

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



Monitoring Times

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SCANNING IN THE BIG APPLE

Also in this Issue:
Radio Shack PRO-96 Scanner
Satellite TV Buyer's Guide
Kenwood Sirius Receiver

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Monitoring Times

Vol. 22, No. 12 December 2003



Cover Story

Christmas in the Big Apple

By Michael Coppola

So you want to go to New York City for the Christmas season? Personally, the author thinks you're nuts, but if you're determined, here is some advice from the locals on where to go for shopping, sights, eats, plus lots of scanning info you can use to entertain yourself while waiting in those "I'm with her" seats.

How I Came to Write for MT 14

By Clem Small

You just never know where it might lead when you first start to share some of the knowledge you've picked up along the way. Clem Small answered an appeal for articles way back in *MT's* early years, and here he is 20 years later, still writing for the magazine!

The USSR's Superpower Transmitters 16

By Bernd Trutenau

During the Cold War the West was bombarded by Soviet broadcasting and blocked by Soviet jamming from powerful transmitters – products of a long and unique engineering history. Now some of these transmitters are being returned to the airwaves under a new and quite different reality.

Satellite TV Buyer's Guide 18

By Ken Reitz

You'd have to be completely unplugged not to hear the ads promoting satellite TV, but which should you buy? Is there really any difference between DISH Network and DirecTV? What about HDTV? And, what ever happened to those big dish satellite systems?

DXing 2.4 GHz 20

By John Mayson

The notion of DXing the new wireless networks on 2.4 GHz seems a bit farfetched. On the other hand, it's done every day, but under the terminology of "wardriving." Here's how you can detect the wireless systems in your neighborhood, plus a lot more useful information about protocols, privacy, and legality.



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Reviews:

The new Radio Shack PRO-96, so-
 phisticated follow-on to the GRE-built
 PRO-95, adds APCO-25 digital de-
 modulation and 9600 baud control chan-
 nel support to its already impressive fea-
 tures. It supports AM and FM modes
 (though not the military air band),
 Motorola, APCO, and EDACS trunking
 (but not LTR), and contains 5500
 memory channels (page 78).

There are a lot of good reasons to
 consider a subscription to a satellite digi-
 tal audio services, but which one? *MT*
 has already reviewed the XM satellite
 radio receiver from Delphi; now we look

at Kenwood's *Here2Anywhere* re-
 ceiver for the Sirius satellite radio sys-
 tem (page 82).

It's Christmas, but where every
 father's heart used to turn to the train
 under the tree, now there's stiff com-
 petition from the Rokenbok System. This
 radio-controlled construction set will
 keep Dad and the kids engrossed for
 hours: just ask Jock Elliott! (page 86).

Computers&Radios continues its
 look into receiving DRM signals on page
 80, and *Bright Ideas* on page 27 has
 more gift ideas for the hobbyist on your
 list (even if that's you)!

TABLE OF CONTENTS

Departments:

Monitoring and the Law	4
<i>South Dakota PD Wants Your Scanner</i>	
Letters	6
Communications	8
Stock Exchange	90
Advertisers Index	90
Closing Comments	92
<i>Holiday Greetings</i>	

First Departments

Getting Started	
Beginners Corner	24
<i>Multimeter Basics</i>	
Ask Bob	26
Bright Ideas	27
Scanning Report	28
<i>A Fond Farewell</i>	
Scanning Canada	30
<i>More Reader Contributions</i>	

Utility World	32
<i>Globe Drops SITOR Services</i>	
Utility Logs	33
Digital Digest	35
<i>Digital Winter Mixed Bag</i>	
Global Forum	36
<i>WPE, WDX SWL Call Signs</i>	
Broadcast Logs	39
The QSL Report	40
<i>Electronic QSLing</i>	
Programming Spotlight	41
<i>"Shortwave" without Shortwave</i>	

Listening Guide

English Language SW Guide	42
<i>Program Listings by Type</i>	
MT Satellite Services Guide	70
<i>Telstar 5</i>	

Second Departments

Milcom	62
<i>Monitoring Fort Leonard Wood</i>	
Tracking the Trunks	64
<i>Signs of Things to Come</i>	
American Bandscan	88
<i>Go West, Young Man</i>	
Outer Limits	69
<i>DX Conditions Improving</i>	
Below 500 kHz	71
<i>DXpedition Results</i>	
On the Ham Bands	72
<i>My Favorite Contest</i>	
Antenna Topics	74
<i>Antennas for Medium-Wave DXing</i>	
Radio Restorations	76
<i>The S-40A - Still a Challenge</i>	

MT Reviews

Scanner Equipment	78
<i>Radio Shack PRO-96 Scanner</i>	
Computers & Radio	80
<i>Part 2: Digging Deeper into DRM</i>	
MT Review	82
<i>Kenwood's Portable Sirius Kit</i>	
On the Bench	84
<i>Debriefing "Isabel"</i>	
The Gadget Guy	86
<i>Rokenbok Rules!</i>	
View from Above	87
<i>Bang, Crash!</i>	
What's New	88



Monitoring and the Law

South Dakota PD Wants Your Scanner

The Aberdeen, South Dakota, visitors and convention bureau describes Aberdeen as a city which emerged with the coming of the railroads, flourished into a strong agricultural economy, and has diversified into a manufacturing and service center. They say it is a city of Midwestern hospitality mixed with metropolitan progressiveness; a community where the quality of life is exceptional and its residents are willing to share. And, from recent reports, the Aberdeen Police Department wants you to share your scanner if you don't have a permit.

