (Bob Hall-RSA)
- 6507.1 VTP-India Navy, Vishakapatnam, RTTY weather forecast at 1853. (Watson-UK)
- 6637.0 Houston-Houston Universal LDOC, TX, working Centurion 314 leaving Miami for Colombia, at 0714. Miami-Sylvair LDOC, FL, working Gemini 2202, at 1230. (Allan Stern-FL)
- 6721.0 Sentry 50-US Air Force, ALE-initiated autopatch to Tinker AFB Meteo, at 2125. (Cleary-SC) E30352DAT-US Air Force AWACS, possible ALE data connect via ADW, Andrews AFB, at 2125. (Perron-MD)
- 6739.0 Reach 109Y-US Air Force Air Mobility Command transport, patch via Puerto Rico HF-GCS for arrival weather in Romania, at 0211. (Cleary-SC)
- 6745.0 Canforce 2639-Canadian Forces CC-130, patch via Trenton Military to Wing Ops for weather, at 2245. (Cleary-SC)
- 6809.0 FC1FEM-FEMA Region 1, MA, calling FCSFEM (FEMA, Washington, DC), ALE at 1417. (Perron-MD)
- 7527.0 Hammer East Node-US ICE, working Omaha 315K, at 1846. Hammer, position from Omaha 95K at 2216. (Cleary-SC)
- 7632.0 AAV4AR-US Army MARS, GA, along with NNNOKAG, Navy/Marine Corps MARS, taking SHARES Southeast regional net check-ins at 1729. (Cleary-SC)
- 7633.5 RAZOR 88-US Air Force E-8 JSTARS, patch via US Air Force MARS station AFA2MH, GA, to Lumberjack (Robins AFB), at 1819. (Cleary-SC)
- 7635.0 Middle East 34-US Civil Air Patrol, VA, checking into CAP.net at 1509. (Cleary-SC)
- 7777.0 RM4-Mexican Army Region 4, calling JADE (Headquarters), also on 9060, ALE at 0032. (Perron-MD)
- 8058.6 PLA-US Air Force, Lajes, Azores, calling KEH34, US State Department, ALE at 0344. (Perron-MD)
- 8060.0 CLC24M-Venezuelan Army, calling CRC2M (Regional Command), ALE at 0151. (Perron-MD)
- 8125.0 KIT88-US Federal Aviation Administration, MD, checking stations into the Eastern Region Net at 1545. (Perron-MD)
- 8191.7 9MR-Malaysian Navy, Kuala Lumpur, RTTY tsunami-related traffic at 0600. (Hall-RSA)
- 8297.7 VTP-Indian Navy, continuous RTTY tsunami-related traffic in English,

- 8301.6 Asian languages, and code, at 0600. (Hall-RSA)
Sector San Juan-US Coast Guard, PR, working unknown SAR aircraft at 1132. (Cleary-SC)
- 8475.2 FUX-French Navy, Le Port, RTTY test loop at 1722. (Hall-RSA)
- 8493.7 "D"-Russian Navy CW cluster beacon (MXI), Odessa, also heard on 10871.7, 13527.7, 16331.7 and 20047.7, at 0810. (Ary Boender-Netherlands)
- 8600.0 1104-Unknown, sounding in ALE at 0008. Many other stations with 4-figure identifiers sounding, also using 9200, at 0012 to 2115. [Unknown agency, also uses 3816.5, 5600, 9168, and 22580. -Hugh] AA2-Israeli Air Force, calling ACCESS2 in ALE, at 0158. (Watson-UK)
- 8834.0 VP-BWF-Russian Aeroflot A320, with HF DL position at 0915. (Hall-RSA)
- 8912.0 Coast Guard 1502-US Coast Guard, patch to Clearwater Air via Service Center (US Customs), at 1450. (Cleary-SC)
- 8983.0 CAMSPAC-US Coast Guard, SAR for sinking vessel Red Diamond with Rescue 1714, at 0017. (Cleary-SC)
- 8992.0 Available-US military, 28-character EAM at 1833 and 1903. (Haverlah-TX)
- 9007.0 Canforce 2053-Canadian Forces, getting weather for Dakar, Senegal from Trenton Military, at 0326. (Cleary-SC)
- 9025.0 JNR-US Air Force, Salinas, PR, passing operator chatter such as "HOW COPY?" in the ALE message of the day field, at 0104. (Glenn Blum-TX) MCC-US Air Force, McClellan AFB, CA, ALE sound at 0110. (Seale-KY) 2154-Possible aircraft attempting ALE autopatch via JNR, Salinas, PR, at 2129. 504, working ADW, Andrews AFB, MD, ALE at 2144. CRO, Croughton, UK, calling ICZ, Sigonella, Italy, ALE at 2206. (Watson-UK)
- 9052.0 AMMAN-French Embassy, Jordan, calling CER42, ALE at 0304 and 0321. (Watson-UK)
- 9060.0 RM15-Mexican Army Region 15, calling JADE (Headquarters), ALE at 0331. (Perron-MD)
- 9123.0 OKC-Romanian Embassy, working CENTR8 (MFA, Bucharest), ALE at 0854. (Watson-UK)
- 9178.0 111-Spanish Guardia Civil, working TWBA, Barcelona, ALE at 0903. (Watson-UK)
- 9190.0 GOAJIRA-Venezuelan Navy vessel Gojaira, calling BRION, vessel Almirante Brion, ALE at 2330. (Watson-UK)
- 9232.0 CLC24-Venezuelan Army, calling SCLC241 (local comm center), ALE at 0021. (Perron-MD)
- 9360.0 OXT-Copenhagen Meteo, FAX ice chart at 1010. (Watson-UK)
- 9365.0 FASHER-United Nations, Sudan, calling OBIED in ALE, at 0524. (Watson-UK)
- 10135.0 PUMA2-Mexican Army, calling PUMA, also 10444, ALE at 1247. (Perron-MD)
- 10194.0 FC4FEM-FEMA Region 4, GA, calling FCSFEM, DC, ALE at 1500. (Perron-MD)
- 10650.0 BOLIVAR-Venezuelan oiler Ciudad Bolivar, calling CLEMENTE, Coast Guard Frigate Almirante Clemente, LSB ALE at 1045. (Perron-MD)
- 10993.6 Coast Guard 1706-US Coast Guard, calling Sector Key West at 1626. (Cleary-SC)
- 11087.0 PWZ-Brazilian Navy, weather in RTTY at 1921. (Hall-RSA)
- 11175.0 Trout 99-US Air Force Speckled Trout C-135C, patch via Puerto Rico HF-GCS for weather at Tbilisi, Georgia (the one near Russia) at 0531. (Cleary-SC) "Aircraft 0140" - Unknown, asked Offutt AFB for his "20" (10-20, location in police or Citizen's Band procedure), confusing the poor Offutt operator, who finally offered to give a twenty count, at 2015. (Stern-FL) Evac 3556-US military, quick patch via Offutt, at 2131. (Haverlah-TX)
- 11181.0 Rest Camp-US military, working Animosity at 1422. (Cleary-SC)
- 11205.0 R40177-US joint task force, giving departure time from Colombia to Smasher, FL, at 1923. (Cleary-SC)
- 11220.0 SAM 201-US Air Force Special Air Mission C-20, possibly a Distinguished Visitor flight, working Andrews HF-GCS at 1340. Doom 91-US Air Force B-52H, patch via Andrews to Barksdale AFB, at 1731. (Cleary-SC)
- 11232.0 Shado 91-US Air Force, patch via Trenton regarding status of Jaws 52 and Cowboy 23, at 0033. (Haverlah-TX) United Nations 03-UN flight setting up a patch with Trenton, at 1535. (Privat-France) Trenton Military-Canadian Forces, patching Goliath Alpha, US Air Force E-3B AWACS, to Sentry Ops for exercise traffic, at 1835. (Perron-MD)
- 11291.0 F-GRND-Euralair "Green Frog" 737, working Dakar, Senegal, at 1350. (Privat-France)
- 11396.0 Reach 223Y-US Air Force, working New York at 1708. (Privat-France)
- 12537.0 21B-Venezuelan Navy, calling CGA, Headquarters, ALE at 0219. (Perron-MD)
- 12591.7 NMN-US Coast Guard CAMSLANT, VA, CW identifier in SITOR-A marker, off frequency (correct is 12592.5) at 1527. (Watson-UK) NMN, same off-frequency marker, at 2055. (Perron-MD)
- 12729.0 UFL-Vladivostok Radio, SITOR-B traffic in 3-shift Cyrillic, parallel on 17175.2, at 0823. (Watson-UK)
- 12769.0 NRV-US Coast Guard, Guam, SITOR-A Indian Ocean weather, at 0625. (Hall-RSA)
- 13139.0 SUCRE-Venezuelan Navy, calling EPLGL, Coast Guard Station La Guaira, in LSB ALE, at 0839. (Perron-MD)
- 13257.0 Trenton Military-Canadian Forces, working aircraft Atlas 10, at 2014. (Perron-MD)
- 13503.6 KWL92-Unknown US Embassy, calling KWL96, also on 11168.6, at 1517. (Perron-MD) [New US State Department ALE net. -Hugh]
- 13886.3 Unid-Moscow Meteo, FAX weather chart at 0605. (Hall-RSA)
- 13927.0 Reach 4673-US Air Force, patch to Westover via MARS station AFN2AC, FL, at 1842. (Cleary-SC) AGA2PA-US Air Force MARS, Patrick AFB, FL, patch with King 19, a C-130, at 2015. (Stern-FL)
- 14455.0 KHA 908-National Aeronautics and Space Administration, CA, checking in stations as SHARES West Region Auxiliary Net control, new net every Wednesday 1600-1800 with 6982.5 secondary, at 1711. (Perron-MD)
- 14487.0 Lincolnshire Poacher (E3)-British intelligence "numbers," transmitter on Cyprus, parallel on 15682 and 16084, in progress at 1344. (Boender-Netherlands)
- 14651.5 LOR-Argentine Navy, coded RTTY message in 5-letter groups, at 0550. (Hall-RSA)
- 15094.0 GVT-US Government default, calling AF5, US Air Force, ALE at 1527. (Perron-MD)
- 15737.5 Unid-Azerbaijan station, manual typing in 3-shift Cyrillic RTTY, at 0910. (Watson-UK)
- 16803.5 Unid-Russian merchant vessels with garbled Russian RTTY, at 1530. (Hall-RSA)
- 17010.0 ERMBEL-Brazilian Navy, Belem, calling BTLCMC1, Marine Special Forces, ALE at 2147. (Perron-MD)
- 17176.0 RFFMEA-French Navy, La Regine, RTTY marker at 1923. (Watson-UK)
- 17412.0 022NHQCAP-US Civil Air Patrol, ALE sound at 1405. (Watson-UK)
- 17487.0 AAR6HXMAR-US Army MARS, TX, calling KGD34NCC, SHARES Master Coordinating Station, VA, ALE at 1631. (Perron-MD)
- 17967.0 ZS-SFH-South African Airways flight 620, HF DL position for Muharraq, at 1514. (Hall-RSA)
- 18018.0 Architect-UK Royal Air Force Flight Watch, air field weather at 1500. (Perron-MD)
- 18042.0 PACMZG-Médecins Sans Frontières (Doctors Without Borders), tsunami-related callups in PACTOR, at 0940. (Hall-RSA)
- 18183.4 7RQ20-Algerian MFA, Algiers, Coq-8 message in French to Niamey, Niger, at 0854. Algerian MFA, Coq-8 news bulletins in French to KIN, Kinshasa, Congo, at 1350. (Watson-UK)
- 18237.5 BAF33-Beijing Meteo, RTTY weather in English, at 0945. (Hall-RSA)
- 18238.0 ZSJ-South African Meteo, Silvermine, forecasts in RTTY at 0946. (Hall-RSA)
- 18248.6 KWL92-Unknown US Embassy, calling KWL90, US Embassy, Manila, Philippines, in ALE at 1510. (Perron-MD)
- 18571.5 83G-Tunis Diplomatic, Tunisia, FEC message in 5-letter groups for unknown station "DLG," at 1608. (Hall-RSA)
- 18757.0 P6Z-French MFA, Paris, FEC message in 5-letter groups at 0934. (Hall-RSA)
- 19452.0 Lincolnshire Poacher (E3), parallel on 18233 and 20707, in progress at 1410 and 1415. (Chris Smolinski-MD)
- 20258.0 1PR97-French Navy, calling 1PLFUO, Toulon, in ALE at 0809. 1PF797, calling 2PLFUO in ALE at 0904. (Watson-UK)
- 20631.0 OFFNPR-US Air Force Non-Secure Internet Protocol Routing Network gateway, Offutt AFB, NE, working DL0003DAT, an E-3B AWACS, at 1731. (Perron-MD)

Counting Your CARBs

This month we focus on some regular Naval broadcast transmissions that listeners can decode using simple RTTY equipment. Digital listeners perusing the logfiles in WUN newsletters (see Resources) and other sources may well have come across cryptic log entries like the following one
PBB Dutch Navy 75bd/850Hz Baudot sending CARB

Or perhaps you've been tuning around the maritime bands and have come across a strange transmission like the following one:

06a 08a 08b 12a 12b 16a
 06a 08a 08b 12a 12b 16a mgj
 06a 08a 08b 12a 12b 16a
 06a 08a 08b 12a 12b 16a mgj

Maybe twenty minutes later, the message changes to:

04a 06aoo 08a 08boo 12a 12b 16a
 04a 06aoo 08a 08boo 12a 12b 16a mgj
 04a 06aoo 08a 08boo 12a 12b 16a
 04a 06aoo 08a 08boo 12a 12b 16a mgj

You check the frequency later still, and just the following is left:

06a 08a
 06a 08a mgj
 06a 08a
 06a 08a mgj

Odd stuff indeed. Well, you've just found a CARB, one which has little to do with counting calories and more to do with keeping naval warships updated with the operational status of various communication channels. CARB, or *Channel Availability Radio Bulletin* messages are broadcast on many fixed channels by various North Atlantic Treaty Organization (NATO) naval stations across the world.

Although various countries have their own particular flavors of this message (see below), here's how a CARB works in general: Each set of digits denotes a channel used for ship-to-shore traffic. Usually, these two digits indicate the MHz part of the relevant maritime band (see Maritime Bands below) in which the channel is located – for example, 04b indicates the “b” channel in the 4MHz band. The letters following the two digits denote the operational status of the channel. Finally, a callsign is usually sent every single or every other line.

In the case of the Royal Navy – the most commonly heard sender of CARB broadcasts – the format of these transmissions is: *mxyz* where *m* is the MHz band being monitored; *x* is the channel within the band being monitored; and where *xy* can be any of the following:

oe have received calling signal, send test message
 pk have received test loud and clear from ship p, send traffic
 pn have not received traffic, ship p send again
 oo channel in use

pr received traffic loud and clear from ship p
 p3 ship p please send traffic three times

So, as an example:

02a 02boo 04apn 08boo 12b 16aoo 16boo gya
 would denote that the shore station is currently monitoring two channels in the 2MHz maritime band, one of which is occupied. A ship transmitting on the 4MHz “a” channel has not been received. The “b” channel in the 8MHz band is also occupied, the 12MHz channel is free and two 16MHz channels are also occupied.

Finally, the callsign of the shore station broadcasting the CARB is GYA.

Many of these stations monitor up to four channels in each of the 10 maritime bands, though not all at the same time of day/night – otherwise the CARB string would be rather long! For example, when listening to the Dutch Navy's broadcasts from stations PBB (Den Helder) or PBC (Goeree Island), the CARB format is as follows:

02A 04B 06A 08A 12B 17X 22X PBC
 The channel numbers are as follows:
 2121.4 Channel 02A
 2259.4 Channel 02B
 4155.0 Channel 04A
 4161.0 Channel 04B
 4171.5 Channel 04C
 6237.5 Channel 06A
 6242.0 Channel 06B
 8321.0 Channel 08A
 8324.0 Channel 08B
 8337.5 Channel 08C
 12375.5 Channel 12B
 16576.0 Channel 17B

The Canadian Forces have a slightly different style from most other stations in terms of the CARB format: they actually list the frequencies in use. NAWS is the abbreviation for “Notice to All Warships.”

NAWS DE CFH ZKR F1 2722 3287 6248 8312
 12389 16576 22182 AR

Finally, the Italian Navy also does something a little different and uses the callsigns allocated to each of the channels in its CARB:
 IGJ44 /IGJ42LO /IGJ43FH /IDR2

Where to Look for CARBs

Here's where you can find various CARBs. All use standard Baudot coded RTTY, so can be decoded with the widest range of equipment:

PBB	Dutch Navy, Den Helder 2845, 3764.4, 6483kHz	75bd/850Hz
PBC	Dutch Navy, Goeree Island 2381, 2474, 6358.5, 8176.5, 8439, 12840.7kHz	75bc/850Hz
MGJ	Royal Navy, Faslane 6783, 8180.1, 8641.7, 9130, 11109, 15750, 17055kHz	75bd/340Hz
GYA	Royal Navy, Whitehall 6783kHz	75bd/340Hz
GYU	Royal Navy, Gibraltar 8625.9, 8635.9, 12824.9, 13370kHz	75bd/200Hz

CFH	Canadian Forces, Halifax 4997, 5097, 6389, 10945, 15920kHz	75bd/850Hz
IGJ	Italian Navy, Augusto IDR, Rome) 2463.1, 3827, 4142.2, 8150.8, 8429.5kHz	75bd/850Hz (shared with IDR, Rome)
CTP	NATO, Lisbon	75bd/850Hz
MTF	Royal Navy, Falkland Islands 14658.9, 16092.3kHz	75bd/200Hz

Note that in the case of the Royal Navy's transmissions, they are often carried over a mixture of available transmitters and rarely from the location to which the callsign is officially allocated. For example, MGJ's signals often emanate from relays in Cyprus rather than the Faslane nuclear submarine base in Scotland.

It is also important to note that CARBs are often one of many different channels of information mixed in as part of a multichannel VFT (Variable Frequency Telegraphy) signal. We will cover VFTs in forthcoming *Digital Digest* columns.

And, at the risk of sounding repetitive, take a listen to these stations before they disappear. Many of these recognizable RTTY signals are being slowly replaced by 600bd STANAG4285 high speed modems for which you'll need some much more sophisticated (and expensive) gear to decode these simple messages.

❖ Maritime Bands

While we are on the subject of maritime services, let's review the frequency bands allocations. Allowing for regional differences, those bands are roughly:

2100-3000kHz	16400-17400kHz
4000-4500kHz	18700-18900kHz
6200-6500kHz	22000-22800kHz
8200-8800kHz	25000-25200kHz
12200-13300kHz	26100-26200kHz

Aside from the aforementioned CARB broadcasts, there are, of course, plenty of other digital signals to hunt for in these regions of spectrum. We'll take a look at a few more in forthcoming columns.

That's it for this month. Please keep your letters and emails coming. We're happy to answer any questions either through the column or privately. Enjoy the digital DX!

Resources:

World Utility News Club	http://www.wunclub.com
Royal Navy	http://www.royal-navy.mod.uk
Royal Dutch Navy	http://www.marine.nl
US Frequency Allocations	http://www.ntia.doc.gov/osmhome/allocrt.pdf

The Tsunami and Shortwave Broadcasting

The Dec. 26 earthquake and tsunami got unprecedented media coverage eventually outside the devastated areas, but shortwave listeners zeroed in immediately on known stations in the region, as well as major international broadcasters.

Since Andaman & Nicobar Islands counts as a separate radio country, All India Radio, Port Blair, was already a prime DX target, on 4760. It had been heard a few days earlier as far away as Pennsylvania by Rich D'Angelo, NASWA *Flashsheet* at 1145-1210. And, just an hour before the quake, as it turned out, at 0005 UT Dec 26 by Günter Lorenz, in North Italy, *hard-core-dx*, its nominal sign-on being 2355.

After the event, we could only wonder if that station survived, but it did: the same day at 1552, a very weak signal on 4760 was reported by Walt Salmaniw, BC, *DX Listening Digest*. However, another AIR on the same frequency at Leh in the far north can cause confusion, but it is normally not on as early as 0019, when Lorenz was hearing 4760.03 the next day. On Dec 28, Port Blair continued past its normal close-down time until 1835* taking phone calls and giving contact numbers in English, says Jari Savolainen, Finland, in *DXLD*. And on New Year's Eve, 4760 put a good signal into Florida at 1200, reports Bob Wilkner, *HCDX*.

One of those messages was in the Nicobar dialect, not understood by station officials. It urged everyone on Nicobar to converge on the helipad to be evacuated to Port Blair, but the Indian Air Force could not handle so many refugees, says Sheela Bhatt, *rediff.com* via Alokesh Gupta. Mike Terry forwarded an AFP story that, with phone lines washed away, AIR Port Blair became a vital communications link, relaying messages 16 hours a day.

AIR Port Blair had a temporary engineer friendly to DXers, so his fate was of concern. Rudolf Sonntag on the *A-DX* list via Wolfgang Büschel heard back from K. S. Venkateswarlu that he was fine, as well as his family in Chennai. By January 9, GRDXC reported that AIR Chennai was appealing for donations of SW radios to be sent to displaced people in the A&N.

The premises of AIR Chennai, 4920, were initially flooded, but that too continued on the air, heard by Roberto Pavanello, Italy, *Play-DX*, Dec 29 at 1650 with funereal sitar music. But on New Year's Eve at 1439, we heard AIR Bangalore, 10330 running a comedy program. AIR website added a special page spotted by Max van Arnhem, Netherlands, BDXC: <http://allindiaradio.org/Tsunami.htm>

We checked the SLBC website in Sri Lanka, with links about aid, live audio in Sinhala and Tamil, <http://www.slbc.lk/> Scott Barbour in NH was able to hear SLBC opening 9770 at 1227 Dec 28, with children's music, but weaker than usual.

Sri Lanka is also home to several SW relay stations, notably Deutsche Welle's at Trincomalee on the northeast coast, seemingly vulnerable to tsunamis. But a few hours later, Wolfgang Büschel found them operating normally, thanks to Diesel generators. Alan Davies in Sumatra, *BC-DX*, heard DW via Trinco 6170 and 7225, Dec 27 at 1600 belting out Paul McCartney's 'Simply Having a Wonderful Christmas Time' -- just about the most insensitive choice of music

possible in the circumstances.

Kim Elliott contacted Michael Krumbin at DW HQ, who confirmed that the station was not damaged since it is not right on the coast, but he was not sure if all the local staff and families were unharmed. By Jan 5, however, Andrea Borgnino, *BCLNews.it*, visiting India, found no signal from DW relay's MW frequency 1548.

The IBC Tamil service into South Asia changed site and frequency on Dec 30, *Observer*, Bulgaria, reported, at 0000-0100 from Novosibirsk 7450, to Jülich, Germany, 6055, 100 kW, 100 degrees.

Western DXers were concerned about well-known Sri Lankan DXer Victor Goonetilleke. Alokesh Gupta, New Delhi, confirmed to us by Dec 27 that Victor and his family were fine, according to a VOA monitoring colleague, C. K. Raman. Victor, 4S7VK immediately went to work providing emergency communications by ham radio, off-topic in this column.

Another Sri Lankan DXer, active in years past with the Union of Asian DXers, is Sarath Weerakoon, who has been managing a bank in Malé, Maldivé Islands. He too was confirmed OK, by Wolfgang Büschel, *BC-DX* and Dave Onley, *ARDXC*.

Radio Minivan, the Maldivé opposition station which started a few months before, began producing a new one-hour program every day during the tsunami crisis, reports Jeff White, Radio Miami International. They said that Radio Minivan was one of few ways to get info to the outlying islands. That's 1600-1700 on 11810 via Germany.

Some stations were not on the ball with tsunami news. Roberto Pavanello, Italy, *Play-DX* heard no mention of that on R. Thailand's news in French, Dec 27 at 2015 on 9535. Nor did Adán González, Venezuela, hear any disaster news on V. of Indonesia, in Spanish Dec. 29 at 1708 on 15150. Not a word; was it recorded a few days earlier? RRI Banda Aceh had been off SW for years, so hearing that was not an option.

Radio Australia no longer has blanket coverage of South Asia, but even if it had, Jean-Gabriel Manguy, General Manager, said no warnings were received that could have been broadcast. But more transmission hours would have been useful in the aftermath and during rescue and relief operations, *Media Network* reported. Shadow Foreign Minister Kevin Rudd took the opportunity to call for Radio Australia to be rebuilt.

Countries further afield whose citizens were vacationing in the tsunami areas added special broadcasts, such as Radio Sweden, at 1130-1200 on 11560, 1200-1600 on 11550 until further notice, taking some resources away from North American and East Asian services, Finn Krone reported to *BC-DX*. Later on, benefit concerts would be heard from Australia, BBC, Canada, among others.

Will international broadcasting sound the warning, next time? Read Kim Elliott at <http://www2.rnw.nl/rnw/en/features/media/features/kae050106>

On the BDXC list, Max van Arnhem reminds us that those annoying CO-DAR swishes interfering with broadcasts on the 4, 12 and 13 MHz bands, among other places, are designed to measure ocean waves. Maybe those will become part of a new tsunami warning system in the Indian Ocean, too.

BELGIUM It looks as if I will be sent away on early retirement at the end of March, so I will not be downgraded to a writer of Internet news items. I will be 63 in February. I would have liked to carry on until 2007, but as a radio man, not in these circumstances. There still is a faint hope that we might be rescued, but it's REALLY faint (Frans Vossen, RVi, via Erik Koie, Copenhagen, *DX Listening Digest*)

BIAFRA [non] Voice of Biafra International transmits on 7380 at 2100-2200 UT every Saturday and Wednesday; a project of Biafra Foundation, and Biafra Actualization Forum (<http://www.biafraland.com/vobi.htm>) Was audible here in Dec, Jan (gh, OK)

BRAZIL 6720, at 0730, R. Guaíba, Porto Alegre, música gaúcha, "Guaíba, líder de audiência do futebol do Rio Grande do Sul." Spurious frequency, fair to poor (Alfredo Locatelli, Uruguay, *El EsKuch@ Newsletter* via Play DX) 6720 would be a mix of their SW frequency 6000 plus their MW from 720. On the radioescutas list, several Brazilians maintained that

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-04=winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

this major station could not possibly be putting out a spur, until Denis Zoqbi explained how this could happen, and 6720 was confirmed by another monitor, Sérgio, PY3BAM (gh)

After a brief period of inactivity due to a transmitter problem, R. Inconfidência, Belo Horizonte (MG), reactivated 6010, heard at 0455 with Brazilian music modules, "Na Rádio Inconfidência, maravilhosas recordações! Memória Nacional!" (Célio Romais, Brasil, *radioescutas*) Also at 2317 with phone-ins from listeners, better signal than before (Francisco Jackson dos Santos, PY1PDF, RJ, *ibid.*) Joining Chile, Colombia, Mexico and Uruguay among others on 6010v (gh)

CENTRAL AFRICAN REPUBLIC [non] Radio Centrafrique from Bangui, heard at 1705-2300 on 9590. From 2200 until 2300* was very strong, much better than earlier, lively African music interspersed with many IDs in French and Radio Centrafrique program promos. At 2235 a long ID as "la Chaîne Nationale de Radio Centrafrique émettent de Bangui." Could this be a new transmitter in the CAR,

or relayed from elsewhere? Earlier, at 1700, a multilingual ID for RFI on same frequency, with Bangui heard when I rechecked at 1705. Went off at exactly 2300 while programming was still in progress (Dave Kenny, BDXC-UK) Audio kept cutting in and out; when on, quite good, but only lasting 10-30 seconds, at 1755 (Steven R. Lare, MI, DXLD)

I think it's Issoudun 500 kW; ILGradio reports a new entry on 9590 from France with no name station (Roberto Scaglione, Sicily, *ibid.*) Just an open carrier at 2130; another day excellent at 1830-1930 with DJ, dedications in French and Sango, 2015 with rural songs, overmodulated (Dario Monferini, Italy) Strong QRM from Nederland in Indonesian from 2200 (Arnaldo Slaen, Argentina, HCDX) At 2100 compared to Africa Number One, Gabon, 9580: 9590 sounded stronger due to modulation, but 9580 measured stronger on the meter; similar fading rate (gh, OK)

HFCC says it's via TDF, Issoudun, France, 500 kW (Vlad Titarev, Ukraine, BC-DX) Yes, via France, since CAR has no functioning SW transmitter, and France is a friend of the CAR government; to counter R. Ndeke Luka, the opposition station heard on SW for some time in the CAR outback (Christian Ghibaudo, Nice, playdx) However, a story originating from PANA on the French-language website of Centrafric Presse, dated 12 October 2004, says a meeting of the Intergovernmental Agency of French-Speaking Countries (AIF) was held in Paris to discuss a plan of rescue for Radio Bangui, mentioning the possibility of renting airtime via Africa No 1, Moyabi, ahead of the elections in the Central African Republic on 13 February (Tony Rogers, BDXC-UK) 9590 is quite irregular. Audio from Bangui is terrible and unstable. Sometimes RFI instead of just carrier, or signing off earlier than 2300 (Thorster Hallmann, Germany, DXLD) HFCC shows this as 500 kW Issoudun, France at 156 degrees (BCDX)

CHINA [non] Sound of Hope, from KVTO, B04: 1600-1700 11765, 2200-2300 9635, both 100 kW from Taipei, and also 2300-2400 on 7310, via Irkutsk? (Eric Zhou, China, DXLD) KVTO is the Berkeley CA 1400 kHz station where it originates (gh)

CZECH REPUBLIC R. Prague 2005 QSL cards can be viewed at <http://www.radio.cz/en/html/qs12005.html> (Swoopan Chakroborty, Kolkata, India, DXLD) Eight of them, on the theme of Czech spas (Eduard Boada I Aragonés, Spain, Noticias DX)

ECUADOR On 2960.90, HCWPS, R. Atlántida, Alausi, 2 x 1480v harmonic stronger than usual. Alausi is a small city located at an altitude of 2600 m, an altitude treatment station on the railway line connecting Guayaquil and Quito (Björn Malm, Quito, DX Listening Digest) Time?

EGYPT Media Minister announced that he had decided to reduce the overseas sections of Radio Cairo to 11 languages only, out of 35! He said he made that decision after checking reports from foreign affairs dept. and security council and the media offices worldwide, bearing in mind that these cuts won't affect the international targets of Egypt and that decision would be in effect from first week in January. To save money, and to improve the quality of the rest of the programs (Alghamoriya Newspaper via Tarek Zeidan, Egypt, DXLD) No reductions detected yet in monitoring as late as January 9 (Wolfgang Büschel, Germany)

ERITREA [non] Voice of Delina - Belgian airtime broker TDP <http://www.airtime.be/schedule.html> added new transmission for Eritrea, in Tigrigna 1500-1600 Saturdays on 15650. Website of the Tesfa Delina Foundation <http://dmsi.delina.org/Notices/n041223.html> confirms that schedule and gives an address in Cerritos, California (Dave Kernick, UK, DXLD) Maybe also Bulgaria site, as Christian Voice after 1600 on 15650 (Wolfgang Büschel, BC-DX) Sent an E-mail thank-you QSL (Björn Fransson, Sweden, SW Bulletin) *1500-1509 local pop music, ID and frequency schedule in local language, many mentions of Delina, man in echo chamber alternating with more local pops. Good on clear channel. Not heard at 1550 re-check (Mike Barraclough, Letchworth Garden City, UK, DXLD)

GREENLAND Although it apparently never has been reported outside Greenland, KNR continues to use short wave from Tasiilaq on the Greenlandic east coast: 3815 (USB) at 1500-1615 and 2100-2215; power 200 W, aerial an omni-directional cage (Stig Hartvig Nielsen for WRTH 2005, DXLD)

HUNGARY R. Budapest heard at 1905 on 7950 = 2 x 3975 (Tim Bucknall, UK, harmonics yahoo group)

INDIA Bridging the gap between heaven and earth, the unearthly time-evoking dreams of another world, is the signature tune of All India Radio. Unique among radio signature tunes with its soothing Indian strains, incredibly, it was designed by an unknown German musician, Walter Kauffman. It has been played for seven decades at countless AIR stations before the start of programs. Kauffman, a Jew, fled Germany to escape Nazi persecution. He found refuge in Bombay, British-ruled India. In the 1930s he composed the tune that would be forever associated with AIR (DW News Magazine via T. R. Rajesh, World DX Club Contact)

IRAN Dear North American Monitoring Clubs, I am writing to you from the English Radio of Islamic Republic of Iran's Broadcasting. We would be very pleased to introduce our radio to the listeners. We can send beautiful QSL cards for those who will send us reception reports. I attach a copy of the Broadcasting schedule for you. IRIB English Service, M. B. Khoshnevisan

1030-1130 15480, 15460 SAs
1530-1630 9610, 9940 SAs
1930-2030 6110, 7320 Eu; 11695, 9855 S&EAf
0130-0230 (Voice of Justice) 9580, 6120 NAM

IRIB English Service, P. O. Box 19395-6767, Tehran, I.R. of Iran; E-mail: englishradio@irib.ir Website: <http://www.irib.ir/worldservice/englishradio> (via Rachel Baughn)

ISRAEL IBA ruled that the Director General did not have authority on his own to end SW transmission. It was decided to continue SW for one more quarter year until March 31. During these weeks the matter of SW is referred to a meeting of the Members of the Broadcasting Authority. Two antennas damaged in a storm were to be repaired in Dec (Doni Rosenzweig, DXLD)

ITALY Some idea of the future of SW from Rai comes from a website <http://www.rai.it/articolo/0,,33003,00.html> showing the land of the Prato Smeraldo SW site is for sale (Andrea Borgnino, *bclnews.it*) Or they move 90 km to a MW site? (Wolfgang Büschel, BC-DX)

KOREA NORTH VOK kept revising its B-04 schedule, changing some frequencies, and times of certain languages; English at 0100, 0200, 0300, 1000 and 1300 as last month, but the rest as of Jan 13:

1500 4405 7570 *9335 *11710 12015
1600 3560 9990 11545
1800 4405 7570 12015
1900 3560 7100 9975 11535 11910
2100 4405 7570 12015

*to NAM or CAM. Many frequencies vary up to 120 Hz (via Nagoya DX Circle, Ivo Ivanov, Arnulf Piontek, BC-DX)

Close-down time for Frontline Soldiers Radio on 3025.5 is approx. +/- 1030* (Roland Schulze, Philippines via Wolfgang Büschel, BC-DX)

KOREA SOUTH On its New Year mailbag in Spanish, the hosts said a change in the name of R. Korea International was being considered (José Elias Diaz Gomez, Venezuela, Noticias DX) I can't say much yet, but it will be a lot like the change R. Japan made (Rubén Guillermo Margenet, Argentina, who contributes DX segments to RKL, *Conexión Digital*) Guess that means "KBS World" - shucks, I was hoping for "Voice of Korea", or "Voice of Free Korea" or maybe "Radio P'yongyang [non]." Actually their home page <http://rki.kbs.co.kr> already used "Voice of Korea" informally (gh)

KURDISTAN [non?] A clandestine in Kurdish was heard on 6310.22 at 1724-1920, playing traditional music and melancholic songs (Günter Lorenz, near Pavia, Italy, HCDX) Also between 1547 and 1955 (Zacharias Liangas, Greece, *ibid.*) But there is also an Italian pirate, R. Malaisi on 6310.1 to confuse things, heard at 0100; both heard at 1630, one with nonstop Kurdish music (Björn Fransson, Sweden, *ibid.*) Another day at 1358, 6310.2 had a brief ID sounding like "Asad Radio Rusha"; also around 0600 (Jari Savolainen, Finland, DXLD) Fade-in 1350, Kurdish and Turkish songs, 1445 ID like R. Roj, maybe related to Kurdish satellite TV program (Zacharias Liangas, Greece, DXLD)

Probably "Azad Radyo Roja." "Roj" means "Sun" in northern Kurdish (Kurmanji) and is an important word for the Kurdish identity, the sun being a central motif in the Kurdish national flag (Bernd Trutenau, World Of Radio) Some Kurds listened to my recording and confirmed it is R. Roj, in northern Kurdish dialect, announcing 6310 for the ME. But who is behind it? (Jari Savolainen, Finland) Strong until 1900* (Zacharias Liangas, Greece, DXLD) also unID at 0439 on 6310.19 with music (Adán González, Venezuela, *ibid.*)

KUWAIT IBB-Kuwait verified with QSL letter, from Kuwait Transmitting Station, c/o American Embassy-Bayan, P. O. Box 77, Safat, 13001 Kuwait, Kuwait (Masato Ishii, Shibata-shi, Japan, DSWCI DX Window) VOA, 11835, sharp looking, full data "IBB-Kuwait Transmitting Station" verification letter in 32 days for 1 IRC and a follow-up report direct to Kuwait. Original report to VOA-U.S. offices unanswered. V/S, George Miller, Supervisor (Scott R. Barbour Jr., NH, DXLD)

LIBYA [non] Three Libyan programs are broadcast from transmitters in France: Radio "Great Jamahyria", "Istiklal Sudan" and "Voice of Africa." The latter broadcasts at 1000-1230 and 1715-2130 on 9485, 11635, 11715, 11860, 15220, 15615, 15660, 17695, 21485 and 21695 (Rumen Pankov, R. Bulgaria DX via John Norfolk)

V. of Africa sent package with no-data letter on sharp looking letterhead, report form and "Welcome to Libya" CD-ROM from the General People's Committee for Tourism, in 217 days for an English report. Nice stamp blocks on envelope (Scott R. Barbour, Jr., NH, DXLD) Same via registered mail, CD a rather amateurish affair and some compatibility problems. Letter signed by someone at Researches and Studies Section, Listeners Affairs (Rich D'Angelo, PA, NASWA Flashsheet)

MADAGASCAR Mr. Eiki Satomi, an IT industrialist (president of MediaMagic Co.) and an amateur (ex JHBJWF) from Sapporo, visited Madagascar Nov 20-26, 2004, including the R. Nederland Relay Station, guided by staff, Solofo and Eddy, who have been employed for more than 20 years, and are also hams 5RBET and 5R8FT. Station is on a hill, 30-minute car ride from Antananarivo. They showed him 3 x 350 kW transmitters and new 250 kW transmitter now in construction. New 130m antenna will also be constructed. Used transmitter tubes, still very expensive, are sent to US manufacturer, recycled, and reused. Photos are at my site <http://www.5a.biglobe.ne.jp/~BCLSWL/Madagascar.html> including the 350 kW transmitting tube. When operation begins, warning siren is blown to get away from the high power or high electric field areas (Takahito Akabayashi, DXLD) The 350 kW would be the Philips 8FZ521. As far as I know, Bonaire and Yavne (Israel) are the only other sites where this model can be found. The "new 250 kW transmitter in construction in red case" appears to be a Brown Boveri SK55. These are no longer manufactured, so where did they obtain this rig? The Sottens, Switzerland, transmitter looked exactly like this (Kai Ludwig, Germany, DXLD)

Shortwave Broadcasting

MALI RTVM was missing from 4835 in mid-December, and its other 60m frequency, 4783, varied to 4787. Then on one occasion in January, at 2030-2210, heard on both 4784 and 4787 with same program (Eric Cordier, France, DXLD)

MONGOLIA VOM's Mailbox on Mondays at 1015 on 12085, liked my report and the show repeats the next day when reception normally is better! Also sent a nice Christmas card and every QSL is of high class (Henrik Klemetz, Sweden, SW Bulletin)

Tentative A-05 schedule from 27 March shows English at 1000-1030 on 12085, 250 kW at 178 degrees; 1500-1530 and 2000-2030 on 12015, 50 kW at 315 degrees (via Swopon Chakroborty, DXLD)

MYANMAR Defense Forces Broadcasting Unit, Taunggyi, 5770, sent me an E-mail QSL from sny@mandalay.net.mm after 75 days for my P-mail reception report. They attached the jpeg file of my Prepared Form QSL Card, filled in and completed in English. Signature illegible, probably a military official such as Chief Commander. Message says, "I appreciate your exact study. Please keep in touch again. Warmly welcome your visit our country." See illustration at <http://www.5a.biglobe.ne.jp/~BCLSWL/QSLO501.html> (Takahito Akabayashi, Tokyo, Japan, DXLD)

NEW ZEALAND [and non] The Radio Heritage Foundation has launched its own website at <http://www.radioheritage.net> on history of Pacific region broadcasting (David Ricquish, NZ, DXLD)

NIGERIA VON international service, news in English at 1700 heard on 7275 instead of 7255 (Jarmo Patala, Finland, dxing.info)

[non] Christian Voice, to Nigeria: 15650 changed to 13820 at 1600-1800, 11560 at 1800-2000 (CVI, DXLD) Via Sofia, 100 kW, 215 degrees, but 13820 collides with Pan American Broadcasting in English, Sundays only at 1600-1630 (Observer, Bulgaria)

SIKKIM AIR Gangtok, 3390, finally made it through at 1240-1310 Dec 12, good enough for me to count it as definite, my 235th NASWA country heard (Steven R. Lare, MI, World Of Radio)

SLOVAKIA A letter from the French service of RSI at yearend said they were entering 2005 with uncertainty, a provisional budget, SW likely to be terminated at the end of March, but continuing on WRN and Internet (Tania Minarovicova, RSI via Roland Paget, via Jean-Michel Aubier <http://perso.wanadoo.fr/jm.aubier>) Then in early Jan, Slovak Public Radio got an unexpected 4.7 megawatt boost from the Finance Ministry, according to Slovak Spectator. This could be good news for RSI, which for much of 2004 was under threat of closure. It remained to be seen whether the additional government funding will allow the international service some breathing space (Andy Sennitt, Media Network blog)

SOMALIA Radio Galkayo, 6980 AM, is the most popular station in the Horn of Africa. We would love to receive your correct reception reports. I have completed repairs to the SW amp and transmitter and listeners are reporting very good signals across Somalia, into Kenya, Ethiopia, Djibouti and Yemen. New sked: 0400-0600 and 0900-1900, but the aging transmitter and amp may not handle the new workload. We have no mail service, but I will arrange that full data QSL letters be mailed by travelers going abroad (Joe Talbot, Somalia, World Of Radio)