Aberdeen Police Sergeant Jay Tobin explained to ABC affiliate KSFY they are not just cracking down for the fun of it. "It's a safety issue to help us do our job so people can't leave the scene before we get there." He pointed out that anyone can have a scanner, but it's where and how they use it that matters. "We've been seeing more in vehicles lately and we're letting people know that there is a state law that says they can be confiscated if we find them in a vehicle without a permit."

The law to which Sergeant Tobin refers is South Dakota Codified law §23-4-5 which states:

The possession of any receiving set or converter described in §23-4-2 in any vehicle or business establishment, without permission pursuant to § 3-4-3, will constitute prima facie evidence of possession for unlawful purposes, and such receiving set shall be confiscated by any peace officer of this state and delivered to the attorney general for disposition.

Under South Dakota Codified Law, Chapter 23-4 titled Safeguard of Law Enforcement Radio Communications states:

§23-4-2 No person who has been convicted of a felony in this state or elsewhere within the past ten years shall possess any frequency modulation receiving equipment capable of being so adjusted or tuned as to receive messages or signals on frequencies assigned by the federal communications commission to local or state law enforcement officers, or to the state or any of its agencies. Any person who violates this section is guilty of a Class

2 misdemeanor. Nothing in this section shall be constructed to affect any radio station licensed by the federal communications system.

This is a common definition of a scanner and is an often seen restriction of convicted criminals possession of scanners.

Although Aberdeen police suggest obtaining a permit to monitor in a vehicle is possible, the South Dakota law on permits for scanners deals only with fixed monitors in authorized places or business. No mention is made in the law of permits for vehicles. The statute specifically reads:

§23-4-3 At the discretion of the attorney general or the legal licensee of each county or municipality, a permit to monitor said assigned frequencies may be issued. Such permit will apply to fixed monitors in authorized places of business. Application for such permit will be made in writing to the attorney general for frequencies assigned to the state of South Dakota and to the sheriff or fire chief for frequencies assigned to various counties and to the chief of police and fire chief of the various municipalities.

Since the "chapter [scanner laws] does not apply to any holders of a valid amateur radio operator or station license issued by the federal communications commission," it appears that having a valid FCC license or some locally created permit not envisioned by the state law would be the only legal way to possess a scanner in your vehicle in South Dakota.

What can happen if you're caught with a scanner in your vehicle? The law is clear on this point. Your scanner will be confiscated and is to be given to the attorney general for disposal. Codified at §23-4-5 under the title Unlawful possession of receiving set or converter without permission - Seizure by peace officer," the law states that:

The possession of any receiving set or converter described in §23-4-2 in any vehicle or business establishment [even a business that sells and repairs radios], without permission pursuant to § 23-4-3, will constitute prima

facie evidence of possession for unlawful purposes, and such receiving set shall be deemed contraband and shall be confiscated by any peace officer of this state and delivered to the attorney general for disposition.

What does "prima facie" and all this mean? Prima Facie means standing alone or on its face and means that mere possession and nothing else is enough for the police to prove that possession is for unlawful purposes. Although we could find no challenges to the South Dakota law, a comparison of this final and most serious seizure provision seem to raise serious issue of constitutionality.

Even in these times of expanding civil forfeiture for suspected criminals, especially in regards to drug assets, certain minimal procedures must be in place and followed. Although the standard of proof can be much lower in a forfeiture case than a companion criminal case where the standard of proof is beyond a reasonable doubt, the basic tenets of our justice system should still be followed. At a minimum those include a fair and unbiased decision maker, and notice and opportunity to be heard. Since the South Dakota law allowing seizure of scanners seems void of both, it is prime for a constitutional challenge.

MT contacted the Aberdeen Police Department for comment, but our calls were not returned.

◆ Free Subscription to MT

In addition to an honorable mention by name for those readers who submit stories to *Monitoring and Law*, beginning in 2004 if we use your story in the column, I will award the contributor a free six months (or extension) of *Monitoring Times*. You'll also be performing a service for your fellow scanner listeners!

Disclaimer

Information in this column is provided for its news and educational content only. Nothing here should be construed as giving specific legal advice. Persons desiring legal advice about their specific situation should consult an attorney license in their jurisdiction.

WORLD RADIO TV HANDBOOK

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Updated with the help of some of the world's leading DXers and SWLs, we are proud to present the 2004 edition of the bestselling directory of world broadcasting on MW, SW and FM

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- National and International broadcasts and broadcasters by country
- MW listings by region
- SW listings by frequency
- International SW broadcasts in English, French, German, Portuguese and Spanish listed by UTC
- TV by country
- Extensive reference section

Available in December from all good bookstores and radio & electronic retailers, and from www.watsonguptill.com
www.grove-ent.com
www.universal-radio.com

SOME COMMENTS ON WRTH 2003:

Compared to other radio handbooks, the WRTH is the only one which covers all our needs.