SUDAN [non] R. Peace, originally only 1 kW from its own transmitter in New Site, was reported last month with signals too strong for that. VT Merlin was apparently testing from one of its sites in the region on the same frequency at 0330-0400, 1630-1700 and 1900-1930 (Wolfgang Büschel, Germany, DXLD) 4750, Radio Peace, *0230-0247 opening ID, long talk by woman in English, poor (Rich D'Angelo, PA, NASWA Flashsheet) So perhaps at 0230 still their own 1 kW in Sudan? (gh)

Sudan Radio Service, via UK at 1500 on 15530, puts good signal in here, almost directly off the back of 140 degree antenna toward Sudan, at 1505 English news by woman with heavy accent but slowly and clearly enunciated, all dealing with Sudan and Darfur; 1512 said would be more news in half an hour, ID as Sudan Radio Service, jingle ID (Glenn Hauser, OK, DXLD) At 1515 "Our Voices" about women's rights in Sudan; some Arabic style music. 1530 "Morning Show" [sic] about preparing for peace in Sudan. 1545 Arabic, and later, vernacular. Sign-off 1659 with multi-lingual IDs. Very good. M-F only; VOA programming on this transmitter prior to 1500 (Brian Alexander, PA, DXLD)

SYRIA [non] As of January, R. Free Syria, via Germany, 9495, stopped broadcasting on Fridays, but continues on Sundays at 1900; the WFAFI Iranian service remains on Saturdays at same time (Jeff White, RMI, DXLD)

UKRAINE On Dec 22, RUI changed most of its frequencies to avoid interference, improve propagation, including English: 0000 & 0400 NAM on 5910 ex-7440; 1200 WEu 15675 ex-15620; 2200 Eu still on 5840 but now also used in Ukrainian from 1800, ex-7555 (Alexander Yegorov, Kiev, via Craig Krist, DXLD)

UAE If you haven't heard Dubai lately on 21605, it's not just because of propagation: replaced by 12005 at 0600-1500, but no more English at 1030, 1330 (via Observer, Bulgaria)

USA [and non] The "Liberty Bell" logo used for Radio Free Europe and Radio Liberty will disappear from corporate websites starting January 1. In many of the new target areas, the bells are too closely associated with Christianity. In order not to be labeled as part of any "Crusade", the Prague-based station is introducing a new corporate style. The colour orange seems to figure in the new style somehow (Jonathan Marks, visiting Prague, Dec 20, Media Network blog) Bell still there at <http://www.rferl.org>, checked January 15 (gh)

Broadcasting Board of Governors (BBG) and RFE/RL are discussing adopting a new name for the RFE/RL operations from Prague, reflect-

ing the changed political situation, Europe no longer a priority target. Informed sources say RFE and RL are to be united under the new label "Radio Liberty International" in the course of 2005 (Bernd Trutenau, Lithuania, DXLD)

The Agency announced to the Union Jan 7 that the budget for the Greenville Relay Station would be slashed by \$150,000. The budget for VOA English would be slashed by \$200,000 (AFGE Local 1812)

VOA English broadcast schedule, featuring program lineup and frequencies on the same page, is available in pdf at my new website <http://kimandrewelliott.com> (Kim Elliott, DC, DXLD) plus press links

Richard Rael, a special English announcer at VOA, died on January 3 of injuries he received in a bicycle accident Dec 24 (DCRTV) I think he was known on the air as "Dick Rael." I would see him many afternoons riding his bike to VOA for the evening shift, and he always had a friendly greeting for me (Kim Elliott, DXLD)

Ran across VOA in French, Dec 31 at 1843 on 17580, listeners phoning in with NY greetings, not remarkable, except - with a noticeable long-path echo, more so during speech than music. Since this is Greenville, about 1900 km from here, that makes the long path some 38 megameters, further than my previous WHRA 17650 long-path catch. It seems 17 MHz is the best band for this to happen, MUF-wise (Glenn Hauser, OK, DXLD)

Jean Shepherd program expanded to 5 days on WBCQ, M-F 2200-2300 on 9330-CLSB, Mondays also on 7415. Area 51 returned UT Mon 0200-0600 on 5105. Radio Free New York added 2200-2400 Sundays on 5105 (Allan Weiner, WBCQ, DXLD) World Microscope, mentioned last month, was already replaced by Christian Media Network January 4 (WBCQ Annotated program guide) O no; Michael Ketter had such big plans it, and it was an excellent talkshow (gh) Despite very cold temperatures, we are working on our 6th transmitter. This transmission system will be like no other ever constructed on the planet! Fully computer controlled and definitely with a very long range. Should be on air sometime this winter (Allan Weiner, WBCQ, Jan 12, DXLD)

International minister Ralph G. Stair, accused of sexual and financial crimes, pleaded guilty to assault and battery November 29, more than 2 years since being charged. With more than 100 of his supporters watching at the Colleton County [SC] Courthouse, Stair admitted to "unlawfully touching" two of his former female followers, a lesser offense reduced from the initial charge of assault and battery of a high and aggravated nature. Circuit Court Judge Jack Gregory concurrently sentenced Stair, 72, of Canadys, to 30 days in the Colleton County Detention Center. With time served, Stair will do no additional time. Stair is leader of the Overcomer Ministry whose residents must sell all their worldly possessions and sever ties with friends and family members before entering. Nearly a dozen civil case accusations varying from wrongful death to financial wrongdoing are also pending against Stair, in the "pleading and motions stage" with no trial date set (Colleton County Press and Standard, Walterboro, via <http://www.thenetteam.net> via Mike Barraclough, World DX Club Contact) The Net Team is one of Brother Stair's major detractors, and there is a lot more on their website, including testimonials, audio. Currently heard on WCCR, WRMI, T-Systems-Germany, 21 AM and FM stations (gh)

Dr. Gene Scott: what you hear on the radio is normally tapes from the studio, not live services. I have been to his services in the cathedral; they can be several hours long. The cathedral has a dramatic aura, full of old Bibles, which are probably quite valuable. The congregation loves to be part of that. DGS in person has a lot of charisma, a captivating speaker, sure of himself, a master salesman so you want to accept whatever he says; and he has a certain aura (I don't mean that in the religious sense) (George McClintock, TN, DXLD)

Harmonic on 4050 at 1055 with C&W Music, two partial IDs adding up to KWMO, Washington MO, "Super-hit country", 1350 x 3 (Larry Russell, MI, DXpedition, MARE Tipsheet)

VIETNAM [non] Radio Quê-Me, 15385, Sat 1200-1230, alternates: 15235, 15695 and/or 15755 also via Tashkent, Uzbekistan. From website: Que Me, B. P. 63, 94472 Boissy Saint Leger cedex, France; queme@free.fr (Wolfgang Büschel, BC-DX)

WESTERN SAHARA [non] Radio Nacional de la RASD, heard on MW 1550 at 2335 Dec 25, and the SW parallel had returned, 7460 with Spanish songs (Steve Whitt, UK, MWC) 7460 also in Arabic at 2110-2137 (Mark Coady, Ontario, DXLD) Also heard mornings around 0700-0800, but not on air Jan 11; QRM by RFA Korean via Mongolia, and jamming at 2100-2300 (Wolfgang Büschel, Germany, *ibid.*)

ZAMBIA On 4500, from Dec 30 at 0400, news in English, possibly ZNBC2; again till 2200 with talks in English about Zambia, Botswana, not \\ ZNBC1 on 4910 (Zacharias Liangas, Greece, DXLD) Must have moved from 6165 due to extremely strong Chad (Thorsten Hallmann, Germany, *ibid.*) 0339-0431 Sunday Morning Show, with lots of ballads. Brief Fish Eagle IS, ID at 0400, news. Very good signal and audio quality, a pleasure to listen to, SINPO 44434 (George Maroti, NY, *ibid.*) Fading after 0430 (Rich D'Angelo, PA, NASWA Flashsheet) Director of Engineering says they had just rehabilitated one of their two 100 kW transmitters and were testing it. Hence, the strong signals (Hans Johnson, Cumbredx via Mike Terry, BDXC-UK) Jan 5 they were already back on their normal 6165 from *0245 with fish eagle IS (Mauno Ritola, Finland)

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

0000 UTC on 4876.7

BOLIVIA: Spanish identification "en el Camino de la Vida, 720 kHz onda modulada 4875 banda internacional." Christian pop music tune to 0030 close down. Bolivia's Radio San Miguel 4905 at 0930 with health topics discussion to newscast. (Fernando Garcia, Baltimore, MD)

0038 UTC on 4065 USB

PIRATE: Sunshine Radio. First log of station on this frequency. Good signal though hampered by poor propagation. Usual pirate station format to IDs at 0042, sign-off at 0050 with closing '60s era music. Pirate **Grass Cutter Radio** 4065 USB *0104-0114*. IDs "Grasscutter Radio...broadcasting from the fookin' ionosphere," followed by music from Robin Trower and Ted Nugent. WMPR 2235-2338 on 6955 ; 0010-0022. (Joe Wood, Greenback, TN) **Mystery Radio** 6220, 0015-0018. (Harold Frodge, Midland, MI)

0215 UTC on 4915

BRAZIL: Radio Nacional (Macapa). Portuguese. Station slogans and promos over background pops. Frequent IDs and regional mentions of city Macapa. Fair signal and minimal fading. (Sam Wright, Biloxi, MS) Brazilians monitored; **Radio Brasil Central** 4985, 0105-0113; **Radio Nacional** (Sao Gabriel da Cachoeira) 3375.1, 1000; **Radio Difusora** 5055, 1009-1015; **Radio Educadora** 2380, 0510. (Arnaldo Slaen, Buenos Aires, ARG); **Radio Bandierantes** 9644.94, 2235-2252; (Frodge, MI) **Radio Educadora de Guajara** 3375.1, 0917-0945. (Rich D'Angelo, PA/NASWA Flash Sheet)

0230 UTC on 4930

TURKMENISTAN: Turkmen Radio. Sign-on in Turkmen into presumed newscast, followed by Middle Eastern music. Best to monitor in USB. (Garcia, MD)

0230 UTC on 4810

MEXICO: Radio Transcontinental. Spanish. Station identification as "XERTA Emisora de cobertura Internacional." Religious programming *El Camino de la Vida*. Mexico's **Radio Mil** 6010 at 0600; **Radio Universidad** 6045, 1200 with interference from **HCJB**. (Garcia, MD; Slaen, ARG; Barbour, NH) **Radio Mil** 6010, 1019-1040+; **Radio Educacion** 6185, 1102-1112+ // 1060 kHz AM. (Frodge, MI) 6185, 0550-0605 with "Educacion" ID and time check. (Wood, TN)

0259 UTC on 3345

SOUTH AFRICA: Channel Africa. Opening identification for English service from Johannesburg, South Africa. Brief drum music prior to another ID, followed by choral anthem and poor signal newscast. (D'Angelo, PA) South African clandestine-Voice of Biafra Int'l 7380, 2140-2149+. Full ID at 2149. (Frodge, MI)

0341 UTC on 4026.8

KURDISTAN: (Clandestine) Voice of the People of Kurdistan. Martial anthem music and mentions of "Kurdistan." Also noted mentions of "Democrati, Iraq (and) kilohertz," but no full copy. Koran recitations into talks over music thru 0400. (Barbour, NH)

0502 UTC 6165

CHAD: Radiodiffusora Nationale Chadienne. French. African pops to talk and mentions of city "N'djamema." (Slaen, ARG) Audible 6165, 0548-0553 with poor French copy. (Wood, TN)

0503 UTC on 9560

NETHERLANDS ANTILLES. Segment on respiratory diseases in Flanders. Music tune *Mind That Gap* by Urban Tribe at 0507. PTWBR notes relay as Antilles, station IDs as via "VOA transmitter in Morocco." (Wood, TN)

0526 UTC on 5005

EQUATORIAL GUINEA: Radio Bata. Spanish identifications to international music and African pops. Female's station promotional to newscast at 0600. (Slaen, ARG; Wright, MS)

0556 UTC on 4784

MALI: Radiodif TV Malienne. French. Interval signal to sign-on national anthem. Fair-poor signal quality drifting from 4782.8-4784 kHz. (Slaen, ARG) Logged 2227-2231+ in French to Afro music //5995. SIO 433. (Frodge, MI)

0830 UTC on 6010

COLOMBIA: LV de tu Conciensa. Spanish religious program "Campana de Dios" to extended ID at 0844 into program La

Palabra de Dios. (Garcia, MD) Logged 1019-1040+ with interference from Mexico's Radio Mil. (Frodge, MI) **Radio Macarena** 6090.34, 10501.25. Audio slightly over modulated. Audible at 1000 to 1058 "Noticiero Macarena" news promo to ads. (Jerry Berg, MA/NASWA Flash Sheet).

1114 UTC on 9500

CHINA: CPBS Shijiazhuang. (Domestic Svc # 1) Pleasant Chinese vocal music to "canned" ID at 1116, // 6175, 7230, 7345; **CPBS Xian** (Domestic Svc # 2) 5925 // 7375 at 1140. (Dave Valko, PA/Cumbre DX) **China Radio Int'l** 13610, 1408-1419+ with "CRI News." Not in 2005 PTWBR. **CRI** 6950, 2339; **CRI** 9855, 2008. (Frodge, MI) **CNR-1**, 6950, 2337-2357*. (Wood, TN) **China's Voice of the Strait** 4940, 1234-1247; 4900, 1247-1300. (Barbour, NH) **CPBS** 4460, 1255-1305. (Barbour, NH)

1200 UTC on 4990

INDIA: All India Radio-Itanagar. Subcontinental music and text, no parallels noted 4800-5100 kHz. (Frodge, MI) **AIR-Bangalore** 17800, 1000-1010 with AIR identifications, news bulletins // 15235 and 13710. (Slaen, ARG) **AIR-Thiruvanthapuram** 5010, 0030-0043. (Berg, MA) **AIR-Andaman & Nicobar Islands** 4760, 1145-1210. (D'Angelo, PA)

1230 UTC on 9810

THAILAND: Radio. Instrumental music presumed to be anthem. Announcement as, "live from the Public Relations Department of the Royal Thai government, this is the news hour." (Valko, PA) **VOA Thailand** relay 9645, 1335-1349; 7160, 1326-1340 in Mandarin. (Barbour, NH)

1345 UTC on 11690

JORDAN: Radio. Station ID including 96.5 FM promo. Rock and New Age music format. Time check over excessive RTTY interference. (Garcia, MD) Logged 1448-1457; 1704-1710+ with English world news. (Frodge, MI)

1800 UTC 12005

TUNISIA: RTV Tunisienne. Arabic newscast and ballad style music tunes. Faint and fair signal quality. (Wood, TN)

2014 UTC on 9390

ISRAEL: Kol Israel. English features in *Weekend Report* program. Identification at 2024 to news headlines. Interval signal precluding French service at 2030 with time pips, ID and news. (D'Angelo, PA) 6280, 2040-2204. (Frodge, MI)

2123 UTC on 4760

LIBERIA: ELWA. Very poor signal quality for musical vocals and announcer's low-level talk. (Barbour, NH) Logged 4760, 2232-2240+ with religious format. (Frodge, MI)

2129 UTC on 9590

CENTRAL AFRICAN REP: Radio Centrafrique. French. Musical pips at 2130 to complete identification at 2130. African pop tunes and chat to 2200. Radio Netherland's Indonesian service sign-on hampered signal. (Slaen, ARG)

2207 UTC on 4950

ANGOLA: Radio Nacional Male/female announcer's Portuguese text. Music segments, station ID and chatty phone calls at 2223. SIO 242. (Frodge, MI)

2215 UTC on 4775

BRAZIL: Radio Congonhas. Portuguese/English. Braz pops with announcers titles. Station identification and music to national news roundup. Local time check amid Peru's Radio Tarma over signal by 2340. (Garcia, MD) Brazil's **Radio Roraima** 4875, 2346-0000. (Slaen, ARG)

2240 UTC on 5840

UKRAINE: Radio Ukraine Int'l. English world news to folk music and identification as "Radio Ukraine" with address. SIO 2+22 with utility interference. Slavic dialect commencing at 2300 "preluded" by piano notes interval signal. Audible 15620, 1249-1301+. (Frodge, MI)

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

Challenging Conventional Wisdom

When an event takes place of the magnitude of the tsunami that struck much of Asia and Africa, it should give pause for everyone to reassess. For example, the principal reason given for there being no warning system in place in that part of the world, as there is for the Pacific, is that there was no perceived need. Tsunami had not occurred in the Indian Ocean in anyone's memory. It's fair to say that now there *will* be such a system there and perhaps for other areas as well, such as in the Atlantic, where the conventional wisdom had been the same.

So it should be for our telecommunications structure. Current orthodoxies seem to say that older analog technologies soon should (and will) be entirely replaced by better, more efficient – in terms of spectrum usage and allocation – and presumably more versatile digital technologies. However, is that true now and will (or should) it really be true in the future? Are there lessons to be learned from the experience of how both already well established and newly developing communications systems fared in the aftermath of this truly epic disaster?

Of course there are. We tend to evaluate our media and the global communications system of which it is a part in terms of our everyday lives which, thankfully, do not characteristically include an event that strains them to and beyond their limits. Yet that embrace of normalcy, and its accompanying penchant for putting stress behind us as quickly as possible, works against an effort to ensure that vital services like a communications system will function effectively during infrequent but inevitable times of trouble.

Radio, both as mass media and as an integral part of an overall communications system – whether local, national or global – functions under the same rubric. Under normal circumstances, radio provides entertainment and information that serves to enhance our lives in some way but can hardly be termed vital to our existence no matter how much we enjoy or appreciate it. To be sure, that is why this column exists – to help you find regular programming that you can enjoy or from which you might gain insight. Indeed, that term “regular programming” bespeaks of normalcy and of how radio as mass media is used on a day-to-day basis. Radio as leisure activity even extends to the various hobbies that have grown around the medium, such as DXing.

But would it not be a monumental mistake to forget that radio has served and continues to serve a more vital and sometimes indispensable purpose in times of emergency? Is it not the

stressful times that must be in the forefront of our minds when we set about to evaluate how radio, our media and our overall communications structure should best function and be structured?

Elsewhere in this issue of *MT*, Glenn Hauser offers a comprehensive description of how shortwave broadcasting performed in the immediate aftermath of the tsunami. Without the necessity for repetition of all that here, I think it would be fair to say that the results were mixed. In some cases, the tsunami itself destroyed stations outright or at least their ability to broadcast. In some others, recent retrenchment caused by resource restrictions hampered the ability of broadcasters to be of service or at least to provide service to the same extent as they once had. In others, though, shortwave either was at the center of initial relief efforts or was literally the only available means of communication in

the immediate aftermath of the disaster.

A veteran broadcast monitor for the VOA, President of the Sri Lanka Amateur Radio Union and longtime observer of the shortwave media, Victor Goonetilleke stated without reservation that “just plain uncomplicated shortwave saved lives.” He described a government center with no communication with its crisis team until a ham radio emergency group established links using battery powered amateur radios. “There are no landlines working and mobile towers [and] FM repeaters are down. Even satellite phone failed.” It stands to reason that the internet and other advanced digital communications systems were not operational in the early critical stages of the emergency either. “Just plain uncomplicated shortwave saved lives.”

The Andaman and Nicobar Islands in the Indian Ocean west of the Indian subcontinent

Table 1: CRI English Service's Programming

The 1st hour (55 minutes)		
Day	Minutes	Program
Mon	30	News & Reports(China Related News, World News, Sports News, Business News, News on Culture-Showbiz, Sci-Tech News, Press Clipping)
	25	People in the Know+ Learning Chinese Now(5')
Tues	30	News & Reports(China Related News, World News, Sports News, Business News, News on Culture-Showbiz, Sci-Tech News, Press Clipping)
	25	Biz China+ Learning Chinese Now(5')
Wed	30	News & Reports(China Related News, World News, Sports News, Business News, News on Culture-Showbiz, Sci-Tech News, Press Clipping)+ Learning Chinese Now(5')
	25	China Horizons (Zhejiang Special, Nanjing Today, Wuxi Journal, Changzhou Report, On the Road)
Thurs	30	News & Reports(China Related News, World News, Sports News, Business News, News on Culture-Showbiz, Sci-Tech News, Press Clipping)
	25	Voices from Other Lands+ Learning Chinese Now(5')
Fri	30	News & Reports(China Related News, World News, Sports News, Business News, News on Culture-Showbiz, Sci-Tech News, Press Clipping)
	25	Life in China+ Learning Chinese Now(5')
Sat	20	News & Reports(China Related News, World News, Sports News, Business News, News on Culture-Showbiz, Sci-Tech News, Press Clipping)
	6	CRI Round-up
Sun	30	Listeners' Garden(Mailbox, My hometown and I, Topic of the week, week ahead)+ Learning Chinese Now(5')
	20	News & Reports(China Related News, World News, Sports News, Business News, News on Culture-Showbiz, Sci-Tech News, Press Clipping)
	6	Reports on Developing Countries
	30	In the Spotlight (Cultural Carousel, In Vogue, Writings from China China melody)+ Learning Chinese Now(5')
The 2nd Hour – RealTime Beijing		
Day	Minutes	Program
Mon-Fri	5	Top News(China News, World News)
	55	Real Time Beijing (Metro(10'), Biz(10'), Leisure(15'), Plus(15'))+ Learning Chinese Now(5')
Sat	10	Top News (China Related News, World News, Sports News, Business News, News on Culture-Showbiz, Sci-Tech News, Press Clipping)
Sun	50	China Root(45')+ Learning Chinese Now(5')
	10	Top News (China Related News, World News, Sports News, Business News, News on Culture-Showbiz, Sci-Tech News, Press Clipping)
	50	China Beat(45')+ Learning Chinese Now(5')

are a prime target for advanced DXers, their prize being the logging and QSLing of the AIR local shortwave transmitter in Port Blair on 4760 kHz. Coincidentally, on the day the tsunami hit, a group of ham radio operators from India were conducting the first DXpedition held on these islands for seventeen years. It had taken that long for Bharati Prasad VU4RBI, a 46 year old mother of two, to gain the approval of Indian authorities to operate an amateur radio station in what is considered by the government to be a politically sensitive area.

Their presence was indeed fortuitous, for from the time the quake and subsequent ocean waves hit Port Blair, her team was hard at work relaying communications "traffic" to and from the authorities and relief groups. In addition, the local radio, AIR Port Blair, suspended regular schedules to operate around the clock and provide vital information to its listeners about where to find food and shelter and how to assist in the relief effort in the affected areas. "Just plain uncomplicated shortwave saved lives."

It's not that the new technologies aren't great. They are. They offer much that had not been possible until their introduction. But in the rush to embrace their very real strengths, their equally very real weaknesses are being swept under the rug. And in doing so, the things that older technology still does better are being unceremoniously dispatched. Shortwave still does one thing better than anything introduced up to now. It is a direct point to point medium that facilitates communications over very broad distances and most effectively avoids the "gate-keeper" - whether the latter is a government or commercial censor or a technical interruption that occurs somewhere on the combine of networks that characterize the "new systems" that carry a message between sender and receiver.

One final point: amateur radio contesting and DXpeditioning, as well as the lighter more pedestrian fare regularly broadcast on radio stations, can be seen as largely frivolous and unnecessary. But they should also be seen in another way - as the very necessary "warm up" for the real work of communications services, which is, to be fully prepared in the event of an emergency.

Planning and reshaping our systems of communication and mass media exclusively on the basis of their *everyday* use undercuts efforts to protect health and safety when times are at their most perilous. I can think of no better time for us all to challenge conventional wisdom.

❖ China Radio International

If the conventional wisdom does indeed consider shortwave passe, so far China Radio International emphatically is not buying it. China has adopted an all points approach in its public diplomacy strategy, and shortwave is in the thick of the mix. CRI has pursued transmitter relay agreements across the globe to give the station a strong signal into all its target areas.

Prominent among those shortwave targets - and directly counter to strategies being pursued by several other "major" broadcasters - is North America. CRI uses relay facilities in Spain, French Guiana, Cuba, Canada and Albania, as well as its home facilities in China to literally

blanket this continent with shortwave signals. It broadcasts over a dozen hours a day on shortwave in English - both in analog and DRM - to North America.

Its programs have expanded into two distinct hours of content (see table 1) that include extensive reports and analyses and daily themed shows, as well as a relatively new magazine primarily targeted at English-speaking foreign residents in China titled *Realtime Beijing*. While still carrying that "feel," the program has broadened its horizons along with its distribution.

In addition to this dramatic, enhanced commitment to shortwave, CRI has created an impressive internet presence <http://en.chinabroadcast.cn> that includes a broad multimedia approach (audio, video and text), 24 hour live access to CRI English broadcasts as well as other services, on demand access to all its newscasts and programs, and interactive Chinese language lessons. CRI's all-points approach includes a new, daily half-hour magazine *Realtime China* on the World Radio Network (which is broadcast on Sirius Satellite Radio, stream 115) and aggressive pursuit of new distribution avenues including placement of programs and reports on local AM and FM stations in major North American cities.

Where at one time it was the BBC, VOA, Deutsche Welle and Radio France Internationale that were the heavyweights that could be heard almost at any time and at virtually any place on the shortwave bands, today it is CRI that has moved smartly to assume that mantle.

[CRI's entire English transmission and frequency schedule may be found in MT's Shortwave Guide section.]

❖ Radio Vlaanderen

On the other hand, a heaping serving of conventional wisdom might be ending one of the best daily half-hours in international radio when the winter schedule closes on March 26th. Radio Vlaanderen Internationaal announced back in October that they would cease broadcasting in English, French and German. According to the parent corporation VRT, medium wave and shortwave are "outmoded delivery methods and there are cheaper and more efficient means of reaching people." The plan is to replace the beautifully produced, popular and longstanding *Brussels Calling* programs in those three languages with a re-configured web site, re-badged as VRT Internationaal, that will offer translated text of the main points from the Flemish and Belgian news stories. (You'll forgive me if I say that this all sounds rather bland.)

Some limited shortwave output will be retained for the relatively large Dutch speaking Belgian community abroad. The content will include domestic service relays, selected sporting events and a few programs produced specifically for them. The broadcasts will be confined to vacationers and expatriates in southern Europe.

According to VRT Radio director Frans Ieven, "These are the inevitable compromises we have to make." One can't help to observe

that these comments echo those made by Swiss Radio International director Nicholas Lombard just before he pulled the switch on that legendary broadcaster. They are no less unconvincing to this observer; neither are they in any way "inevitable."

RVi's most prominent and recognizable voice, Frans Vossen, has suggested that there is a slight chance that the decision may not necessarily be final. He has advised that the Flemish media minister Geert Bourgeois has invited both Belgians and foreign listeners to weigh in on the future of Flemish public broadcasting, including the international broadcaster. If, like me, you'd like to see the English programs of RVi continue, write to him without delay at:

Media Minister Geert Bourgeois
Alhambra Building
Emile Jacqmainlaan 20
1000 Brussels
Belgium

or e-mail him at kabinet.bourgeois@vlaanderen.be

Perhaps in the same way that listeners were instrumental in helping to stave off the closing of Radio Slovakia International last year, such an effort can be successful once again and preserve a valuable service like RVi.

❖ The List

Like Africa, the South Asian region is largely a mystery to us in the Western Hemisphere. It also happens to be just about the hardest to hear via shortwave in North America. It doesn't help that most of these broadcasts are not beamed specifically to us. But fear not: *The List* has some suggestions for you this month. Be advised, however, that most of these broadcasts will not propagate to us on a daily basis. So persistence, patience, and a mix of skill and luck will be necessary for you to hear them.

English Broadcasts Into & From the Tsunami Zone

Station	Time (UTC)	Frequencies (KHz)
All India Radio	1745-1945 2045-2230	9445, 13605 9445
Bangladesh Betar	1745-1900	7185, 9550
Deutsche Welle	1600-1700	6170, 7225, 11695
(Newslink Asia	2200-2300	6180, 6225
M-F :05-.30)	2300-0000	7250, 9815, 12035
(Asia This Week	0000-0100	6030, 7290
F 1630, A 2230, A 2330, S 0030)		
Radio Pakistan	1600-1615	9390, 11570
Radio Sri Lanka	0025-0430	15745
	1900-2000	6010 (S only)
Radio Thailand	0030-0100	5890 (to NA!)
	0300-0330	5890 (to NA!)
Voice of America	0100-0200	7200, 11705, 11820, 17740
(South Asia News	0200-0300(M-F)	
Now)		
Voice of Indonesia	2000-2100	9550 or 15150

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QSLing the Spas?

Ready for an update in QSLing? It might be March, but it's not too late to get on the QSL bandwagon from Radio Prague. Each year, Radio Prague issues a new series of cards, to the delight of collectors. The 2005 issues feature eight colorful views of Spas in the Czech Republic. To view the series go to <http://www.radio.cz/en/html/qs12005.html>. These cards are beautiful and you will likely want to add the series to your verifications collection!

Radio Canada International's Maple Leaf Mailbag program has announced a new set of three QSL cards for reports on its program. The cards were made from photos contributed by listeners mail and will be a sought-after set for hobbyists.

One more lingo site will translate your letters or phrases in over twelve languages without a word limit at <http://www.worldlingo.com/wl/translate>.

From Dr. Adrian Peterson, International Relations Coordinator of Adventist World Radio, comes word of a new address update. AWR has revised its procedure for issuing QSL cards, moving from one central contact address in England to several regional addresses. New contacts are as follows. Good luck and report often to MT!

Listeners in the Asia/Pacific region:

AWR Asia/Pacific
798 Thomson Road
Singapore 298186, Republic of Singapore

Listeners in the European region:

AWR Europe
Whitegates St. Mark's Road
Binfield, Berkshire RG42 4AT, England

Listeners in the African region:

AWR Africa
P.O. Box 2522
Cramerview 2060
Johannesburg, South Africa

Listeners in North/Central/South America:

Dr. Adrian Peterson
903 Tanninger Drive
Indianapolis, IN 46239 USA



Adventist World Radio

AMATEUR RADIO

Czech Republic OK2BMT, 19 meters SSB. Full data picture QSL card. Received in six months via ARRL bureau. (Larry Van Horn N5FPW, NC)

US-Arkansas W5P, 40 meters SSB. Full data card from the Louisiana Purchase Bicentennial Special Event Station. Received in 63 days for an SASE to QSL Manager Rickey Mobley WB5DP, 12 Ludington Cove, Little Rock, AR 72227. (Van Horn, NC)

USS Berry (DD-933) W3MAD, via Washington Naval Yard, Washington, DC; 20 meters SSB. Full data picture card. Received in 159 days for an SASE to QSL Manager K31RV, 11910 Coronada Place, Kensington, MD 20895. (Van Horn, NC)

CHINA

Xizang PBS-Urumqi 7155 kHz. Full data Chinese text paper card with red station stamp, personal Chinese form and three cancelled stamps. Received in 37 days for an English report and one IRC. Station address: 84 Tuanjie Lu, Urumqi, Xinjiang 830044, China. (Scott Barbour, Intervale, NH)

CZECH REPUBLIC

Radio Prague 7345 kHz. Full data color card of Janske Lazne-North Bohemia, part of the Czech Spas series. Received in 36 days for an English report and one IRC. Station address: Radio Praque-Czech Radio, Vinohradska 12, 12099 Prague 2, Czech Republic. (Sam Wright, Biloxi, MS; Tom Banks, Dallas, TX)

NORTHERN MARIANA ISLANDS

FEBC-KFBS, 11580 kHz. Full data color transmitter card signed by Irene Gabbie-QSL Secretary, plus program schedule. Received in 36 days for an English report, and mint stamps (used for reply). Station address: P.O. Box 500209, Saipan, Mariana Islands MP 96950 USA. Website: <http://www.febc.org>. (Brian Bagwell, St. Louis, MO)

MEDIUM WAVE

Canada-CFUN 1410 kHz AM. Partial data verification letter signed by Jon Kurpias-Engineering Dept. Received in two weeks, after I hand-delivered a follow up report to the station during my vacation. Station address: CHUM Radio Vancouver, #300-380 West Second Avenue, Vancouver BC Canada V5Y 1C8. (Patrick Griffith NONNK, Westminster, CO)

KTNS 1060 kHz AM, Oakhurst, CA. Partial data email verification from Larry W. Gamble-Owner, General Manager. Email received in nine hours and 36 minutes for report of special DX Test. Email address: mtkaat@sierratel.com (Griffith, CO)

WNTP, 990 kHz AM. Nice QSL card signed by Renè Teto-Chief Engineer. Received in six days for a taped report of DX Test. Station address: 117 Ridge Pike, Lafayette Hill, PA 19444. Website: <http://www.newstalk990.com> (Patrick Martin, Seaside, OR)

PIRATE

The Crystal Ship, 4070 kHz. Full data QSL card signed by "The Poet", plus pennant and promotional literature. Received in 15 days for an email report to tcshortwave@yahoo.com. QSL maildrop: P.O. Box 1, Belfast, NY 14711. (Joe Wood, Greenback, TN)

SERBIA & MONTENEGRO

International Radio of Serbia & Montenegro, 9580 kHz. Full data RSCG Listener's Club card, unsigned. Greeting card, sticker and program schedule. Received in 138 days for an email report to radioyu@bitsyu.net. Station address: Hilendarska 2/IV, P.O. Box 200, 11000 Beograd, Serbia and Montenegro. (Kraig Krist KG4LAC, Annandale, VA)

TIBET

Xizang PBS-Lhasa, 5240, 7240 kHz. Full data Chinese text card with red-ink stamp. Postcard of Postala Palace-the Soul

of Snowland, with note, "Please continue support of our English program Holy Tibet on 7385 kHz." Received in 176 days for an English report. Same QSL card received from Holy Tibet (4905 kHz) two years ago. Station address: Xizang, 180 Beijing Zhonglu, Lhasa, Xizang 850000, China. (Barbour, NH)

TRAVELERS INFO STATIONS

HAR 1650 kHz AM, Astoria and Seaside, Oregon. Full data verification letter confirming both sites, signed by Dan Dollar-ODOT Region 2-Emergency Services Manager. Received in 31 days for a taped report to; Oregon Dept. of Transportation, P.O. Box 14360, Salem, OR 97309-5074. (Martin, OR)

WPVW567, 1610 kHz AM, Ellensburg, Washington. Verification letter signed by Kerry Jorgensen-Supervisor-Central Washington TMC. Received in 40 days for a TIS report to: 2809 Rudkin Road, Union Gap, P.O. Box 12560, Yakima, Washington 98909-2560. (Martin, OR)

WPUJ289 1650 kHz AM, Kent, Washington. Verification letter signed by Terry C. Miller-Manager. Noted operation is owned by the city of Kent, and identifies as the Washington Dept. of Transportation. Received in 14 days for a taped report to; Washington State Dept. of Transportation, P.O. Box 47300, Olympia, WA 98504-7300. (Martin, OR)

UNITED ARAB EMIRATES

Salaam Watandar-Internews Afghanistan, 15195 via Dhabbaya. Partial data FM Coverage Map with site and power notation. Received in 42 days for an English report and two US dollars. Nice "WHO" Afghan stamps and Internews Afghanistan seal on the envelope. Station address: (via website) <http://www.internews.org>; Internews Afghanistan, Baharistan, Karti-parwan, Next to Haji Mir Ahmad Mosque, Kabul, Afghanistan. (Barbour, NH; Arnaldo Slaen, Buenos Aires, Argentina)

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 Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

Find the station you want to hear.

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

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

Day Codes

s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly
occ:	occasional
DRM:	Digital Radio Mondiale

In the same column ⑥, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

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

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

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

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

Target Areas

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

MT MONITORING TEAM

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Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

- Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
- Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.
- Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007. They are only authorized on a non-interference basis until that date.
- Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide.

0000 UTC - 7PM EST / 6PM CST / 4PM PST

0000	0007	vl	Sierra Leone, SLBS	3316do			
0000	0015	vl	Cambodia, National Radio	11940as			
0000	0015	vl	Croatia, Croatian Radio	7285sa			
0000	0015		Japan, Radio	13650as	17810as		
0000	0030		Egypt, Radio Cairo	7115na			
0000	0030		Thailand, Radio	9680va	13695va		
0000	0030		UK, BBC World Service	9410me	9740as	5970as	
				15280as	15310as	11955as	
				17790as		15360as	17615as
0000	0030		USA, Voice of America	11760va	7215va	9890va	
				17740va	11995as	15185va	15290va
0000	0045		India, All India Radio	9705as	9950as	11620as	
				11645as	13605as		
0000	0057		Canada, Radio Canada Intl		9880as		
0000	0059		Germany, Deutsche Welle		6030as	7290as	
0000	0059		Spain, Radio Exterior Espana		6055no		
0000	0100		Anguilla, Caribbean Beacon		6090am		
0000	0100		Australia, ABC NT Alice Springs		2310irr	4835do	
0000	0100		Australia, ABC NT Katherine		5025do		
0000	0100		Australia, ABC NT Tennant Creek		4910do		
0000	0100		Australia, HCJB		15525as		
0000	0100		Australia, Radio		9660as	12080as	13630pa
					15240pa	17750pa	1775pa
					17795as		
0000	0100		Bulgaria, Radio		7400na	9700na	
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		China, China Radio Intl		6020al	6075as	
					7170as	7180as	7345eu
					5030va	6150va	
0000	0100		Costa Rica, University Network		7375va	9725va	
0000	0100		Guyana, Voice of		3290do		
0000	0100		Japan, Radio		6145na		
0000	0100		Malaysia, RTM		7295as		
0000	0100		Namibia, Namibian BC Corp		6060af	3270af	3290af
0000	0100		Netherlands, Radio		9845na		
0000	0100		New Zealand, Radio NZ Intl		17675pa		
0000	0100		Sierra Leone, Radio UNAMSIL		6137af		
0000	0100		Singapore, Mediacorp Radio		6150do		
0000	0100	vl	Solomon Islands, SIBC		5020do	9545do	
0000	0100	DRM	UK, BBC World Service		6010na		
0000	0100		UK, BBC World Service		5975ca	6010na	
					12095ca		
0000	0100		Ukraine, Radio Ukraine Intl		5910na		
0000	0100		USA, AFRTS		4319usb	5446usb	5765usb
					6350usb	7590usb	7812usb
					12133usb	12579usb	13362usb
					5755na	13855usb	
0000	0100		USA, KAIJ Dallas TX		5755na		
0000	0100		USA, KTBN Salt Lake City UT		7505na		
0000	0100		USA, KWHR Naalehu HI		17510as		
0000	0100		USA, WBCQ Kennebunk ME		5105na	7415na	
					9330na		
0000	0100		USA, WBOH Newport NC		5920am		
0000	0100		USA, WEWN Birmingham AL		5825va	7425va	
					11530va		
0000	0100		USA, WHRA Greenbush ME		7580na		
0000	0100		USA, WHRI Noblesville IN		7315am	7535am	
0000	0100		USA, WINB Red Lion PA		9320am		
0000	0100		USA, WJIE Louisville KY		13595am		
0000	0100		USA, WRMI Miami FL 6870am		9955am		
0000	0100		USA, WRMI Miami FL 6870am		9955am		
0000	0100		USA, WTJC Newport NC		9370na		
0000	0100		USA, WWCR Nashville TN		3210na	5070na	
					7465na	13845na	
0000	0100		USA, WWRB Manchester TN		5050na	5085na	
					5745na	6890na	
0000	0100		USA, WYFR Okeechobee FL		6065na	9505na	
					11720sa		
0000	0100		Zambia, Radio Christian Voice		4965af		
0005	0030	sm	Austria, Radio Austria Intl		7325sa		
0015	0030	twhta	Austria, Radio Austria Intl		7325sa		
0030	0100		Australia, Radio		9660as	12080as	13630pa
					15240pa	15415pa	17750pa
					17775as	17795as	
0030	0100	sm	Austria, Radio Austria Intl		7325am		
0030	0100	mtwhf	Germany, Bible Voice Broadcasting		7105as		
0030	0100	s	Germany, Pan American BC		5945va		
0030	0100		Lithuania, Radio Vilnius		9875na		
0030	0100		Lithuania, Radio Vilnius		9875na		
0030	0100		Sri Lanka, SLBC		6005as	15745as	
0030	0100		Thailand, Radio		5890na	13595na	
0030	0100		UK, BBC World Service		5970as	6195as	
					9740as	11955as	15280as
					17615as	17790as	
0030	0100		USA, Voice of America		7215va	9890va	
					15185va	15290va	

0045	0100	twhta	Austria, Radio Austria Intl		7325am
0045	0100		Pakistan, Radio	9340as	11565as
0055	0100		Italy, RAI Intl	11800na	

0100 UTC - 8PM EST / 7PM CST / 5PM PST

0100	0115		Italy, RAI Intl		11800na		
0100	0115		Pakistan, Radio		9340as	11565as	
0100	0127		Czech Rep, Radio Prague Intl		6200na	7345na	
0100	0128		Vietnam, Voice of		6175am		
0100	0130		Australia, Radio		9660as	12080as	13630pa
					15240pa	15415pa	17750pa
					17775as	17795as	
0100	0130	s	Germany, Universal Life		7145as		
0100	0130	twhtas	Serbia & Montenegro, Intl Radio		7115va		
0100	0130		Slovakia, Slovak Radio		7230am	9440am	
0100	0130		Uzbekistan, Radio Tashkent		5975as	6165as	
					7160as		
0100	0156		Romania, Radio Romania Intl		6140na	9510na	
					9615na	11740na	
0100	0157		China, China Radio Intl		6005na	7345na	
					9580na		
0100	0157	DRM	Netherlands, Radio		15525na		
0100	0157		Netherlands, Radio		9845na		
0100	0200		Anguilla, Caribbean Beacon		6090am		
0100	0200		Australia, ABC NT Katherine		5025do		
0100	0200		Australia, ABC NT Tennant Creek		4910do		
0100	0200		Australia, HCJB		15560as		
0100	0200		Canada, CBC Northern Service		9625do		
0100	0200		Canada, CFRX Toronto ON		6070do		
0100	0200		Canada, CFVP Calgary AB		6030do		
0100	0200		Canada, CKZN St John's NF		6160do		
0100	0200		Canada, CKZU Vancouver BC		6160do		
0100	0200		Canada, Radio Canada Intl		6190am	9755am	
					9810am		
0100	0200		Costa Rica, University Network		5030va	6150va	
					7375va	9725va	
0100	0200		Cuba, Radio Havana		6000na	9820na	
0100	0200		Guyana, Voice of		3290do		
0100	0200		Indonesia, Voice of		9525as	11785pa	15150al
0100	0200		Japan, Radio		6030va	15325pa	17560va
					17685pa	17825na	17835sa
					17810as	17845as	17685pa
0100	0200		Malaysia, RTM		7295as		
0100	0200		Namibia, Namibian BC Corp		6060af	3270af	3290af
0100	0200		New Zealand, Radio NZ Intl		17675pa		
0100	0200		North Korea, Voice of		9345am	9730as	11735am
					15180as		
0100	0200		Sierra Leone, Radio UNAMSIL		6137af		
0100	0200		Singapore, Mediacorp Radio		6150do		
0100	0200	vl	Solomon Islands, SIBC		5020do	9545do	
0100	0200		Sri Lanka, SLBC		6005as	11905as	15745as
0100	0200		UK, BBC World Service		5975ca	6195as	
					9825ca	11955ca	12095as
					17790as	15310as	15360as
0100	0200		USA, AFRTS		4319usb	5446usb	5765usb
					6350usb	7590usb	7812usb
					12133usb	12579usb	13362usb
					5755na	13855usb	
0100	0200		USA, KAIJ Dallas TX		5755na		
0100	0200		USA, KTBN Salt Lake City UT		7505na		
0100	0200		USA, KWHR Naalehu HI		17510as		
0100	0200		USA, Voice of America		7200va	11705va	
					11820va	17740va	
0100	0200		USA, WBCQ Kennebunk ME		5105na	7415na	
					9330na		
0100	0200		USA, WBOH Newport NC		5920am		
0100	0200		USA, WEWN Birmingham AL		5825va	7425va	
					11530va		
0100	0200		USA, WHRA Greenbush ME		7580na		
0100	0200		USA, WHRI Noblesville IN		7315am	7535am	
0100	0200		USA, WINB Red Lion PA		9320am		
0100	0200		USA, WJIE Louisville KY		13595am		
0100	0200		USA, WRMI Miami FL 6870am		9955am		
0100	0200		USA, WTJC Newport NC		9370na		
0100	0200		USA, WWCR Nashville TN		3210na	5070na	
					5935na	7465na	
0100	0200		USA, WWRB Manchester TN		5050na	5085na	
					5745na	6890na	
0100	0200		USA, WYFR Okeechobee FL		6065na	9505na	
					11720sa		
0100	0200		Zambia, Radio Christian Voice		4965af		
0105	0115	vl	Croatia, Croatian Radio		7285sa		
0130	0200		Australia, Radio		9660as	12080as	13630pa
					15240pa	15415pa	17750pa
					17795as		
0130	0200		Australia, Voice Intl		17775as		
0130	0200		Iran, Voice of the Islamic Rep		6120am	9580am	
0130	0200		Sweden, Radio		11550va		
0130	0200	twhta	USA, Voice of America		7405va	9775va	
					13740va		

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0200 UTC - 9PM EST / 8PM CST / 6PM PST

0200	0227	Czech Rep, Radio Prague Intl	6200na	7345na	
0200	0227	Iran, Voice of the Islamic Rep	6120am	9580am	
0200	0228	Hungary, Radio Budapest	9775na		
0200	0230	Australia, HCBJ	15560as		
0200	0230	Austria, AWR Europe	6175me		
0200	0230	Belarus, Radio	5970eu	7210eu	
0200	0230	Serbia & Montenegro, Intl Radio	7130va		
0200	0257	China, China Radio Intl	13640as	11770as	
0200	0259	Canada, Radio Canada Intl	6190am	9755am	
		9810am			
0200	0300	Anguilla, Caribbean Beacon	6090am		
0200	0300	Argentina, RAE	11710na		
0200	0300	Australia, ABC NT Alice Springs	2310irr	4835do	
0200	0300	Australia, ABC NT Katherine	5025do		
0200	0300	Australia, ABC NT Tennant Creek	4910do		
0200	0300	Australia, Radio	9660as	13630pa	
		15240pa	15415pa	15515as	17750pa
		21725pa			
0200	0300	Canada, CBC Northern Service	9625do		
0200	0300	Canada, CFRX Toronto ON	6070do		
0200	0300	Canada, CFVP Calgary AB	6030do		
0200	0300	Canada, CKZN St John's NF	6160do		
0200	0300	Canada, CKZU Vancouver BC	6160do		
0200	0300	Costa Rica, University Network	5030va	6150va	
		7375va	9725va		
0200	0300	Cuba, Radio Havana	6000na	9820na	
0200	0300	Egypt, Radio Cairo	7260na		
0200	0300	Guyana, Voice of	3290do		
0200	0300	Malaysia, RTM	7295as		
0200	0300	Myanmar, Radio	7185do		
0200	0300	Namibia, Namibian BC Corp	6090af	3270af	3290af
0200	0300	New Zealand, Radio NZ Intl	17675pa		
0200	0300	North Korea, Voice of	4405as	13650as	
		15100as			
0200	0300	Philippines, Radio Pilipinas	12015as	15120aa	
		15270as			
0200	0300	Russia, Voice of	7180na	7350na	15425na
		15475na	15595na		
0200	0300	Sierra Leone, Radio UNAMSIL	6137af		
0200	0300	Singapore, Mediacorp Radio	6150do		
0200	0300	Saloman Islands, SIBC	5020do	9545do	
0200	0300	South Korea, Radio Korea Intl	9560na	11810na	
		15575na			
0200	0300	Sri Lanka, SIBC	6005as	11905as	15745as
0200	0300	Taiwan, Radio Taiwan Intl	11875as	5950na	9680na
		15465va			
0200	0300	UK, BBC World Service	5975ca	6195as	
		9525ca	9750af	11955as	12095ca
		15310as	15360as	17790as	
0200	0300	USA, AFRTS	4319usb	5446usb	5765usb
		6350usb	7590usb	7812usb	10320usb
		12133usb	12579usb	13362usb	13655usb
0200	0300	USA, KAIJ Dallas TX	5755na		
0200	0300	USA, KJES Vado NM	7555na		
0200	0300	USA, KTBN Salt Lake City UT	7505na		
0200	0300	USA, KWHR Naalehu HI	17510as		
0200	0300	USA, Voice of America	7200va	11705va	
		11820va	17740va		
0200	0300	USA, WBCQ Kennebunk ME	5105na	7415na	
		9330na			
0200	0300	USA, WBOH Newport NC	5920am		
0200	0300	USA, WEWN Birmingham AL	5825va	7425va	
		11530va			
0200	0300	USA, WHRA Greenbush ME	7580na		
0200	0300	USA, WHRI Noblesville IN	5835am	735am	
		7535am			
0200	0300	USA, WINB Red Lion PA	9320am		
0200	0300	USA, WJIE Louisville KY	13595am		
0200	0300	USA, WRMI Miami FL	6870am	9955am	
0200	0300	USA, WTJC Newport NC	9370na		
0200	0300	USA, WWCR Nashville TN	3210na	5070na	
		5935na	7465na		
0200	0300	USA, WWRB Manchester TN	5050na	5085na	
		5745na	6890na		
0200	0300	USA, WYFR Okeechobee FL	5985na	6065na	
		9505na	11855ca		
0200	0300	Zambia, Radio Christian Voice	4965af		
0205	0215	Croatia, Croatian Radio	7285no		
0215	0230	Nepal, Radio	3230as	5005as	6100as
		7165as			
0230	0258	Vietnam, Voice of	6175am		
0230	0300	Belarus, Radio	5970su	7210eu	
0230	0300	Sweden, Radio	6010na		
0245	0300	Albania, Radio Tirana	6115eu	7160eu	
0245	0300	UK, BBC World Service	11865af		
0250	0300	Vatican City, Vatican Radio	7305om	9605am	

0300 UTC - 10PM EST / 9PM CST / 7PM PST

0300	0330	vi	Croatia, Croatian Radio	7285na	
0300	0330		Egypt, Radio Cairo	7260na	
0300	0330		Philippines, Radio Pilipinas	15120as	15270pa
0300	0330	s	Swaziland, TWR	3200af	
0300	0330		Thailand, Radio	5890na	15460na
0300	0330	a	UK, Wales Radio Intl	9795va	
0300	0330		USA, KJES Vado NM	7555na	
0300	0330		USA, Voice of America	7290af	7340af
			9885af		6035af
0300	0330		Vatican City, Vatican Radio	7360af	6080af
0300	0355		South Africa, Channel Africa	3345af	7390af
0300	0357		China, China Radio Intl	7190na	9690na
			9790na	11770as	15110as
0300	0359		New Zealand, Radio NZ Intl	17675pa	
0300	0400		Anguilla, Caribbean Beacon	6090am	
0300	0400		Australia, ABC NT Alice Springs	2310irr	4835do
0300	0400		Australia, ABC NT Katherine	5025do	
0300	0400		Australia, ABC NT Tennant Creek	4910do	
0300	0400		Australia, Radio	9660as	12080as
			15240pa	15415pa	15515as
			21725pa		
0300	0400		Bulgaria, Radio	9400na	9700eu
0300	0400		Canada, CBC Northern Service	9625do	
0300	0400		Canada, CFRX Toronto ON	6070do	
0300	0400		Canada, CFVP Calgary AB	6030do	
0300	0400		Canada, CKZN St John's NF	6160do	
0300	0400		Canada, CKZU Vancouver BC	6160do	
0300	0400		Costa Rica, University Network	5030va	6150va
			7375va	9725va	
0300	0400		Cuba, Radio Havana	6000na	9820na
0300	0400	vi	Guatemala, Radio Cultural	3300so	
0300	0400		Guyana, Voice of	3290do	
0300	0400		Japan, Radio	21610pa	
0300	0400		Malaysia, RTM	6175as	7295as
			15295as		9750as
0300	0400		Namibia, Namibian BC Corp	6090af	3270af
			6090af		3290af
0300	0400		North Korea, Voice of	3560as	7140as
			9345as	9730as	
0300	0400		Oman, Radio	15355as	
0300	0400		Russia, Voice of	7150na	7180na
			12010na	15425na	15475na
			17695as		
0300	0400		Sierra Leone, Radio UNAMSIL	6137af	
0300	0400		Singapore, Mediacorp Radio	6150do	
0300	0400	vi	Saloman Islands, SIBC	5020do	9545do
0300	0400		Sri Lanka, SIBC	6005as	11905as
0300	0400		Taiwan, Radio Taiwan Intl	5950va	15125va
			15320va		
0300	0400	vi	Uganda, Radio	4976do	5026do
0300	0400		UK, BBC World Service	3255af	7196do
			7160af	9605as	9750af
			12035af	15280as	11760va
			15575va	17760as	11765af
					15310ca
					15360as
					17790as
					1790as
					9625va
0300	0400	vi/ mtwhf	USA, Sudan Radio Service	5446usb	5765usb
0300	0400		USA, AFRTS	4319usb	5765usb
			6350usb	7590usb	7812usb
			12133usb	12579usb	10320usb
					1362usb
					13855usb
0300	0400		USA, KAIJ Dallas TX	5755na	
0300	0400		USA, KTBN Salt Lake City UT	7505na	
0300	0400		USA, KWHR Naalehu HI	17510as	
0300	0400		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
0300	0400		USA, WBOH Newport NC	5920am	
0300	0400		USA, WEWN Birmingham AL	5825va	7425va
			11530va		
0300	0400		USA, WHRA Greenbush ME	7580na	
0300	0400		USA, WHRI Noblesville IN	5835om	7315am
			7535am		
0300	0400		USA, WINB Red Lion PA	9320am	
0300	0400		USA, WJIE Louisville KY	13595am	
0300	0400		USA, WRMI Miami FL	6870am	9955am
0300	0400		USA, WTJC Newport NC	9370na	
0300	0400		USA, WWCR Nashville TN	3210na	5070na
			5935na	7465na	
0300	0400		USA, WWRB Manchester TN	5050na	5085na
			5745na	6890na	
0300	0400		USA, WYFR Okeechobee FL	6065na	9505na
			9985na	11740na	
0300	0400		Zambia, Radio Christian Voice	4965af	
0300	0400	vi	Zimbabwe, ZBC Corp	5975do	
0330	0358		Hungary, Radio Budapest	9775na	
0330	0358		Vietnam, Voice of	6175am	
0330	0400	twfhas	Albania, Radio Tirana	6115eu	7160eu
0330	0400		Sweden, Radio	6010na	
0330	0400		UAE, Emirates Radio	12005na	13675na
0330	0400		UK, BBC World Service	3255af	15400na
			6190af	7160af	9750af
			12035af	15420af	11760af
					15575af
					6035af
0330	0400		USA, Voice of America	7290af	9885af
			7290af	9885af	
0345	0400		Tajikistan, Radio	7245irr	

Shortwave Guide



0400 UTC - 11PM EST / 10PM CST / 8PM PST

0400	0427	Czech Rep, Radio Prague Intl	6200na	7345na		
0400	0430	Australia, Radio 9660as 15240pa 15515pa	12080as 17750pa	13630pa 21725pa		
0400	0430	France, Radio France Intl	9555af	9805af		
0400	0430	Sri Lanka, SLBC	6005as	11905as	15745as	
0400	0430	USA, Voice of America	4960af	6080af		
		7290af 9575af 9775af	9885af			
0400	0450	Turkey, Voice of	6020va	7240me		
0400	0456	Romania, Radio Romania Intl	11870va	15250va	9515va	
		China, China Radio Intl	9755na	6190na	9560na	
0400	0457	Netherlands, Radio	6165na	9590na		
0400	0457	DRM Netherlands, Radio	15400au			
0400	0459	Germany, Deutsche Welle	9710as	6180af	9545as	
		Anguilla, Caribbean Beacon	6090am			
0400	0500	Australia, ABC NT Alice Springs	2310irr	4835do		
0400	0500	Australia, ABC NT Katherine	5025do			
0400	0500	Australia, ABC NT Tennant Creek	4910do			
0400	0500	Canada, CBC Northern Service	9625do			
0400	0500	Canada, CFRX Toronto ON	6070do			
0400	0500	Canada, CKZN St John's NF	6160do			
0400	0500	Canada, CKZU Vancouver BC	6160do			
0400	0500	Costa Rica, University Network	7375va 9725va	6150va		
		Cuba, Radio Havana	6000na	9820na		
0400	0500	Guyana, Voice of	3290do			
0400	0500	Malaysia, RTM	6175as	7295as	9750as	
		15295as				
0400	0500	Namibia, Namibian BC Corp	6090af	3270af	3290af	
		New Zealand, Radio NZ Intl	15720pa			
0400	0500	Russia, Voice of	7150na	7180na	7350na	
		12010na 15595na	6137af	15595na	17695as	
0400	0500	Sierra Leone, Radio UNAMSIL	6150do			
0400	0500	Singapore, Mediacorp Radio	5020do	9545do		
0400	0500	vi Solomon Islands, SIBC	3345af			
0400	0500	South Africa, Channel Africa	5026do	7196do		
0400	0500	vi Uganda, Radio	4976do			
0400	0500	DRM UK, BBC World Service	6010na			
0400	0500	UK, BBC World Service	3255af	5975am		
		6005af 6135am 6190af	7160af	11760af		
		11765af 12035af	15420af	15575af		
0400	0500	vi/ mtwhf UK, Sudan Radio Service	9625va			
0400	0500	Ukraine, Radio Ukraine Intl	5910na			
0400	0500	USA, AFRTS	4319usb	5765usb		
		6350usb 7590usb	7812usb	10320usb		
		12133usb 12579usb	13362usb	13855usb		
		USA, KAIJ Dallas TX	5755na			
0400	0500	USA, KTBN Salt Lake City UT	7505na			
0400	0500	USA, KWHR Naalehu HI	17780as			
0400	0500	USA, WBCQ Kennebunk ME	5105na	7415na		
		9330na				
0400	0500	USA, WBOH Newport NC	5920am			
0400	0500	USA, WEWN Birmingham AL	11530va	5825va	7425va	
		USA, WHRA Greenbush ME	7580na			
0400	0500	USA, WHRI Noblesville IN	5835am	7315am		
		7535am				
0400	0500	USA, WINB Red Lion PA	9320am			
0400	0500	USA, WJIE Louisville KY	13595am			
0400	0500	USA, WMLK Bethel PA 9265eu	9955eu			
0400	0500	USA, WRMI Miami FL 6870am	9955am			
0400	0500	USA, WTJC Newport NC	9370na			
0400	0500	USA, WWCR Nashville TN	3210na	5070na		
		5770na 5935na				
0400	0500	USA, WWRB Manchester TN	5050na	5085na		
		5745na 6890na				
0400	0500	USA, WYFR Okeechobee FL	7355va 9505va	6065va	6855va	
		9715va				
0400	0500	USA, WYFR Okeechobee FL	6855va	7355va		
0400	0500	Zambia, Radio Christian Voice	6065af			
0400	0500	vi Zimbabwe, ZBC Corp 5975do				
0405	0415	vi Croatia, Croatian Radio	12105au	12110au	7285na	9480au
		12105au 12110au	7545va	17600va		
0430	0445	Israel, Kol Israel	6280va	7185eu		
0430	0445	Uzbekistan, Radio Tashkent	11905eu			
		Czech Rep, Radio Prague Intl	9865as	11600va		
0430	0457	Australia, Radio	9660as	12080as	13630pa	
0430	0500	15240pa 15415pa	15515va	17750pa		
		Nigeria, Radio/Ibadan	6050do			
0430	0500	Nigeria, Radio/Kaduna	4770do	6090do		
0430	0500	Nigeria, Radio/Lagos	3326do			
0430	0500	mtwhf Swaziland, TWR	4775af	6120af		
0430	0500	USA, Voice of America	4960af	6080af		
		7290af 9575af 9775af				
0445	0500	Italy, RAI Intl	5965af	6000af	7230af	

0500 UTC - 12AM EST / 11PM CST / 9PM PST

0500	0530	Australia, Radio	9660as	12080as	13630pa	
		15160pa 15240pa	15515va	17750pa		
0500	0530	Belgium, Radio Vlaanderen Intl	9590na			
0500	0530	France, Radio France Intl	11850af	11995af		
0500	0530	UK, BBC World Service	9605as	11955as		
		15280as 15310as	15360as	15575as		
		17760as 17790as	21660as			
0500	0530	Vatican City, Vatican Radio	7360af	9660af		
		11625af				
0500	0555	South Africa, Channel Africa	7240af	11875af		
0500	0557	China, China Radio Intl	11750as	11770as	11880as	15350as
		15465as 17505af	17505as	17540as		
0500	0559	Germany, Deutsche Welle	12035af	15410af	7285af	9565af
		Anguilla, Caribbean Beacon	6090am			
0500	0600	Australia, ABC NT Alice Springs	2310irr	4835do		
0500	0600	Australia, ABC NT Katherine	5025do			
0500	0600	Australia, ABC NT Tennant Creek	4910do			
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	Costa Rica, University Network	7375va 9725va	6150va		
		Cuba, Radio Havana	6000na	6060na	9550na	
		11760am				
0500	0600	vi Greece, Voice of	5865eu	7475eu	9420eu	
0500	0600	Guyana, Voice of	3290do			
0500	0600	Japan, Radio	5975eu	6110na	7230eu	
		15195as 17810as	21755pa			
0500	0600	Malaysia, RTM	6175as	7295as	9750as	
		15295as				
0500	0600	Namibia, Namibian BC Corp	6060af	6175af		
0500	0600	New Zealand, Radio NZ Intl	15720pa			
0500	0600	Nigeria, Radio/Ibadan	6050do			
0500	0600	Nigeria, Radio/Kaduna	4770do	6090do		
0500	0600	Nigeria, Radio/Lagos	3326do			
0500	0600	Nigeria, Voice of	15120af			
0500	0600	Russia, Voice of	7150na	7180na	7350na	
		12010na 15595na	15595na	17695as		
0500	0600	Sierra Leone, Radio UNAMSIL	6137af			
0500	0600	Singapore, Mediacorp Radio	6150do			
0500	0600	vi Solomon Islands, SIBC	5020do	9545do		
0500	0600	Swaziland, TWR	6120af			
0500	0600	Swaziland, TWR	4775af			
0500	0600	Swaziland, TWR	9500af			
0500	0600	vi Uganda, Radio	4976do	5026do	7196do	
0500	0600	UK, BBC World Service	9410eu 11760me	15565eu	6135ca	6195eu
		UK, Sudan Radio Service	11795va			
0500	0600	USA, AFRTS	4319usb	5446usb	5765usb	
		6350usb 7590usb	7812usb	10320usb		
		12133usb 12579usb	13362usb	13855usb		
0500	0600	USA, KAIJ Dallas TX	5755na			
0500	0600	USA, KTBN Salt Lake City UT	7505na			
0500	0600	USA, KWHR Naalehu HI	11565as	17780as		
0500	0600	USA, Voice of America	6035af	6105af		
		7295af 13710af				
0500	0600	USA, WBCQ Kennebunk ME	5105na	7415na		
		9330na				
0500	0600	USA, WBOH Newport NC	5920am			
0500	0600	USA, WEWN Birmingham AL	11530va	5825va	7425va	
		USA, WHRA Greenbush ME	7580na			
0500	0600	USA, WHRI Noblesville IN	5970am	7315am		
0500	0600	USA, WJIE Louisville KY	13595am			
0500	0600	USA, WMLK Bethel PA 9265eu	9955eu			
0500	0600	USA, WRMI Miami FL 6870am	9955am			
0500	0600	USA, WTJC Newport NC	9370na			
0500	0600	USA, WWCR Nashville TN	3210na	5070na		
		5770na 5935na				
0500	0600	USA, WWRB Manchester TN	5050na	5085na		
		5745na 6890na				
0500	0600	USA, WYFR Okeechobee FL	7355va 9505va	6065va	6855va	
		9715va				
0500	0600	USA, WYFR Okeechobee FL	6855va	7355va		
0500	0600	Zambia, Radio Christian Voice	6065af			
0500	0600	vi Zimbabwe, ZBC Corp 5975do				
0505	0515	vi Croatia, Croatian Radio	12105au	12110au	7285na	9470au
		12105au 12110au	6005do			
0515	0525	Rwanda, Radio	3366do	4915do		
0525	0600	vi Ghana, Ghana BC Corp	6010eu	9815eu		
0530	0545	UK, BBC World Service	11750as	12080as		
0530	0600	Australia, Radio	9660as	15240as	15415pa	
		13630pa 15160va	15515as	17750as		
		15515as 17750as				
0530	0600	Thailand, Radio	13780eu			
0530	0600	UAE, Emirates Radio	15435va	17830va	21700va	
0530	0600	mtwhf UK, BBC World Service	6005af	6190af		
		7160af 11765af 11940af	15420af	17640af		
		17885af				
0530	0600	UK, BBC World Service	9605as	11955as		
		15310as 15360as	15575as	17760as		
		17790as 21660as				

Shortwave Guide



0600 UTC - 1AM EST / 12AM CST / 10PM PST

0600	0605	as	South Africa, TWR	11640af		
0600	0620		Vatican City, Vatican Radio	4005eu	5890eu	
			7250eu			
0600	0630		France, Radio France Intl	9595af	15155af	
0600	0630	as	UK, BBC World Service	6005af	6190af	
			11765af	17640af	17885af	
0600	0630		USA, Voice of America	6035af	6105af	
			7295af 9695af	11835af	13710af	
0600	0630	mtwhf	USA, Voice of America	11995af		
0600	0635	mtwhf	South Africa, TWR	11640af		
0600	0657		China, China Radio Intl	6115na	7385af	
			11770na	11880as	15140as	15350as
			15465as			
0600	0659		Germany, Deutsche Welle	6140eu	7225af	
			11785af	15410af		
0600	0700		Anguilla, Caribbean Beacon	6090am		
0600	0700		Australia, ABC NT Alice Springs	2310irr	4835do	
0600	0700		Australia, ABC NT Katherine	5025do		
0600	0700		Australia, ABC NT Tennant Creek	4910do		
0600	0700		Australia, Radio	9660as	11880as	12080as
			13630pa	15160va	15240as	15415va
			15515va	17750as		
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, University Network	5030va	6150va	
			7375va 9725va	11870va		
0600	0700		Cuba, Radio Havana	6000na	6060na	9550na
			11760am			
0600	0700	DRM	Germany, Deutsche Welle	21675af		
0600	0700	vi	Ghana, Ghana BC Corp	3366do	4915do	
0600	0700	vi	Greece, Voice of	5865eu	9420eu	15c30eu
0600	0700		Guyana, Voice of	3290do		
0600	0700		Japan, Radio	7235eu	11690as	11740as
			11760as	15195as	17870pa	21755pa
0600	0700		Liberia, ELWA	4760ao		
0600	0700		Malaysia, RTM	6175as	7295as	9750as
			15295as			
0600	0700		Namibia, Nambian BC Corp	6060af	6175oi	
0600	0700		New Zealand, Radio NZ Intl	15720pa		
0600	0700		Nigeria, Radio/Ibadan	6050do		
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do	
0600	0700		Nigeria, Radio/Lagos	3326do	4990do	
0600	0700		Nigeria, Voice of	15120af		
0600	0700		Russia, Voice of	17665pa	21790pa	
0600	0700		Sierra Leone, Radio UNAMSIL	6137af		
0600	0700		Singapore, Mediacorp Radio	6150do		
0600	0700	vi	Salomon Islands, SIBC	5020do	9545do	
0600	0700		South Africa, Channel Africa	7240af	15220af	
0600	0700	as	Swaziland, TWR	4775af		
0600	0700		Swaziland, TWR	6120af	9500af	
0600	0700		UK, BBC World Service	9605as	11955as	
			15310as	15360as	17760as	17790as
			21660as			
0600	0700		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7590usb	10320usb	13855usb
			12133usb	12579usb	13362usb	
0600	0700		USA, KAJI Dallas TX	5755na		
0600	0700		USA, KTBN Salt Lake City UT	7505na		
0600	0700		USA, KWHR Naalehu HI	9930as	11565as	
0600	0700		USA, WBCQ Kennebunk ME	5105na	7415na	
0600	0700		USA, WBOH Newport NC	5920am		
0600	0700		USA, WEWN Birmingham AL	5825va	7425va	
			7570vo			
0600	0700		USA, WHRA Greenbush ME	7580na		
0600	0700		USA, WHRI Noblesville IN	7315am	7535am	
0600	0700		USA, WJIE Louisville KY	13595am		
0600	0700		USA, WMLK Bethel PA 9265eu	9955eu		
0600	0700		USA, WRMI Miami FL 6870am	9955am		
0600	0700		USA, WTJC Newport NC	9370na		
0600	0700		USA, WWCR Nashville TN	3210na	5070na	
			5770na 5935na			
0600	0700		USA, WYFR Okeechobee FL	5850eu	7355eu	
			9680eu 11530na	11580va		
0600	0700	vi	Vanuatu, Radio	4960do		
0600	0700		Yemen, Rep of Yemen Radio	9780me		
0600	0700		Zambia, Radio Christian Voice	6065af		
0600	0700	vi	Zimbabwe, ZBC Corp	5975do		
0605	0615	vi	Croatia, Croatian Radio	9480au	12105au	
			12110au			
0605	0630	as	Austria, Radio Austria Intl	17870me		
0630	0645	as	UK, BBC World Service	9875eu		
0630	0656		Romania, Radio Romania Intl	9565eu	11710eu	
0630	0700	vi	Georgia, Radio Georgia	11805eu		
0630	0700		UK, BBC World Service	6005af	6190af	
			11765af	11940af	15400af	17640af
			178851af			
0630	0700		USA, Voice of America	6080af	7295af	
			11835af			
0630	0700		Vatican City, Vatican Radio	9660af	11625af	
			13765af			

0635	0700	as	Austria, Radio Austria Intl	17870me
0645	0700	mtwhf	Austria, Radio Austria Intl	17870me

0700 UTC - 2AM EST / 1AM CST / 11PM PST

0700	0715	vi	Croatia, Croatian Radio	9470au	12105au
			12110au		
0700	0720	as	UK, BBC World Service	6190af	11765af
			11940af	15400af	17885af
0700	0730		Slovakia, Slovak Radio	13715au	15460au
0700	0730	a	Tibet, Xizang PBS	6110as	9490as
0700	0759		New Zealand, Radio NZ Intl	15720pa	
0700	0800	s	Albania, TWR	11865eu	
0700	0800		Anguilla, Caribbean Beacon	6090am	
0700	0800		Australia, ABC NT Alice Springs	2310irr	4835do
0700	0800		Australia, ABC NT Katherine	5025do	
0700	0800		Australia, ABC NT Tennant Creek	4910do	
0700	0800		Australia, HCJB	11750au	
0700	0800		Australia, Radio	9660as	11880as
			13630pa	15160va	15240as
			1750pa		
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		China, China Radio Intl	11855as	11880as
			15350as	15465as	17540as
0700	0800		Costa Rica, University Network	5030va	6150va
			7375va 9725va	11870va	
0700	0800		Eqt Guinea, Radio Africa	15184at	
0700	0800		France, Radio France Intl	11700af	11725af
0700	0800		Germany, Deutsche Welle	6140eu	
0700	0800	DRM	Germany, Deutsche Welle	21675af	
0700	0800		Germany, Overcomer Ministries	6110eu	
0700	0800	vi	Ghana, Ghana BC Corp	3366do	4915do
0700	0800	vi	Greece, Voice of	9420eu	11645eu
0700	0800		Guyana, Voice of	3290do	5950do
0700	0800		Liberia, ELWA	4760do	
0700	0800		Malaysia, RTM	6175as	7295as
			15295as		
0700	0800		Myanmar, Radio	9730do	
0700	0800		Nigeria, Radio/Ibadan	6050do	
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do
0700	0800		Nigeria, Radio/Lagos	3326do	4990do
0700	0800		Russia, Voice of	12005pa	12060pa
			21790pa		17665pa
0700	0800	DRM	Russia, Voice of	15780eu	
0700	0800		Sierra Leone, Radio UNAMSIL	6137af	
0700	0800		Singapore, Mediacorp Radio	6150do	
0700	0800	vi	Salomon Islands, SIBC	5020do	9545do
0700	0800		South Africa, Channel Africa	11825af	
0700	0800		Swaziland, TWR	6120af	
0700	0800		Swaziland, TWR	9500af	
0700	0800		Taiwan, Radio Taiwan Intl	5950no	
0700	0800		UK, BBC World Service	9605as	11955as
			15310as	15360as	17760as
			21660as		
0700	0800		USA, AFRTS	4319usb	5446usb
			6350usb	7590usb	10320usb
			12133usb	12579usb	13362usb
0700	0800		USA, KAJI Dallas TX	5755na	
0700	0800		USA, KTBN Salt Lake City UT	7505na	
0700	0800		USA, KWHR Naalehu HI	9930as	11565as
0700	0800		USA, WBCQ Kennebunk ME	5105na	7415na
0700	0800		USA, WBOH Newport NC	5920am	
0700	0800		USA, WEWN Birmingham AL	5825va	7425va
			7570va		
0700	0800		USA, WHRA Greenbush ME	7580na	
0700	0800		USA, WHRI Noblesville IN	7315am	7535am
0700	0800		USA, WJIE Louisville KY	13595am	
0700	0800		USA, WMLK Bethel PA 9265eu	9955eu	
0700	0800		USA, WRMI Miami FL 6870am	9955am	
0700	0800		USA, WTJC Newport NC	9370na	
0700	0800		USA, WWCR Nashville TN	3210na	5070na
			5770na 5935na		
0700	0800		USA, WYFR Okeechobee FL	5855va	5985va
			9495va 9715va	9985va	
0700	0800	vi	Vanuatu, Radio	4960do	
0700	0800		Zambia, Radio Christian Voice	9865af	
0720	0800	as	UK, BBC World Service	6190af	11765me
			11940af	15400af	17885af
0730	0800		Bulgaria, Radio	11600eu	13600eu
0730	0800		Georgia, Radio Georgia	11910eu	
0730	0800	s	Germany, Bible Voice Broadcasting	5945eu	
0730	0800	as	Guam, TWR/KTWR	15255as	
0740	0800	mtwhf	Guam, TWR/KTWR	15225as	
0745	0800	s	Albania, TWR	11865eu	
0745	0800	s	Monaco, TWR	9870eu	

Shortwave Guide

0800 UTC - 3AM EST / 2AM CST / 12AM PST

0800	0827		Czech Rep, Radio Prague Intl	7345eu	9880eu	
0800	0830		Australia, ABC NT Katherine	5025do		
0800	0830		Australia, ABC NT Tennant Creek	4910do		
0800	0830		Australia, Radio	5995as	9580as	9590as
			9710as 12080pa 13630pa	15240pa	17750pa	
0800	0830		Belgium, Radio Vlaanderen Intl	5965eu		
0800	0830		Myanmar, Radio	9730do		
0800	0857		China, China Radio Intl	11855al	11880as	
			15350as	15465as	17540as	17490al
0800	0900	mtwhfs	Albania, TWR	11865eu		
0800	0900		Anguilla, Caribbean Beacon	6090am		
0800	0900		Australia, ABC NT Alice Springs	2310irr	4835da	
0800	0900		Australia, HCJB	11750au		
0800	0900		Canada, CFRX Toronto ON	6070do		
0800	0900		Canada, CFVP Calgary AB	6030do		
0800	0900		Canada, CKZN St John's NF	6160do		
0800	0900		Canada, CKZU Vancouver BC	6160do		
0800	0900		Costa Rica, University Network	5030va	6150va	
			7375va 9725va	11870va		
0800	0900		Eqt Guinea, Radio Africa	15184af		
0800	0900	as	Germany, Bible Voice Broadcasting	5945eu		
0800	0900		Germany, Deutsche Welle	6140eu		
0800	0900	DRM	Germany, Deutsche Welle	21675af		
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915da	
0800	0900	vl	Greece, Voice of	9420eu	11645eu	15630eu
0800	0900		Guam, TWR/KTWR	15225as		
0800	0900		Guyana, Voice of	3290do	5950do	
0800	0900		Indonesia, Voice of	9525as	11785pa	15150al
0800	0900	vl/as	Italy, IRRS 1384Oeu			
0800	0900		Liberia, ELWA	4760do		
0800	0900		Malaysia, RTM	6175as	7295as	9750as
			15295as			
0800	0900	mtwhf	Monaco, TWR	9870eu		
0800	0900		New Zealand, Radio NZ Intl	9885pa		
0800	0900		Nigeria, Radio/Ibadan	6050do		
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do	
0800	0900		Nigeria, Radio/Lagos	3326do	4990do	
0800	0900	vl	Pakistan, Radio	15100eu	17835eu	
0800	0900		Papua New Guinea, Catholic Radio		4960va	
0800	0900		Papua New Guinea, NBC	4890do		
0800	0900	DRM	Russia, Voice of	15780eu		
0800	0900		Russia, Voice of	12005pa	12060pa	17495pa
			17525pa	17570pa	17665pa	21790pa
0800	0900		Sierra Leone, Radio UNAMSIL	6137af		
0800	0900		Singapore, Mediacorp Radio	6150do		
0800	0900	vl	Solomon Islands, SIBC	5020do	9545do	
0800	0900	s	South Africa, SW Radio League	9750af	17700af	
0800	0900		South Korea, Radio Korea Intl	9570as	9640eu	
0800	0900	as	Swaziland, TWR	6120af		
0800	0900		Swaziland, TWR	9500af		
0800	0900		Taiwan, Radio Taiwan Intl	9610au		
0800	0900		UK, BBC World Service	9605as	11955as	
			15310as	15360as	17760as	17790as
			21660as			
0800	0900	as	UK, BBC World Service	11760me	15575as	
0800	0900		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0800	0900		USA, KAIJ Dallas TX	5755na		
0800	0900		USA, KNLS Anchor Point AK	9615as		
0800	0900		USA, KTBN Salt Lake City UT	7505na		
0800	0900		USA, KWHR Noalehu HI	11565as	17780as	
0800	0900		USA, Voice of America	5995af	11655af	
0800	0900		USA, WBCQ Kennebunk ME	5105na	7415na	
0800	0900		USA, WBOH Newport NC	5920am		
0800	0900		USA, WEWN Birmingham AL	5825na	7425na	
			11875na			
0800	0900		USA, WHRI Noblesville IN	5860am	7315am	
0800	0900		USA, WJIE Louisville KY	13595om		
0800	0900		USA, WMLK Bethel PA 9265eu	9955eu		
0800	0900		USA, WRMI Miami FL 6870am	9955am		
0800	0900		USA, WTJC Newport NC	9370na		
0800	0900		USA, WWCR Nashville TN	3210na	5070na	
			5770na 5935na			
0800	0900		USA, WYFR Okeechobee FL	5950af	6855af	
			7455af 9985af			
0800	0900	vl	Vanuatu, Radio	4960do		
0800	0900		Zambia, Radio Christian Voice	9865af		
0805	0815	vl	Croatia, Croatian Radio	12105ou	12110ou	
0815	0845	wf	Germany, Bible Voice Broadcasting	5945eu		
0815	0850	a	Albania, TWR	11865eu		
0815	0850	a	Monaco, TWR	9870eu		
0815	0900		Guam, TWR/KTWR	11840as		
0830	0900		Australia, ABC NT Katherine	2485do		
0830	0900		Australia, ABC NT Tennant Creek	2325do		
0830	0900		Australia, Radio	5995as	9580as	9590as
			9710as 12080pa 13630pa	15240pa	15415pa	
			17750pa			
0830	0900		Georgia, Radio Georgia	11910eu		

0900 UTC - 4AM EST / 3AM CST / 1AM PST

0900	0915	a	Germany, Bible Voice Broadcasting	5945eu		
0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915da	
0900	0920	mtwhfs	Albania, TWR	11865eu		
0900	0920	mtwhf	Monaco, TWR	9870eu		
0900	0930		Australia, Radio	9580as	9590as	11880as
			15240pa			
0900	0930		Guam, TWR/KTWR	11840as		
0900	0945	s	Germany, Bible Voice Broadcasting	5945eu		
0900	0957		China, China Radio Intl	15210pa	17490eu	
			17690pa			
0900	0959	DRM	Germany, Deutsche Welle	21675af		
0900	1000		Anguilla, Caribbean Beacon	6090am		
0900	1000		Australia, ABC NT Alice Springs	2310do	4835irr	
0900	1000		Australia, ABC NT Katherine	2485do		
0900	1000		Australia, ABC NT Tennant Creek	2325do		
0900	1000		Australia, HCJB	11750au		
0900	1000		Australia, Voice Intl	11955as		
0900	1000		Canada, CFRX Toronto ON	6070do		
0900	1000		Canada, CFVP Calgary AB	6030do		
0900	1000		Canada, CKZN St John's NF	6160do		
0900	1000		Canada, CKZU Vancouver BC	6160do		
0900	1000		Costa Rica, University Network	5030va	6150va	
			7375va 9725va	11870va	13750va	
0900	1000		Eqt Guinea, Radio Africa	15184af		
0900	1000		Germany, Deutsche Welle	6140eu		
0900	1000	vl	Greece, Voice of	9375eu	9420eu	11645eu
			15630eu			
0900	1000		Guyana, Voice of	3290do	5950do	
0900	1000	vl/as	Italy, IRRS 1384Oeu			
0900	1000		Malaysia, RTM	7295as	15295as	
0900	1000		New Zealand, Radio NZ Intl	9885pa		
0900	1000		Nigeria, Radio/Ibadan	6050do		
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do	
0900	1000		Nigeria, Radio/Lagos	3326do	4990do	
0900	1000	vl	Pakistan, Radio	15100eu	17835eu	
0900	1000		Papua New Guinea, Catholic Radio		4960va	
0900	1000		Papua New Guinea, NBC	4890do		
0900	1000	DRM	Russia, Voice of	15780eu		
0900	1000		Russia, Voice of	17495pa	17525pa	17570va
			17665pa			
0900	1000		Singapore, Mediacorp Radio	6150do		
0900	1000	vl	Solomon Islands, SIBC	5020do	9545do	
0900	1000	s	UAE, Radio UNMEE	21460af		
0900	1000		UK, BBC World Service	6190af	6195as	
			9605as 11940af	12095eu	15190ca	15310as
			15360as	15400af	15485eu	15565eu
			17640eu	17760as	17790as	17830of
			1788saf	21470af	21660as	
0900	1000	s	UK, BBC World Service	11760me	15575me	
0900	1000		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0900	1000		USA, KAIJ Dallas TX	5755na		
0900	1000		USA, KTBN Salt Lake City UT	7505na		
0900	1000		USA, KWHR Noalehu HI	11565as	17780as	
0900	1000		USA, Voice of America	5995af	11655af	
0900	1000		USA, WBCQ Kennebunk ME	5105na	7415na	
0900	1000		USA, WBOH Newport NC	5920am		
0900	1000		USA, WEWN Birmingham AL	5825na	7425na	
			11875na			
0900	1000		USA, WHRA Greenbush ME	7580na		
0900	1000		USA, WHRI Noblesville IN	5860am	7315am	
0900	1000		USA, WJIE Louisville KY	13595am		
0900	1000		USA, WRMI Miami FL 6870am	9955am		
0900	1000		USA, WTJC Newport NC	9370na		
0900	1000		USA, WWCR Nashville TN	3210na	5070na	
			5770na 5935na			
0900	1000		USA, WYFR Okeechobee FL	5950af	6855af	
			6890af 7455af	9450af		
0900	1000	vl	Vanuatu, Radio	4960do		
0900	1000		Zambia, Radio Christian Voice	9865af		
0905	0915	vl	Croatia, Croatian Radio	12105ou	12110ou	
0930	1000		Australia, Radio	9580as	9590as	11880as
			15240pa	15415pa		
0930	1000		Georgia, Radio Georgia	11910me		