Anker Petersen, Danish SW Club International

If you are a serious DXer intent on getting those really faint faraway tropical band and AM MW stations, then WRTH is the only way to go for ALL the frequencies and stations cross-referenced by country or by frequency. *J.P., South Africa*

The book is very, very good. My congratulations. WRTH is the best. *G.B., Brazil*

A really fine publication on which all involved should be heartily congratulated! *D.T., UK*

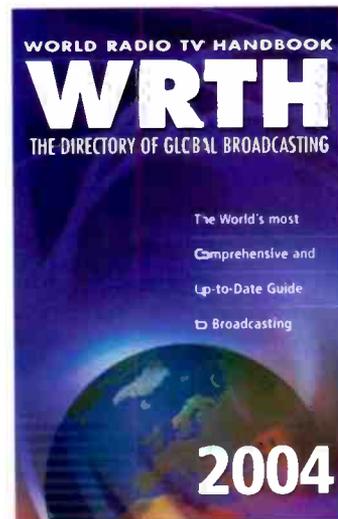
The 2003 edition of the World Radio TV Handbook is a shiny new volume, and this is not only because of what you see when you first look at it, but also because of what you find in its informative and up-to-date contents. *Adrian Peterson, AWR Wavescan*

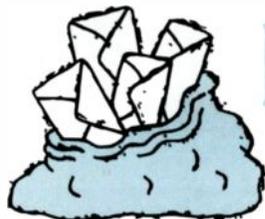
As a good general overview of worldwide broadcasting, WRTH is still the best guide on the market. Anyone waiting for a verdict on whether or not the 2003 edition is worth buying should not hesitate to place an order.

Radio Netherlands Media Network

An excellent, well-presented publication again and always within finger-tip range of my receiver.

R.S., UK





LETTERS TO THE EDITOR

Proof in Performance

The following letters were among those received in response to the October *Communications* item on ham response to the power blackout in the Northeast, and Larry Van Horn's *Closing Comments* on the Military Affiliate Radio Service (MARS).

"Excellent approach to highlighting the relative performance reality between the general Amateur Radio Service organized as RACES/ARES and the Military Affiliate Radio System. While the ARS practice includes recreational and experimental activity along with significant emergency communications support, the MARS programs have largely degenerated into private chat circuits.

"Verbose signal reports ('I have you medium readable with thunderstorms in the background') can hardly be characterized as experimental. The few fairly respectable MARS training mission activities are of questionable value and do not reach the level of superiority often claimed by the MARS leadership. Perhaps, this expose will induce command principals to take another look at the substance of these programs and heed recommendations to either reconstitute or terminate the programs.

"Again, thank you for your effort to highlight the MARS program failure in meeting primary mission responsibilities. Good show..."

— Al Uvietta

"I am an Army MARS member (AAR0JA). I am the Emergency Operations Officer for the State of Washington Army MARS (AAM0EWA). In Washington State, the MARS Members take our volunteered efforts rather seriously. I have worked hard to establish, and am in the process of refining, procedures that work closely with each county EOC and other agencies. We are more than just a 'MARSgram' handling group. We are very involved in Homeland Security and general Emergency Communications. We train daily on emergency communications procedures. We hold monthly drills, and annual emergency exercises.

"We are not the same communications service as RACES/ARES. The Amateur Radio services primarily serve local communications needs. For instance, during this current October flooding in the Puget Sound area of western Washington State, the EOC's of several counties were activated and helped the local Red Cross and County agencies. MARS, on the other hand, provides communications out of the region, in support of JDOMS and national interests. However, both services, for practical purposes, is composed of the same sort of individuals — Amateur Radio Operators.

"The effectiveness of MARS is directly related to the individual MARS member. Whether that individual has volunteered for MARS or for ARES, the quality of those services is in the hand of that volunteer. To criticize a volunteer organization is to criticize the Amateur Radio Operators who volunteer their skills and time.

"I take issue with what I am reading in these comments regarding MARS. The comments seem to me to be incomplete. The full picture is *not* being shown. Larry has not presented comments from those many MARS members who hold a *different* viewpoint.

"My experience is quite a bit different than what some 'ex-MARS member' and some small group of outside observers portray. My question remains, 'Why rely on the opinion of an ex-member, who is no longer current?' The ex-member who 'monitors' might have a bias, might not know what frequencies are current, and many frequencies are regional and might not propagate to the listener's location.

"I don't pretend to say that there are not issues that must be addressed in MARS, as a whole. The issues, if they exist, are the same issues any volunteer group might have, including ARES. There are *many* very serious and very dedicated MARS members who are quite skilled, actively trained, and dedicated to providing great amounts of time and energy to the service of their country in providing quality emergency communications support."