1000 UTC - 5AM EST / 4AM CST / 2AM PST

1000	1029		Czech Rep, Radio Prague Intl	21745va		
1000	1030		Guam, AWR/KSDA	11870os	11900as	
1000	1030	vl	Libya, Voice of Africa	21695af		
1000	1030		Mongolia, Voice of	12085as		
1000	1030		UK, BBC World Service	6195as	7320eu	
			9605as 9740as	12095eu	15310as	15360as
			15485eu	15565eu	17640eu	17760as
			17790as	21660as		
1000	1057		China, China Radio Intl	15210pa	17490pa	
			17690pa			
1000	1057		Netherlands, Radio	7315as	9790as	12065as
			13820au			
1000	1059		New Zealand, Radio NZ Intl	9885pa		

Shortwave Guide



1000	1100		Anguilla, Caribbean Beacon	11775am		
1000	1100		Australia, ABC NT Alice Springs	2310do	4835irr	
1000	1100		Australia, ABC NT Katherine	2485do		
1000	1100		Australia, ABC NT Tennant Creek	2325do		
1000	1100		Australia, HCJB	11750au		
1000	1100		Australia, Radio	9580as	9590as	11880as
			15240pa	15415pa		
1000	1100		Australia, Voice Intl	11955as		
1000	1100		Canada, CFRX Toronto ON	6070do		
1000	1100		Canada, CFVP Calgary AB	6030do		
1000	1100		Canada, CKZN St John's NF	6160do		
1000	1100		Canada, CKZU Vancouver BC	6160do		
1000	1100		Costa Rica, University Network	5030va	6150va	
			7375va 9725va	11870va	13750va	
1000	1100		Eq Guinea, Radio Africa	15184af		
1000	1100		Guyana, Voice of	3290do	5950do	
1000	1100		India, All India Radio	13710pa	15020as	
			15235as	15260as	17800pa	17895pc
1000	1100	vl/as	Italy, IRRS 13840eu			
1000	1100		Japan, Radio	6120na	9695as	11730as
			17585eu	17750va	21755pa	
1000	1100		Malaysia, RTM	7295as	15295as	
1000	1100		Nigeria, Voice of	11770af	15120al	
1000	1100		North Korea, Voice of	6285as 9335ca	9850ca	
1000	1100		Papua New Guinea, Catholic Radio		4960va	
1000	1100		Papua New Guinea, NBC	4890do		
1000	1100		Singapore, Mediacorp Radio	6150do		
1000	1100	vl	Solomon Islands, SIBC	5020do	9545do	
1000	1100	as	South Africa, Channel Africa	11825af		
1000	1100		UK, BBC World Service	11940ca	15190ca	
			15400af	17830af	17885af	21470af
1000	1100	s	UK, BBC World Service	15575as		
1000	1100		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1000	1100		USA, KAIJ Dallas TX	5755na		
1000	1100		USA, KTBN Salt Lake City UT	7505na		
1000	1100		USA, KWHR Naalehu HI	9930as	11565as	
1000	1100		USA, Voice of America	15615me	17555me	
1000	1100		USA, WBCQ Kennebunk ME	5105na		
1000	1100		USA, WBOH Newport NC	5920am		
1000	1100		USA, WEWN Birmingham AL	5825na	7425na	
			11875na			
1000	1100		USA, WHRI Noblesville IN	5860am	9495am	
1000	1100		USA, WRMI Miami FL 6870arr.	9955am		
1000	1100		USA, WTJC Newport NC	9370na		
1000	1100		USA, WWCR Nashville TN	5070na	577Cna	
			5935na 9985na			
1000	1100		USA, WYFR Okeechobee FL	5950na	6855na	
			6890na 7455na	9450na		
1000	1100	mtwhf	Zambia, Radio Christian Voice	9865af		
1030	1045		Ethiopia, Radio	5990af	7110af	9704af
1030	1045		Israel, Kol Israel	15640va	17535va	
1030	1058		Vietnam, Voice of	9840as	12020as	
1030	1100		Iran, Voice of the Islamic Rep	15460as	15480as	
1030	1100		UAE, Emirates Radio	13675va	15370va	15395va
			21605va			
1030	1100	t	UAE, Radio UNMEE	21550af		
1030	1100		UK, BBC World Service	6195as	9605as	
			9740as 11945as	15285cs	15310as	17760as
			17790as	21660as		
1030	1100	mtwhf	Vatican City, Vatican Radio	5885eu		

1100 UTC - 6AM EST / 5AM CST / 3AM PST

1100	1104	vl	Pakistan, Radio	15100eu	17835eu	
1100	1127		Iran, Voice of the Islamic Rep	15460as	15480as	
1100	1128		Vietnam, Voice of	7285as		
1100	1130		Australia, Radio	5995as	6020as	9475as
			9560as 9580as	9590as	11880as	12080as
			15240pa			
1100	1130	vl	Libya, Voice of Africa	17695af	21675af	21695af
1100	1130		Tibet, Xizang PBS	4920as	6110as	9490as
1100	1130	t	UAE, Radio UNMEE	21550af		
1100	1130		UK, BBC World Service	6190af	11940af	
			15400af	17830af	21470af	
1100	1157		China, China Radio Intl	5960na	13665al	
			17490na			
1100	1200		Anguilla, Caribbean Beacon	11775am		
1100	1200		Australia, ABC NT Alice Springs	2310do	4835irr	
1100	1200		Australia, ABC NT Katherine	2485do		
1100	1200		Australia, ABC NT Tennant Creek	2325do		
1100	1200		Australia, HCJB	15425as		
1100	1200		Australia, Voice Intl	13685as		
1100	1200		Canada, CFRX Toronto ON	6070do		
1100	1200		Canada, CFVP Calgary AB	6030do		
1100	1200		Canada, CKZN St John's NF	6160do		
1100	1200		Canada, CKZU Vancouver BC	6160do		
1100	1200		Costa Rica, University Network	5030va	6150va	
			7375va 9725va	11870va	13750va	
1100	1200		Ecuador, HCJB	12005am	21455am	
1100	1200	vl	Greece, Voice of	9375eu	9420eu	9775eu

1100	1200	vl/as	Italy, IRRS 13840eu	15630eu	15650eu	
1100	1200	vl	Italy, IRRS 15665va			
1100	1200		Japan, Radio	6120na	9695as	11730as
1100	1200		Malaysia, RTM	7295as	15295as	
1100	1200		New Zealand, Radio NZ Intl		15530pa	
1100	1200		Nigeria, Voice of	11770af	15120al	
1100	1200		Papua New Guinea, Catholic Radio		4960va	
1100	1200		Papua New Guinea, NBC		4890do	
1100	1200		Singapore, Radio Singapore Intl		6080as	6150as
1100	1200		South Africa, Channel Africa		11825af	
1100	1200		Taiwan, Radio Taiwan Intl		7445as	
1100	1200	s	UK, BBC World Service		15575as	
1100	1200		UK, BBC World Service	6195va	7320eu	
			9740as 12095eu	15190va	15310eu	15485eu
			15565eu	17640as	17790as	
1100	1200	mtwhf	UK, BBC World Service		17830af	
1100	1200		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1100	1200		USA, KAIJ Dallas TX	5755na		
1100	1200		USA, KTBN Salt Lake City UT		7505na	
1100	1200		USA, KWHR Naalehu HI		9930as	11565as
1100	1200		USA, Voice of America		15615me	17555me
1100	1200		USA, WBCQ Kennebunk ME		5105na	
1100	1200		USA, WBOH Newport NC		5920am	
1100	1200		USA, WEWN Birmingham AL		5825na	7425na
			11875na			
1100	1200		USA, WHRI Noblesville IN		7535am	9495am
1100	1200		USA, WINB Red Lion PA		9320am	
1100	1200		USA, WJIE Louisville KY		7490am	
1100	1200		USA, WRMI Miami FL 6870am		9955am	
1100	1200		USA, WTJC Newport NC		9370na	
1100	1200		USA, WWCR Nashville TN		5070na	5770na
			5935na 15825na			
1100	1200		USA, WYFR Okeechobee FL		5950am	6890am
			7355am	9555am	11725am	11830am
1100	1200		Zambia, Radio Christian Voice		9865af	
1130	1145		UK, BBC World Service		7135as	11920as
1130	1157		Czech Rep, Radio Prague Intl		11640va	21745va
1130	1200		Australia, Radio	5995as	6020as	9475as
			9560as 9580as	9590as	11880as	12080as
1130	1200		Belgium, Radio Vlaanderen Intl		9945va	
1130	1200	as	Germany, Bible Voice Broadcasting		5945as	
1130	1200		Guam, AWR/KSDA	15260as		
1130	1200		UK, BBC World Service		6190af	11940af
			17830af	17885af	21470af	
1130	1200		Vatican City, Vatican Radio		11625af	13765af
			15570af			
1145	1155		Rwanda, Radio	6055do		

1200 UTC - 7AM EST / 6AM CST / 4AM PST

1200	1215	vl	Cambodia, National Radio		11940as	
1200	1230		Australia, HCJB	15425as		
1200	1230		France, Radio France Intl		15275af	21620af
1200	1230	vl	Libya, Voice of Africa	17695af	21675af	21695af
1200	1230		Malaysia, RTM	7295as	15295as	
1200	1230		UAE, AWR Africa	15135as		
1200	1230		Uzbekistan, Radio Tashkent		5060as	5975as
			6025as 9715as			
1200	1245	w	Germany, Bible Voice Broadcasting		5945as	
1200	1257		China, China Radio Intl		9730as	9795pa
			11760pa	11980as	11760pa	13665al
			13790eu	17490eu		
1200	1257	as	Netherlands, Radio	11675na		
1200	1259		Netherlands, Radio	15725na		
1200	1259	s	Canada, Radio Canada Intl		9670as	11730as
1200	1259		Germany, Universal Life		6045me	
1200	1259		New Zealand, Radio NZ Intl		15530pc	
1200	1300		Anguilla, Caribbean Beacon		11775am	
1200	1300		Australia, ABC NT Alice Springs		2310do	4835irr
1200	1300		Australia, ABC NT Katherine		2485do	
1200	1300		Australia, ABC NT Tennant Creek		2325do	
1200	1300		Australia, Radio	5995as	6020as	9475as
			9560as 9580as	9590as	11880as	
1200	1300		Australia, Voice Intl	13685as		
1200	1300		Canada, C3C 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		Costa Rica, University Network		9725va	11870va
			13750va			
1200	1300		Ecuador, HCJB	12005am	21455am	
1200	1300	vl/as	Italy, IRRS 13840eu			
1200	1300		Nigeria, Voice of	11770af	15120al	
1200	1300		Papua New Guinea, Catholic Radio		4960va	
1200	1300		Papua New Guinea, NBC		4890do	
1200	1300		Singapore, Radio Singapore Intl		6080as	6150as
1200	1300		South Korea, Radio Korea Intl		9650na	
1200	1300		Taiwan, Radio Taiwan Intl		7130as	
1200	1300		UK, BBC World Service		6190af	11940af

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1200	1300	mtwhf	15190va UK, BBC World Service	17830af 17830af	17885af 17830af	21470af 17830af
1200	1300		Ukraine, Radio Ukraine Intl		15675eu	
1200	1300		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1200	1300		USA, KAIJ Dallas TX	5755na		
1200	1300		USA, KTBN Salt Lake City UT		7505na	
1200	1300		USA, KWHR Naalehu HI		9930as	11565as
1200	1300		USA, Voice of America		6110va	9645va
			9760va 11705va 11715va		15665va	
1200	1300		USA, WBCQ Kennebunk ME	17495na	5105na	9330na
1200	1300		USA, WBOH Newport NC		5920am	
1200	1300		USA, WEWN Birmingham AL	11875na	5825na	7425na
1200	1300		USA, WHRI Noblesville IN		7535am	9495am
1200	1300		USA, WINB Red Lion PA		9320am	
1200	1300		USA, WJIE Louisville KY		7490am	
1200	1300		USA, WRMI Miami FL 6870am		9955am	
1200	1300		USA, WTJC Newport NC		9370na	
1200	1300		USA, WWCR Nashville TN	5935na	5070na	5770na
1200	1300		USA, WYFR Okeechobee FL	11530na 11970na	6890na	7355na
1200	1300		Zambia, Radio Christian Voice		9865af	
1215	1300		Egypt, Radio Cairo	17670as		
1230	1245		UK, BBC World Service	21640af	15425eu	21640af
1230	1258	a	Vietnam, Voice of	9840os	12020as	
1230	1300		Germany, Universol Life		6045me	
1230	1300		Australia, HCJB	15405as		
1230	1300		Bangladesh, Bangla Betor		7185as	9550as
1230	1300		Bulgaria, Radio	11700eu	15700eu	
1230	1300	h	Germany, Bible Voice Broadcasting		5945as	
1230	1300	vl	Libya, Voice of Africa	21675af	21695af	
1230	1300		Malaysia, RTM	7295as		
1230	1300		Sri Lanka, SLBC	6005as	11930as	15745as
1230	1300		Thailand, Radio	9810va		

1300 UTC - 8AM EST / 7AM CST / 5AM PST

1300	1315	f	Germany, Bible Voice Broadcasting	5945as		
1300	1329		Canada, Radio Canada Intl	9670os	11730as	
1300	1330		Ecuador, HCJB	12005am	21455am	
1300	1330		Egypt, Radio Cairo	17670as		
1300	1330	vl	Libya, Voice of Africa	21675af	21695af	
1300	1356		Romania, Radio Romania Intl		15105eu	17745eu
1300	1357		China, China Radio Intl	7250va	9795pa	
			11760pa	11885as	11990na	13790na
			11980as	15180na	15230na	17625na
1300	1357	DRM	China, China Radio Intl		11810va	
1300	1359		Poland, Radio Polonia	9525eu	11850eu	
1300	1400		Anguilla, Caribbean Beacon		11775am	
1300	1400		Australia, HCJB	15405as		
1300	1400		Australia, Radio	5995as	6020as	9475as
			9560as 9580as 9590as			
1300	1400		Australia, Voice Intl	13685as		
1300	1400		Canada, CBC Northern Service		9625do	
1300	1400		Canada, CFRX Toronto ON		6070do	
1300	1400		Canada, CFVP Calgary AB		6030do	
1300	1400		Canada, CKZN St John's NF		6160do	
1300	1400		Canada, CKZU Vancouver BC		6160do	
1300	1400	mtwhf	Canada, Radio Canada Intl	9515am	13655am	
			17820am			
1300	1400		Costa Rica, University Network		9725va	11870va
			13750va			
1300	1400		Germany, Deutsche Welle		6140eu	
1300	1400		Germany, Overcomer Ministries		13810eu	
1300	1400		Malaysia, RTM	7295as		
1300	1400		New Zealand, Radio NZ Intl		9870pa	
1300	1400		Nigeria, Voice of	11770af	15120af	
1300	1400		North Korea, Voice of		4405eu	7570eu
			9335na 11710na 12015eu			
1300	1400		Papua New Guinea, Catholic Radio			4960va
1300	1400		Papua New Guinea, NBC		4890do	
1300	1400		Singapore, Radio Singapore Intl		6080as	6150as
1300	1400		South Korea, Radio Korea Intl		9570as	9770as
1300	1400		Sri Lanka, SLBC	6005as	11930as	15745as
1300	1400		UK, BBC World Service		6190af	11940af
			15190va 15410af		17830af	17885af
			skd0204			
1300	1400	mtwhf	UK, BBC World Service		17830af	
1300	1400		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1300	1400		USA, KAIJ Dallas TX	5755na		
1300	1400		USA, KNLS Anchor Point AK		9615as	
1300	1400		USA, KTBN Salt Lake City UT		7505na	
1300	1400		USA, KWHR Naalehu HI		9930as	11565as
1300	1400		USA, Voice of America		6110va	9645va
			9760va 11705va			
1300	1400		USA, WBCQ Kennebunk ME	5105na	7415na	

1300	1400		9330na 17495na			
1300	1400		USA, WBOH Newport NC		5920am	
1300	1400		USA, WEWN Birmingham AL	15745na	7425na	9955na
1300	1400		USA, WHRA Greenbush ME		17560na	
1300	1400		USA, WHRI Noblesville IN		9840am	15105am
1300	1400		USA, WINB Red Lion PA		13570am	
1300	1400		USA, WJIE Louisville KY		7490am	
1300	1400		USA, WRMI Miami FL 6870am		15725am	
1300	1400		USA, WTJC Newport NC		9370na	
1300	1400		USA, WWCR Nashville TN	13845na	7465na	9985na
1300	1400		USA, WWRB Manchester TN		9320na	12170na
1300	1400		USA, WYFR Okeechobee FL	11830va 11855va	7355va	7580va
1300	1400		Zambia, Radio Christian Voice		9865af	
1305	1330	as	Austria, Radio Austria Intl	17855va	6155eu	13730eu
1315	1330	mtwhf	Austria, Radio Austria Intl		17655va	
1315	1330	a	Russia, TWR	7535eu	7560as	
1330	1400		Guam, AWR/KSDA	11980as		
1330	1400	mtwhf	Guam, AWR/KSDA	15660as		
1330	1400		India, All India Radio	9690as	11620as	
1330	1400		Laos, National Radio	7145as		
1330	1400	mtwhf	Serbia & Montenegro, Intl Radio		11835pa	
1330	1400		Sweden, Radio	7420eu	11550va	15240va
			18960ol			
1330	1400	DRM	Sweden, Radio	7240va		
1330	1400		Turkey, Voice of	15155va	15195eu	
1330	1400		UAE, Emirates Radio	13630va	13675va	15395va
			21605va			
1330	1400		UK, BBC World Service		15105af	17810af
1330	1400	a	UK, Wales Radio Intl	17745va		
1330	1400		Uzbekistan, Radio Toshkent	6025as 9715as	5060as	5975as
1335	1400	as	Austria, Radio Austria Intl	17855va	6155eu	13730eu
1345	1400	mtwhf	Austria, Radio Austria Intl	17855va	6155eu	13730eu

1400 UTC - 9AM EST / 8AM CST / 6AM PST

1400	1415	h	Germany, Bible Voice Broadcasting	7485os		
1400	1415		Russia, FEBA	9445as		
1400	1415	mtw	UK, BBC World Service		15420af	21490eu
1400	1420		Turkey, Voice of	15155va	15195eu	
1400	1429		Czech Rep, Radio Prague Intl		21745va	
1400	1430		Australia, Radio	5995as	6080as	7240as
			9590as 11750pa			
1400	1430	DRM	Canada, Radio Canada Intl		7240eu	
1400	1430	mtwhf	Germany, Deutsche Welle		15725na	
1400	1430	a	Germany, Pan American BC		13820me	
1400	1430	vl	Libya, Voice of Africa	21675af		
1400	1430		Thailand, Radio	9725as		
1400	1457		China, China Radio Intl		7405na	9560os
			9700eu 9795eu 11765eu		13675as	13685af
			17630af			
1400	1500		Anguilla, Caribbean Beacon		11775am	
1400	1500		Australia, Voice Intl	13685as		
1400	1500		Canada, CBC Northern Service		9625do	
1400	1500		Canada, CFRX Toronto ON		6070do	
1400	1500		Canada, CFVP Calgary AB		6030do	
1400	1500		Canada, CKZN St John's NF		6160do	
1400	1500		Canada, CKZU Vancouver BC		6160do	
1400	1500		Canada, Radio Canada Intl	9515am	13655os	
			17820am			
1400	1500	DRM	China, China Radio Intl		9610va	
1400	1500		Costa Rica, University Network		9725va	11870va
			13750va			
1400	1500		France, Radio France Intl		7180va	17620va
1400	1500	as	Germany, Bible Voice Broadcasting		7485as	
1400	1500		Germany, Deutsche Welle		6140eu	
1400	1500		Germany, Overcomer Ministries		13810eu	
1400	1500		India, All India Radio	9690as	11620os	
1400	1500		Japan, Radio	7200as	9875as	11840pa
1400	1500		Jordan, Radio	11690na		
1400	1500		Malaysia, RTM	7295as		
1400	1500		Netherlands, Radio	9345as	12080as	15595as
1400	1500		New Zealand, Radio NZ Intl		9870pa	
1400	1500		Nigeria, Voice of	11770af	15120af	
1400	1500		Oman, Radio	15140as		
1400	1500		Singapore, Mediacorp Radio		6150do	
1400	1500		South Africa, Channel Africa		11825af	
1400	1500		Sri Lanka, SLBC	6005as	11930as	15745as
1400	1500		Taiwan, Radio Taiwan Intl		15265as	
1400	1500		UK, BBC World Service		6190af	11940af
			15190va 17830af		21470af	21660af
1400	1500	mtwhf	UK, BBC World Service		17830af	
1400	1500		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1400	1500		USA, KAIJ Dallas TX	5755na		
1400	1500		USA, KJES Vado NM	11715na		

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1400	1500		USA, KTVN Salt Lake City UT	7505na	
1400	1500		USA, KWHR Naalehu HI	9930as	11565as
1400	1500		USA, Voice of America	6110va	7125va
			9645va 9760va	11705va	15425va
1400	1500		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na 17495na		
1400	1500		USA, WBOH Newport NC	5920am	
1400	1500		USA, WEWN Birmingham AL	9955na	11530na
1400	1500		USA, WHRA Greenbush ME	17560na	
1400	1500		USA, WHRI Noblesville IN	9840am	15105am
1400	1500		USA, WINB Red Lion PA	13570am	
1400	1500		USA, WJIE Louisville KY	7490am	
1400	1500		USA, WRMI Miami FL 6870am	15725am	
1400	1500		USA, WTJC Newport NC	9370na	
1400	1500		USA, WWCN Nashville TN	7465na	9985na
			13845na		
1400	1500		USA, WWRB Manchester TN	9320na	12170na
1400	1500		USA, WYFR Okeechobee FL	7580va	11615va
			11855va	13695va	
1400	1500		Zambia, Radio Christian Voice	9865af	
1415	1430		Nepal, Radio	3230as	5005as
			7165as		
1430	1458	mtwhf	Belgium, Radio Vlaanderen Intl	15725na	
1430	1500		Australia, HCJB	15390as	
1430	1500		Myanmar, Radio	5040do	5985do
1430	1500	DRM	South Korea, Radio Korea Intl	9770am	
1430	1500		Sweden, Radio	15240eu	18960af
1445	1500	as	Germany, Pan American BC	13820me	
1445	1500	mtwhfa	UK, BBC World Service	6140as	7205as
			15245as		

1500 UTC - 10AM EST / 9AM CST / 7AM PST

1500	1515	s	Germany, Pan American BC	13820as	
1500	1528	mwhf	Romania, Radio Romania Intl	15725na	
1500	1528		Vietnam, Voice of	9840as	12020as
1500	1530		France, Radio France Intl	9875eu	
1500	1530		Mongolia, Voice of	12015eu	
1500	1530		Sn Lanka, SLBC	6005as	11930as
1500	1530		UK, BBC World Service	6190af	11860af
			11940af	15400af	21470af
			21490af	21660af	
1500	1557		Canada, Radio Canada Intl	5985as	9635as
			11730as	11975as	
1500	1557		China, China Radio Intl	7160eu	7405na
			9435eu 9525eu	9785as	13675na
1500	1557		China, China Radio Intl	13685af	17630af
1500	1557		Netherlands, Radio	9345as	12080as
1500	1559		Germany, Overcomer Ministries	13810eu	1559as
1500	1600		Anguilla, Caribbean Beacon	11775am	
1500	1600		Australia, HCJB	15390as	
1500	1600		Australia, Radio	5995as	6080as
			9590as 11750pa	7240as	
1500	1600		Australia, Voice Intl	11840as	
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	DRM	China, China Radio Intl	9610va	
1500	1600		Costa Rica, University Network	9725va	11870va
			13750va		
1500	1600	a	Germany, Bible Voice Broadcasting	12005as	
1500	1600		Germany, Deutsche Welle	6140eu	
1500	1600	vl/ as	Greece, Voice of	9420eu	15485eu
			15630eu	15650eu	
1500	1600		Guam, TWR/KTWR	12105as	
1500	1600		Japan, Radio	6190as	7200as
			9875as	9505na	
1500	1600		Jordan, Radio	11690na	
1500	1600		Malaysia, RTM	7295as	
1500	1600		Myanmar, Radio	5040do	5985do
1500	1600		New Zealand, Radio NZ Intl	9870pa	
1500	1600		North Korea, Voice of	3560af	4405eu
			7570eu 9335na	9990me	11710na
1500	1600		Russia, FEBA	7340as	
1500	1600		Russia, Voice of	5945as	6205as
			7315as 7350as	7415as	9900as
			12025as	11500as	
1500	1600	as	Russia, Voice of	12060eu	
1500	1600		Singapore, Mediacorp Radio	6150do	
1500	1600		South Africa, Channel Africa	11825af	17770af
1500	1600	DRM	Taiwan, Radio Taiwan Intl	9770eu	
1500	1600		UK, BBC World Service	5975as	6195as
			7160as 9740as	12095eu	15190ca
			15485eu	17790as	15310as
			15565eu	17830af	
1500	1600	mtwhf	UK, BBC World Service	15530va	
1500	1600	vl/ mtwhf	USA, AFRTS	4319usb	5765usb
			6350usb	7590usb	7812usb
			12133usb	12579usb	13362usb
			13815na	13855usb	
1500	1600		USA, KJES Vado NM	11715na	
1500	1600		USA, KTVN Salt Lake City UT	15590na	

1500	1600		USA, KWHR Naalehu HI	9930as	11565as
1500	1600		USA, Voice of America	6110va	9685va
			9795va 9825va	11835va	13865af
			15460va	17715af	17895af
1500	1600		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na 17495na		
1500	1600		USA, WBOH Newport NC	5920am	
1500	1600		USA, WEWN Birmingham AL	9955na	11530na
1500	1600		USA, WHRA Greenbush ME	17560na	17650na
1500	1600		USA, WHRI Noblesville IN	9840am	15105am
1500	1600		USA, WINB Red Lion PA	13570am	
1500	1600		USA, WJIE Louisville KY	7490am	
1500	1600		USA, WRMI Miami FL 6870am	15725am	
1500	1600		USA, WTJC Newport NC	9370na	
1500	1600		USA, WWCN Nashville TN	7465na	9985na
			13845na		
1500	1600		USA, WWRB Manchester TN	9320na	12170na
1500	1600		USA, WYFR Okeechobee FL	11615va	11855va
			15210va	17760va	
1500	1600		Zambia, Radio Christian Voice	9865af	
1530	1545		India, All India Radio	7255va	9910va
			11740va		
1530	1545		UK, BBC World Service	9600as	11685as
1530	1600	mwh	Germany, Bible Voice Broadcasting	12005as	
1530	1600		Iran, Voice of the Islamic Rep	9610as	9940as
1530	1600	mtwhf	South Korea, Radio Korea Intl	15725na	
1530	1600		UAE, AWR Africa	15225as	
1530	1600		UK, BBC World Service	6190af	11940af
			15400af	17830af	21470af
			21470af	21660af	
1545	1600	t	Germany, Bible Voice Broadcasting	9460me	
1545	1600	s	Germany, Pan American BC	13820me	

1600 UTC - 11AM EST / 10AM CST / 8AM PST

1600	1615		Pakistan, Radio	9390va	11570va
			15725va		11850va
1600	1627		Iran, Voice of the Islamic Rep	9610as	9940as
1600	1628	s	Hungary, Radio Budapest	6025eu	9580eu
1600	1628		Vietnam, Voice of	7220va	7280va
			11630va		9550va
1600	1629	s	Germany, Universal Life	9495me	
1600	1630	s	Germany, Pan American BC	13820me	
1600	1630		Guam, AWR/KSDA	15480as	15495as
1600	1630	as	Guam, TWR/KTWR	12105as	
1600	1630	as	Libya, Voice of Africa	15220af	17840af
1600	1630	vl	Swaziland, TWR	6070af	
1600	1630		UK, BBC World Service	6190af	11940af
			15400af	17830af	21470af
1600	1635		UAE Emirates Radio	13630va	13675va
			21605va	15395va	
1600	1650		New Zealand, Radio NZ Intl	9870pa	
1600	1657		China, China Radio Intl	7255eu	9435eu
			9525af 9570af	11900af	17730na
1600	1657		China, China Radio Intl	7255eu	9435eu
			9525eu 9570af	11900af	17730na
1600	1659	as	Canada, Radio Canada Intl	9515am	13655am
			17820am		
1600	1659		Germany, Deutsche Welle	6170as	7225as
			11695as		
1600	1700		Anguilla, Caribbean Beacon	11775am	
1600	1700		Australia, HCJB	15390as	
1600	1700		Australia, Radio	5995as	6080as
			9475as 9710as	7240as	
1600	1700		Australia, Voice Intl	11840as	
1600	1700		Canada, CBC Northern Service	9625do	
1600	1700		Canada, CFRX Toronto ON	6070do	
1600	1700		Canada, CFVP Calgary AB	6030do	
1600	1700		Canada, CKZN St John's NF	6160do	
1600	1700		Canada, CKZU Vancouver BC	6160do	
1600	1700	DRM	China, China Radio Intl	17510va	
1600	1700		Costa Rica, University Network	11870va	13750va
1600	1700		Ethiopia, Radio	5990af	7110af
			9560af 9704af	11800af	
1600	1700		France, Radio France Intl	9730af	11615af
			15160af	15605af	
1600	1700	t	Germany, Bible Voice Broadcasting	9460me	
1600	1700	vl	Greece, Voice of	15485na	
1600	1700		Jordan, Radio	11690na	
1600	1700		Malaysia, RTM	7295as	
1600	1700		North Korea, Voice of	3560va	9990me
			11545va		
1600	1700		Russia, Voice of	4940va	4965va
			6005me	6130eu	4975va
			7415as 9470me	7260as	7290eu
1600	1700		South Korea, Radio Korea Intl	5975as	9870va
1600	1700		Taiwan, Radio Taiwan Intl	11815as	
1600	1700		UK, BBC World Service	3915as	5975as
			6195as 7160as	9410eu	11750as
			15310as	15485eu	15190ca
			17820eu	15565eu	17790as
1600	1700	mtwhf	UK, BBC World Service	17830af	
1600	1700	vl/ mtwhf	UK, Sudan Radio Service	15530va	
1600	1700		USA, AFRTS	4319usb	5765usb
			6350usb	7590usb	7812usb
			10320usb	13855usb	

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1600	1700		12133usb	12579usb	13362usb	13855usb
1600	1700		USA, KAJI Dallas TX	13815na		
1600	1700		USA, KJES Vado NM	11715na		
1600	1700		USA, KTBN Salt Lake City UT		15590na	
1600	1700		USA, KWHR Naalehu HI		9930as	11565as
1600	1700		USA, Voice of America		6160va	7125va
			9645va 9760va	11835va	13600af	15240af
			15445af	15460af	17715af	17895af
1600	1700		USA, WBCQ Kennebunk ME		5105na	7415na
			9330na 17495na			
1600	1700		USA, WBOH Newport NC		5920am	
1600	1700		USA, WEWN Birmingham AL		11530va	13615va
			15695va	15745va	17595va	
1600	1700		USA, WHRA Greenbush ME		17650na	
1600	1700		USA, WHRI Noblesville IN		9840am	15105am
1600	1700		USA, WINB Red Lion PA		13570am	
1600	1700		USA, WJIE Louisville KY		7490am	
1600	1700		USA, WMLK Bethel PA 9265eu			
1600	1700		USA, WRMI Miami FL 9955am		15725am	
1600	1700		USA, WTJC Newport NC		9370na	
1600	1700		USA, WWCR Nashville TN		9985na	12160na
			13845na			
1600	1700		USA, WWRB Manchester TN		9320na	12170na
1600	1700		USA, WYFR Okeechobee FL		6085va	11830va
			13695va	17690va	18980va	21455va
1600	1700		Zambia, Radio Christian Voice		9865af	
1605	1630	as	Austria, Radio Austria Intl		13675na	
1610	1625	as	Austria, Radio Austria Intl		13675na	
1615	1700	as	UK, BBC World Service		11860af	15420af
			21490af			
1630	1700		Egypt, Radio Cairo	9855af		
1630	1700	s	Germany, Bible Voice Broadcasting		9460me	
1630	1700		Guam, AWR/KSDA	11980as		
1630	1700		UK, BBC World Service		6190af	11940af
			15400af	15420af	17830af	21470af
			21660af			
1635	1700	as	Austria, Radio Austria Intl		13675na	
1640	1650		Turkmenistan, Turkmen Radio		4930as	
1640	1655	mtwhf	Austria, Radio Austria Intl		13675na	
1645	1700	mtwhf	Germany, Bible Voice Broadcasting		9460me	
1645	1700		Tajikistan, Radio	7245irr		
1651	1700		New Zealand, Radio NZ Intl		9870pa	

1700 UTC - 12PM EST / 11AM CST / 9AM PST

1700	1710	mtwh	Moldova, Radio PMR	5960eu		
1700	1715	mf	Germany, Bible Voice Broadcasting		9460me	
1700	1720	f	Moldova, Radio PMR	5960eu		
1700	1727		Czech Rep, Radio Prague Intl		5930eu	15710af
1700	1730		Azerbaijan, Voice of		6110me	
1700	1730	DRM/ a	Canada, Voice of NASB		11900sa	
1700	1730		France, Radio France Intl		11615af	15605af
1700	1730		Jordan, Radio	11690na		
1700	1730	vl	Libya, Voice of Africa	11715af	11860af	15220af
			15615af	15660af		
1700	1730		UK, BBC World Service		6195eu	9410eu
			12095eu	15565eu	17820eu	
1700	1745	DRM	China, China Radio Intl		12080va	
1700	1745	h	Germany, Bible Voice Broadcasting		9460me	
1700	1745		UK, BBC World Service		3255af	6005af
			6190af 9630af	15400af	15420af	17830af
			21470af			
1700	1750		New Zealand, Radio NZ Intl		9870pa	
1700	1755		South Africa, Channel Africa		15285af	
1700	1757		China, China Radio Intl		6100eu	7255eu
			9570af 11900af			
1700	1800		Anguilla, Caribbean Beacon		11775am	
1700	1800		Australia, HCJB	15390as		
1700	1800		Australia, Radio	5995as	6080as	7240as
			9475as 9710as	11880pa		
1700	1800		Australia, Voice Intl	11840as		
1700	1800		Canada, CBC Northern Service		9625da	
1700	1800		Canada, CFRX Toronto ON		6070da	
1700	1800		Canada, CFVP Calgary AB		6030da	
1700	1800		Canada, CKZN St John's NF		6160da	
1700	1800		Canada, CKZU Vancouver BC		6160da	
1700	1800	DRM	China, China Radio Intl		17510va	
1700	1800		Costa Rica, University Network		11870va	13750va
1700	1800		Egypt, Radio Cairo	9855af		
1700	1800		Eqt Guinea, Radio Africa		7189af	15184af
1700	1800	as	Germany, Bible Voice Broadcasting		9460me	
1700	1800		Germany, Overcamer Ministries		17550na	
1700	1800	vl	Greece, Voice of	15485na		
1700	1800		Japan, Radio	9535na	11970eu	15355af
1700	1800		Malaysia, RTM	7295as		
1700	1800		Nigeria, Voice of	7255af	7275af	
1700	1800		Russia, Voice of	5910as	5945as	7415as
			9470me	9830me		
1700	1800		Swaziland, TWR		3200af	
1700	1800		Taiwan, Radio Taiwan Intl		11815as	
1700	1800	mtwhf	UK, BBC World Service		17830af	
1700	1800	vl/ mtwhf	UK, Sudan Radio Service		11715va	
1700	1800		USA, AFRTS	4319usb	5446usb	5765usb

1700	1800		6350usb	7590usb	7812usb	10320usb
1700	1800		12133usb	12579usb	13362usb	13855usb
1700	1800		USA, KAJI Dallas TX	13815na		
1700	1800		USA, KTBN Salt Lake City UT		15590na	
1700	1800		USA, KWHR Naalehu HI		9930as	
1700	1800		USA, Voice of America		13710af	15240af
			15455af			
1700	1800		USA, WBCQ Kennebunk ME		5105na	7415na
			9330na 17495na			
1700	1800		USA, WBOH Newport NC		5920am	
1700	1800		USA, WEWN Birmingham AL		11530va	13615va
			15695va	15745va	17595va	
1700	1800		USA, WHRA Greenbush ME		17650na	
1700	1800		USA, WHRI Noblesville IN		9840am	15105am
1700	1800		USA, WINB Red Lion PA		13570am	
1700	1800		USA, WJIE Louisville KY		7490am	
1700	1800		USA, WMLK Bethel PA 9265eu		15265eu	
1700	1800		USA, WRMI Miami FL 9955am		15725am	
1700	1800		USA, WTJC Newport NC		9370na	
1700	1800		USA, WWCR Nashville TN		9985na	12160na
			13845na			
1700	1800		USA, WWRB Manchester TN		9320na	12170na
1700	1800		USA, WYFR Okeechobee FL		13695va	17510va
			18980va	21455va	21680va	
1700	1800		Zambia, Radio Christian Voice		9865af	
1715	1800		China, China Radio Intl		12080va	
1730	1745	f	Russia, FEBA	9840as		
1730	1745		UK, BBC World Service		3390af	7230af
			9685af			
1730	1745	mtwhf	UK, United Nations Radio		7170af	9565me
			17810af			
1730	1800		Guam, AWR/KSDA	11560as		
1730	1800		Liberia, ELWA	4760da		
1730	1800	vl	Philippines, Radio Pilipinas		11730as	11890as
			15190pa			
1730	1800		Slovakia, Slovak Radio		5915eu	6055eu
1730	1800		Swaziland, TWR	9500af		
1730	1800		UK, BBC World Service		5875eu	6015eu
			6195eu 7190eu	9410eu	12095eu	15565eu
			17820eu			
1730	1800		USA, Voice of America		11975af	17895af
1735	1745	vl/th	Paraguay, Radio Nacional		9739sa	
1745	1800		Bangladesh, Bangla Betar		7185as	9550as
1745	1800		India, All India Radio	7410eu	9445af	9950eu
			11620eu	11935af	13605af	15075af
			15155af	17670af		
1745	1800		UK, BBC World Service		3255af	6190af
			15400af	15420af	17830af	21470af
1751	1800		New Zealand, Radio NZ Intl		11980pa	

1800 UTC - 1PM EST / 12PM CST / 10AM PST

1800	1810		Zanzibar, Voice of Tanzania		11734do	
1800	1815	DRM	China, China Radio Intl		12080va	
1800	1815	a	Germany, Bible Voice Broadcasting		7210as	
1800	1827		Czech Rep, Radio Prague Intl		5930va	9415va
1800	1828		Vietnam, Voice of	5955eu	7280eu	11630as
1800	1830		Austria, AWR Europe	9530af		
1800	1830		Egypt, Radio Cairo	9855af		
1800	1830	s	Germany, Bible Voice Broadcasting		6015va	
1800	1830	s	Germany, Universal Life		11840af	
1800	1830	vl	Libya, Voice of Africa	9485af	11635af	11715af
			11860af			
1800	1830		South Africa, AWR Africa		3215af	3345af
			11925af			
1800	1830		UK, BBC World Service		3255af	6190af
			15400af	15420af	17830af	21470af
1800	1850		New Zealand, Radio NZ Intl		11980pa	
1800	1856		Romania, Radio Romania Intl		5965eu	7130eu
1800	1857		Netherlands, Radio	6020af	9895af	11655af
1800	1859		Canada, Radio Canada Intl		5850af	7185af
			9770af 11875af	15140af		
1800	1859		Poland, Radio Polonia	7265eu	7270eu	
1800	1900		Anguilla, Caribbean Beacon		11775am	
1800	1900	mtwhf	Argentina, RAE	9690eu	15345eu	
1800	1900		Australia, Radio	6080as	7240as	9475as
			9580as 9710as	11880pa		
1800	1900		Australia, Voice Intl	11685as		
1800	1900		Bangladesh, Bangla Betar		7185as	9550as
1800	1900		Canada, CBC Northern Service		9625do	
1800	1900		Canada, CFRX Toronto ON		6070da	
1800	1900		Canada, CFVP Calgary AB		6030da	
1800	1900		Canada, CKZN St John's NF		6160da	
1800	1900		Canada, CKZU Vancouver BC		6160da	
1800	1900		China, China Radio Intl		6100eu	12080va
1800	1900	DRM	China, China Radio Intl		17510va	
1800	1900		Costa Rica, University Network		11870va	13750va
1800	1900		Eqt Guinea, Radio Africa		7189af	15184af
1800	1900	as	Germany, Bible Voice Broadcasting		9460me	
1800	1900	as	Germany, Bible Voice Broadcasting		6015as	7210as
			9730me			
1800	1900		Germany, Overcamer Ministries		17550na	
1800	1900	vl				