— 73 de Tomas, NW7US (AAR0JA/
AAM0EWA)

Larry Van Horn will be glad to respond in greater length to some of the above points, but to summarize briefly: The purpose of the editorial was not to criticize the dedication or competency of the volunteer hams, but to question the leadership and the viability of the mission itself. Even when there is a crisis, it appears MARS is not being used, even when it stands ready: It rarely even passes MARSgrams. The complete picture was shown in the DAIG report a year ago; the editorial was a look to see what had been done one year later to address those concerns. Larry's sources were both from within and without the organization.

MT would be glad to entertain a discussion regarding the viability of the MARS program. We already have more comments in hand, but what has been your experience? Is MARS serving its purpose? Do the federal agencies in your area know it's there?

Radio in NYC

Hugh Stegman recently vacationed in NYC and made these observations when he learned of this month's cover feature:

"Radiowise, what seems to be happening in this city right now is a scramble for tower space-vertical real estate. The Empire State Building is full, and the WTC is gone. The Empire State is considering adding more FM stations to its 16-station combiner, but that would require a new combiner with more ports, and also they aren't sure the floor can take any more big racks of gear.

"One building in Times Square is just now finishing a new broadcasting mast over their existing (occupied) skyscraper. It is a sight to behold.

At 450 feet up from the building roof it gets the two radomes (one TV, one FM) up over just about every other building in New York except the Empire State, and in fact right here it has the same height above the visual horizon as the much taller but much more distant WTC used to. There are already a few 850 MHz corner reflectors mounted to this tower, probably telco, so it isn't all broadcast.

"NOAA weather is on the GE building in Rockefeller Center, and from what I can see of the antenna farm up there, they are far from alone.

"The Staten Island Ferry rammed the dock today, killing 10. The captain ran home afterwards, and tried to kill himself. There is never a dull moment in THIS city."

— Hugh Stegman

License to Listen

"I travel via Northwest Airlines about 45 weeks each year and pass through airports nearly every weekend. I always take with me my IC706MKIIG power supply, and antenna cables. TSA always, *always* inspects the Pelican case that houses my radio gear and electronics.

"I'm a retired cop and today am a consultant on the Forensic Mapping System for law enforcement. I copied and reduced in size my FCC station license and taped it to my radio. While standing near the TSA inspector, I always remind them of my license being right there on the radio. They frequently say, 'That's a good idea.'

"I also always come to the airport with the Pelican case secured with those strong, but thin plastic 'hand cuff' lock strips. So far, whether I'm present or not, they've always replaced the locking strips to maintain the safety of my radio equipment. I also take aboard via my carry-on-briefcase, a Yaesu VX-2 which has yet to be questioned by TSA, apparently for other reasons.

"Another advantage would be for the passenger to wear a hat or shirt that presents them as an Amateur Radio operator, as they stand the visual 'scan' by TSA screeners. It helps to 'appear the part' if asked direct questions about the radio gear.

"A patient, savvy traveler will approach the TSA inspections less stressed if they take just a few steps to reduce the 'focus' and 'suspicion' surrounding radio communications gear aboard an aircraft. With that in mind, my travels have been uneventful and safe. Let's keep it that way! Happy DXing! :-)"

— Mick Capman KC8WQM

DXing Papua New Guinea

"I especially enjoyed Gayle Van Horn's article on PNG radio stations as I listen to them almost every night I stay up late.

"She mentions that 'Radio New Ireland' is presumably off the air due to transmitter troubles. Looking back over my logs I see that I have listed reception of that station on 6.25.03; I have also logged reception of Indonesian-sounding music at

that frequency on other occasions, likely from Indonesian stations. Since my log is so specific I assume that I probably had reason to believe that I had RNI rather than Indonesia, though no ID was heard. Could this coincide with a period before they were off the air?

"My reception of the tropical band stations in the Indonesian-PNG-southeast Asian areas is quite good here in San Jose, California, using an Icom R-75 receiver and a 350 foot dipole antenna with balun and careful grounding of my coaxial lead-in to reduce local noise. I have logged many dozens of catches in the 90 and 120 M bands from that region; now it's my favorite spot to lie in wait for a good one."

- Steve Waldee - retired broadcast station chief engineer

New Radio Netherlands Schedule

Brian Rogers writes, "I'm sure it's too late to change anything in my article (*Life as a News Junkie*, Nov issue), but RN has made big changes in their North American English Language Service. It's now as follows: 1200 UTC on 5,965 kHz; 1900 UTC weekends only on 15,315 kHz, 17,725 kHz, and 17,875 kHz; 0000 UTC on 9,845 kHz; 0100 UTC on 6,165 kHz; and 0400 UTC on 6,165 kHz and 9,590 kHz.

"All their transmissions now apparently start on the hour and it looks like they've eliminated the daily West Coast service at 1430 UTC."

(Even this may not be accurate as things keep changing - watch the MT SWG for the latest! - ed.)

Thanks to Robert Wyman

On behalf of MT, I want to extend a note of thanks to Robert Wyman for his nearly three years at the helm of the *Scanning Report* column. Previously, Robert had submitted photography and freelance articles to the magazine, and led a seminar at the last MT Convention. We look forward to more such contributions from him in the future, and extend our hearty thanks for his hard work on the column.

As Robert says in this month's article, it seems time to combine the trunked and the conventional scanner coverage back into a single column now that trunk-tracking is so well established. Dan Veeneman will undertake to do this in *Scanning Report* which will be expanded back to three pages next month. Please give Dan your support, especially by providing your local conventional and trunked frequencies.

May you be blessed with family and friends and good radio companions on this holiday season. Please join us in the earnest prayer that in the coming year the radio waves will be used not to foment hatred but to help understand and celebrate the variety and kinship of our precious human family.

- Rachel Baughn KE4OPD

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

- Rachel Baughn, KE4OPD editor

HAUSER'S HIGHLIGHTS

NORWAY

NRK's final SW schedule, in Norwegian, expiring Dec 31; may still include some BBCWS relays in English:

1200-1230	11615, 12070, 13800, 18950
1300-1330	9590, 11610, 13800, 17550
1400-1430	13800, 17735
1500-1530	13800, 15735, 17525
1600-1630	7490, 13800, 15705
1700-1730	7490, 9980x, 13800x, 18950
1800-1830	7490, 15735
1900-1930	7490, 13800
2000-2030	7490, 9980
2100-2130	7490, 7560
2200-2230	7465, 7560
2300-2330	7390, 7465, 7490, 7560
0000-0030	7490, 7560
0100-0130	7560, 9945
0200-0230	7490, 7560, 9590
0400-0430	7465, 7490, 7560
0500-0530	7490
0600-0630	5945, 13800
0700-0730	7180, 9590
0800-0830	11975, 13800
0900-0930	11975, 13800, 18950
1000-1030	13800, 21765
1100-1130	13800, 21755

x = except Sun Web: <http://www.nrk.no/radionorway> (via Wolfgang Bueschel, Alemania, Conexión Digital)

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BC245,
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Announcing Scancat-Gold for Windows
Version 8.2552

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Radio Honor Roll

"Why scanners should not be regulated"

"I lived in Spokane Washington in 1988. I was on the south side having lunch with my girl friend and like always had my 2-meter rig on tuned to Spokane PD. An officer came on the air and said in a muffled voice 'I'm stung, 29th & Lamonte, can't breathe.' Dispatch came back, 'unit calling.' They didn't hear his call for help and no one else did. I said we better go and we made the six blocks in about 30 seconds. The officer was slumped over the wheel in respiratory distress.

"I pulled the officer from his car and opened his airway, then grabbed his mic and told dispatch to respond EMS code to 29th & Lamonte. Two of his buddies said over the radio 'that's not his voice' and I had several PD units there in a heartbeat. EMS arrived, started a line and was giving Epinephrine.

"We had to go, my girl friend was late getting back to work. When she told her boss what happened he said 'can't you come up with a better excuse than that for being late?' Like someone would make up a story like this for being 5 minutes late to work.

"The funny thing was this was a major street where he was working radar. No one even looked twice at a guy with long hair dragging a cop from his car and laying him out on the road."

— E. Jay Fleming, KA7MBQ

Jay said he contacted Spokane PD and the Mayors office trying to find out how the officer did, but no one would speak to him. Though this incident happened back in 1988, we know good scanning citizens make a difference all the time. If you have a story on the positive uses of scanners, *MT* readers would like to hear it.

73, SK

After completing 43 years of publication, *73 Amateur Radio Today* magazine is calling it quits: The September 2003 issue was the magazine's last. According to self-proclaimed "El Supremo and Founder" Wayne S. Green II, W2NSD, it was a simple matter of economics.

The first issue of *73* was published in October 1960 from what Green once described as "a small, dingy apartment" on E 15th Street in Brooklyn, New York. Late-night radio personality Jean Shepherd, K2ORS (SK—deceased or "silent key"), was listed as a contributing editor. The magazine—which became virtually inseparable from Wayne Green himself—was a pioneer promoter of SSB, FM, solid-state, easy construction projects and the marriage of personal computing and Amateur Radio.

Green's *73* editorials and regular round of hamfest and convention personal appearances originally concentrated on Amateur Radio and his ideas to improve, advance and grow it. In more

recent years, however, they veered into conspiracy theories, cures for cancer, AIDS and other ailments and his books on those topics.

Green told ARRL that no definite arrangements have been made yet about how to handle outstanding *73* subscriptions. He said he does plan at some point to make available on a Web site "articles of lasting interest." (*ARRL*)

FCC issues spectrum-leasing rules

The Federal Communications Commission issued its final rules on secondary markets allowing wireless carriers to lease unused spectrum to other companies. The secondary markets rules were voted on in May, but issuance of the final rules make them regulatory policy.

Previously any license transfer required FCC approval. Prior approval is now unnecessary for leases in which there is no change in de facto control. The approval processes for other types of leases, transfers and assignments of licenses has also been streamlined.

The FCC hopes that access to spectrum will promote increased competition in wireless broadband development, open doors for innovators and entrepreneurs, and increase the number and variety of wireless applications available to consumers. The new rules also should encourage wireless deployment in rural America.