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1800	1900	India, All India Radio	7410eu	9445af	9950eu		
		11620eu	11935af	13605af	15075af		
		15155af	17670af				
1800	1900	Liberia, ELWA	4760do				
1800	1900	Malaysia, RTM	7295os				
1800	1900	Nigeria, Voice of	7255af				
1800	1900	North Korea, Voice of	12015eu	4405eu	7570eu		
1800	1900	Philippines, Radio Pilipinas	15190pa	11730as	11890as		
1800	1900	Russia, Voice of	5910as	5945as	7290eu		
		7415as 9830me	11510af				
1800	1900	Russia, Voice of	5950eu	6175eu			
1800	1900	Sierra Leone, Radio UNAMSIL	6137af				
1800	1900	Swaziland, TWR	3200af	9500af			
1800	1900	Taiwan, Radio Taiwan Intl	3965eu				
1800	1900	UK, BBC World Service	17830af				
1800	1900	UK, BBC World Service	12095eu	6195eu	9410eu		
		13700eu					
1800	1900	UK, Voice Africa	11560af				
1800	1900	USA, AFRTS	4319usb	5446usb	5765usb		
		6350usb	7590usb	7812usb	10320usb		
		12133usb	12579usb	13362usb	13855usb		
1800	1900	USA, KAIJ Dallas TX	13815na				
1800	1900	USA, KTBN Salt Lake City UT	15590na				
1800	1900	USA, KWHR Naalehu HI	9930as				
1800	1900	USA, Voice of America	6035af	11975af			
		13710af	15240af	17895af			
1800	1900	USA, WBCQ Kennebunk ME	9330na 17495na	5105na	7415na		
1800	1900	USA, WBOH Newport NC	5920am				
1800	1900	USA, WEWN Birmingham AL	11530va	13615va			
		15695va	15745va	17595va			
1800	1900	USA, WHRA Greenbush ME	17650na				
1800	1900	USA, WHRI Noblesville IN	9840am	15105am			
1800	1900	USA, WINB Red Lion PA	13570am				
1800	1900	USA, WJIE Louisville KY	7490am				
1800	1900	USA, WMLK Bethel PA 9265eu	15265eu				
1800	1900	USA, WRMI Miami FL 9955am	15725am				
1800	1900	USA, WTJC Newport NC	9370na				
1800	1900	USA, WWCR Nashville TN	9985na	12160na			
		13845na					
1800	1900	USA, WWRB Manchester TN	9320na	12170na			
1800	1900	USA, WYFR Okeechobee FL	7240eu	13695eu			
		15115eu	17510eu	17535eu	18930eu		
1800	1900	Yemen, Rep of Yemen Radio	9780me				
1800	1900	Zambia, Radio Christian Voice	4965af				
1830	1845	Israel, Kol Israel	9390va	11605va			
1830	1845	UK, BBC World Service	7105eu	6050eu	6130eu		
1830	1900	Belgium, Radio Vlaanderen Intl	7490eu	5910eu			
1830	1900	Bulgaria, Radio	5800eu	7500eu			
1830	1900	South Africa, AWR Africa	11925af				
1830	1900	Sweden, Radio	6065eu				
1830	1900	UK, BBC World Service	3255af	5975af			
		6005af 6190af	9630af	15400af	15420af		
		17830af	21470af				
1840	1854	Rwanda, Radio	6055do				
1845	1900	Congo, RTV Congolaise	4765af	5985af			
1851	1900	New Zealand, Radio NZ Intl	15265pa				

1900 UTC - 2PM EST / 1PM CST / 11AM PST

1900	1915	Congo, RTV Congolaise	4765af	5985af		
1900	1928	Vietnam, Voice of	7280eu	11630as		
1900	1930	Germany, Bible Voice Broadcasting	6015va			
1900	1930	Germany, Universal Life	7105me			
1900	1930	Libya, Voice of Africa	11635af	11715af		
1900	1930	Lithuania, Radio Vilnius	9710eu			
1900	1930	Philippines, Radio Pilipinas	11730as	11890as		
		15190pa				
1900	1945	China, China Radio Intl	12080vo			
1900	1945	India, All India Radio	7410eu	9445af	9950eu	
		11620eu	11935af	13605af	15075af	
		15155af	17670af			
1900	1957	China, China Radio Intl	9440af 9585af	6100eu	7295af	
1900	1959	Germany, Deutsche Welle	13780af	6180af	11365af	
		17800af				
1900	2000	Anguilla, Caribbean Beacon	11775am			
1900	2000	Australia, Radio	6080as	7240as	9500as	
		9580as 9710as	11880pa			
1900	2000	Australia, Voice Intl	11685as			
1900	2000	Canada, CBC Northern Service	9625do			
1900	2000	Canada, CFRK Toronto ON	6070do			
1900	2000	Canada, CFVP Calgary AB	6030do			
1900	2000	Canada, CKZN St John's NF	6160do			
1900	2000	Canada, CKZU Vancouver BC	6160do			
1900	2000	Costa Rica, University Network	11870va	13750va		
1900	2000	Eqt Guinea, Radio Africa	7189af	15184af		
1900	2000	Germany, Bible Voice Broadcasting	6015va	9460me		
		9470af				
1900	2000	Ghana, Ghana BC Corp	3366do	4915do		

1900	2000	vi	Greece, Voice of	7430eu	15485eu	
1900	2000		Libena, ELWA	4760do		
1900	2000		Malaysia, RTM	7295os		
1900	2000		Namibia, Namibian BC Corp	6060af	3270af	3290af
1900	2000		Netherlands, Radio	7120af	9895af	11655af
			17810af			
1900	2000	os	Netherlands, Radio	15315na	17725na	17875na
1900	2000		New Zealand, Radio NZ Intl	15265pa		
1900	2000		Nigeria, Radio/Ibadan	6050do		
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do	
1900	2000		Nigeria, Radio/Lagos	3326do	4990do	
1900	2000		Nigeria, Voice of	7255af		
1900	2000		North Korea, Voice of	3560va	9975va	11535va
1900	2000		Papua New Guinea, Catholic Radio		4960va	
1900	2000		Papua New Guinea, NBC		4890do	
1900	2000		Russia, Voice of	6175eu	6235eu	7290eu
			7335eu 7400eu	11510af		
1900	2000		Sierra Leone, Radio UNAMSIL		6137af	
1900	2000	vl	Sierra Leone, SLBS	3316do		
1900	2000	vl	Solomon Islands, SIBC		5020do	9545do
1900	2000		South Africa, Channel Africa		3345af	
1900	2000	m	South Africa, SW Radio League		3215af	
1900	2000		South Korea, Radio Korea Intl		5975eu	7275eu
1900	2000	a	Sri Lanka, SLBC	6010eu		
1900	2000		Swaziland, TWR	3200af		
1900	2000		Thailand, Radio	9840eu		
1900	2000	vi	Uganda, Radio	4976do	5026do	7196do
1900	2000	mtwhf	UK, BBC World Service		17830af	
			UK, BBC World Service		3255af	5975af
			6005af 6190af	9630af	12095af	15400af
			17830af			
1900	2000		UK, Voice Africa	11560af		
1900	2000		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7590usb	7812usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1900	2000		USA, KAIJ Dallas TX	13815na		
1900	2000		USA, KJES Vado NM	15385na		
1900	2000		USA, KTBN Salt Lake City UT	15590na		
1900	2000		USA, Voice of America	4940af	6035af	13710af
			9785va 11975af	12015me	13640af	13710af
			15240af	15580af	17895af	
1900	2000		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na 17495na			
1900	2000		USA, WBOH Newport NC	5920am		
1900	2000		USA, WEWN Birmingham AL	11530va	13615va	
			15695va	15745va	17595va	
1900	2000		USA, WHRA Greenbush ME	17525na	17650na	
1900	2000		USA, WHRI Noblesville IN	9840am	15665am	
1900	2000		USA, WINB Red Lion PA	13570am		
1900	2000		USA, WJIE Louisville KY	7490am		
1900	2000		USA, WMLK Bethel PA 9265eu	15265eu		
1900	2000		USA, WRMI Miami FL 9955am	15725am		
1900	2000		USA, WTJC Newport NC	9370na		
1900	2000		USA, WWCR Nashville TN	9985na	12160na	
			13845na			
1900	2000		USA, WYFR Okeechobee FL	9230va	6020va	17510va
			6085va 13695va	15565va	17510va	18980va
1900	2000		Zambia, Radio Christian Voice	4965af		
1900	2000	vl	Zimbabwe, ZBC Corp	5975do		
1905	1915	vl	Croatia, Croatian Radio		6165na	13830na
1915	1925		Rwanda, Radio	6005do		
1915	1930		UK, BBC World Service		15105af	17885af
1915	1945	f	Germany, Bible Voice Broadcasting	7295af		
1915	2000		China, China Radio Intl	12080na		
1925	1945		Armenia, Voice of	4810eu	9965os	
1930	2000	mtwhf	Belarus, Radio	7105eu	7340eu	
1930	2000		Iran, Voice of the Islamic Rep	6110eu	7320eu	
			9855af 11695af			
1930	2000		Serbia & Montenegro, Intl Radio	6100eu		
1930	2000		Slovakia, Slovak Radio	5915eu	7345eu	
1930	2000		Turkey, Voice of	6055eu		
1935	1955		Italy, RAI Intl	6035eu	9760eu	
1945	2000	mtwhfa	Albania, Radio Tirana	6115eu	7210eu	
1945	2000	f	Germany, Bible Voice Broadcasting	7220af		

2000 UTC - 3PM EST / 2PM CST / 12PM PST

2000	2015	fs	Germany, Bible Voice Broadcasting	7220af	9470me
2000	2020		Turkey, Voice of	6055eu	
2000	2025		Israel, Kol Israel	6280va	9390va
2000	2027		Iran, Voice of the Islamic Rep	6010af	7320eu
			9855af 11695af		
2000	2028		Hungary, Radio Budapest	3975eu	6025eu
2000	2030	vl	Libya, Voice of Africa	11635af	11715af
2000	2030		Mongolia, Voice of	12015eu	
2000	2030		Papua New Guinea, Catholic Radio		4960va
2000	2030		Swaziland, TWR	3200af	
2000	2030		USA, Voice of America	4940af	6035af
			11975af	13710af	15240af
2000	2030		Vatican City, Vatican Radio	7365af	9755af
			11625af		
2000	2050		New Zealand, Radio NZ Intl	15265pa	

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				2100 UTC - 4PM EST / 3PM CST / 1PM PST			
2000	2057		China, China Radio Intl 7190al 7285al 7295eu 9855eu	6100eu 9440eu	5960al 9600eu		
2000	2057	as	Netherlands, Radio	15315na	17725na		
2000	2059		Germany, Deutsche Welle 15205af 15410af	12025af	13780af		
2000	2059	mtwhf	Spain, Radio Exterior Espana	9595af	9680eu		
2000	2100		Anguilla, Caribbean Beacon	11775am			
2000	2100		Australia, ABC NT Alice Springs	2310do	4835irr		
2000	2100		Australia, ABC NT Katherine	2485do			
2000	2100		Australia, ABC NT Tennant Creek	2325do			
2000	2100	as	Australia, Radio	6080pa 9500as	7240os 9580as	11650as	
2000	2100		Australia, Radio	11880pa	12080pa		
2000	2100		Australia, Voice Intl	11685as			
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		Canada, Radio Canada Intl	15180am			
2000	2100	DRM	China, China Radio Intl	12080va			
2000	2100		Costo Rica, University Network	13750va			
2000	2100		Eqt Guinea, Radio Africa	7189af	15184af		
2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do		
2000	2100	vl	Greece, Voice of	15485va	17565va		
2000	2100		Indonesia, Voice of	9525as		15150al	
2000	2100	vl	Italy, IRRS 5775eu				
2000	2100		Liberia, ELWA	4760do			
2000	2100		Malaysia, RTM	7295as			
2000	2100		Namibia, Namibian BC Corp	6060af	3270af	3290af	
2000	2100		Nigeria, Radio/Ibadan	6050do			
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do		
2000	2100		Nigeria, Radio/Lagos	3326do			
2000	2100		Nigeria, Voice of	7255af	9690af		
2000	2100		Papua New Guinea, NBC	4890do			
2000	2100		Russia, Voice of	6145eu	6235eu	7290eu	
2000	2100		Russia, Voice of	7300eu	7330eu		
2000	2100		Sierra Leone, Radio UNAMSIL		6137af		
2000	2100	vl	Sierra Leone, SLBS	3316do			
2000	2100	vl	Solomon Islands, SIBC		5020do	9545do	
2000	2100		South Africa, AWR Africa	15295af			
2000	2100	vl	Uganda, Radio	4976do	5026do	7196do	
2000	2100	mtwhf	UK, BBC World Service	17830af			
2000	2100		UK, BBC World Service	3255af	6005af		
2000	2100		USA, AFRTS	6190af 9630af 4319usb	12095af 5446usb	5765usb	
2000	2100		USA, AFRTS	6350usb 12133usb	7590usb 12579usb	7812usb 10320usb 13855usb	
2000	2100		USA, KAJI Dallas TX	13815na			
2000	2100		USA, KJES Vado NM	15385na			
2000	2100		USA, KTVN Salt Lake City UT		15590na		
2000	2100		USA, WBCQ Kennebunk ME	9330na 17495na	5105na	7415na	
2000	2100		USA, WBOH Newport NC		5920am		
2000	2100		USA, WEWN Birmingham AL	15695va 15745va	11530va 17595va	13615va	
2000	2100		USA, WHRA Greenbush ME		17525no	17650na	
2000	2100		USA, WHRI Noblesville IN		9840am	15665am	
2000	2100		USA, WINB Red Lion PA		13570am		
2000	2100		USA, WJIE Louisville KY		7490am		
2000	2100		USA, WMLK Bethel PA	9265eu	15265eu		
2000	2100		USA, WRMI Miami FL	9955am	15725am		
2000	2100		USA, WTJC Newport NC		9370no		
2000	2100		USA, WWCN Nashville TN		9985na	12160na	
2000	2100		USA, WWRB Manchester TN		13845na		
2000	2100		USA, WYFR Okeechobee FL		9320no 3230va	12170na 5810va	
2000	2100		USA, WYFR Okeechobee FL	6020va 7360va 17510va	7580va 17575va	15195va	
2000	2100		Zambia, Radio Christian Voice		4965af		
2000	2100	vl	Zimbabwe, ZBC Corp	5975do			
2005	2100		Syria, Radio Damascus		12085eu	13610eu	
2015	2100		China, China Radio Intl		12080va		
2025	2045		Italy, RAI Intl	6040af	11880af		
2030	2045		Thailand, Radio	9535eu			
2030	2058		Vietnam, Voice of	5955va	7220va	7280va	
2030	2100		Vietnam, Voice of	9550va 11630va			
2030	2100		Belgium, Radio Vlaanderen Intl		7490eu		
2030	2100		Cuba, Radio Havana	9505va	11760va		
2030	2100		Egypt, Radio Cairo	15375af			
2030	2100	vl	Libya, Voice of Africa	11635af			
2030	2100		Sweden, Radio	6065eu	7240eu	9415al	
2030	2100		USA, Voice of America	11975af	6035af	11835os	
2030	2100	os	USA, Voice of America	13710af	15240af	15580af	
2045	2100		India, All India Radio	7410eu	9445eu	9910eu	
2050	2100		India, All India Radio	9950eu 11620pa 11715pa			
2050	2100		Vatican City, Vatican Radio		4005eu	5885eu	
2051	2100		New Zealand, Radio NZ Intl		17675pa		
2100	2110		Vatican City, Vatican Radio		7250eu	4005eu	5885eu
2100	2130		Australia, ABC NT Katherine		2485do		
2100	2130		Australia, ABC NT Tennant Creek		2325do		
2100	2130		Australia, Radio	9500as	9660as	11650as	
2100	2130		Australia, Radio	11695pa	12080pa	13630pa	15515pa
2100	2130	s	Belarus, Radio	7105eu		7340eu	
2100	2130		Cuba, Radio Havana	9505va		11760vo	
2100	2130	vl	Libya, Voice of Africa	11635af			
2100	2130		South Korea, Radio Korea Intl		3955eu		
2100	2145	DRM	China, China Radio Intl		12080vo		
2100	2145		Nigeria, Radio/Ibadan		6050do		
2100	2157		China, Chino Radio Intl	9600eu 9855af	11640af	7190eu	5960al 7285al
2100	2157		China, Chino Radio Intl	13660eu		13630eu	13630af
2100	2157		Czech Rep, Radio Prague Intl		5930va	9430va	
2100	2157	DRM	Netherlands, Radio	15150eu			
2100	2159		Canada, Radio Canada Intl	15180am		5890eu	9770eu
2100	2159		Germany, Deutsche Welle	15410af	9615af	13780af	
2100	2200		Anguilla, Caribbean Beacon		11775am		
2100	2200		Australia, ABC NT Alice Springs		2310do	4835irr	
2100	2200		Austria, AWR Europe	9830af			
2100	2200		Canada, CBC Northern Service		9625do		
2100	2200		Canada, CFRX Toronto ON		6070do		
2100	2200		Canada, CFVP Calgary AB		6030do		
2100	2200		Canada, CKZN St John's NF		6160do		
2100	2200		Canada, CKZU Vancouver BC		6160do		
2100	2200		Costa Rica, University Network		13750va		
2100	2200		Egypt, Radio Cairo	15375af			
2100	2200		Eqt Guinea, Radio Africa		7189af	15184af	
2100	2200	vl	Ghana, Ghana BC Corp		3366do	4915do	
2100	2200	vl	Greece, Voice of	15485va	17565va		
2100	2200		Guyana, Voice of	3290do	5950do		
2100	2200		India, All India Radio	7410eu	9445eu	9910eu	
2100	2200		India, All India Radio	9950eu 11620pa 11715pa			
2100	2200	vl	Italy, IRRS 5775eu				
2100	2200		Japan, Radio	6035pa	6090eu	6180eu	
2100	2200		Japan, Radio	11855af	17825na	21670pa	
2100	2200		Liberia, ELWA	4760do			
2100	2200		Malaysia, RTM	7295as			
2100	2200		Namibia, Namibian BC Corp	6060af	3270af	3290af	
2100	2200		New Zealand, Radio NZ Intl		17675pa		
2100	2200		Nigeria, Radio/Kaduna		4770do	6090do	
2100	2200		Nigeria, Radio/Lagos		3326do		
2100	2200		North Korea, Voice of	4405eu	7570eu	12015eu	
2100	2200		Papua New Guinea, NBC		4890do		
2100	2200		Sierra Leone, Radio UNAMSIL		6137of		
2100	2200	vl	Sierra Leone, SLBS	3316do			
2100	2200		South Africa, Channel Africa		3345af		
2100	2200		Syria, Radio Damascus		12085eu	13610eu	
2100	2200		UK, BBC World Service		3255af	3915as	
2100	2200		UK, BBC World Service	5965as 5975ca	6005af	6110as	6190af
2100	2200		USA, AFRTS	6195va 9410eu	9605af	12095ca	15400af
2100	2200		USA, AFRTS	6350usb	7590usb	5466usb	5765usb
2100	2200		USA, AFRTS	12133usb	12579usb	7812usb	10320usb
2100	2200		USA, KAJI Dallas TX	13815na		13855usb	
2100	2200		USA, KTVN Salt Lake City UT		15590na		
2100	2200		USA, Voice of America	13710af	15580af	6035of	11975of
2100	2200		USA, WBCQ Kennebunk ME	9330na 17495na	5105na	7415na	
2100	2200		USA, WBOH Newport NC		5920am		
2100	2200		USA, WEWN Birmingham AL	15695va 15745va	11530va 17595va	13615va	
2100	2200		USA, WHRA Greenbush ME		17525no	17650no	
2100	2200		USA, WHRI Noblesville IN		9840am	15665am	
2100	2200		USA, WINB Red Lion PA		13570am		
2100	2200		USA, WJIE Louisville KY		7490am		
2100	2200		USA, WMLK Bethel PA	15265eu			
2100	2200		USA, WRMI Miami FL	9955am	15725am		
2100	2200		USA, WTJC Newport NC		9370no		
2100	2200		USA, WWCN Nashville TN		9985na	12160na	
2100	2200		USA, WWRB Manchester TN		13845na		
2100	2200		USA, WYFR Okeechobee FL		9320na 3230va	12170na 5810va	
2100	2200		USA, WYFR Okeechobee FL	6020va 7360va 17510va	7580va 17575va	15195va	
2100	2200		Zambia, Radio Christian Voice		4965af		
2100	2200	vl	Zimbabwe, ZBC Corp	5975do			
2110	2130	mtwhf	UK, BBC World Service		11675ca	15390ca	
2115	2157		China, China Radio Intl		21080va		
2115	2200		Egypt, Radio Cairo	9990eu			
2130	2145	hf	UK, BBC World Service		11680ca		
2130	2156		Romania, Radio Romania Intl		6015eu	6055eu	
2130	2200		Australia, ABC NT Katherine		5025do		
2130	2200		Australia, ABC NT Tennant Creek		4910do		

Shortwave Guide



2130	2200		13630pa	15515pa		2230	2300		USA, Voice of America	9545va	9785va
2130	2200		Guam, AWR/KSDA	11980as	12010as				11935as	13755va	
2130	2200	f	Turkey, Voice of	9525as		2245	2300		India, All India Radio	9705as	9950as
2130	2200		UK, Wales Radio Intl	7150eu	7325eu				11645as	13605as	11620as
2130	2200		Uzbekistan, Radio Tashkent	11905eu	5025eu	7185eu					

2200 UTC - 5PM EST / 4PM CST / 2PM PST

2200	2205		Syria, Radio Damascus		12085eu	13610eu					
2200	2220		Turkey, Voice of	9525as							
2200	2228		Hungary, Radio Budapest		6025eu	12010af					
2200	2230		Belgium, Radio Vlaanderen Intl		11730na						
2200	2230		India, All India Radio	7410eu	9445eu	9910eu					
			9950eu	11620pa	11715pa						
2200	2230	vl	Italy, IRRS 5775eu								
2200	2230		Liberia, ELWA	4760do							
2200	2230		Papua New Guinea, NBC		4890do						
2200	2230		Serbia & Montenegro, Intl Radio		6100eu						
2200	2230		USA, Voice of America		11835as						
2200	2245		Egypt, Radio Cairo	9990eu							
2200	2257	DRM	China, China Radio Intl		7170eu						
2200	2259	DRM	Netherlands, Radio	15525na							
2200	2259	os	Canada, Radio Canada Intl		15180am						
2200	2259		Canada, Radio Canada Intl		9800no						
2200	2259		Germany, Deutsche Welle		6180as	6225as					
2200	2259		Spain, Radio Exterior Espana		9595af	9688eu					
2200	2300		Anguilla, Caribbean Beacon		6090am						
2200	2300		Australia, ABC NT Alice Springs		2310do	4835irr					
2200	2300		Australia, ABC NT Katherine		5025do						
2200	2300		Australia, ABC NT Tennant Creek		4910do						
2200	2300		Australia, Radio	13620pa	13630pa	15230pa					
			15240pa	15515pa	21740pa						
2200	2300		Bulgaria, Radio	5800eu	7500eu						
2200	2300		Canada, CBC Northern Service		9625do						
2200	2300		Canada, CFRX Toronto ON		6070do						
2200	2300		Canada, CFVP Calgary AB		6030do						
2200	2300		Canada, CKZN St John's NF		6160do						
2200	2300		Canada, CKZU Vancouver BC		6160do						
2200	2300		Costa Rica, University Network		13750va						
2200	2300		Eat Guinea, Radio Africa		7189af	15184af					
2200	2300	vl	Ghana, Ghana BC Corp		3366do	4915do					
2200	2300		Guyana, Voice of	3290do							
2200	2300		Malaysia, RTM	7295as							
2200	2300		Namibia, Namibian BC Corp		6060af	3270af	3290af				
2200	2300		New Zealand, Radio NZ Intl		17675pa						
2200	2300		Nigeria, Radio/Ibadan		6050do						
2200	2300		Nigeria, Radio/Kaduna		4770do	6090do					
2200	2300		Nigeria, Radio/Lagos	3326do	4990do						
2200	2300		Sierra Leone, Radio UNAMSIL		6137af						
2200	2300	vl	Sierra Leone, SLBS	3316do							
2200	2300	vl	Solomon Islands, SIBC		5020do	9545do					
2200	2300		Taiwan, Radio Taiwan Intl		9355eu						
2200	2300		UK, BBC World Service		5965as	6195va					
			7105as	9605af	9740as	11955as	12095ca				
2200	2300		Ukraine, Radio Ukraine Intl		4840eu						
2200	2300		USA, AFRTS		5446usb	5765usb					
			6350usb	7590usb	7812usb	10320usb					
			12133usb	12579usb	13362usb	13855usb					
2200	2300		USA, KAJI Dallas TX	13815na							
2200	2300		USA, KTBN Salt Lake City UT		15590na						
2200	2300		USA, KWHR Naalehu HI		11565as	17510as					
2200	2300		USA, Voice of America		7215va	9890va					
			15185va	15290va	15305va	17740va					
2200	2300		USA, WBCQ Kennebunk ME		5105na	7415na					
			9330na	17495na							
2200	2300		USA, WBOH Newport NC		5920am						
2200	2300		USA, WEWN Birmingham AL		9975va	11530va					
			15695va	15745va							
2200	2300		USA, WHRA Greenbush ME		7570na	9455na					
			17650na								
2200	2300		USA, WHRI Noblesville IN		7535am	9455am					
2200	2300		USA, WINB Red Lion PA		13570om						
2200	2300		USA, WJIE Louisville KY		13595om						
2200	2300		USA, WRMI Miami FL	9955am	15725am						
2200	2300		USA, WRMI Miami FL	9955om	15725am						
2200	2300		USA, WTJC Newport NC		9370na						
2200	2300		USA, WWCR Nashville TN		9465na	9985na					
			12160na	13845na							
2200	2300		USA, WWRB Manchester TN		9320na	12170na					
2200	2300		USA, WYFR Okeechobee FL		5810va	9690va					
			11740va	21525va							
2200	2300		Zambia, Radio Christian Voice		4965af						
2205	2230		Italy, RAI Intl		11895as						
2230	2257		Czech Rep, Radio Prague Intl		5930vo	7345va					
2230	2259		Canada, Radio Canada Intl		6160as	7195as					
			9730as								
2230	2300	mtwhfa	Albania, Radio Tirana	7120eu							
2230	2300	os	Australia, HCJB	15525as							
2230	2300		Guam, AWR/KSDA	11850as	15320as						
2230	2300	vl/fs	Italy, IRRS 5775eu								
2230	2300		Papua New Guinea, NBC		9675do						
2230	2300		Sweden, Radio	6065eu							

2300 UTC - 6PM EST / 5PM CST / 3PM PST

2300	0000		Anguilla, Caribbean Beacon		6090am						
2300	0000		Australia, ABC NT Alice Springs		2310do	4835irr					
2300	0000		Australia, ABC NT Katherine		5025do						
2300	0000		Australia, ABC NT Tennant Creek		4910do						
2300	0000	as	Australia, HCJB	15525as							
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		Costa Rica, University Network		13750va						
2300	0000		Cuba, Radio Havana	9550na							
2300	0000	vl	Egypt, Radio Cairo	7115na							
2300	0000		Ghana, Ghana BC Corp		3366do	4915do					
2300	0000		Guyana, Voice of	3290do							
2300	0000		India, All India Radio	9705as	9950as	11620as					
			11645as	13605as							
2300	0000		Malaysia, RTM	7295as							
2300	0000		Namibia, Namibian BC Corp		3270af	3290af					
			6060af								
2300	0000		New Zealand, Radio NZ Intl		17675pa						
2300	0000		Papua New Guinea, NBC		9675do						
2300	0000		Sierra Leone, Radio UNAMSIL		6137af						
2300	0000	vl	Sierra Leone, SLBS	3316do							
2300	0000	vl	Singapore, Mediacorp Radio		6150do						
2300	0000		Solomon Islands, SIBC		5020do	9545do					
2300	0000		UK, BBC World Service		5975ca	6195eu					
			12095ca								
2300	0000		USA, AFRTS		4319usb	5446usb	5765usb				
			6350usb	7590usb	7812usb	10320usb					
			12133usb	12579usb	13362usb	13855usb					
2300	0000		USA, KAJI Dallas TX	13815na							
2300	0000		USA, KTBN Salt Lake City UT		15590na						
2300	0000		USA, KWHR Naalehu HI		11565as	17510as					
2300	0000		USA, Voice of America		7215va	9890va					
			11995as	15185va	15290va	15305va					
			17740va								
2300	0000		USA, WBCQ Kennebunk ME		5105na	7415na					
			9330na								
2300	0000		USA, WBOH Newport NC		5920am						
2300	0000		USA, WEWN Birmingham AL		7425va	9975va					

Monitoring Military Flight Demonstration Groups MT's Annual Air Show Guide

Air show! Nothing stirs excitement more for the aircraft enthusiast than those two magical words.

Bottom line: there is nothing quite as thrilling as going out to one of the many weekend public air shows across the country and watching one of the military or civilian demonstration teams strut their stuff in front of thousands of airplane fanatics. But, add to the visual drama in front of you the element of monitoring the team's radio communications, and you will have a whole new perspective that few can realize or enjoy.

Since the 2005 air show season starts in the second week of March, we present our annual frequencies to monitor. You can find the military flight demonstration team schedules for the upcoming air show season on page 13 of *MT's* feature section.

❖ Where do you hear the action?

2004 provided airshow monitors with many challenges, especially with major changes all season long in the Navy's Blue Angel team frequencies. But seasoned veterans knew the right bands to look for communications when the team didn't show up on their long standing and widely published frequencies.

So were do the veterans go to look for new activity? You will need to concentrate your search within several selected bands to locate air show activity in your area. Search the following bands in the modes indicated (MHz).

118.0-137.0	AM mode (AM) 25 kHz steps <i>Note: We have reports of a lot of new air show activity in the new portion of the civilian aero band: 136-137 MHz. Be sure to check this frequency range for civilian and military demo aircraft communications</i>
122.7-123.575	AM 25 kHz steps
138.0-144.0z	AM/Narrowband FM (NBFM) 12.5 kHz steps
148.0-150.8	AM/NBFM 12.5 kHz steps
225.0-389.0	AM 25 kHz steps
389.0-400.0	AM/NBFM 25 kHz steps
406.1-420.0	NBFM 12.5 kHz steps

U.S. Military Flight Demonstration Teams

Blue Angels

The U.S. Navy (USN)/Marine Corps (USMC) military team is represented on the air show circuit by the Blue Angels flying their F/A-18 Hornet aircraft. The other major piece of

hardware in the squadron is their C-130 Hercules transport aircraft, affectionately known as "Fat Albert." It is the only Marine Corps aircraft permanently assigned to support a Navy squadron and is flown by an all-Marine Corps crew of three pilots and five enlisted personnel. "Fat Albert" flies more than 140,000 miles during the course of a show season.

As we mentioned above, following the BA team last season proved to be a real challenge. Here is a breakdown of what was heard up to the close of the last show in 2004. Since it is not known what 2005 will bring, I strongly encourage readers to check the *Monitoring Times* website (<http://www.monitoringtimes.com>) prior to any air show they plan to attend. We will publish updates on our air show web page as we get them from field reports during the season. Note: Asterisks indicate a new frequency found during the 2004 season.

Blue Angel Cross Country Air-Air	143.600 (AM)
237.800*	238.150
Pre-Show/Taxi	237.800 273.300* 275.350 284.250*
Tower-Comm Cart (NBFM)	173.825*
Tower Observer	143.000 (AM)
Diamond formation aircraft (1-4)	238.150 263.350 264.350* 264.550 265.000*
<Com 1>	275.350 284.250* <Com 2> 299.650* 307.700
Opposing solo aircraft (5/6)	237.800* 249.625* 251.600 345.900 346.500*
Delta Formation	237.800* 275.350
Maintenance/Ground communications (NBFM)	142.000 143.600 163.000* 164.900 165.225* 167.500* 167.800* 168.900 169.400 170.900
USMC C-130 "Fat Albert" aircraft	236.450 263.350 263.500 273.300 305.500*
Unknown usage	254.500* 256.250 262.850* 286.000 302.150 381.000*

Thunderbirds

The premier U.S. Air Force (USAF) flight demonstration team is known as the Thunderbirds. This team uses a mix of six aircraft, performing formation flying and solo routines. The four-aircraft diamond formation demonstrates the training and precision of Air Force pilots, while the solos highlight the maximum capabilities of the Lockheed Martin F-16 Fighting Falcon. The pilots perform approximately 30 maneuvers in a demonstration. The entire show, including ground and air, runs about 1 hour 15 minutes.

The list below has frequencies reportedly used by the Thunderbirds during the last six air show seasons. It should be noted that at some shows 143.850 and 235.250 MHz roles may be reversed from what is published below.

Frequency	Usage (* New frequency in 2004)
140.400	Support/show aircraft X-country Air-Air (AM)
141.850	Pre-take/Four ship/Diamond formation linked to PA system (AM)
142.575*	Program audio/Air-Ground comms (NBFM)
143.850	Pre-show communications/Diamond formation (AM)
235.200*	Thunderbird Control/ComCart
235.250	Solo aircraft on/off show center <Uniform 1>
322.950	Engine Starts/Solo aircraft (5-6) Air-Air <Uniform 2>

Maintenance/Ground teams (NBFM)	142.175*	143.900	413.000 (Digital)
	413.025 (Analog/digital)	<Channel 1>	
	413.100 (Analog/digital)	<Channel 2>	
	413.250 (Analog)	413.275 (Analog)	413.350 (Digital)
	413.375 (Digital)		

Special Units

Both the Navy and the Air Force have other special flight demonstration units in addition to those units mentioned above. Listings below transmit in the AM mode. Here is a list of those units and their frequencies.

USAF A-10 Thunderbolt demonstration teams	123.150	123.475	136.575	138.050
	138.100	138.200	138.250	138.300
	138.475	138.500	139.625	139.725
	139.800	139.975	140.400	142.200
	236.850	269.900	305.400	327.700
	343.000	343.000	384.550	
USAF B-1B Bomber Flyover	238.150			
USAF B-2 Bomber Flyovers (509BW)	388.850			
USAF B-52 Bomber Flyovers	376.025			
USAF F-15 Eagle demonstration teams	122.775	225.650	228.450	228.950
	232.150	233.525	234.600	236.150
	236.550	237.400	238.625	238.825
	239.400	252.525	252.575	252.775
	254.675	257.075	258.375	259.550
	260.275	262.025	262.050	264.875
	264.975	266.550	268.175	275.675
	276.675	279.650	282.675	282.800
	285.150	287.775	292.725	296.925
	298.350	301.525	303.950	305.650
	315.125	315.850	317.800	319.325
	325.325	325.725	325.775	330.125
	333.550	338.750	351.050	355.750
	359.225	364.125	376.025	376.075
	384.500	384.550	384.850	385.700
	391.200	396.900	397.100	399.750
	399.850			

US Air Force F-16 Fighting Falcon demonstration teams

122.775	123.150	134.175	136.575
138.025	138.100	138.150	138.200
138.250	138.475	138.425	138.900
139.750	139.825	139.900	139.925
139.975	140.375	141.600	227.700
229.075	261.200	283.700	317.800

336.925 344.900 376.025 376.075
384.550

US Air Force AETC T-6 Texan East Coast Team
123.400 138.400 283.700 (Ground support
team uses FRS radios)

US Air Force Combat search and rescue (SAR)
demonstrations

139.700 225.450 236.000 242.000
251.900 252.800 259.000 280.500
282.800 287.500 381.000 384.550

US Coast Guard aircraft/SAR demonstrations

122.900 (SAR) 157.050 (Drug Interdiction
demo) 157.075 (Command Post) 237.900
282.800 326.150 345.000 379.050

US Navy S-3 Viking aircraft demonstrations
263.400

US Navy SAR demonstrations 242.500 282.000
283.100

Military Parachute Teams

The colorful U.S. Navy Seal Parachute Team, known as the **Leap Frogs**, are frequent visitors around the country at various sporting events and air shows. This team has been regularly reported on its 407.500 MHz (NBFM) frequency nationwide the last several years. Two years ago we got a report of team communications on 134.100 and 270.000 MHz (AM).

A new Army parachute team that has recently joined the air show circuit is the **Black Daggers** (see *MT Milcom* May 2004). Frequencies discovered for them in 2004 include: 123.450, 136.000, 136.500, 138.650, 237.300 and 238.150 MHz.

The U.S. Army Parachute Team is known as the **Golden Knights**. They also make the rounds during the air show season. Look for their communications on 123.400, 123.475 or 123.500 MHz. You should also keep 32.300, 32.400, 122.575, 124.875, 284.900 and 367.700 MHz plugged in for possible GK activity.

During the 2001 and 2002 seasons I received several reports that the Golden Knights were using civilian UHF frequencies (462.625 MHz a business itinerant frequency known as Black Dot) and two FRS frequencies: 467.5625, and 467.6125 MHz. These reports suggest that the Golden Knights might be using Family Radio Service radios. It might be a good idea to keep FRS frequencies in your scanner since you might hear some interesting activity on these frequencies during air shows. The standard FRS frequencies are (NBFM mode):

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

We did receive a report of the ground pyrotechnics personnel from the Tora Tora Tora and Warbirds flight demonstration team using FRS radios for communications during one recent show. You will also find other military monitoring enthusiasts who use FRS radios at the show to meet each other. Load them up in your scanner and you might make a new *Milcom* friend or two.

One final note regarding military UHF frequencies. The government's version of the Family Radio Service is known as the Inter-Squad Radio or ISR. I have seen a couple of scattered

reports over the last couple of years that these radios might be in use at air shows by military units. It might be a good idea to program these frequencies in as part of your air show load out.

396.8750	Channel 1	397.1250	Channel 2
397.1750	Channel 3	397.3750	Channel 4
397.4250	Channel 5	397.4750	Channel 6
397.5500	Channel 7	397.9500	Channel 8
398.0500	Channel 9	399.4250	Channel 10
399.4750	Channel 11	399.7250	Channel 12
399.9250	Channel 13	399.9750	Channel 14

Civilian/Foreign Air Demonstration Teams

The Canadian Forces **Snowbird** aircraft demonstration team (431 Air Demonstration Squadron) is another regular on the U.S./Canada air show circuit. The following frequencies have been recently reported for this popular aerial team: 123.325 227.600 242.600 245.500 245.750 246.500 272.100 (Primary) 284.900 299.500 333.300 340.100 MHz. A new Snowbird VHF frequency was confirmed this last year on 116.000 MHz (AM).

Some frequencies for other foreign military and US civilian flight demonstration teams that have been reported to us include:

Civilian Flight Demonstration Teams

Aeroshell Aerobatics Team	123.150
All American Firebirds Flight Demonstration Team	122.775
Bud Light Air Force (ex- Coors Microjet)	122.925 123.350 123.475
Firecat (Rich Perkins)	123.500
French Connection Air Show	122.925 122.975 129.975
Geiko Extra 300 - Tim Webber	123.150
Heritage Flight (F-15/F-16/F-86/P-51)	132.950 136.575
Ian Groom's FedEx Red Bull Aerobatic Team	122.725 122.775 122.825 123.150 123.350
Jim LeRoy Bulldog Team	123.150
Lima Lima Flight Team	123.150 123.175 123.425
Manfred Radius Glider Aerobatics Team	123.150
North American Jet Air Show Team	122.775 122.925 129.650 129.925
Northern Lights Aerobatic Team	123.325 136.975
P-51 Mustang Flight Team (Commemorative Air Force)	122.850 122.875
Patty Wagstaff Air Shows Inc	122.750 123.475
Pitts Special U.S. Air Force Reserve	123.150
Rayban Gold Aerobatics Team	122.925
Red Baron Stearman Squadron	122.725 122.775 123.150
Red Eagles Flight Demo Team	123.475
Sean Tucker Power Aerobatics	122.875 122.950 123.150 123.475
Showcopters	134.700
Sky Soldiers Demonstration Team (Army Aviation Foundation)	123.025 242.400
Skytypers Team	122.775
Swift Magic Aerobatic Team	122.775 122.925
Tora Tora Tora Warbirds Team (Commemorative Air Force)	123.450 469.500 469.550

Foreign Military Flight Demonstration Teams

Asas de Portugal, Esquadra 103 (Wings of Portugal 103 Squadron) Flight Team	262.150
Blue Eagles Royal Army Air Corps Flight Team (UK)	136.975

Brazilian Air Force Team (Brazil)	130.550 130.650 132.250
Canadian Forces Skyhawks Parachute Jump Team (Canada)	123.000 294.700
Falcons Royal Air Force Parachute Jump Team (UK)	255.100 465.100
Frecce Tricolori Military Flight Team (Italy)	307.800 381.000
Grasshopper Helicopter Team (Netherlands)	281.100
Halcones Military Flight Team (Chile)	136.175
La Patrouille Adecco Air Force Flight Team (France)	138.450 141.825 143.100 143.850 242.650
La Patrulla Aguila Military Flight Team (Spain)	130.500 252.500
Military Stars Flight Team (Turkey)	264.400 279.600
Patrouille Suisse Military Flight Team (Switzerland)	288.850
Red Arrows Royal Air Force Flight Team (UK)	242.200 242.050 243.450 253.450

❖ Not Just Any Old Scanner Will Do

Some of the handheld scanners currently marketed are *not* suited for air show monitoring. There are certain requirements your air show radio has to meet in order to successfully monitor the two major military aerial demonstration teams – the Blues and T-Birds.

If you are going to a Thunderbird show, you will need a scanner that can monitor the 138-150 MHz military land mobile band in the AM mode. Most of the older Uniden scanners cannot be used for air show monitoring due to their lack of independent transmission mode selection.

You also need a scanner that has the 225-400 MHz military aeronautical band in it. Most of the action (especially the Blues) will be heard in this military UHF portion of the spectrum. Adding this criteria to the mix of possible radios again narrows down our choice for air show scanners even more.

Finally, I would like to extend a hearty thanks to the over 80 contributors who took the time last year to share their post show reports with us. I deeply appreciate the time and effort each of you took to let us know what you were hearing.

If you find the list useful and you make an air show in 2005, please pass along any frequencies that you monitor, whether it is on the list above or not. This will greatly aid us so we can keep this annual *MT* listing up-to-date. I hope to hear from each of the shows this year and you can reach me via e-mail at larry@grove-ent.com or larryvanhorn@monitoringtimes.com. Our snail mail address is: *MT Milcom*, 7540 Highway 64 West, Brasstown, NC 28902. Until next month, 73 and good hunting.

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ScramblingNews.com

What's Up With Low Band?

Welcome to another edition of *The Fed Files*! As I reported in the January column, we are now able to get together every other month, thanks to your support and input. Please keep your letters and e-mails coming!

When's the last time you tuned in anything between 30 and 50 MHz on your scanner? And when have you heard any federal agencies down there? There are plenty of military low-band VHF channels in use all over the country, but there are also many other federal allocations in the VHF low-band. I have seen quite a few low-band frequencies listed in my area for agencies such as the Bureau of Indian Affairs, the Department of Interior, the Department of Agriculture and more, but have not yet tried to tune them in to see if they are active.

Recent government mandates from the National Telecommunications Information Agency (NTIA) require all federal communications systems in the VHF high band (162 MHz to 174 MHz) and the UHF federal band (406.1 MHz to 420 MHz) to comply with "narrow band" standards. However, no such narrowband requirements are being imposed on the VHF low band frequencies. Does this mean that they are writing off the 30 to 50 MHz band? We'll have to keep listening and see!

There are several "chunks" of the VHF low-band that are allocated to military and federal government agencies. If you want to search those bands, here's a rundown on what segments to listen to:

29.900 MHz to 31.000 MHz
 32.000 MHz to 33.000 MHz
 34.000 MHz to 35.000 MHz
 36.000 MHz to 37.000 MHz
 38.000 MHz to 39.000 MHz
 40.000 MHz to 42.000 MHz
 46.000 MHz to 47.000 MHz
 49.000 MHz to 50.000 MHz

It helps if you can use a scanner that allows you to "link" these search bands together to sweep all these frequencies in one pass. Search this spectrum using 10 kHz steps and see what you hear.

When scanning through these band segments, keep in mind that there are many military stations using these frequencies as well as federal agencies. How do you tell them apart? It can be tricky, but listen to what is being said and see if there are locations or call signs mentioned. If your scanner

can decode CTCSS squelch tones, military low-band FM signals almost always carry a sub-audible tone of 150 Hz, which will show up as 151.4 Hz on your scanner. Remember that, due to the nature of these low frequencies, signals can "skip" a great distance from the transmitter's location, so you may hear stations that are hundreds or even thousands of miles away.

There are a couple of federal frequencies just below 30 MHz that seem to be important to government communications. The frequencies of 27.575 MHz and 27.585 MHz are both allocated to federal use and have been protected from re-allocation in past years. Who uses these? Since they are allocated as federal itinerant frequencies, it could be almost any agency. Let us know if you hear anything down there!

For a very concise listing of VHF-low frequencies and which federal agencies they are allocated to, I would recommend a copy of Larry Van Horn's *Grove's Federal Frequency Directory*, Second Edition, or the consolidated frequency listing in the latest edition of *Police Call*, both of which are available from Grove Enterprises at 828-237-9200 or <http://www.grove-ent.com>.

❖ Listening In to the USGS

In the December 2004 issue of *Monitoring Times*, Bob Grove had a fascinating article about "Monitoring the Earth" in Hawaii. I've had the opportunity to monitor the earth up in my area recently, with the latest volcanic activity of Mt. St. Helens in southeastern Washington State. The US Geological Survey (USGS), part of the Department of the Interior, is charged with monitoring and studying the volcano and its effects on the area around it. You can find out more about the USGS at their web site, <http://www.usgs.gov/>.

Searching my information about possible USGS radio frequencies turned up hundreds of them, so I don't have room to list them all, but here is what I have heard in use at Mt. St. Helens:

167.0750 MHz – Input to
 168.4250 repeater
 168.4250 MHz – Repeaters on both the north and south sides of Mt. St. Helens

168.4500 MHz – Possible simplex use
 169.8250 MHz – USGS Nationwide

The USGS uses many different devices for monitoring the volcano and its activities, including GPS, laser-height sensing equipment, as well as seismic sensors. Here are some sensor frequencies that have been heard in southern Washington:

162.1250	162.1750	162.2000
163.3970	163.6050	163.6600
163.9000	164.0060	164.6600
164.8450	165.8100	166.4180
167.8150	406.1500	409.6000
412.1250	416.5500	416.79375
417.7250		

Some of these frequencies carry digital data, but others can be heard with an audio tone that varies with the seismic activity. Around the end of October 2004, when Mt. St. Helens was becoming active again, the USGS radio frequencies became very active.

There were some references made about using the "new digital" radios, but we never did figure out exactly what they were referring to. However, I did hear what sounded like digital encryption on 167.050 MHz in early November, but I was never able to confirm who it was. The USGS was back in their normal analog operation shortly afterwards.

❖ US Marshals & Planet Airways

I recently ran across some interesting information regarding the US Marshals JPATS (Justice Prisoner and Alien Transportation System) program and one of the private contractors. You can read more about the JPATS program on the Department of Justice web site: <http://www.usdoj.gov/marshals/jpats/>

In several cities that I have traveled



to, I have seen Boeing 727 aircraft painted with Planet Airways colors and logos. These aircraft caught my attention due to the fact they were parked in remote areas of the airports, and had plain white cars, vans and buses parked nearby, along with many people armed with shotguns! Apparently these aircraft were in the process of loading prisoners to be transported to federal prison facilities in various parts of the country. I did a search on the Internet and found that Planet Airways is a contractor that provides aircraft and flight crews for the US Marshals Service.

Here are some possible frequencies for the US Marshals Service:

- 162.7125 MHz
- 162.7875 MHz
- 162.8250 MHz
- 163.0750 MHz
- 163.2000 MHz – Primary Nationwide
- 164.6000 MHz
- 166.4625 MHz – DHS Common
- 168.8625 MHz
- 170.7500 MHz
- 170.8000 MHz
- 170.8500 MHz
- 170.8750 MHz
- 170.9250 MHz
- 408.5250 MHz
- 411.0000 MHz
- 411.0500 MHz
- 411.1000 MHz
- 411.1375 MHz
- 411.1750 MHz
- 412.6500 MHz
- 412.7000 MHz
- 414.0500 MHz
- 414.5750 MHz
- 417.1000 MHz
- 417.1750 MHz
- 417.7000 MHz

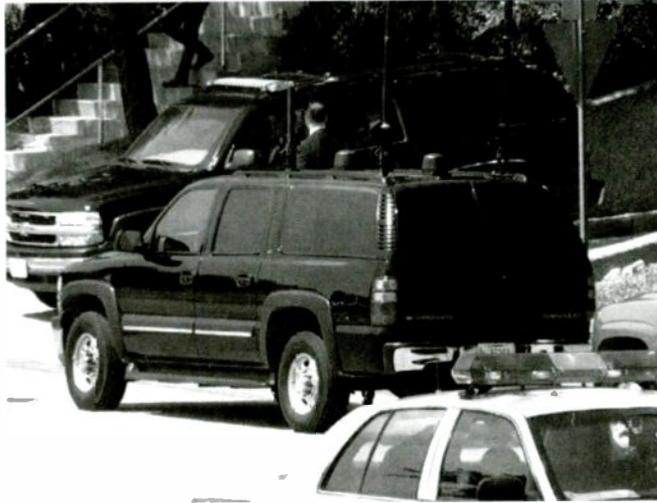
Traditionally, the Marshals Service has used VHF frequencies nationwide, but I've been wondering about them using UHF frequencies, now that most of the Federal Prisons have moved to UHF trunking systems. Might the prisons have some UHF simplex frequencies for use away from the prisons?

If you monitor your local air traffic control frequencies, keep an ear out for flights using the call sign JUSTICE. These usually indicate an aircraft belonging to the Justice Department or an aircraft flying a Justice Department mission. Recently, JUSTICE 893 landed at Boeing Field in Seattle and it was a Planet Airways 727.

We'll talk more about federal agencies and the aircraft they fly in the next *Fed Files*.

❖ New WHCA Communications Vehicle

During 2004 there were many e-mails flying around on the FEDCOM e-mail list concerning a "new" vehicle that was seen in some presidential motorcades. The vehicle



Look for the new Roadrunner SUV in Presidential motorcades

was a large black SUV with some unusual antennas on the roof. This first caught my attention in mid summer, but some had stated the unusual SUV had been in the Presidential motorcades for over a year.

The theories about the purpose of this new part of the motorcades varied from the interesting to the unbelievable. Some guessed it was some sort of bomb or chemical weapons detector, others suggested it was used to monitor cell phone calls near the President and there were many suggestions of a cell phone jamming system.

After researching this new vehicle in publicly available sources, I believe that it is a new generation communications vehicle operated by the White House Communications Agency or WHCA. After September 11, 2001, there was a mandate placed upon the WHCA to improve the communications capabilities for the President in the field, especially when faced with an emergency. This new vehicle, developed by the WHCA with the Navy Research Laboratory is a mobile communications hub that provides real-time data, video and voice communications while the motorcade is out of reach of Air Force One. The system is a secure, IP (Internet Protocol) based link that allows the Presidential motorcade to maintain solid communications with voice, data and live video, everywhere they go.

For many years, one of the WHCA vehicles in the Presidential motorcade was a

black Ford van outfitted with HF, VHF, UHF, cellular and satellite communications. This vehicle was referred to by the call sign Roadrunner. The WHCA has designed this new vehicle to replace the ageing Roadrunner fleet and reports from some monitors confirm that the Roadrunner moniker has been assigned to the new Suburban with the large antennas on top.

What frequencies does this new system utilize? That's still somewhat of a mystery, but indications are that some of the system uses current VHF radio links, UHF and SHF satellite frequencies, possibly INTELSAT, as well as possible interconnection to land-based cellular and PCS digital phone networks. Whatever frequencies may be used, you can be certain that they are secured using the latest in encryption technology. I'm afraid the good old days of monitoring presidential phone calls on the old Echo/Foxtrot frequencies are long gone!

I have not seen any reports from monitors that have been able to search the bands when this vehicle was nearby to confirm any RF emissions, but keep listening and perhaps someday we will learn more about the new Roadrunner.

❖ Late Breaking News!

At the time I was getting this month's column ready, I received preliminary information about changes in Coast Guard UHF air frequencies. Al Stern passed along the following information:

"As of 1 Jan 05, USCG comms will no longer be authorized on 381.8 MHz. The US Coast Guard frequency setup will include the following:

- Ops Primary - 345.000 MHz
- Ops Secondary - 237.900 MHz
- Air-Ground Working Primary - 326.150 MHz
- Air-Ground Working Secondary - 379.050 MHz"

Actually the Coast Guard, now part of the Department of Homeland Security, is changing almost all their frequencies, including their HF (shortwave) frequencies. (Turn to Utility World in this issue for more - ed.) See you in the next *Fed Files*!

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Upgrading the Shack

Welcome to the first edition of RailScanning for 2005. I hope that Santa brought you many nice gifts last Christmas, including scanners and maybe even some model trains for your layouts.

This issue will cover information about two new toys I bought in November, ATCS, and radio frequencies for various rail systems across the United States.

❖ On the prowl....

I am always on the prowl for a good radio to use for listening to the railroads. Many times these radios are not scanners, but are ham radios since I am also an amateur radio operator. Lately I tend to listen much more than I talk. Of course, I have been listening to trains since 1971 while at Purdue University. I used to monitor the railroads for traffic while sleeping.

Every November we have the Fort Wayne Hamfest. I attend and assist with it. I knew I needed a new radio for my office at home. I was mainly looking at the Icom 2200H 2-meter mobile, which had just been introduced. This radio has the capability of digital communications. The digital module has not been introduced by the time of this writing in December.

The other ham band radio I was interested in was the Yaesu FT-2800. I checked on <http://www.eham.com>, which showed that numerous owners were unhappy with this radio due to quality issues in its initial manufacture. However, I checked out a dual-band (2/440 MHz) radio from Yaesu, designated as the FT-7800, and found rave reviews.

❖ Yaesu FT-7800

The FT-7800 also has 1000 memories and a wide-band receiver. The radio covers 108 to 520 MHz plus 700.000 - 999.990 MHz with the cellular frequencies blocked. The radio even receives the AM band aircraft frequencies. The FT-7800 has the NOAA Weather Alert with all ten NOAA channels programmed into the receiver.

With two weeks to go until the Hamfest, I decided to order one from a ham radio store in Ohio. Yaesu had a rebate on them and the price was about the same as that of the new Icom and it did host dual band capabilities. Transmit capabilities were on both the 2-meter (144 MHz) band and on the UHF (ultra high frequency) band located around 440 MHz.

I had the radio running in two days. The reception is excellent. I did find a couple of railroad channels that tend to lock up when I have the computer running near the radio. They seem to be seldom used frequencies and although I can scan with the squelch turned higher, I chose to lockout these few unused channels. My computer caused some of the lockups.

Ninety-one RR channels

I programmed in all ninety-one U.S. VHF rail channels initially. I connected the radio to my Diamond F23A vertical antenna with the tip around 30 feet. My first impressions were great. I was receiving the South Shore dispatcher from atop the water tower at Michigan City. This must be approximately 100 miles. Then I realized the signal was from the South Shore's Hedgewich, Illinois, base south of Chicago, which is much farther.

I have received radio channels no other radio I own has ever received with this antenna. Previously I had been using a Yaesu FT-1500 with the Diamond antenna. I still have some unidentified channels, which have been strong and crisp.

I need to take some more time to work with the instruction manual. This ham radio can be programmed with frequency banks. The radio will not receive 2-meter and 440 MHz at the same time, but the radio can scan a mixture of both frequency bands.

Scan rate!

The scan rate is rather slow at about 12-to-15 channels per second, but the sensitivity is terrific and intermodulation has been non-existent in my location. Yaesu made a rock solid performer with this radio. The FT-7800 even has five frequency banks to program for listening to certain blocks of frequencies such as railroads and aircraft.

I have been so intrigued with the reception of this radio, I haven't talked on it even though I have owned it for two months. My venerable Regency HX-1000 has been retired now. My Vertex Standard VX-150 HT is also a favorite. Both these radios are tops in my opinion for railscanning. I own an Icom V-8 HT too, but it does not compare to the performance of the VX-150.

A new antenna too!

I did also buy a Jetstream 2/440 vertical antenna to use with the Yaesu FT-7800. It is 18 feet tall and had 8.3 dB of gain on the 2-meter band. This antenna should work as well, if not better, than the Diamond F23A on both VHF and the UHF railroad band. It has been too cold to install it. That will occur in the spring.

My next radio purchase.....

My next radio will probably be the Icom 2200H. The Yaesu FT-1500 will be transferred into my van for use with one of the ham band antennas and the Icom will come as a base radio for 2-meters here in my office. I will use the Diamond F23A for both ham radio and railroads!

❖ Various RR frequencies

North Carolina...

The Aberdeen & Rockfish operates from Aberdeen, North Carolina, and uses the following repeater system for its communications.

161.280 Ch 1 Road and repeater output - Raeford
161.280/160 .530 Ch 2 Road repeater



Norfolk Southern #9767 races toward Fort Wayne, Indiana, as it crosses Notestine Road west of Grabill.



Norfolk Southern #9778 prepares to depart East Wayne Yard in New Haven, Indiana.

The Aberdeen, Carolina & Western in Charlotte, North Carolina, uses 160.680 for its general operations and 160.560 for switching along its trackage.

The Tuscola & Saginaw Bay Railroad operates the ex-Ann Arbor Railroad trackage in Michigan. The railroad is based in Owosso, Michigan. They use two frequencies to operate their trains. They are:

160.575 Ch 1 Road and dispatcher (Vassar)
161.100 Ch 2 Road and dispatcher (Millington)

The Ozarks...

The Arkansas & Missouri Railway runs from Springdale, Arkansas, down in the Ozarks into Missouri. Their locomotives are all Alco's manufactured by the American Locomotive Company.

160.440 Ch 1 Road
160.785 Ch 2 Yard
161.160 Ch 3 BN Interchange
161.475 Ch 4 Maintenance of Way (MofW)
451.400/456.400 Dispatcher links - Springdale-Winslow-Fort Smith

Pennsylvania Industrial RR

The Turtle Creek Industrial Railroad in Export, Pennsylvania, uses UHF business band radio frequencies for their operations.

468.700 Road and yard
463.800 Dispatcher

Alabama Railroads

Opp, Alabama, hosts the operations of the Alabama & Florida using 160.380 for its general operating frequency.

The Alabama Railroad based in Corduroy, Alabama, uses both 160.500 and 160.695 for its general operations.

The Alabama & Gulf Coast operates old Frisco trackage from Fountain, Alabama, to the Panhandle of Florida. Its three radio channels are:

160.335 Road
160.560 Switching
161.340 Maintenance of Way

The Tip-Up Line

The Toledo, Peoria & Western operates from East Peoria, Illinois, and is a RailAmerica company. We always called it the Tip-Up. Their radio frequencies are as follows:

160.245/161.535 PBX
161.400 Road

161.310 Yard
161.175 Union Pacific interchange

Norfolk Southern Coordinated Ops

Sapulpa is just outside Tulsa, Oklahoma, and is home to the Tulsa-Sapulpa Union Railway. They use two channels for operating their railroad, as follows:

161.070 Ch 1 General operations
160.815 Ch 2 General operations

The Alaska Railroad

The Alaska Railroad runs from Anchorage to Fairbanks, Alaska. Several of their radio frequencies are Federal channels and not RR allotted channels due to the fact that the railroad here was once Federally-owned and operated.

160.305/161.355 Data Telemetry
164.625 Ch 1 Road and Dispatcher-to-train
164.625/165.3375 Ch 2 Train-to-Dispatcher
165.2625 Ch 3 Yard and Police
164.9875 Ch 4 Gravel train loading
161.415 Ch 5 Yard
161.445 Ch 6 Yard
161.385 Ch 7 Special operations
161.565 Ch 8 Reserved
165.3125/171.3625 Ch 9 PBX
166.2250/171.3375 Ch 10 PBX
166.3750/171.7250 Ch 11 PBX

The Indiana and Ohio Railway

The Indiana & Ohio Railway uses the following channels in their operations in Indiana and Ohio.

160.545 Road: CIND
161.220 Road: Ex-DT&I Subdivision
161.295 Road: Logan Subdivision
160.695 Switching: Logan Subdivision
161.385 Road: Oasis Sub, Mason Sub, Blue Ash, Brookville Sub
161.385 Yard: McCullough
161.415 Yard: Valley Junction
161.430 Yard: Springfield

Tomahawk in Wisconsin

Tomahawk, Wisconsin, hosts the Tomahawk Railway. This is a switching railroad that works paper mills.

160.290 General operations
160.740 General Operations

Down South in Kentucky

Transkentucky Transportation operates from Paris, Kentucky, to a port on the Ohio River hauling mostly coal. Their radio channels are:

160.665 Road
161.265 Yard
161.445 Dispatcher
161.190 General operation

Many-apples shortline

The Twin Cities & Western operates from Minneapolis, Minnesota, and heads west across the prairie to Appleton. They use several Geeps with the Caterpillar engine replacing the original Electro-Motive engines.

160.875 Ch 1 Yard - Hopkins to Appleton, Minnesota
161.460 Ch 2 Road - Hopkins to Appleton, Minnesota
160.860 Maintenance of Way

❖ ATCS highlights....

ATCS (Advanced Train Control Systems) is the protocol the railroads use for controlling the signaling and henceforth the dispatching of the trains on their railroad by radio control. The railroads use six pairs of 800-900 MHz radio frequencies for operations on this system. The frequencies are typically licensed to the AAR (Association of American Railroads), but are used by the specific railroads.

The digital signals can be found on the frequencies in Table 1.

Table 1: ATCS (Advanced Train Control Systems)

Channel	MCP (MHz)	BCP (MHz)	Normal User
1	896.8875	935.8875	Union Pacific
2	896.9375	935.9375	CSX
3	896.9875	935.9875	Shared ATCS Network
4	897.8875	936.8875	BNSF
5	897.9375	936.9375	Norfolk Southern
6	897.9875	936.9875	South Pacific

The primary ATCS functions are centralized route and block interlocking for managing track occupancies, the issuance of movement authorities to trains and maintenance vehicles, tracking equipped trains, and speed enforcement. Other uses are for fuel economy and monitoring of wayside systems and the general exchange of instructions and other messages.

To find out more about how railfans use ATCS go to <http://www.atcsmon.com>. Check out the software that can be downloaded from this Yahoo Group to enable monitoring the rail traffic by the Internet via remote monitoring sites. Online assistance can be found in the ATCS Yahoo Group.

For the adventurous, you can monitor these signals and route the digital signal from the discriminator output of your radio to the sound card line input of a home computer. With the software found on <http://www.atcsmon.com>, the signal can be monitored, enabling the viewer to watch train movements on the computer screen.

The railroads are now moving toward PTC or Positive Train Control in which the digital signals are encrypted. Be sure to try out ATCS monitoring and have fun while you can.

❖ Your frequencies are needed.

Your emails and letters are most welcome to make this column a success. If you listen to the railroads, please send the railroad radio frequencies you listen to in your area for publication in this column. We are also interested in your thoughts on the ham radios, scanners and antennas you use for railscanning for inclusion in this column. Send to the email above or to this column in care of *Monitoring Times*.

Until the next column, be sure to STOP, LOOK, and LISTEN when crossing all railroad tracks!

Loggings Galore

Welcome to the March issue of *Below 500 kHz*. This month, we continue our focus on reader mail and loggings, both of which have been up significantly in recent months. This is great news on two counts; I've always felt that the best information comes directly from you, and the fall survey clearly showed that readers want to see more frequencies in the magazine.

One quick item before we get to the mailbag. March 11th and 12th are the dates for the 18th annual Winter SWL Festival to be held in Kulpsville, PA (near Philadelphia). The event has become the "Dayton" of SWL meets, and offers programs on all facets of the radio hobby - long-wave through UHF. This year, I am presenting a program on collecting and using vintage receivers. If you appreciate "old iron," this one is for you. Numerous other programs are on tap. You can get complete information on the event at: <http://swlfest.com/>. I hope to meet you there!

❖ Reader News & Loggings

Let's begin with Fraser Bonnett, W3UTD (PA), who writes: "Here are some logs from a few evenings' listening here in Central PA. I've not done anything for over a year, so it's nice to be back at the dials." Fraser's equipment includes an LF-111 antenna with an integrated LF converter (4 to 4.5 MHz output), and a Collins R-390A receiver.

Table 1. Pennsylvania Loggings

Freq.	Ident.	Location
206	GLS	Galveston, TX
212	TS	Timmins, ON
218	YUY	Rouyn, QC
223	YYW	Armstrong, ON
235	CN	Cochrane, ON
236	OW	Ottawa, ON
237	EZF	Fredericksburg, VA
239	FE	Forestville, QC
257	SQT	Melbourne, FL
263	QY	Sydney, NS
273	ZV	Sept Iles, QC
286	ZSM	Gros Cap, ON
332	QT	Thunder Bay, ON
350	LE	Roleigh, NC
351	YKQ	Waskaganish, QC

353	QG	Windsor, ON
363	RNB	Millville, NJ
373	AEA	South Hill, VA
373	ZQ	Mont Laurier, QC
382	YPL	Pickle Lake, ON
398	ZQG	Windsor, ON
404	ZYB	Yellek, ON
409	YTA	Pembroke, ON
411	VFU	Van Wert, OH
416	BKL	Cleveland, OH
423	PCW	Port Clinton, OH
429	IKY	Springfield, KY
515	OS	Columbus, OH
526	ZLS	Stella Maris, BAH

Tom Wrensch, N9HR (WI) sent the logs shown in Table 2. He uses a Kenwood TS-2000 receiver for longwave work, and adds the following about his tuning technique: "Sometimes I find it easier to copy using the AM filter even though it is so wide compared to the 500 Hz CW one. This also means that I cannot tell the exact frequency of all beacons. Some are zero-beated in more than one place, so your *BeaconFinder* comes to the rescue again."

Tom notes that he also hears a beacon near 363 kHz sending *MT*. I wish I could say this one originates from our Brasstown offices, but that is not the case. Is anyone else hearing this one? Drop a line to *Below 500 kHz* so we can spread the word.

Table 2. Wisconsin Loggings

Freq.	Ident.	Location
200	HXF	Hartford, WI
205	XZ	Wawa, ON
209	CLI	Clintonville, WI
209	IB	Atikokan, ON
218	RL	Red Lake, ON
223	YYW	Armstrong, ON
233	QN	Nakina, ON
242	GM	Milwaukee, WI
245	YZE	Gare Bay, ON
247	YLH	Landsdowne House, ON
248	WG	Winnipeg, MB
250	YTJ	Terrace Bay, ON
258	ZSJ	Sandy Lake, ON
260	YAT	Attawapiskat, ON
266	YFH	Fort Hope, ON
272	YQA	Muskoka, ON
274	YPM	Pikangikum, ON
276	YEL	Elliot Lake, ON
278	NM	Matagami, QC
284	QD	The Pas, MB
286	ZSM	Sault Ste Marie, ON
300	YIV	Island Lake, MB
303	YPP	Parent, QC
305	YQ	Churchill, MB
317	VC	Lo Ronge, SK
326	YQK	Kenora, ON
328	YTL	Big Trout Lake, ON
329	LLE	West Bend, WI
329	YHN	Hornepayne, ON
332	QT	Thunder Bay, ON
332	SG	Green Bay, WI
335	YLD	Chapleau, ON

338	HE	Sheboygan, WI
338	VTI	Vinton, IA
338	ZEM	Eastmain, QC
340	YY	Mont Joli, QC
341	LDM	Ludington, MI
341	YYU	Kapuskasing, ON
344	CL	Cleveland, OH
346	YXL	Sioux Lookout, ON
347	AIG	Antigo, WI
350	ME	Chicago, IL
351	YKQ	Waskaganish, QC
353	QG	Windsor, ON
355	YWP	Webequie, ON
356	GR	Green Bay, WI
356	RCX	Ladysmith, WI
359	UES	Waukesha, WI
362	SB	Sudbury, ON
365	AA	Fargo, ND
365	MRJ	Mineral Point, WI
366	YMW	Maniwaki, QC
368	OH	Chicago, IL
368	SOY	Sioux Center, IA
370	YBV	Berens River, MB
371	GW	Kuujuarapik, QC
371	RYV	Watertown, WI
376	YAG	Fort Frances, ON
377	CWI	Clinton, IA
378	RJ	Roberval, QC
379	FSK	Fort Scott, KS
379	UG	Waukegan, IL
382	PCZ	Wauca, WI
382	YPL	Pickle Lake, ON
385	HYX	Saginaw, MI
388	H7	Manitowaning, ON
389	EN	Kenosha, WI
389	IL	Willmar, MN
389	LCG	Wayne, NE
391	BHN	Fort Leonard Wood, MO
391	DDP	Dorado, PTR
391	MFI	Marshfield, WI
391	OO	Oshawa, ON
392	ML	Charlevoix, QC
394	YB	North Bay, ON
395	OS	Oshkosh, WI
395	XEN	Xenia, OH
396	PH	Inukjuak, QC
398	ZQG	Windsor, ON
399	ZHD	Dryden, ON
400	MS	Madison, WI
401	YPO	Peawanuck, ON
404	ZYB	North Bay, ON
407	AQ	Appleton, WI
407	BNW	Boone, IA
410	MK	Milwaukee, WI
411	HDL	Holdenville, OK
412	CMY	Sparta, WI
414	RPB	Belleville, KS
417	HHG	Huntington, IN
417	IY	Charles City, IA
419	RYS	Detroit/Grasse Isle, MI
423	CKP	Cherokee, IA
426	FTP	Fort Payne, AL
426	IZS	Montezuma, GA
429	POH	Pocahontas, IA
430	AYB	Auburn, NE
434	SLB	Storm Lake, IA
435	IY	Washington, GA

Finally, we hear from frequent contributor Mike Roth (CT), KA11ZN, who writes: "I wanted to let you know I still enjoy your *MT* column very much, and I find the *BeaconFinder II* to be a great resource! Recent conditions have netted me many new loggings, the top three distant ones being Newfoundland

(1110 mi.), Kansas (1280 mi.), and Mexico (1660 mi.), respectively."

Mike also maintains a website at <http://www.pbase.com/insomni-vore/ndbs>, where you can see photos of numerous beacons in his area.

Table 3. Connecticut Loggings

Freq.	Ident.	Location
216	ME	Matane, PQ
220	BX	Blanc Sablon, PQ
221	HM	Hamilton, ON
223	YYW	Armstrong, ON
229	PD	Port Hawkesbury, NS
232	GP	Gaspé, PQ
233	QN	Nakina, ON
235	CN	Cochrane, ON
236	OW	Ottawa, ON
239	FE	Forestville, PQ
241	HF	Hearst, ON
244	DG	Chute Des Passes, PQ
253	YTF	Alma, PQ
260	UFX	St. Felix De Valois, PQ
261	ZH	Lebel Sur Quevillon, PQ
266	ZMM	Montreal, PQ
266	ZHM	Hamilton, ON
268	S7	Hanover, ON
272	ZMR	Montreal, ON
275	R1	Thetford Mines, PQ
276	YEL	Elliot Lake, ON
281	CA	Cartwright, NF
281	QX	Gander, NF
281	HXX	Berlin, NH
283	PT	Pelee Island, ON
286	ZSM	Sault Ste. Marie, ON
291	9Q	Amos, PQ
300	YOG	Ogoki Post, PQ
304	ZQM	Moncton, NB
317	ZZR	Trenton, ON
329	BK	Utica, NY
329	OU	Quebec, PQ
330	CZM	Cozumel, MEX
336	BDB	Melfa, VA
338	5Y	Trenton, NS
338	ZEM	Eastmain, PQ
339	LQX	Lehighton, PA
341	LDM	Ludington, MI
341	CCJ	Springfield, OH
344	AVN	Avon, NY
349	APG	Aberdeen Pvg. Gnds., MD
353	F7	Parry Sound, ON
354	ZZV	Sept Iles, PQ
355	YWP	Webequie, ON
362	FMH	Falmouth, MA
363	1F	Bathurst, NB
364	TZ	Winchester, VA
364	2B	Springdale, NF
364	ZHZ	Halifax, NS
365	JN	Muncie, IN
372	CQD	Erie, PA
377	CWI	Clinton, IA
382	XU	London, ON
382	SJX	Beaver Island, MI
387	6E	Grand Manan, NB
388	H7	Manitowaning, ON
393	CVX	Charlevoix, MI
397	ZHA	Hamilton, ON
397	ZST	St. John, NB
398	ZQG	Windsor, ON
400	ZYG	Charlottetown, PEI
404	ZY8	North Bay, ON
408	HBD	Hubbard, OH
412	CTZ	Clinton, NC
413	YHD	Dryden, ON
414	RPB	Belleville, KS
416	BKL	Cleveland, OH

WSQT X-Band Pirate/Clandestine Appears in DC

Listeners on the East Coast of North America were startled around Christmas time to hear a pirate and/or clandestine station on 1680 kHz in the expanded medium wave band. The station, with WSQT call letters, advocated protests at the inauguration of President George W. Bush of the United States. Sometimes they also use a slogan of "Guerrilla Radio." The signal was well heard throughout the Washington-Baltimore area, and Larry Van Horn reported the signal made it all the way to Brasstown, North Carolina. Major national media quickly picked up this story, sending the news around the world.

The station claims to be operated by urban activists in the Washington, DC, area, with an interest in issues such as housing, homelessness, war, and the environment. They claim to be using a transmitter constructed from parts acquired at Radio Shack. CNN reported that the FCC was not aware of the station until they were contacted by a CNN reporter. The FCC told CNN that they would use direction finding equipment to find and then close down the unlicensed station. But, as of press time at *MT*, this had not yet happened.

❖ 4065-4070 kHz

Most North American pirates broadcast somewhere near 6925 kHz. They do this because the pirates want to have an audience for the shows that they broadcast, and because this is where the listeners normally will be looking for the stations. This happy marriage between broadcasters and listeners has been useful to both sides of this situation. But, pirate radio stations sometimes appear on any frequency of their choosing, for a variety of reasons.

One of the oddball frequency ranges that has recently seen some North American pirate activity has been the area between 4065 and 4075 kHz. During the winter, during relatively low sunspot counts in the solar cycle, this frequency range just above the 80 meter Amateur Radio band can support nighttime propagation over surprising distances. So, if you are looking for rare pirate catches, this unusual frequency range is a new one to add to your bandscanning.

❖ New Star Clandestine Web Site?

The New Star Broadcasting Station has been one of the most oddball clandestine stations on the shortwave bands in recent years. The sta-

tion mixes Chinese music and numbers station messages. It has never been established whether the station is a genuine spy operation by either the Taiwan or Chinese government. Loggings of this one have been rare in recent years. But, a web site discussing the station has been discovered on the internet. Despite the fact that the web site is several years old, it may be of interest to many of us. Check it out at the <http://www.swl.net/radiochina/newstar/newstar.htm> URL.

When it was active, the frequencies to look for this clandestine were 8300, 9725, 11430, 13750, and 15390 kHz. Since the web site referenced here was constructed, a better identification for this one has been commonly accepted as Star Star Broadcasting Station.

❖ Schoech's Clandestine Survey

Martin Schoech, the force behind the wonderful *Clandestine Radio Watch* newsletter, has released the results of his 2004 *Clandestine Activity Survey*. This annual survey calculates the volume of political clandestine broadcasting across the world. Martin reports that in 2004 there were 1,229 hours of clandestine broadcasting scheduled on a weekly basis. This was a 28.5% decline in comparison with 2003, and it represents the second lowest figure since Martin began his calculations in 1986. Martin reports that the most common target areas for clandestine broadcasting in 2004 were (not surprisingly) Iraq, Afghanistan, and North Korea.

Martin also notes that he still maintains a personal web site, which you can check out at <http://www.schoechi.de>

❖ Winter SWL Fest

It's that time of year when we start thinking about the Winter Shortwave Listeners Festival. The annual gathering of radio monitoring hobbyists has grown to become the largest such event in the world. As usual, pirate and clandestine DXing will be well represented at this year's fest. But, all aspects of the radio monitoring hobby are covered, and the main purpose of the Fest is for everybody to have a good time. This year the Fest is scheduled for March 11 and 12, 2005.

As usual, several *MT* staff will be among the hundreds of radio hobbyists gathered for the annual Kulpsville reunion. We hope to see you there. Registration forms for the fest are available at <http://swlfest.com/>

❖ What We Are Hearing

Monitoring Times readers heard twenty different North American pirates this month. You can hear them too, if you follow some simple rules:

Pirate radio stations never use regular announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. You sometimes have to tune up and down through the pirate radio band to find the stations, but the primary North American pirate frequency of 6925 kHz remains the best place to scan. More than 90% of all North American shortwave pirate broadcasts are heard on or near 6925 kHz.

Captain Morgan- Rock music with a slogan that "You're in the pirate zone." (Says to send reports to ACE, and has QSLed lately)

Grasscutter Radio- Rock music supplemented by pirate radio advocacy. They like to organize conversations among pirates. (grasscutterrado@hotmail.com)

Ground Zero Radio- Dave Gunn's mix of rock music and comedy. (Elkhorn)

Indira Calling- Pirate parody of All India Radio. (Providence)

James Bond Radio- We don't know much about this one, which mixes drama and music programming. Occasionally, a synthesized voice says, "Bond, James Bond." (None)

Radio Cochiguaz- South American Pirate plans to transmit in upper sideband on 11430 kHz. They anticipate irregular operation on the weekends with 150 watts. (Santiago)

Smooth Blues Radio- Their ID makes their format obvious. They claim to broadcast from Mississippi. (None)

Sunshine Radio. Rock music, announcer either a young boy or a female. (None, some replies via the grasscutterrado@yahoo.com)

The Crystal Ship- Classic rock, perhaps because it is a reincarnation of a famous 1970s pirate. Sometimes uses frequencies near 4070 kHz. (Belfast and tcshortwave@yahoo.com)

Take It Easy Radio- Desperado plays Eagles, other rock, old time radio dramas, and diverse pirate radio programming. He also QSLs. (Merlin and takeiteasyradio@yahoo.com)

Tu Nave Kosmos- South American pirate, with host Danny Flex, surprisingly produces English language programming for relay by North American pirates. Rock and comedy. (tunavekosmos@hotmail.com)

Undercover Radio- Dr. Benway's rock music spiced with comedy and parody in the classic pirate format. (Merlin)

WAZL- The famous and hilarious Fearless Fred, the founder of Radio Garbanzo. (Belfast)

WBMR- Michael O'Farad at Black Mountain Radio features rock music and drama. (wbmrradio@hotmail.com)

XERV Relay- Some pirate has been relaying programming from the Los Angeles AM medium wave station on 1090 kHz. These shows use a quasi-Mexican call sign, even though the format is rock music. (None)



continued on page 71

Brainstorms and Daydreams

Editor's Note: This column was written before the December 26 tsunami which put Echolink, a rare DXpedition, and ham radio to the ultimate test. Maybe Skip's brainstorm isn't such a pipe dream after all...

I tend to do some of my best thinking for this column with chopsticks in my hands. This is because I do a lot of brainstorming over lunch at one of a number of local Chinese Restaurants with my long time friend and ham radio compatriot Jon WB2KKS. Between Jon and I, we have over 50 years of amateur radio activity (and even more than that as SWLs). So there are very few ham subjects that have not been covered between bites of Dim Sum and General Tso's Chicken.

At one of our recent meetings over fine Asian cuisine, we talked about the growing use of *combined communications* modes such as *Echolink*. We also talked about looking forward to this winter's rarer DX offerings such as the Peter I Island (Antarctica) DXpedition 3YØX (hopefully in my log book by the time you read this column). We also talked about how issues with BPL might drive some hams off of the HF bands (in the short term) and thought about doing more with VHF/UHF operation including weak signal and maybe even satellite modes.

EchoLink

For those of you who haven't experienced it yet, EchoLink is a software package that allows licensed Amateur Radio stations to communicate with one another over the Internet, using voice-over-IP (VoIP) technology. With this software, it is possible to link ham stations by way of the Internet, allowing for reliable voice communication.

Echolink systems are often set up with connections to VHF/UHF repeaters allowing for interesting worldwide contacts. Also, the Echolink software package allows for secure remote control that appears to be adaptable for controlling both radio and PC systems. You can learn a great deal more about this protocol and even download the software at <http://www.echolink.org>

Echolink is just one of many digital protocols that lend themselves to amateur radio use, both for direct communications and control applications. Hams have been in the forefront of figuring out how to mix personal computers and radio since the earliest days of the PC movement. Remember, Steve Wozniak was a ham!

Rare DX

Expeditions such as the operation on Peter I

Island make for rare DX not just because the locations are remote. Putting on a serious DXpedition to anywhere can be a major financial expenditure. Transportation costs, equipment, infrastructure for living off the land and dozens of other things lead to the need for many hams to empty many wallets to give the rest of us an opportunity to get one more "new one" into the log book. If you have ever taken an extended vacation outside of the United States, imagine multiplying your basic costs by a factor of about 5 and then multiply it again across a party of operators sufficient to keep the station on the air for the duration of the activity. You're talking real money here, folks!

Broadband over Power Lines

BPL and its potential for HF interference could be problematic for hams. I have already said in this column that I don't expect it to be a long term issue because I expect many other telecommunications systems will rapidly surpass the "promise" of BPL. Still, in the short term, some hams may have to contend with interference challenges while their local public utility tries to dip its toe in the Internet waters.

As someone who always tried to turn lemons into lemonade, I realize that I have conquered most of the major HF band challenges including QRP awards. It may be time to devote more shack space

to operating in the VHF/UHF world, including digital modes and satellite communications. Who knows, if I can find enough surplus tubing and screening, I might even try my hand at constructing a parabolic antenna to attempt the challenge of EME, at least until the BPL QRN blows over.

❖ Building Castles in the Air

But, in this case, Green Tea and Hot and Sour Soup have turned Old Uncle Skip into something of a big idea man. Nothing I am about to expound upon is carved in stone. Heck, some of it may not even be fully addressed by the rules of amateur DX practice. Instead, think of it as food for thought, maybe even Chinese food at that...

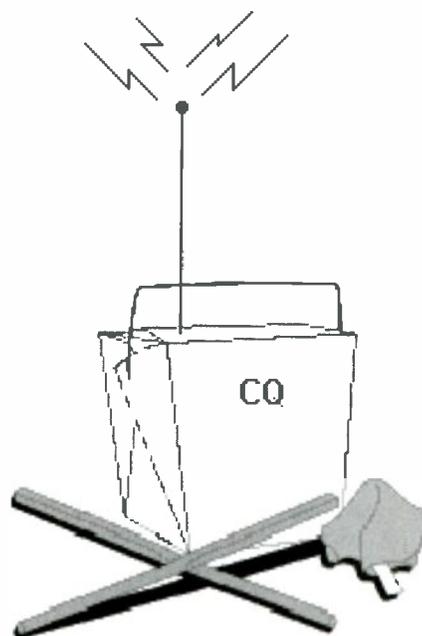
As I have mentioned in previous columns, at any given time there are about 20 or so DX entities that are considered rare, usually because the cost of setting up a station at such places is expensive and maybe even dangerous. (We won't even get into those entities where politics keeps hams off the air.) It just seems that there has to be a better way. One that not only puts the entity on the air for DX award purposes, but maybe does a more important thing. That being, *advancing the amateur radio art*, one of the real reasons why we have been awarded our operating privileges.

All of the above-mentioned lunch discussion got me wondering about a number of ideas. Feel free to take any one or more of them and run with them. I'll be happy to write about your accomplishments if you do. Don't be too surprised if I try to figure things out, too. Part of the fun of ham radio is building foundations under castles in the air.

Remotely possible...

Radio amateurs worldwide now have the ability to perform highly efficient digital communications, thanks to personal computers and transceiving equipment that easily interfaces with PCs. Almost since the beginning of the personal computer movement, hams have come up with dozens of novel ways to control radio equipment both by hardware interface and by way of remote control RF signals. Perhaps the ultimate expression of these skills can be found in most of the current crop of Amateur Satellites.

Amateur and Commercial radio space communication demonstrates clearly that a radio system can be set up and controlled in a remote and hostile environment. (You'd be hard pressed to get much more remote and hostile than the Clark Belt!) Many hams have experimented with remote control of ground-based HF stations, too, both over telephone lines and by way of VHF/UHF remote links. How cool is it to have a 20 meter DX contact



Is a new kind of remotely operated ham station in your tea leaves or fortune cookie?

(complete with control of rotatable beam antennas) by way of your handi-talkie while you're out for a walk with the family dog? There are a number of repeater systems set up around the country that allow group members to do just that.

Combined communications modes, such as Echolink and some packet radio systems, allow a signal to travel in novel ways because it can move partly through radio waves and partly through wireline telecommunications networks, including the Internet. I remember, during the early days of the packet radio movement, running a two meter signal to my nearest packet repeater, setting up a series of "hops" through successive systems to a packet station in New York that allowed me to access a hardwire telecommunications "wormhole" that linked me to packet systems in both Russia and the UK. With this connection established, I could then communicate with hams in those countries by way of their packet systems.