FCC Commissioner Michael Copps voted against the rules. He issued a dissenting statement, saying, in part, "I do not see how the law allows us to effectuate these policies." (*Mobile Radio Technology Bulletin*)

High Spectrum Openings

The FCC recently opened more than 10 GHz of upper millimeter wave spectrum in the 70-, 80- and 90-gigahertz range—now largely unused except by a few classified military applications. Loea Corp. petitioned for the use of the bands in September of 2001. Now Loea claims to be the first to deploy commercial systems using the 70 GHz to 90 GHz spectrum bands.

Tom Wetmore, Loea's VP of sales and marketing, said that its technology can be used for the last-mile communications links, especially to office buildings, where fiber optic connections often don't reach. It was originally developed for use with passive millimeter wave cameras for military applications. The cameras allow planes and helicopters to see through fog.

Loea's technology is currently installed at federal government facilities and at the University of Hawaii. In January of 2003, Loea's system supported live broadcasting of Super Bowl XXXVII.

Cisco Systems may also be working on developing the spectrum for very high speed data transmission.

In a separate proceeding, the FCC also set service rules for the 1710-1755 MHz and 2110-2155 MHz spectrum bands. This spectrum is now used by the federal government and the Defense Department for wireless communications and precision-guided missiles. It is expected that

the spectrum will be auctioned in 2005, although current government users will not be required to vacate the frequencies until 2008.

Although the FCC is allowing a great deal of flexibility on how the spectrum will be used, the FCC hopes it will facilitate cellular phone services, such as very-high-speed data services. However, it is as yet unclear how much interest the US consumer has in such third-generation services.

On the other hand, since it increases the amount of spectrum available to cellular providers by about 50 percent, you can bet someone will be bidding on it!

High Speed at High Altitudes

Connexion by Boeing and Rockwell Collins have announced an agreement to provide high-speed connectivity for the corporate aviation market. The new service, "Collins eXchange," will combine the the Connexion by Boeing broadband network with Rockwell Collins' services for business aviation.

Connexion by Boeing will provide the technology for two-way, high-speed connectivity and manage the network and satellite assets. Rockwell Collins will provide and install the antenna, manage the airborne system installation, vendor relations and customer service, including marketing and sales. Connexion by Boeing will manage sales and marketing to governments.

Installation of the Collins eXchange systems are expected to begin in mid-2004 with service beginning in early 2005. (*MRT Bulletin*)

FCC raids long-time pirate station

Federal marshals and representatives of the FCC raided a quiet residence in San Francisco which housed an unlicensed, low-power FM radio station. Volunteers at San Francisco Liberation Radio, which has been on the air for 10 years, said the agents removed an antenna from the roof and seized computers, tape and CD players, turntables, a mixing board and other equipment.

San Francisco Liberation Radio broadcasts "radical progressive" political views and independent music programs at 93.7 FM, reaching listeners as far away as the East Bay. In August, Supervisor and mayoral candidate Matt Gonzalez drafted a resolution supporting the station for its alternative viewpoints.

"People are really crushed," said Michael Rosenberg-Beausoleil, a high school social studies teacher who worked in corporate radio for years and now doubles as DJ John Hell on Liberation Radio. "It's community radio, and what this is saying is the community does not deserve to have a voice."

The Bay Area is an acknowledged leader in the free-radio wars, having set a hefty precedent in the mid-1990s with Stephen Dunifer's Free Radio Berkeley. That station exemplified what a small broadcaster with an alternative viewpoint could provide for its neighborhood, before it was shut down by court injunction in 1998. (*San Francisco Chronicle*)

Commercial Pirate

Service-minded citizen or crafty capitalist? The jury may be out among his supporters, but an administrative law judge for the FCC has no doubt in his mind. Dave Becker of Homer, Alaska, has owned and operated several radio stations in southcentral Alaska and the Kenai Peninsula for the past 20 years, but he's been "hurling appeals, technical challenges and legal diversions at federal regulators since at least 1996," according to the *Anchorage Daily News* report. Over the years Becker operated seven translator towers which were ruled to be illegal, but weren't taken off the air until 15 months later. This past summer, Becker was fined \$140,000 and ordered to shut down two of his four stations (KPEN and KWVV), but don't look for them to disappear anytime soon, either.

One of Becker's rivals (who claim Becker has been garnering substantial ad revenues in the area they are licensed to cover), Kenai station KSRM owner John Davis, says Becker's defiance is breathtaking, practically daring the FCC to take his other licenses. "I would be scared spitless putting everything on the line like that," he said.

Becker says the FCC keeps changing he rules to get rid of him, and he's just exercising his right to appeal...and appeal...and appeal...

Cumulative RF Radiation

For the first time, the FCC proposed forfeitures against four licensees (KBIG-FM, KKBT, KRTH-FM, and KWHY-TV) for violating the radio frequency radiation maximum permissible exposure limits at a multi-user site where the power density level produced by each individual licensee was within acceptable limits, but the cumulative effect exceeded the limits established by the FCC. The transmitters at issue are located on Mt. Wilson, in Los Angeles, Calif. The Commission proposed a forfeiture of \$10,000 for each station - a total of \$40,000.

FCC agents inspecting the Mt. Wilson transmitter site determined that RFR levels in a publicly accessible area, located about 100 feet from a U.S. Post Office, exceeded the maximum permissible exposure limits by 60.5 percent. Shortly after the violation was brought to the stations' attention by the FCC, they took steps to limit public access to the area where the RF radiation exceeded the maximum permissible exposure limits. (*MRT Bulletin*)

"Communications" is compiled by editor Rachel Baughn from news and reports sent in by our readers. Thanks to this month's fine roster of reporters: Anonymous, NY; Norman Hill, VA; Ira Paul MI; Doug Robertson, CA; Brian Rogers, MI; Mike Roth, IL; Richard Sklar, WA; John Vercillino, IL; and via email: anonymous "hilarly" and "punworg"; McAllister Bryant; E Jay Fleming; Bob Grove; Mike Hearne; Maryanne Kehoe; John Mayson; Jerry None; Bob Parnass; Adrian Peterson; D Prabakaran; Ken Reitz; Larry Van Horn; and Barry Williams. Thanks also to the ARRL and the *MRT Bulletin*.

Holiday treats from The Classical Station, WCPE

Join WCPE this December for the finest in classical music for the holiday season on FM, satellite and Internet broadcasting. The fun begins with our annual birthday salute to Ludwig van Beethoven, Dec. 13-16, leading up to a Big Beethoven Birthday Bonanza on Dec. 16, with 24 hours of Beethoven's music.

Then, it's the week before Christmas, when WCPE brings a week of favorite Christmas carols and seasonal selections. There will be plentiful helpings of brass, baroque and other favorites.

The Jewish celebration of Chanukah begins at sundown on December 19. WCPE presents a special program of music for the Celebration of Lights, hosted by the late Andrea Rosnick, at 6 p.m. that day.

Make sure your Christmas Eve plans include The Great Sacred Music of Christmas, presented by Al Ruocchio, host of The WCPE Opera House. He'll bring you the stars of the opera stage performing your favorites, beginning at 7 p.m.

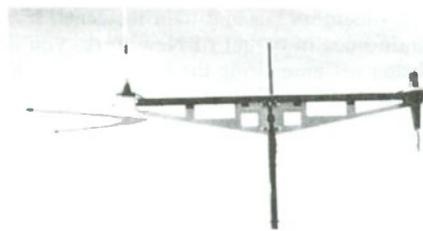
On Christmas Day wake to glorious holiday works including Handel's Messiah, Tchaikovsky's Nutcracker, Bach's Christmas Oratorio and all the great carols of Christmas.

Be sure to listen for more special holiday presentations during December on WCPE's Great Sacred Music, Sunday mornings from 8 to 11, and Peaceful Reflections, Sunday evenings from 9 until midnight.

Ring in the New Year with WCPE's Countdown to 2004. You'll hear classical favorites and Viennese waltzes starting at 7 p.m. on New Year's Eve. Of course you'll hear Auld Lang Syne at midnight and then the party continues! The New Year is welcomed with favorites by Bach, Rachmaninov, Mozart, Copland, Tchaikovsky and others! (All times are Eastern)

The Classical Station, WCPE, is a 100% listener-supported non-profit radio station dedicated to bringing Great Classical Music to everyone 24 hours a day. You can hear our beautiful music on the Internet in RealAudio, Windows Media, QuickTime, MP3 and Ogg Vorbis streaming technologies. Our programming is also available on the Galaxy 5 Satellite, transponder 7, at 5.58 and 6.12 MHz. Owners of DTV receivers can tune to G5 958. For more information, call 1-800-556-5178, or visit us online at TheClassicalStation.org.