Echolink takes this notion a step further by adding reliable voice communications and the Internet to the mix. Further, current generation hardware and software allows for complex communications by way of any PC equipped with a basic sound card.

The radio hobby has come a long way in terms of microprocessor controlled equipment as well as miniaturization through the use of surface mount component technology. You can cram a lot of radio and features into a very small package. Take a look at any modern 2 meter handheld to see where we are. Take a look at the latest in cellular telephone technology to see where we are headed. We have also, through both ground and space based experiments, come up with novel power management tools. Solar power, high efficiency batteries and power control circuits have been applied to earthbound repeaters as well as amateur satellite systems.

Applied theory

Okay, now pick any rare DX entity at random. Here's where the fun begins!

It wouldn't be all that hard to build a complete HF amateur radio station into a small package along with solar charged batteries. This could be augmented with a control system board capable of operating on the VHF/UHF bands by way of satellite or a combined communications system that got close enough for reliable high band communication. A common thermal lined picnic cooler could be easily modified to be both protective and weatherproof. The station could be set up in any remote location and attached to anything from a simple dipole to a more complex antenna array depending on conditions and power availability. Low drain latching relays can do wonders with antenna tuning.

A DXpedition could leave just such a station behind after finishing up their formal operations. It could then be accessed by hams for a unique form of communications with a rare DX entity. Some of our ham satellites have exceeded their design life by several factors. A well designed ground station could provide months or even years of continuous contact.

It's a stretch...

Okay, so maybe such a station doesn't fit in with the letter and spirit of the DXCC rules.

Likewise, it might require some creative reading (or rewriting) of the regulations about third party traffic and unattended operating. But the technology certainly exists to make such a station work.

Want to dream a bit further? How about a system that can be airdropped into a remote location and, through the use of some basic robotics techniques, could deploy an antenna and get to work. You don't have to apply this technique to a rare DX entity. You could use something like this to activate some of the harder to get to VHF/UHF grid squares domestically.

The argument has been made recently in a number of ham publications that we have lost our engineering edge. That we have nothing more to give the radio world except reliable emergency communications. I don't accept that position for one nanosecond! I have just presented a couple of ideas for further development that are not only within the skill and scope of many dedicated hams, they could represent new and different ways of deploying communications in remote locations. I am sure I am not the only one thinking how such remote systems could be deployed in emergencies or to improve communications in areas where power or environment might present unique problems. We, as hams have to get back in the business of dreaming! We still have a great deal to offer to the art of radio.

Then again, it might just be the Vegetable Lo Mein talking.

❖ A Winterfest Upgrade

By the way, there's still time to plan to show up at the Kulpville SWLfest March 11-12 (<http://www.swlfest.com>). Just as we did last year, a group of us will be offering VE exams for all classes of Amateur Radio licenses. You can be one of the folks who can tell all their friends that Old Uncle Skip signed off on your license paperwork!

Have fun! I'll see you on the bottom end of 40 meters.

UNCLE SKIP'S CONTEST CALENDAR

ARRL International DX Contest (SSB)
Mar 5 0000 UTC - Mar 6, 2400 UTC

Oklahoma QSO Party
Mar 12, 1400 UTC - Mar 13, 0200 UTC and
Mar 13, 1400 UTC - 2000 UTC

North American Sprint (RTTY)
Mar 13, 0000 UTC - 0400 UTC

Wisconsin QSO Party
Mar 13, 1800UTC - Mar 14, 0100 UTC

10-10 International Mobile Contest
Mar 19, 0001UTC - 2359 UTC

Virginia QSO Party
Mar 19, 1800 UTC - Mar 21, 0200 UTC

CQ WW WPX Contest (SSB)
Mar 26, 0000 UTC - Mar 27, 2359UTC

QRPARCI Spring Homebrewer Sprint
Mar 28, 0000 UTC - 0400 UTC,

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Antenna Types: The Marconi

Last month we discussed Hertz's dipole antenna, and the fact that the majority of antenna's in use today are descended from Hertz's early work. This month we look at some decedents of Hertz's dipole.

While working with a Hertzian, half-wavelength dipole antenna (fig. 1A) the wireless pioneer Marconi decided to remove one half of the dipole and substitute a ground connection in its place. He then set the remaining 1/4 wavelength element up vertically just above that ground connection (fig. 1B).

Marconi's new vertical antenna worked very well, and has remained a popular antenna since that time. It performs equally well in all compass directions, which makes it a useful broadcasting antenna. The antenna also directs a good portion of its radiation and reception at somewhat low angles relative to the earth. This makes it popular not only for broadcast work, but also for long-haul, low-frequency communication and for DX work on the shortwave bands.

Much later, George Brown and his co-workers developed the quarter-wavelength ground-plane antenna (fig. 1C), which has some features in common with the Marconi. The ground-plane antenna usually uses a quarter-wavelength, vertical element over a so-called ground plane, rather than over the actual ground. The ground plane consists of two or more quarter-wavelength radials extending outward below the bottom of the vertical element. In contrast to the ground plane, the ground to which the Marconi is connected is either earth, or, prefer-

ably, earth plus radials placed in or on the earth. The Marconi radials do not need to be a quarter wavelength long, because they are not tuned elements, they are current-return collectors.

To see the ground-plane antenna's relationship to the half-wave dipole, just picture a half-wavelength dipole rotated to a vertical position. Then split the bottom half of the dipole into two strips. If we pull these strips outward they become radials, and we have made a ground plane antenna from the dipole.

Like the half-wavelength dipole, the 1/4 wavelength ground plane antenna has a folded-element version which has greater bandwidth than the simple vertical element design. Popular vertical-element lengths for both the ground-plane antenna and the Marconi designs include the .53* wavelength, which is sometimes implemented by AM broadcast stations to combat fading, and the .625 (5/8) wavelength. Both these lengths have more gain and low-angle radiation than the 1/4 wavelength element.

When we continue this series next month we'll find more examples of the tremendous influence of Hertz's pioneering antenna work on today's antenna technology.

❖ Let's Build a Ground-Plane Antenna (or Two):

From around 25 MHz and higher in frequency, the ground-plane antenna design produces an antenna of a size which is practical for most of us to consider building and installing. Here are the basic steps in building a ground-

plane antenna.

1. The vertical element, and radial elements are all of the same length. Determine this length from:

$$\text{Length (ft)} = 234/\text{Freq in MHz, or}$$

$$\text{Length (m)} = 71.3/\text{Freq in MHz}$$

Thus, both the vertical element and radials for a ground-plane antenna for 100 MHz operation would be 2.34 feet or .713 meters (71.3 cm) long.

Short, self-supporting elements can be made of heavy wire, or, for longer elements, of metal rod or tubing. Thicker elements give a greater bandwidth. Stronger construction results if we make two radials from one continuous length of conductor. To do this, cut a conductor twice as long as the length given by the equations. Bend this conductor at the middle to a 90-degree angle. This makes two quarter-wavelength radials joined at their ends.

Brown has assured us that using more than two radials is unnecessary; it's simply for cosmetic effect. Some folks use three or four radials: suit yourself on number of radials to use.

2. Make the insulating base (fig. 1D) from well-varnished hardwood, plastic, PVC tubing, or other strong insulating material. U-bolts can be handy for attaching large elements to a base. Smaller elements can be made to fit into PVC tubing and held in place by their mounting holes. The feed line can then be run up through the tubing to the antenna base.

Whatever technique you use, make the base long enough that it can serve to attach the antenna to a mast or other support.

3. This antenna offers about 50-ohms feed-point impedance, so 50-ohm coax feed line is preferred, but 75-ohm should work fine, too, in most installations. Attach the feed line, and seal the coax's open end against water. Black plastic tape pulled very tight as it is wrapped will work. Coax sealant is available in various radio supply stores (such as Radio Shack® catalog # 278-1645).

4. Further weather protection can be added by preparing a shroud from a plastic bottle with screw-on cap as shown (fig. 1E). The bottom of the bottle is removed, and notches made for the radials at the bottom of the sides. If you used PVC pipe as a base, then a pipe cap makes a good shroud as in fig. 1C. Seal against water where the vertical element goes through the cap.

5. Mount the antenna as high and in the clear as practical.

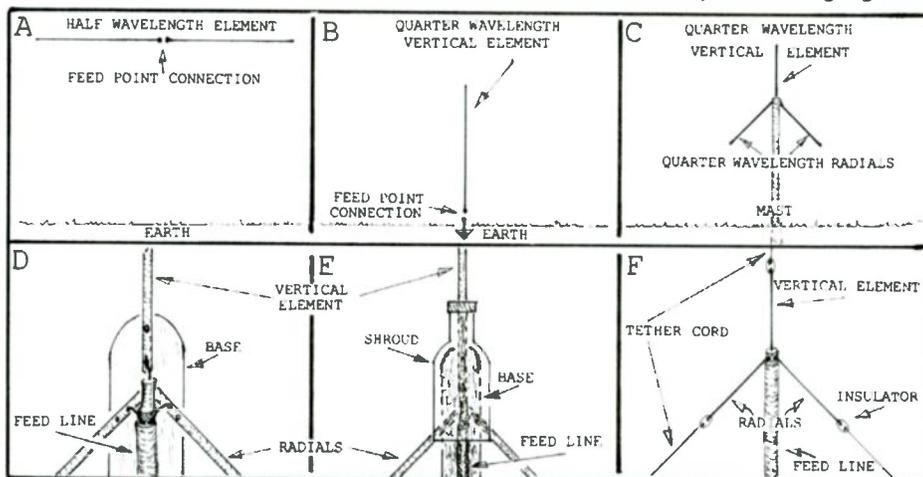


Fig. 1. A half-wavelength dipole (A), a Marconi, grounded, quarter-wavelength, vertical antenna (B), a ground-plane antenna (C), One possible base arrangement for a ground-plane antenna (D), one version of a weather shroud (E), and an inexpensive, easily-built ground-plane antenna (F).

This Month's Interesting Antenna-Related Web site:

A nice power-point survey of antenna types is found at:

http://www.educatorscorner.com/media/Exp_101_ppt_Chpt18b.ppt

And here's a site that will test, and maybe extend your knowledge of antenna technology:

<http://members.aol.com/ab0di/el3c8.html>

❖ The Quick, Inexpensive, Easy Version:

A very simple, inexpensive, easy, but effective ground-plane antenna (fig. 1F) can be made by following these steps:

1. Strip the outer insulation, braid (shield), and inner insulation off a half wavelength of coaxial cable. This leaves an exposed half wavelength of bare wire as the vertical element.
2. Trim a bit of outer insulation from the shield so that you can attach the radials as shown. Make these radials from one length of wire as described above. When attached, they should each make an angle of about 45 degrees with the coax feed line as it hangs directly down between them.
3. If you use this antenna outside, seal the open end of the coax.

If you live in lightning country use lightning-induced damage protection for outdoor

antennas. The minimum is never use the antenna when lightning is likely and disconnect the feed line from your rig, and ground it when it is not in use.

Last Month:

I asked: "Electromagnetic waves have both electrical and magnetic properties, right?"

RADIO RIDDLES

So are the dipole antennas discussed above "electric antennas," or "magnetic antennas," or "electromagnetic antennas," or is this just a joke?"

Well, most antenna designs respond primarily to either the electric field or the magnetic field of the incoming wave which they receive. The wire dipoles discussed last month respond primarily to the electric field, and so they can be called "electric antennas."

Some dipole antennas are constructed by cutting a half-wavelength long slot in a sheet of metal. These respond primarily to the incoming wave's magnetic field, and are known as "magnetic antennas." Slot antennas find application built into the metal skin of aircraft. Of the relatively few magnetic-antenna designs available, small loop antennas are perhaps the most common.

This Month:

Typically, dielectrics (insulators) neither conduct electricity well, nor respond much to magnetic fields. So, since antennas function via electrical and magnetic phenomena, dielectrics have no function in antenna design other than to insulate conductors or hold them in place. Right?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then, Peace, DX, and 73.

*In the December *Antenna Topics* the length of the anti-fade antenna should have been given as .53 rather than 7/8 wavelength. Thanks to Gary Peterson, KØCX, for catching this.

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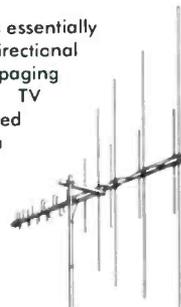
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The NC-57 – Some Unexpected Glitches

At the close of last month's column, it looked as if the NC-57 would be ready to settle down and behave once we took care of the trashed r.f. gain control. In preparation for doing this repair, I had asked a friend with a bigger junk box than mine to see if he could come up with the required replacement – a 10,000-ohm, 2-watt wirewound potentiometer – not a very common component. After a diligent search, Bill managed to come up with one.

❖ The Best Laid Plans....

This month's session began with my undoing of all of the work I had done last time to remount the chassis in its cabinet. That annoying procedure that had required resoldering a couple of virtually inaccessible connections using a combination of braille, instinct and luck. However, the cabinet had to be removed again because there was no other way to dismount the faulty pot.

I began to get a bad feeling when I saw how difficult it was to remove the defective unit once I had it freed up and disconnected. The pot was half buried under densely-wired r.f. components that would have been virtually impossible to move out of the way. However, I was able to work out an exit strategy by turning the control this way and that as I snaked it around the obstructions. The catch is that my replacement unit was much bigger than the original. It would have fit in the position vacated by the old pot – but there was absolutely no way to get it there!

So, I carefully examined the old control to see if it could somehow be placed back into service. The rotor, which appeared to be made from a stiff copper alloy, was seriously bent and no longer in contact with the resistance element. Someone had apparently forced the rotor against its stop – perhaps under the impression that

it was fitted with an on-off switch like the a.f. gain control.

I would have liked to dismantle the potentiometer for easier access to the bent part, but there was no way to do that. However, through careful bending with a small pair of long-nosed pliers, I was able to straighten out the crinkled metal, restoring the original geometry. The rotor was now in firm contact with the resistance element over its entire travel path.

After spraying the element with some contact cleaner and working the control back and forth several times, I hooked an ohmmeter across it and checked for continuity. I was pleased to observe a smooth uninterrupted change in resistance throughout the entire range.

After snaking the pot back into position and remounting it, I was ready to reinstall the cabinet and continue testing.

❖ Not a Peep!

Crossing my fingers, I plugged in the radio, clicked on the power, and waited for the warmup. But there was no sound except for a little static in the speaker as I turned the audio gain control. The set had seemingly reverted to its original fault: blocking of the r.f. signal caused by failure of the r.f. gain control. Had my fix gone sour? Would I have to pull the set apart again and search for a properly fitting control?

Disgusted, I unplugged the radio and placed an ohmmeter across the repaired unit. Much to my surprise, it was still just fine! However, a quick check with the multimeter showed that the 6SG7 2nd i.f. amplifier had no plate voltage. Referring to the schematic, I saw that the tube received its plate voltage via one of the segments of the CW Oscillator-MVC-AVC-Automatic Noise Limiter selector switch.

In the CW Oscillator and MVC positions, the 6SG7 plate was connected directly to the B-plus bus. However, in the AVC and ANL positions, the plate received voltage through a 2200-ohm, 1/2-watt resistor. Could the resistor be somehow defective?

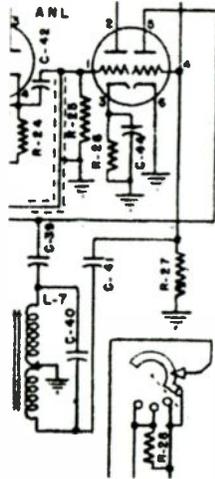
There was one easy way to test the theory. I warmed up the NC-57 again and moved the selector switch from the AVC position, where it had last been, to the MVC position. The radio immediately came to life. It must have been in that position during my initial successful test of the radio last month.

I wasn't looking forward to finding the little resistor, which could easily have been buried behind a switch wafer. But it turned out to be no problem at all. As soon as I upended the chassis and eyeballed the selector switch there it was – sitting right on top. And it was broken in half! There was no discoloration or any other sign of electrical stress. It was just broken in half. Go figure!

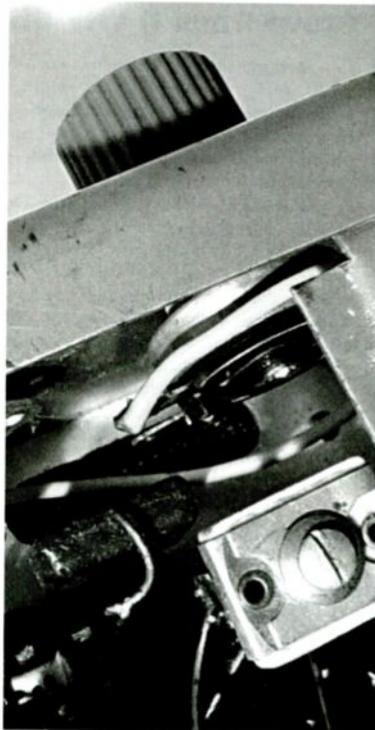
After substituting a good 2200-ohm resistor for the damaged one, I found that the radio now pulled in signals at all positions of the selector switch.

❖ CW Oscillator Problem

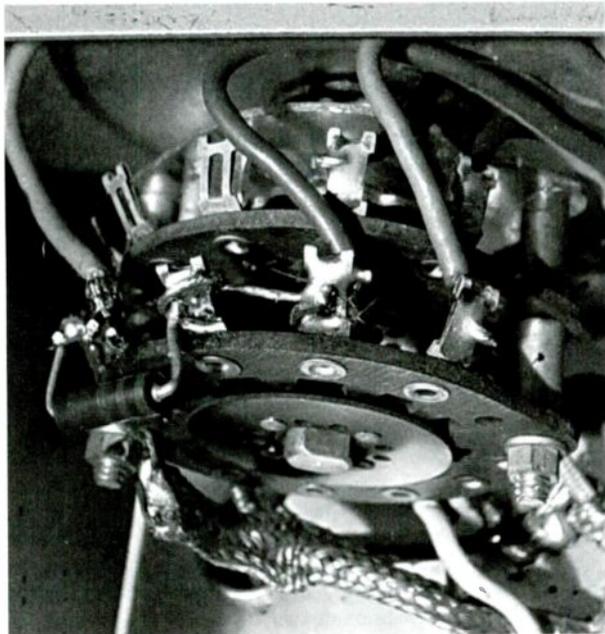
With full operation restored, it was time to touch up the alignment of the i.f. transformers. To set up for this, one feeds a modulated 455-kHz signal into the radio's front end (at the mixer tube) and hooks up a meter to indicate the strength of the output signal. There are a few ways to do the latter, and I've discussed and tried them all in this column at one time or another.



Location of the unexpected circuit problems. Wiper on switch segment (lower right) feeds plate voltage to 2nd i.f. tube. A break in the associated resistor (R28) cut off voltage in AVC and ANL switch positions. Right half of 6SN7 (upper right) is CW oscillator; L7 is oscillator coil. Mica capacitors C40 (tuning) and C41 (grid coupling) were leaky.



Repaired r.f. gain control (behind the front-panel knob) barely fits into a confined space surrounded by other components.



Broken resistor (R28) on back of selector switch was easily replaced by the one shown here.

This time, the most convenient way seemed to be to connect an a.c. voltmeter (via a .01 uf capacitor) to the plate of the 6V6 audio output tube. With that in place, and the radio's AVC turned off so that it would not try to control the strength of the output signal, I proceeded to tweak the screwdriver adjustments of the i.f. transformers' permeability-tuned cores.

The manual indicated that the six adjustments (two for each of the three transformers) could be done in any order. This procedure was carried out without any problems, and I found that the original adjustments were still very close. I was a little surprised to find that, though the adjustment peaks were definite, they didn't seem as pronounced as I had expected from my experience with other radios.

The next step was to adjust the tuning of the CW oscillator so that it would zero beat the 455-kHz test signal with the pitch control halfway between its stops. Switching to the CW position of the selector switch, I soon found that the oscillator was not working at any position of the pitch control.

Getting out the multimeter again, I found that the section of the 6SN7 dual triode doing duty as a CW oscillator was getting proper plate voltage. There were not many other components in this oscillator circuit – just two mica capacitors, a paper cap, and a coil. The paper unit had been replaced during my initial recapping session. Micas fail so rarely that I never replace them when doing a general recapping. So these were original.

At this point, there was only course open, and I took it. I disconnected and removed the micas so that I could test them and the oscillator coil out of the circuit. Both micas showed excessive leakage on my capacitor checker, but the coil was fine.

I replaced the 270 pf grid coupling capacitor with a new silver mica unit, but I didn't happen to have an exact replacement

for the 220 pf cap that had been connected across the coil to tune it. I did have some 100 pf caps, and I used my checker to pick out a couple that were slightly high in value. These I connected in parallel across the coil.

Reassembling the circuit, I tried the radio again and was rewarded with a very robust signal from the oscillator. And I was able easily to adjust it so that zero beat with the test signal occurred exactly half way between the stops of the pitch control.

❖ Deja Vu All Over Again

Finding bad mica caps in a radio is a rare occurrence – as is finding bad tubes (at least in transformer-powered sets). But if you followed the previous Hallicrafters S-40 restoration, you'll remember that the set

had both problems. Besides the micas, at least three tubes were weak and had to be replaced.

Not only did the NC-57 have those bad mica caps, but at least three of its tubes had been replaced. I know because the replacements used were not original types, but close equivalents. (I had pulled these and substituted the proper types.)

I think I understand this "coincidence." The plate voltages in both sets had soared out of control: in the Hallicrafters because of the overheating and derating of a power resistor; in the National because open circuiting of the r.f. gain control had lifted the power-supply bleeder from ground. Interesting!

❖ Oops Department

Careful as I try to be, my fingers sometimes trip on the keyboard to create the occasional typo. Looking over the January column, I noticed a couple of them. On the first page, third column, second paragraph, the sentence beginning on the fifth line should start: "The first (brown) and second (black) significant figures...." On the second page, first column, first paragraph, the parenthetical phrase in the seventh line should read: "(using figure 1b as a position reference only)."

❖ Feedback Department

I've received a number of responses to my "How Do You Like Us So Far?" query in the January column. And I'd like to extend my thanks to everyone who wrote. But I am hoping to increase the sample size, so it's still not too late to influence the future direction of *Radio Restorations*. If you have some feedback or ideas about the column, please sit right down and write now! Use the e-mail address at the head of the column, or send a note to me at P.O. Box 1306, Evanston, IL

60204-1306.

If you have a copy of the January issue, you'll find my specific questions there – but it's not really necessary to review them if it's not convenient. Just tell me what you think. Need a little extra inducement? Okay, then! Everyone who responds to the survey will receive a copy of a very useful, 12-page Philco booklet titled *Trouble Shooting Techniques*. Published in 1952, the publication outlines a down-to-earth procedure for localizing trouble in a.m. receivers.

Those who contact me by e-mail will receive the booklet in .pdf (Acrobat) format. It has been scanned full-size (8-1/2" X 11") at good resolution and will print out nicely. Snail mail respondents will receive a hard copy of the booklet. Folks who have already responded will also get a copy.

Trouble Shooting Techniques comes to you courtesy of my friend Chuck Schwark, proprietor of the "Philco Repair bench" web site (<http://www.philcorepairbench.com>), where you will find most everything you need to know (and things you may never have thought to ask) about vintage Philco radios and lore.

Thanks in advance for your responses. Next month, we'll complete the NC-57 restoration by tweaking its r.f. and oscillator adjustments and doing some necessary minor housekeeping. I'll also introduce our next restoration project. I have a couple of interesting ones in mind, but haven't decided between them yet.

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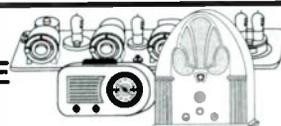


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REVIEW

A Poor Man's Ideal Portable - Degen DE1103

By Eric Bryan

With my old Sony ICF SW1 on the blink, I bought the Grundig Mini World 100PE, then the Kaito WRX911 (both pocket analog sets), as temporary measures while I hunted for a replacement. (See October 2004 *Monitoring Times* for my comparison of these two sets.) I was pleasantly surprised at the performance of these tiny, inexpensive units – pulling in African and European stations here on the U.S. West Coast.

Nothing beats the analog feel for band-scanning, but I still wanted a radio with digital precision for DXing. I was holding out for the ideal radio which would meet my list of desired features:

- Full coverage of 100-30,000 kHz
- Dual conversion for image rejection
- SW tuning in 1 kHz increments
- A tuning knob
- Direct entry
- Memories (20 to 40)
- SSB reception
- Sleep timer
- Dial light
- Small portable
- Operation on two to four AA batteries

Of course I also wanted the radio to be sensitive and selective. And in the spirit of the poor man's shortwave listening post, I wanted to pay \$100 or less.

I was curious about some of the analog-digital hybrids, in which an analog tuner is fitted with digital readout. Many of these were intriguing and all had tuning knobs, but none of them read out to the last frequency digit. Does 9.46 MHz mean 9460 kHz, 9465, or even 9455 kHz? It would be nice to have analog-feel tuning, but the 15 kHz of frequency guesswork would hamper DXing.

The Grundig YB550PE had many of the functions I wanted but omitted LW and SSB. A huge plus was its scroll wheel which tunes in 1 kHz increments, and it was also fairly small. But then I discovered the Teesun PL200, a tiny version of the YB550PE. The extreme portability of that set was almost a clincher plus it had a tuning knob, but the PL200 lacked the same things the YB550PE did. Next, I almost decided on the Grundig YB400PE because of its proven and venerable record. But it didn't cover all of long wave, required six AAs batteries, and lacked a tuning knob.

Thinking maybe I could find an analog-digital hybrid which read out to the last kHz digit, I searched online and came up with the reverse: a digital-analog which read out to the last kHz digit. The Degen DE1103 came with a bonus for someone like me with analog leanings – in addition to the precise digital readout,

it had a semi-analog dial and needle. Instead of achieving exact digital readout on an analog radio, the engineers here had done the reverse, adding an "analog" readout to a digital radio. I thought it was clever, but apparently Sony experimented with a similar thing several years ago (ICF SW40) without success.

While I was reading up on this radio which appeared to fulfill my wish list, I noticed it was being sold on eBay for a low price. When the Degen DE1103 suddenly dropped another \$10, I was hooked!

Vital Stats

Aside from all my requirements, the DE1103 has an extended FM band (76-108 MHz), a built-in battery charger (batteries charge inside the radio), an AC adaptor, a line-out jack, an external antenna jack (external antenna disables whip on SW and FM), a Wide/Narrow

switch which lets you select a 55.845 MHz or a 450 kHz IF (and doubles as an FM tone selector), a Hold (lock) button, a signal strength meter, a Local/DX switch, two

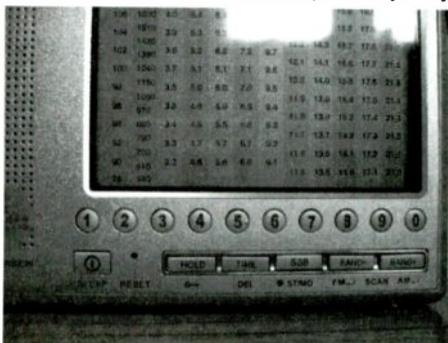


alarms (radio only), 255 memories, auto scan, memory scan, a flip-out stand so the radio can sit at about a 30 degree angle, and all of these features presented within 6"x4"x1" dimensions and weighing in at a pound or less with the four included rechargeable 100 mA NiMH AAs inserted.

Honestly, I was so glad to be getting a digital radio with a knob which tuned in 1 kHz steps, many of these other features were extras to me.

The Buttons

The direct-entry digit buttons are in one row, 1-0, beneath the dial face. This is an inconvenient setup when fumbling in the darkness at the bedside to enter a memory or frequency,



where the traditional telephone-pad layout can be operated by touch. There's a slight ridge on button 5 to help orient you, and you can count your way in from 1 or 0. Still, the buttons are small, and your hand has to move around to find them, where the usual keypad format requires almost no movement and provides easy counting. But this is the price for having the semi-analog dial face where a standard keypad would normally be.

In the upper left corner are three buttons: M/F/AL1; STORE/AL2; and VOL/CHG. Underneath the direct entry buttons are seven more buttons: Power/Sleep; Reset; Hold; Time/Del; SSB/St-Mono; Band-/FM enter; Band+/AM enter.



The Jog Dial

Probably the main thing to keep in mind when approaching this radio is to recognize the jog dial as the multi-purpose control it is. Besides being a tuning knob, it's also for memory setting and scanning, charge, sleep, clock, and alarm time setting, and volume control. But all of these functions can be operated through direct entry, too, including volume (press a desired volume level/number, then push VOL). The volume control is easily mastered.



The LCD/Semi-Analog Dial Face

Information at the top of the dial includes a 4-position triangular signal strength meter, mode (AM or FM), frequency, volume (0-63), a note if either of the alarms is set, and a battery icon which appears during charging and which flashes when the cells are about to run out. Pressing Time changes the frequency to the clock momentarily. The clock displays when the radio is off, and while charging, the signal



strength meter doubles as a charging indicator, to show that charging is in progress. Further, the meter acts as a battery level indicator, to show how much charge is left in the cells. And, with the radio charging, pushing CHG changes the clock to the number of charging hours left.

LW, 120 meters, the 18900-19020 band, 11 meters, and the CB band aren't shown on the semi-analog face, only by the digital readout. The SW coverage of the semi-analog face is (kHz):

- 3100-4100
- 4500-5500
- 5500-6500
- 6500-7500
- 9000-10000
- 11450-12450
- 13450-14450
- 14950-15950
- 17050-18050
- 20950-21950

While in one of these bands, a thin LCD line appears and acts as the tuning needle. On SW it jumps in 25 kHz steps, so it reads anywhere from exactly on to 24 kHz off. On MW, it jumps every 30 kHz, and on FM, from .47 to 4.27 MHz, depending on where you are on the dial face.

The digital tuning increments via the knob are 1 kHz for MW and SW, and .02 and .03 MHz (alternating) on FM. When you reach the top or bottom of one of these bands, the needle snaps back to the opposite end of the band. To tune to frequencies outside these bands, you must enter them, or a memory, directly (but coverage is complete, from 100-29999 kHz).

Auto scanning up or down is in 5 kHz increments on SW, 1 kHz on MW, and .10 MHz on FM. Auto scan goes through the entire band on the dial, following the needle as it wraps around back to the top or bottom of the band. When auto scanning or manual tuning while outside one of the bands on the dial face, if you then enter one of the bands, you are locked in that band until you again direct-enter an outside frequency or memory or use Band - or + to enter another band on the dial face.

Memories

The memories are labeled from 0-9, then 0A-0F, 10-19, 1A-1F, 20-29, 2A-2F, and so on. Presets numbered 0-99 can be accessed through direct-entry. Any memory with a letter in its label (from 0A to FE; there is no FF) can only be accessed by the jog dial in memory mode.

Your positions on each of the 12 bands on the dial face are remembered, unless you switch to memory mode, when they are effaced by presets.

The operation manual refers to memories 0-99 as the "convenience" area, and memories 0A-FE as the "hidden" area. As you can see, deciding how to set and use your memories can be a confusing business.

Memory scanning is accomplished by entering memory mode and then turning the jog dial, which will run you up or down through all preset memories (unset memories and all other frequencies are skipped). This feature is the way to at least partially overcome the lack of a standard keypad for groggy bedside operation: If you preset all your sleep time frequencies consecutively in a cluster in the memory, then

enter memory mode, all you have to do is turn the tuning knob to carousel up and down through your group of chosen stations, without having to press a single button.

SSB

For SSB reception, you tune to a SSB signal with the knob or by direct entry, punch the SSB button, turn the knob until the transmission starts to become intelligible, then adjust the fine tune dial for precise demodulation. SSB is stable, and the fine tune dial feels smooth and solid. Once you fine tune a SSB signal, usually no further adjustment is necessary.

Illumination

With the light switch on, while running on batteries, the radio lights up whenever the jog dial is turned or one of the front buttons is pushed. Not only is the dial face illuminated with an amber glow, but all of the front buttons are, too. The lights stay on for 15 seconds after the last turn of the dial or press of a button. When running on AC power, with the light switch on, the lights are always on.

To get the lights to come on without changing your settings, punch any of the direct entry digit buttons. These functions only change the LCD readout for a few seconds before returning to the standard readout, giving you 14 "light buttons" to choose from.

Selectivity

Selectivity is excellent on all bands. I did a test on SW with the crushingly massive signal of Radio Thailand's 5890 relay. With the IF switch set to wide, I found the bleed-over ceased about 15 kHz up or down, at 5905 and 5875. On the narrow setting, RT's footprint was reduced to about a 5900 to 5880 spread. If there were fair signals on 5880 and 5990, they would be listenable with the narrow IF, though perhaps not on 5885 and 5895, but Radio Thailand is extremely strong in my area.

Overall, the IF selector works like a charm, and is usually only necessary to separate stations which are 5 kHz apart. If a station does interfere, switching the filter from wide to narrow will usually make the desired station listenable, providing it isn't too weak. The sound will be somewhat muffled and an increase in volume will be necessary, but the interfering signal will be drastically reduced or eliminated. A strong station 10 kHz away will rarely interfere, unless it's your local AM station.

The narrow IF setting is also helpful in pulling out a signal suffering under heavy noise.

Tuning up 49 meters, there are no traces of the spurious signals of RT or gospel stations in the background, as there are on single conversion units. Images are rare.

Tuning with the knob is smooth, probably as close to an analog feel as they could get it, with no muting. But when a band is quiet, some chirping can be heard with each 1 kHz step.

Sensitivity

The 1103 has a very low internal noise floor, so that weak stations inaudible on a noisier radio will appear on the 1103. The rat's

nest encountered around 6 MHz here in the Northwest in the evening on single conversion and lower quality radios is absent on the 1103. The BBC on 5975 usually has no interference, and the band is quiet on adjacent channels.

The 1103 can pull in almost any signal with the 36" telescopic antenna. Plugging in the included 35 foot wire and stringing it indoors gives a further boost. With the wire plugged in, the BBC on 11835 and Radio Vlaanderen Intl on 11635 often overload this radio, necessitating unplugging the wire or sliding the LO/DX switch to LO. Radio Havana Cuba on 9820 also sometimes overloads with the wire.

Table 1 lists some of the stations I've heard lately on the 1103, minus the monster stations. I always use the wire indoors, though just about all stations come in using the whip.

Table 1: Sample Loggings of Moderate-Strength Stations

Austria:	9870
Argentina:	15345
Belgium (RTBF):	17570 (via Julich)
Bulgaria:	9700 11700
Chile:	11665
Croatia:	9925 (via Julich)
Czech Rep:	6200 7345 17485
Dominican Rep (tent):	6025
Egypt:	7115 11855 12050
Gabon:	15475
Greece:	7475 12105 15630
Hungary:	9790
Indonesia:	9525 11785
Israel (Kol):	9435 11585 13635
Israel (Galei Zahal):	15640 17535
Italy:	15785
Jordan:	11800
Kuwait:	11690
Kuwait:	11675 15110 15505
Libya:	11635 15205 15315
Libya:	15660 17635 17695
Libya:	17880
Moldova (Cland):	13800
Morocco:	15345
Nigeria:	7255 15120 17800
Philippines:	11720 15190 17720
Portugal:	15480 21830
Romania:	11820 15380
Saudi Arabia:	13710
Serbia/Montenegro:	9580
Singapore:	6150
S. Africa:	7265 9770 15265
Spain:	6055 15110 15290
Spain:	15385
Switzerland:	13645 15445 15515 (all via Julich)
Syria:	12085 13610
Tunisia:	7275
Turkey:	7170 9460 15350
Ukraine:	7545
UN Radio:	15495 (UK)
Vatican:	7250 7300 12055 15570
Vatican:	15595 17515

Also heard were many Middle Eastern and African relays of Radio France Intl, Deutsche Welle, BBC, and VOA. On 41 meters SSB, I've heard hams from Australia, Arkansas, and throughout the Midwest. On the CB band, "The Big Bad Wolf from The Bayou" and another from Dallas came crashing in during early afternoon.

At night on MW, a station is audible almost every 10 kHz with just the internal antenna. The

1103 pulls in the low powered FM stations well on the whip or wire.

Audio

The 1103's 3-inch speaker is powerful enough to be listenable in a mid-sized room. Those who have the 1103 and the bigger YB400PE say the Degen's sound isn't as rich and resonant as the Grundig's.

With the included earphones, which apparently are similar to the Sennheiser models MX/200 or MX/300, I tuned in Nigeria on 7255 near the top of the hour. I was stunned by the depth and timbre of the African drums during Voice of Nigeria's interval signal. They sounded huge. Through the earphones, music on decent SW signals has rich bass.

Build Quality

I was impressed with the feel of the cabinet, aluminum front, and controls of the 1103. The whip is fairly thick and heavy duty and the whole unit is solid. The silver model especially has a nice finish and the bare aluminum face looks sharp. The dark model has a flat gray finish, with the aluminum face painted a matte milk chocolate color.

A Fatal Flaw?

One of the 1103s I tried developed a faulty tuning shuttle, affecting all jog dial functions. The Yahoo! Kaito-de1103 user's group reported some other units with the same problem. The dealer I bought the radio from says Degen claims to have ironed out the shuttle fault and improved SW sensitivity (already extremely sensitive) in their recent batches of 1103s. My replacement from a new lot so far shows no problems, though the faulty radio took about two months to begin acting up. Time will tell.

Bottom Line

There are a few changes I could recommend for easier operation, but overall, besides the direct entry button configuration and possible future tuning shuttle faults, I may have found my ideal radio. Everything works well, from the sleep timer and alarms to the tuning knob and SSB fine tuning.

Availability

I bought my 1103 from eBay seller Liypn, a gentleman in Hong Kong who, unlike some of the other sellers, offers a one year warranty on the radio. His usual price is \$44.90 plus \$20 shipping to the US. The 1103 comes with a

220V AC adaptor, so Liypn offers a 110/220V transformer for \$7.90 at no extra shipping cost. Liypn currently carries a %100 satisfaction rating on eBay.

Radios4You.com plans to sell the KA1103 (Kaito version of the DE1103) in the US, with a 110V adaptor and one year warranty. (Tecsun is the parent company of Degen and Kaito, and they also manufacture a good part of the Grundig line at their factory in Hong Kong.) The KA1103 should be the same as the DE1103, relabeled as a Kaito.

Detailed specs of the 1103 and Degen line can be found at: <http://www.degen.com.cn>

Thank you to the Yahoo! kaito-de1103 users' group for their many helpful posts.

Note: If you get a DE1103, be aware that the factory set (and reset) volume level is 40 (it comes on in FM). My normal listening volume is between 8 and 12, 20 at the most to fill the room. I worry the 40 level is high enough to damage the speaker. The second you turn it on (out of the box or after resetting), immediately hit a direct entry button 1-0 and immediately punch VOL/CHG and save your speaker and ears. You will not have time to hit VOL/CHG and go to the jog wheel to turn it down. It has to be done instantaneously with the buttons.

Optoelectronics X Sweeper

By Bob Grove W8JHD

One of the handiest gadgets for the frequency explorer would be a hand-held device that not only provides signal reception, but shows band activity on a wide-span spectrum display and also accurately reveals their frequencies. Scanners can slowly sweep and memorize search-discovered frequencies for later recall and monitoring, but have no wide-span spectrum display. Spectrum analyzers can manually be tuned to various portions of the spectrum to visually display signals and some have audio recovery, but they tend to be large and expensive.

For several years a Chinese manufacturer has offered such a device, but at \$2000 its slow sweep doesn't find wide appeal. Now a prominent, American test-equipment manufacturer has released a faster device at lower cost.

The new Optoelectronics X Sweeper expands technology embodied in a previous Opto product, their Xplorer, offering a continuous frequency range from 30-3000 MHz (3 GHz) (less cellular except on government models), and sweeping, acquiring and memorizing active frequencies in that entire range in as little as one second. Apparently it accomplishes this quick sweep of a vast amount of spectrum through the use of a proprietary comb-generating variable-frequency oscillator, mixing a large number of separate oscillator frequencies simultaneously.

❖ The X Sweeper at a Glance

As shown in the accompanying photo, it's a handful; the black plastic case measures 4-1/2"W x 8-1/4"H x 2-1/2"D and weighs nearly 2 pounds. A convenient (although hard to open), hinged, tilt bracket is recessed in the back, allowing desk-top placement at a comfortable viewing angle.

The 64 x 128 LCD is backlit for night viewing, and is strongly visible in direct sunlight as well. Contrast can be adjusted by a simple key press. Yet another selection can reverse the contrast from blue on white (normal) to white on blue. The backlight can be extinguished to extend battery life during high ambient lighting conditions.

The display shows currently-chosen functions, menu, center frequency, VFO settings, clock/calendar, span, spectrum bar graph, and other readouts as selected by the operator.

The X Sweeper's LCD spectrum display will show analog signals, but not digital, and the audio detector circuitry is designed to demodulate FM signals only, although weak audio from strong AM aircraft signals were heard during our test.

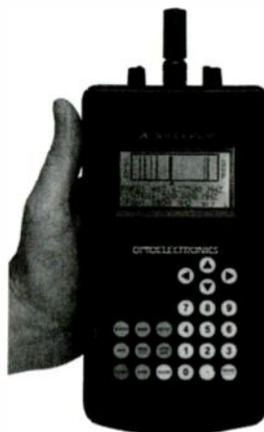
A 25-button membrane keypad allows direct frequency entry as well as selection of operating mode, setup instructions, lockout of undesired response frequencies, "joystick" up/down keys for VFO operation, rapid span/frequency changes, and bank selection for stored "hit" (active) frequencies.

As many as 1000 search-discovered frequencies can be automatically stored in its 10 memory banks (100 channels each) which may then be scanned for continued activity or identification.

Up to 65,000 hits are recorded and reported by the memory which also stores frequency, signal strength, and a time and date stamp. A separate log memory bank can store up to 1919 first- or last-sweep-discovered frequencies with their own reports.

An optional GPS unit (\$249, factory-installed at the time of order) provides automatic memorization of the X Sweeper's latitude and longitude for each signal record for mobile/portable applications.

Spans of frequency bands may be swept from user-selectable widths of 0.1, 0.3, 1, 3, 10, 100, 300, 1000 and 3000 MHz. Up to 2000 unwanted frequencies (inter-



ference, continuous carriers, signal harmonics, intermod products, "birdies," etc.) may be locked out of the scan/search function at the touch of a key.

An autoskip/autohold function allows the unit to search and register active-frequency hits without dwelling on each signal for audible monitoring, enabling a much faster registry of active frequencies. Alternatively, the unit will lock onto a search-discovered frequency for monitoring.

❖ Low sensitivity and broad selectivity

Near-field reception is assured, and weak, distant signals are ignored by the deliberately-low sensitivity of the unit. Typically, the Sweeper responds to signal levels above 20 microvolts in the 30-800 MHz range, increasing to 150 microvolts at 1 GHz, and 40 millivolts at the top end (2.4-3 GHz). Compared to the fractional-millivolt sensitivities of scanners and receivers, this is relatively deaf, but is necessary to reduce unwanted hits from distant signals.

Intermediate-frequency (IF) Selectivity is quite broad (nearly 100 kHz), dictating that the unit will respond to the strongest (and presumably the closest) signal in its passband.

❖ Power requirements

Power is provided for up to 6-10 hours (as warned by a Low Battery sign before shutdown) by 8 AA alkaline batteries (included), or continuously from the 120 VAC wall adaptor (included). Alternatively, the unit can be operated by user-provided and externally-recharged NiMH or NiCd cells.

Its 9-12 VDC power jack makes it a natural for long-duration mobile operation, identifying nearby signals as they are approached or passed. Alternatively, a 12 volt gel cell or other high-current, rechargeable battery in a belt or sling pouch would be a practical consideration for extended portable operation.

❖ Accessories

A swiveling, telescoping whip (4-1/2 to 22 inches) is provided (although when fully extended, the weight of our whip caused it to continually swivel downward from its loose connector sleeve). Optional antennas are available from Optoelectronics, but the standard BNC connector accepts an endless number of widely-available antennas.

Detected audio is clearly and loudly heard from the internal speaker, disconnected when an optional earphone is plugged into the 3.5 mm (1/8") jack. Volume and squelch controls are provided.

An RS232 jack (1/8" stereo) allows data download from a computer (cable and software included), and a C15 Reaction Tuning jack is offered as well.

❖ Reaction Tuning

The ability of the X Sweeper to lock onto the frequency of a nearby transmitter may be used to control certain Icom, Uniden and Radio Shack scanners in order to use those radios' additional

reception capabilities. A list of such scanners is supplied in the user's manual. The installation of an Optoscan 535 or 456 digital interface (\$199 option) is required for some scanner models.

❖ Caveats

It must be pointed out that this is a piece of test equipment, not a scanner. As such, its display shows a single, narrow bar for a near-field signal, and the detector demodulates the strongest (usually closest) FM sources. It is not a selective, sensitive receiver that can distinguish between closely-spaced, weak or distant signals, nor does the display sweep or refresh quickly enough to show digital bursts, spread spectrum, frequency hopping, pulse, or single-signal waveforms.

The temptation to attach a large, outdoor antenna to this instrument is irresistible, but signal saturation from the receiver's limited dynamic range is likely, especially in a strong-signal environment, creating all sorts of phantom signals and misidentified frequency readouts from the resulting intermodulation, which also slows the search function. Adjusting the squelch knob to a looser setting reduces the false hits, but decreases the low sensitivity even further.

Since there is no attenuator, strong signals may be reduced by shortening the antenna or increasing the distance from the signal source.

No provision is made for rechargeable batteries to be charged in the X Sweeper - surprising considering the cost of the instrument and the presence of such a facility in other, less expensive Opto products. A separate charger must be acquired (available from Opto for \$89, although a less expensive discount-store model will work just fine), and two screws must be removed each time the batteries are accessed.

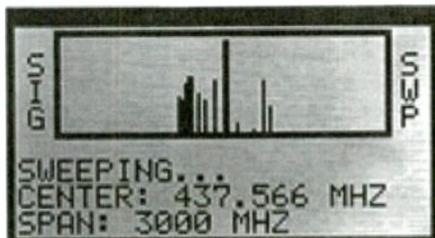
The sweep circuitry of the X Sweeper does emit RF noise into its immediate environment; while using it in my car I was unable to listen to weak and moderate FM signals on my car radio.

❖ Our Field Tests

Sweeping the spectrum from 30-3000 MHz, our sample could lock onto a nearby transmission within as little as one second, and no longer than a few seconds. Narrowing the span didn't make signal acquisition faster, but it did reduce the likelihood of false stops and certainly made the LCD spectrum display easier to read in an RF-rich environment.

Unlike many scanners that inaccurately display search-discovered frequencies slightly high or low of their actual carrier frequencies, we found the X Sweeper to have an excellent window detector that accurately displays intercepted frequencies to 4 decimal places (specified accuracy of 500 Hz).

The BNC antenna jack invites the user's



choice of whips, mobile antennas, or even base antennas as the requirement dictates. The supplied telescoping whip enabled reception of two-way base stations from several miles away using the monitoring function.

Sitting in my car at Wal-Mart with a roof-top antenna connected, I was unable to sweep-detect 460 MHz FRS handy-talkies in use by the clerks, but miles-distant paging signals and the sheriff's repeater came in loud and clear.

A more serious assignment to sweep a professional office for a suspected listening device made the X Sweeper a logical choice. Many interesting emissions from modern office equipment were revealed (but no bugs were found!).

❖ The Bottom Line

The outstanding features of this new test equipment are its wide frequency range, audio recovery capability, fast search and acquisition of signals, accurate frequency determination, scanable memory with auto-loaded hits, LCD display of signals over a wide spectrum, direct keyboard frequency entry, and small size and weight.

The signal-strength bar graph with its digital level readings is useful for antenna adjustments, bug detection, interference locating, signal-distance estimating and, with a directional antenna, hidden-transmitter hunting.

The X Sweeper is available for \$1599 plus \$10 shipping from Optoelectronics, 5821 NE 14th Ave. Ft. Lauderdale, FL 33334. For additional information or to place your order, phone (954) 771-2050, email them at sales@optoelectronics.com, or visit their website at <http://www.optoelectronics.com>.

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Wavecom W51LAN

Lee Reynolds

This month's review item is a high-end standalone digital signal decoder called the W51LAN from the good people at Wavecom Nachrichtentechnik (*that means Communications Technology, folks!*) in Bulach, Switzerland. It's good, it's expensive (*by the average hobbyist's standards*) but my, oh my, ya gotta love toys like this! Curious? Let's take a closer look...

Who makes it?

The makers of this device, Wavecom (<http://www.wavecom.ch>) are quite well known in the digital communications and decoding world for their wide range of DSP-based digital communications decoders. They produce devices aimed at the high-end hobbyist market all the way upward to the alphabet agencies and other kinds of government bodies around the world. They're doing something right because they're continuing to produce high quality hardware and excellent software for their user base and expand/update their range of offerings.

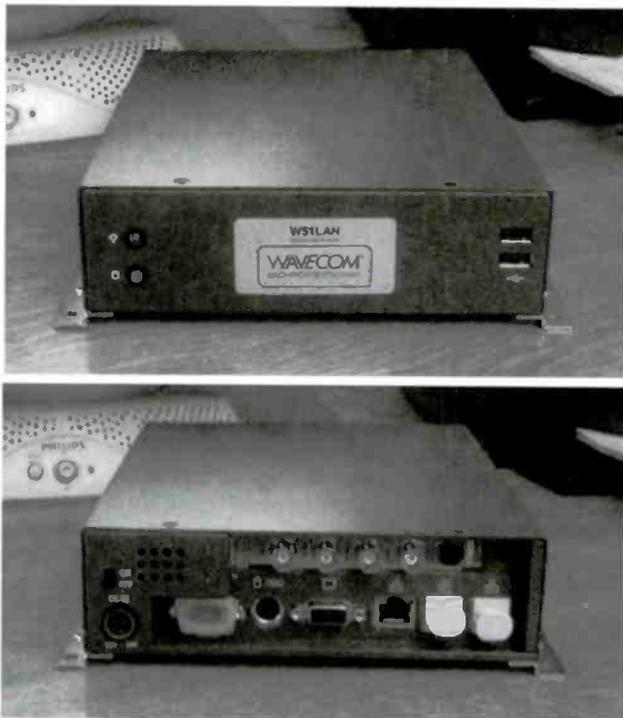
What is it?

The W51LAN is a standalone version of Wavecom's W51PC decoder card. No PC necessary, it comes with its own very small form factor PC wrapped around it, fully configured and ready to be dropped into a LAN, MAN or WAN (Local, Medium or Wide area networks) by the user or to be taken out and about for use in the field. Judging by the configuration of the device and the options that are available for it, this decoder is aimed squarely at the NGO/governmental level user.

What do you get?

The W51LAN arrives very well packaged; you get the W51LAN itself, a small, unassuming blue box measuring approximately 2"H x 7"W x 9"D, small 24vdc power supply, the decoder software on CD-ROM, a thick user's manual for the decoder, a thinner manual for the PC the decoder card is installed in, straight and crossover CAT 5 LAN cables for connecting the device into the network and miscellaneous OS software and connecting cables for the PC.

The PC host is a DSM 96M1542 Nano Server M-R (<http://www.dsm-computer.de>). It uses a 799MHz VIA Nehemiah CPU,



has 248 MB of RAM, a 30GB hard drive and built-in Ethernet, video, USB and serial ports. Windows XP Professional is provided as the operating system.

How to install it –

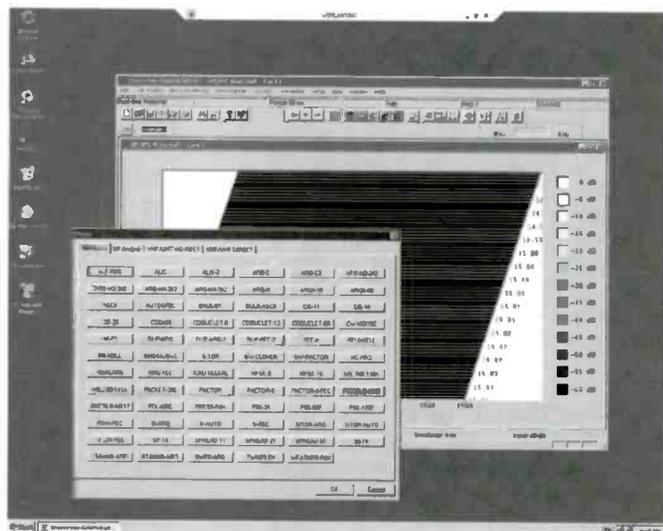
If you're already running Windows XP and a local network, all you have to do is plug in the W51LAN power supply, connect the W51LAN itself to a hub or switch using the supplied Ethernet cable, fire up Remote Desktop Connection on your main computer, point it at the W51LAN and you're away! The W51LAN will provide a desktop to the controlling system that is identical to a normal Windows XP desktop with a W51PC card installed. Use of the W51LAN from this point on is exactly the same as if the card was installed in your local computer and requires that no additional software be installed on your main computer. This

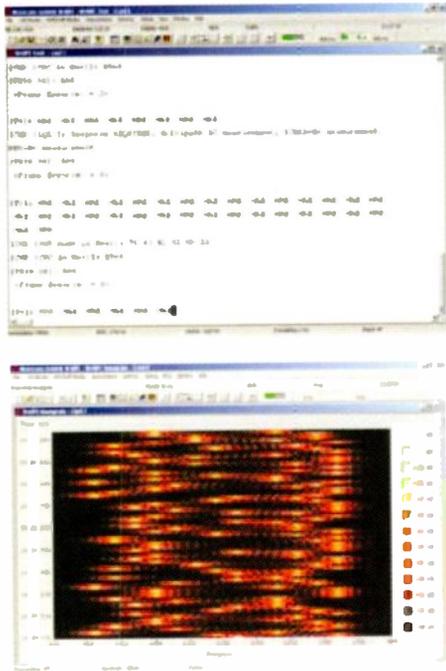
is the access method I most utilized – it made everything else seem cumbersome by comparison.

The second way of using the W51LAN is by using the built-in network capabilities of the W51LAN software and Microsoft's DCOM (Distributed Component Object Module – a way for programs to manipulate objects on different computers across a network) on your system to talk to the W51LAN. This is a somewhat trickier mode to implement than using Remote Desktop and requires the installation of the DCOM package from Microsoft if you don't already have it on your system. Using DCOM, you run the front-end software (GUI) for the W51LAN decoder card on your local system while it talks to server-like code running on the remote system.

The third way of using the W51LAN is to plug keyboard, mouse and monitor into the device and simply use it as you would a normal computer with a W51PC card installed in it. This is an acceptable way of using the decoder, but you'd be missing out on the remote operability of the W51LAN as a result.

I can imagine a number of very intriguing scenarios for remote receiving and decoding of signals using this package along with something analogous to the software used by, say, the DX Tuners network (<http://www.javoradio.com>). I can also visualize some nonexistent (or so they say) government agency with a lot





of these boxes scattered all over the world and all of them talking to some location not too far outside the Washington Beltway. Your tax dollars at work, folks!

How well does it work?

As is usual with Wavecom products, the W51LAN does a very professional and smooth job – the hardware and software installation is (in this case) almost nonexistent – and once you've chosen your flavor of access to the W51LAN it's a simple case of fire 'er up and let 'er rip! I've reviewed other Wavecom products in these pages before so I won't repeat myself unnecessarily – the Wavecom software interface is remarkably consistent across the various current models, well thought out, stable and reasonably customizable.

If you want to get a good idea of what the interface looks like and how the decoders operate, go to <http://www.wavecom.ch/download.htm#W51PC%20Software> and download the 3.1MB user manual in PDF format; that'll give you a close look at how the software looks and feels. Also available at that same web address are the brochures for various decoders and a specification sheet that does a nice job of detailing the differences between the decoder models.

On air testing of the W51LAN revealed performance that was, as is to be expected, identical to my own W51PC card. The software was stable (no lockups, no strange behavior), the auto classification components did a decent job of divining the characteristics of various signals and, as ever, I had a dang good time playing with the box. Good ranges of analysis tools are available (FFT, sonagram, waterfall, oscilloscope, PSK code rate/symbol check, FSK analysis, autocorrelation, bit length analysis, bit correlation) and they work well. Nothing beats turning what was previously annoying noise (like DGPS signals down on LF) into readable, loggable catches!

Wavecom is continuing to expand the

range of modes their cards handle, and data types such as AIS (a shipboard VHF position/course reporting system) and STANAG 4529 are now available to the hobbyist user. Additional, somewhat intriguing, modes are available in the Professional Version software, but this version of the software isn't usually available to us mere non-governmental mortals. Again, you can see what the difference is by download the specification brochure for Wavecom's web site.

Summing up the W51LAN

This is a nice device with excellent capabilities that is aimed squarely at the commercial/governmental market. It's an easy all-in-one solution for the user that wants a decoding system that's easily portable or remotable and who doesn't want to get involved in setting up and integrating the decoder/software and the computer.

When I'm rich I'll have one or two of these knocking around my radio room, I'm sure...

Wavecom's W51 series is available to qualified buyers from Grove Enterprises for \$7795 (1-800-438-8155; <http://www.grove-ent.com>). A pager-blocked version is available for legal import into the U.S. For more information contact Wavecom Elektronik, Hammerstr. 8, CH-8180 Bülach, Switzerland; info@wavecom.ch

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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Outer Limits continued from page 59

- WHGW**- Normally relays of radio drama programs produced by others, mostly for licensed radio stations. (whgw6925@myway.com)
- WHYP**- The James Brownard memorial pirate station claims to broadcast from North East, PA, just like Brownard did on his licensed version of the station. Rock, comedy, and pirate advocacy. (Providence)
- WKRP**- Another classic pirate that has returned with a rock music format. (none known)
- WMPR**- Techno rock music sometimes supplemented by seasonal fare. (None)
- WSPY**- Their spy numbers transmissions were supplemented by Christmas music around the holidays. Who says that spies don't observe holidays? (None)
- XB37**- A new one with an unusual call sign, sometimes given in Morse code. Their shows so far have been a mix of old radio, TV, and movie audio, mixed with parody ads. (xb37@netscape.net)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations, especially in Europe where the value of the US dollar is plunging rapidly. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 69, Elkhorn, NE 68022; PO Box 28413, Providence, RI 02908; Casilla 259, Santiago 14, Chile; and PO Box 293, Merlin, Ontario N0P 1W0.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for submitting pirate loggings with a hope that pirates might QSL the logs remain *The ACE* (\$2 US for sample copies via the Belfast address above) and the e-mailed *Free Radio Weekly* newsletter, still free to contributors via niel@ican.net. The *Free Radio Network* web site, another outstanding source of content about pirate radio, is found at <http://www.frn.net>, and a few pirates will occasionally QSL a report left on the FRN.

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brassstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Lee Banner, Fishkill, NY; Peter Beck, Germany; Artie Bigley, Columbus, OH; Ross Comeau, Andover, MA; Ed Cummings; John Figliozzi, Halfmoon, NY; Harold Frodge, Midland, MI; David Guertzki, Caronport, Saskatchewan; William T. Hassig, Mt. Prospect, IL; Harry Helms, Wimberly, TX; Ed Kusalik, Edmonton, Alberta; Chris Lobdell, Stoneham, MA; Ben Loveless, Bloomfield, MI; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; Bill McClintock, Wellington, OH; Mark Morgan, Cincinnati, OH; Pancho Villa, Upstate NY; Adrian Peterson, Indianapolis, IN; Lee Reynolds, Lempster, NH; Martin Schoeck, Eisenach, Germany; John Sedlacek, Omaha, NE; Larry Van Horn, Brassstown, NC; Richard Weil, St. Paul, MN; Niel Wolfish, Toronto, Ontario; Mike Wolfson, Ashland, OH; and Joe Wood, Greenback, TN.

Spectrum Labs – PC Based Electronic Construction

I hate sound cards! I can't tell you how many days ... no, weeks, I have wasted in the past few months because of computer soundcards. There is some great radio software out there that uses the PC's sound card as the signal input and it's a great idea in theory. The soundcard functions as an A/D converter (analog to digital converter) when it takes sound input and digitizes it to 1's and 0's so the PC can use it. Conversely, acting as a D/A converter, the soundcard converts digital data back into analog sound waves. In theory, soundcards are a ready-made interface between radios and computers.

However, due to the haphazard way PC soundcards developed in the early days of the PC, no soundcard "standard" was set. Key factors such as conversion methodology, signal sampling rate, PC microprocessor utilization, PC RAM utilization, and separation of input/output functions vary greatly between soundcards. So why should I be surprised when they act so differently?

A few months ago, getting DRM to work properly took hours of attempts with different computers. In the end it came down to finding a soundcard that worked with the DRM program. Then, like magic, demodulated DRM resulted.

I recently endured a two week long wrestling match trying to get FlexRadio Systems' SDR-1000 transceiver working. The soundcard is a critical component when using the SDR-1000. In the end, it took disabling the on-motherboard soundcard and trying a number of different PC soundcards to get the SDR-1000 operational.

To be fair, FlexRadio states right up front that it only guarantees the operation of the

SDR-1000 with their approved list of soundcards. Not willing to sacrifice a good portion of my writer's fee for one of these approved soundcards, I eventually found an economical soundcard (around \$40) that worked. However, recent emails from Hams using the SDR-1000 indicate that the operational capabilities of the SDR-1000 are greatly improved when one uses one of the \$100+ approved soundcards.

❖ LowFERs take notice!

This month we will look at a freeware program, Spectrum Lab, that transforms your PC into an ELF receiver or a VLF receiver. It can be used for beacon logging, digital communications, audio test generator and to detect SID events and remove hum from signals. If you're in Europe, you can decode time signals and run a digital, real-time, very accurate clock display.

The Spectrum Lab program does all this, and more, with no external components. However, Spectrum Lab operates using the PC's soundcard, so I prepared for more days of trying to adjust the multitude of soundcard, motherboard and Windows parameters. Ugh, what fun.

❖ On the Go ... No Go

Since I'm often on the road, my laptop is usually where programs are first tried. I'd tried running earlier versions of Spectrum Lab on my laptop without success. However, I was impressed with its potential. So when the new version was released I tried again.

This time was no different; no signals, just squeals from my laptop no matter what combinations of settings I used. But I decided that if Spectrum Lab worked even half as good as it claims, I owed it to MT readers to give it an all-out try on the same desktop computer that I used for the SDR-1000. Success!

So what does it take to run Spectrum Lab? The needs are modest. From the program's extensive Help file, the requirements to run Spectrum Lab are:

- a PC with Win95 or Win98 installed (not sure if WinNT is okay)
- a soundcard with an audio input resolution of 16 bits
- a color graphics mode with at least 640*480 pixels with 256 colors (a graphics mode with higher resolution and "true color" is preferred, and even required under WinXP)

To use the program as a VLF receiver, a PC with at least 166 MHz Pentium II is recommended. The program states that a "Creative Labs Soundblaster 16 has been tested, others work too, but some soundcards don't." Did I mention that I hate soundcards?

The laptop I originally tried the program on fits the suggested configuration, but would not work properly. Buried deep in the Help file is a reference to known problems with laptops using ESS Audio drivers. A look at my laptop system confirmed that it, too, used ESS Audio drivers. Just great.

The program was successfully run on a desktop PC with a Pentium III 1GHz, 256M RAM running Windows 98. The soundcard used was an Aureal Vortex 8830 soundcard. Now let's use Spectrum Lab.

❖ Ready, Load, Listen

Spectrum Lab Version 2.4b12, a 1.88 Meg program, can be downloaded at <http://www.qsl.net/d14yh/> as freeware. It unzips and installs quickly and easily. Spectrum Lab allows two distinct methods of use. In the simplest method, pre-defined circuits and therefore functions can be accessed with a click of the mouse. The program includes twenty-three pre-defined applications.

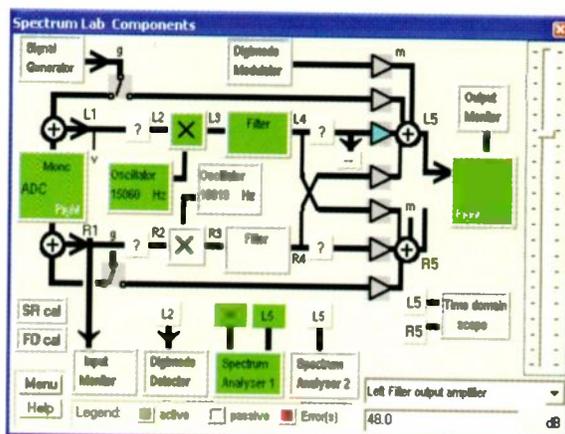


Figure 2 - The Components Display Showing Functional Circuit Blocks and Connections.

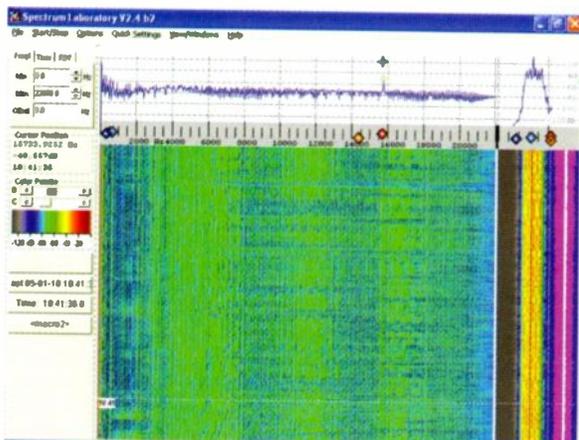


Figure 1 - Spectrum Lab Main Display Configured as a VLF Receiver.

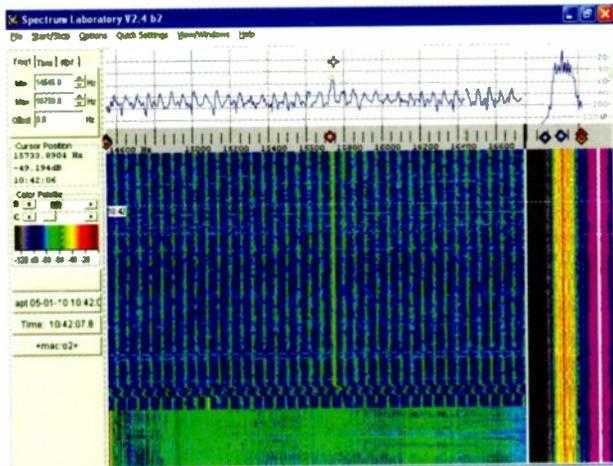


Figure 3 – Zooming in on a signal at 15773 Hz.

For the technically adroit, Spectrum Lab provides function blocks that can be arranged into customized circuits. Parameters such as gain and sampling rate for each function block are user definable. This program, in the hands of an experimenter, does a lot! In the words of the program, "There are some more features included in the program which you have to discover yourself." Let's keep it simple and load the pre-defined VLF receiver.

❖ Voila, a VLF Receiver

How do we get a VLF receiver? First we go to the "File" menu on the Main screen, Figure 1. Then the "Load Settings" sub menu is selected. Finally, the file named SaqRcvr1.usr is loaded. This configures the program as a VLF receiver centered at 17.2 kHz.

The Component Display, Figure 2, is where the function blocks are connected by the circuit designer (or any user) into specific applications – in our case a 17.2 kHz receiver.

A long piece of wire (200 feet +) acting as an antenna is connected to the microphone input of the soundcard. To protect the soundcard input from static discharge, it is suggested that back-to-back *fast* diodes be used in-line between the microphone input and the antenna wire. (See the Help file for more details.)

A simplified overview of operation follows. The soundcard runs at a sample rate of 44100. Then the frequency is converted down to a frequency of 650Hz. This signal is sent

to a 100Hz narrow-band filter. The resulting signal is amplified and converted to sound by the soundcard's D/A converter.

By clicking on each functional block, the user can adjust the block's parameters. For example, tuning the receiver can be accomplished by clicking the Oscillator block on the Component Display and entering a frequency. An easier tuning method is via the Main Display as we will see later.

When viewed on the PC screen, correctly operating active blocks are colored green. If an operational problem exists within the PC, the block color goes red.

❖ Displays

Figure 1, the Main Display of Spectrum Lab, is a busy screen displaying four different graphs: two Upper spectrum displays and two corresponding lower waterfall displays. Here we see that we are tuned to a signal peak at 15773 Hz.

The top left display is the entire accessible spectrum, 0 to 22,020 Hz, with received signals displayed as vertical peaks. A red colored diamond indicates the frequency to which we are tuned. In this case we are tuned to the signal at 15773 Hz.

In the display to the right we see the demodulated signal output. It is shown centered about the 650 Hz "intermediate" frequency.

The two waterfall displays below the spectrum displays show their corresponding frequency spectrums in an unfolding time domain. The user can control all aspects of these displays.

❖ Control

The Main screen also provides the user control of the receiver. Notice that between the top spectrum displays and bottom waterfalls there is a "band" of numbers. A number of diamond-shaped boxes exist in this band. On the PC screen each diamond has a different color indicating their functions. The diamond under the peak at 15773 is colored red and is the VFO tuning diamond.

Tuning is accomplished by hovering over the red diamond, then holding the left mouse button and dragging the red diamond to the desired frequency. Once you get the diamond close to the signal peak of interest, a right click on the numbers band will zoom in on the frequency. See Figure 3 Then finer tuning adjustments can be made.

❖ BEFORE Using!

As suggested in the extensive and easy to use Help file, circuit and soundcard gain setup is critical. (Did I mention that I hate soundcards?) For this procedure I enlisted the assistance of Spectrum Lab's Signal Generator

accessed by left clicking on the top left function block (Signal Generator) in the Component Display.

The Signal Generator box, labeled Test Tone Generators in Figure 4, is shown producing a 17968.8 Hz signal at a level of -36 dBs. The VLF receiver is tuned to the generator's signal, which can be seen on the left spectrum display and in the Input Monitor display at the lower left of Figure 4. We have opened the Output Monitor display from the "View/Windows" menu on the Main display. Remember, we are attempting to optimize the soundcard and circuit gains for proper receiver operation.

Next, open your PC's soundcard volume controls. Right clicking the speaker icon at the lower right system tray usually does this. Then go to the recording control's microphone volume control. Keep this window active.

Now go to the receiver's output gain control on the Component Display, Figure 2. Notice the seven arrowheads on the right side of the screen. These are amplifier blocks. The third one from the top is connected to the output of the receiver through the Filter block and has been selected via a left click. Now the vertical slider on the extreme right of Figure 2 controls the gain of this stage.

With the receiver tuned to the signal, move the microphone volume control until the signal and the noise floor baseline is just visible on the Main left spectrum display. Make sure that the Input Display trace is not red, which indicates an overdrive condition.

Move the slider control on the Component screen so the Output trace just turns green, not red. That should match your receiver to your PC's soundcard. These settings can then be stored to a file via the "Quick Settings" menu on the Main display.

❖ So Much More

Other pre-defined decoders of interest to monitors are included: slow Morse decoding (QRSS) and MT HELL. The Help file provides details and websites for additional information. Remember that due to the primary application of the soundcard, Spectrum Lab circuit operations will be limited to a maximum of 23 kHz.

Download Spectrum Labs and play with it. This freeware program does so much, you could spend weeks exploring its capabilities, customizing circuit blocks and designing monitoring applications. It's like having your own little electronics construction lab without the soldering iron burns!

Enjoy. Did I mention that I still hate soundcards?

Daniel Sampson's
PRIME TIME SHORTWAVE

<http://www.primetimeshortwave.com>

Your guide for up-to-date English shortwave schedules sorted by time, country and frequency plus a DX media program guide and newsletter

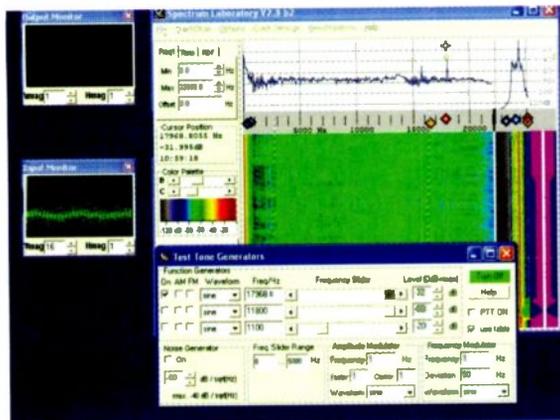


Figure 4 – Receiving Signal Generator on 17968.8 Hz for Gain Adjustment.

What's NEW

Tell them you saw it in *Monitoring Times*

AOR Discone Antennas

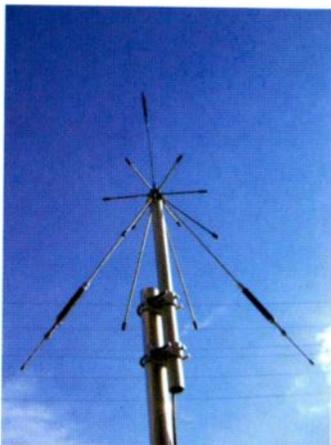
AOR USA is also moving up in the antenna world with its release of two new discone antenna systems designed for broad bandwidth and operation up to 3 GHz.

"The DA5000 and DS3000A are designed to maximize the operation of newer receivers capable of capturing signals of 2 GHz or more," said Takashi "Taka" Nakayama, KW6I, Executive Vice President of AOR USA.

Both antennas present very small wind load and are built to exacting tolerances. The DA5000 UHF Discone antenna for 700 MHz to 3 GHz is only 1 foot high and weighs just 1.6 pounds. The antenna feed point has a low-loss Type N connector and low-loss cable is recommended in order to derive maximum performance.



The DS3000A (only 2.9 feet high and 1.55 pounds) can receive from 75 MHz to 3 GHz. The DS3000A also supports transmitting on 144, 430, 904 and 1200



MHz, safely handling loads up to 50 watts. The antenna system includes mounting hardware for standard masts and 10 meters (33.8 feet) of low-loss RG58A/U cable terminated in a Type N connector.

Suggested retail price for the DS3000A is \$129.00USD, and \$339.00USD for the DA5000, but buyers may find the antennas at a significant discount from their favorite amateur radio dealer.

Nitelogger II

Similar, but much more efficient than a voice-activated tape recorder, the new Nitelogger II allows unattended recording of audio activity with no tape wasted by silent periods. By omitting time between traffic, you can compress a whole day or night's worth of monitoring onto a single tape. Use Nitelogger between a scanner, receiver, or even an online scanner and any tape recorder with a remote jack.



This improved model of an old favorite is available from Nitelogger (<http://www.nitelogger.com>) or from Grove Enterprises (<http://www.grove-ent.com>) or call 800-438-8155) for \$49.95. Watch *Monitoring Times* for an upcoming review.

Klingenfuss Shortwave Frequency Guide

The Ninth Edition of the 2005 *Klingenfuss Shortwave Guide* has been released, and as with previous editions, it remains one of my favorite resources.

This edition has the latest frequencies, including the winter schedules released just prior to publishing. It is also the only publication worldwide that combines both shortwave broadcast and utility radio stations, complete in one reference volume.

Digital Radio and Monitor-

ing Utility Stations feature articles delve into changes through the past year, refuting the nay sayers by demonstrating there remains plenty to monitor on radio.

As with past editions, the book begins with an introductory chapter on monitoring utility stations, followed by a by-frequency listing from .18 to 28079.9 kHz.

Following an introduction, the broadcast radio stations are also listed by-frequency. Frequencies are listed in an easy-to-follow, by-frequency format which also indicates start/end times and location. Target areas and languages, plus a Remarks field will help you narrow down a station identification. This is especially advantageous for both the program listener and the DXer during a monitoring session.

You will find the same frequency listings and easy to use format in the by-country section, *Alphabetical List of Broadcast Radio Stations*. This is a real plus, when your focus is on monitoring a specific country.

Frequency information, as well as parallel frequencies, appear to be accurate from recent monitoring, but as with other publications, it will remain accurate only until seasonal frequency adjustments.

For years, all of my DXing sessions have included the Klingenfuss shortwave guide. I use it as a reference when narrowing down the identity of either a utility or broadcast station. I would highly recommend this publication to any hobbyist seeking a basic reference to complement his listening.

For ordering information on the 2005 *Shortwave Frequency*

Guide as a CD ROM, refer to <http://www.klingenfuss.org>; the CD ROM is also available from Grove Enterprises <http://www.grove-ent.com> (or call 1-800-438-8155) for \$25.95 plus S/H (product # STF26-05).

The 2005 *Shortwave Frequency Guide* is also available in book format from Klingenfuss or from Universal Radio, Inc. (\$34.95 as Book # 0169) <http://www.universal-radio.com>, 1-800-431-3939; 6830 Americana Pkwy., Reynoldsburg, OH 43068-4113.

— Gayle Van Horn
MT Frequency Manager

World Radio TV Handbook

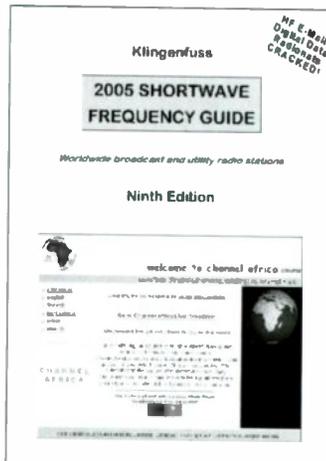
The *World Radio Handbook (WRTH) 2005* is another reference source every listener should have in his or her listening post. The 59th edition, released just in time for the DX season, remains a comprehensive directory and guide of international and domestic radio and television.

As with past editions, *WRTH* complies input from worldwide contributors to bring the hobbyist the most up-to-date information on shortwave, medium wave and FM broadcasts.

This year's edition begins with a thought-provoking editorial from publisher Nicholas Hardyman on the *Future of Radio*, followed by a selection of receiver reviews, including the best low-cost receivers. Additional articles are *Managing the HF Spectrum*, *Digital Radio Update* and the latest from Denmark's *World Music Radio* from Anker Petersen.

A new section is the *DRM International Broadcast* by UTC and language. The reference section has been expanded to include transmitter sites for domestic SW and Broadcaster Abbreviations. Standard Time and Frequency Transmissions, DX Club information, Internet sources and other essential hobby information will complement your monitoring.

Information, as in past editions, appears to be accurate, thanks to a dedicated contributing staff. Information on seasonal frequency adjustments may now be viewed at <http://www.wrth.com>. This



method of updating information began last year and has proven very popular. *MT* compliments the staff for making this improvement for the benefit of their readers.

As a reference, *WRTH* remains the most comprehensive guide to broadcasting, and should be present in every listening post. This information-packed volume is a must-have!

WRTH 2005 (BOK03-05) is available from Grove Enterprises <http://www.grove-ent.com> for \$26.95 plus S/H (product # BOK 03-05), or call 1-800-438-8155.

Gayle Van Horn
MT Frequency Manager

ICOM IC-756PROIII

Icom America Inc. has upgraded the popular IC-756PROII with a number of significant new features incorporated into its IC-756PROIII. "The number one reason for upgrading to a PROIII is the improved receiver performance," says Ray Novak N9JA, National Sales Manager. "The lower distortion at all stages of the receiver means better handling of strong signals and a quieter band. Worldwide, better receiver performance is the number one desire of HF operators. The biggest improvement was increasing strong-signal linearity, followed by the improved bandpass filters and roofing filter. If you have nearby amateur or shortwave-broadcast transmitters, you'll really notice the difference."

The PROIII is a state-of-the-art HF transceiver designed for high performance in demanding conditions, such as contesting and DXing. The PROIII uses 32-bit Digital Signal Processing and fully customizable filters in both receiver and transmitter.

The Real-Time Spectrum Scope on the bright, high-contrast TFT color LCD screen continues to be one of the 756PRO family's unique features. The PROIII now offers a "mini-scope," an inset spectrum display visible even while

using other functions or configuring features. A screen-saver feature is now provided along with dual clocks.

The PROIII's transmitter has been upgraded with adjustable SSB transmit filter bandwidth and more than 100 different audio equalization settings. With a built-in RTTY modulator/demodulator, the PROIII is a self-contained RTTY station. 60-meter band transmit coverage is also available.

Of course, the PROIII inherits the whole of the PROII's feature set, including 32-bit floating-point DSP, 24-bit audio, powerful notch and noise reduction capabilities, dual watch, and special features to make digital mode operating a breeze.

The IC-756PROIII is available at \$3676.00 retail and is available from any authorized Icom America Amateur Radio dealer. For a dealer in your area or to download the IC-756PROIII brochure please check at <http://www.icomamerica.com>.

Bearcat BCD396T Coming

Uniden America Corporation announced a new handheld digital scanner, the Bearcat BCD396T, at the Consumer Electronics Show (CES) in January. The BCD396T offers APCO 25 digital capability, Close Call™ RF Capture Technology, Dynamic Memory Management, Fire Tone-Out as well as 5,500 channels and a frequency range of 25MHz to 1300MHz, excluding cellular. This new model has not been FCC type-accepted and won't hit the shelves until late summer 2005.

"With the BCD396T, we listened to our consumers and have incorporated their feedback on features they wanted, into a high-quality product that meets the demands of both professionals, such as law enforcement officials, and scanner enthusiasts," said Paul Opitz, Uniden Product Manager.

"For example, we have eliminated the proprietary battery pack and removed the need for an add-in board for APCO 25, reduced the size of the model, and added a backlit keypad."



Eton Porsche Satellite Radio

At January's CES Show, Eton Corporation's Porsche Design division revealed the desktop P7131 and palm-sized P7132 digital radio set which incorporate AM/FM/shortwave and XM satellite radio in the U.S. It will be launched as

a Digital Audio Broadcast radio in the UK.

"We are proud of it because it has the sound quality for the audiophile and the looks for the design-conscious consumer," said an Eton spokesperson.

The Porsche radio is set to go on sale at the end of January in the US and in the first quarter of 2005 in the UK. In the US it is expected to cost \$250.

WiNRADiO AX-37 UHF Beam An MT review by Bob Grove

Much attention in the past has been given to antennas for under 1 GHz, but not until the recent advent of wireless computer networks has adequate thought been given to high-gain microwave antennas. With the soaring volume of products for the 2.4 GHz band, alert manufacturers sense a good market here.

One such example is the new WiNRADiO AX-37E series of antennas, covering 300-3000 MHz. These UHF, log-periodic, dipole arrays pack a wallop with their 6 dBi isotropic gain (4dBd) bolstered by their built-in, 20 dB preamplifiers. Passive models (AX-37A and AX-37EN) for transmitting or receiving are available without the preamp.

Since antennas are small, and power is often low in the microwave spectrum, high gain can mean a substantial improvement in received signal strengths without the risk of the overload consequences which plague lower-frequency receiving systems. Additionally, in RF-dense environments, a directional antenna can discriminate among a multitude of potentially-disruptive signals.

The original AX-37A is a planar array etched on an open circuit board. The new AX-37E and AX-37EN (amplified and passive, respectively) are packaged in hermetically-sealed housings to meet the stringent requirements of outdoor installations.

The specifications for these two new releases are virtually identical to those of the original model. The low-noise preamp of the AX-37E produces only 2 dB of noise and presents an impressive third-order intermod figure (IP3) of +26 dBm. The required 12 VDC @ 65 mA is delivered to the enclosed preamp through an SMA connector, requiring an optional power supply, T and cabling.

Both antennas exhibit a VSWR of 1.4:1 and exhibit a front-to-back signal ratio of 16 dB. Each is mounted in an 11.5" x 8.4" housing with a total weight of only 2.6 lbs. Mast-mounting brackets are included.

The WiNRADiO AX-37 antennas are available from Grove Enterprises, the North American distributor for WiNRADiO products (7540 Hwy 64 West, Brasstown NC 28902; 800-438-8155; <http://www.grove-ent.com>)



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Attention all those wanting to know what's going on with ham radio in the New Orleans area, check out: <http://groups.yahoo.com/group/GNOAmateurRadio/>

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