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4. Two Meter Al (78-3/4") Grey (large thin 5" pads) 7.5# \$349.00
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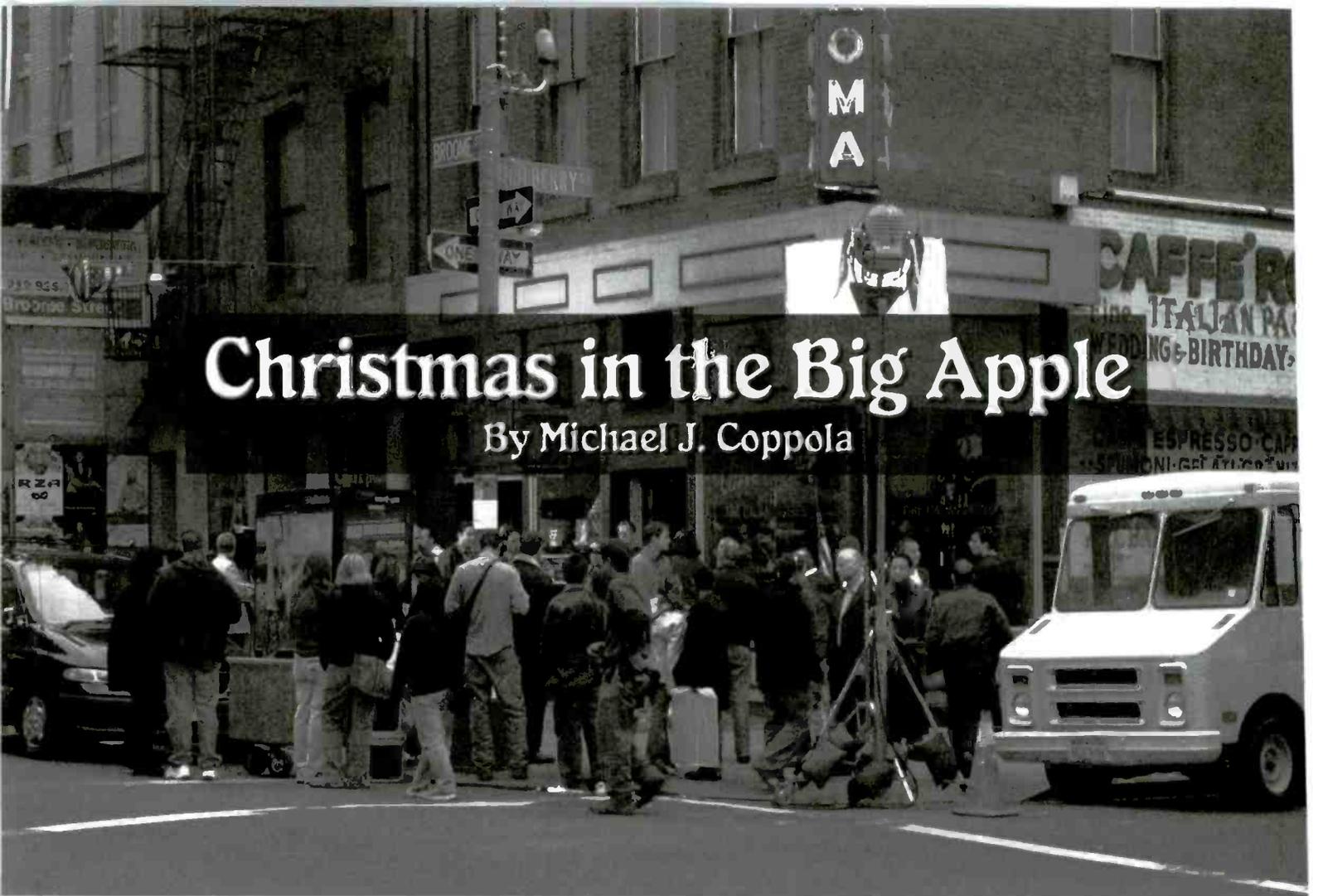
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Christmas in the Big Apple

By Michael J. Coppola

The set of "Third Watch"

So, it's almost December: Time for vacations, family, good times and memories. Then you leave the house or hotel and find mad shoppers, traffic, and women attacking each other over the 50% off tables!

Some of you may be planning to combine family experiences with good shopping by making a visit to New York City. Well, hopefully by the time you finish reading this article, you'll have the "back way" around the madness you'll likely find here. I'll cover what's good to visit, where and when to avoid certain areas, and what to listen to while doing it.

Travel Tips

First, traveling. If you're coming in by plane, I'm sure everyone knows all bets are off as far as scanning on the plane. However, you are now allowed to use your cell phone as long as the plane is on the tarmac and not in the process of landing or taking off.

If you have a portable radio, unless you are a police officer, I would suggest just holding off until you leave the airport. Especially in this area, you will most likely be stopped and questioned. Even though it's legal, in the New York/New Jersey metropolitan area, law enforcement does not take any chances.

If you're traveling by train, you'll want to listen to the NJ Transit system or Amtrak. NJ Transit PD can be heard on 160.830 with a pl of 123.0. If any incident occurs with NJ Tran-

sit property, it will come over that channel. This includes bus and train incidents. If your train goes in or out of New York, you'll be better off monitoring the Port Authority radio system. That info can be found in the tables following this article. Port Authority police will be the first notified and responding agency for any incident involving mass transit within their jurisdiction. This includes all airports, PATH (Port Authority Trans Hudson) trains, as well as the tunnels and bridges.

If you're traveling by vehicle, you'll want to monitor the NJ State Police trunked system. That list can also be found at the end of this article.

Monitoring Public Safety

Here are a few tips on monitoring the NYPD and FDNY. First, the precinct numbers start at the base of Manhattan and increase in numbers as you go up. So, for example, if you're walking around the Holland Tunnel area, then you're in the confines of the 1st precinct, but if you're near the George Washington Bridge all the way up in the area of 178th St, then you're in the 34th Precinct.

When monitoring the fire department, you can get an idea of where they are by the "box" number. Usually, a box location is the number of the nearest pull station – a fire/police box on the street corner that connects the user directly to police or fire departments by pulling the le-

ver. For example, if you hear Box-100, then you're near Battery Park on the South side of town, but if you hear a fire at Box-1625, then that's all the way up by 147th St and 8th Ave.

Basics for city freqs: NYPD Special Operations (who the cops call for help), 470.8375 (pl 136.5); this covers the entire city, not just Manhattan. Emergency Services Units (ESU) Adam, Boy, and Truck 1 and 2 cover Manhattan. "1" units cover the South half and "2" units cover the North Side. Manhattan borough fire is 154.250 (pl 186.2) and Citywide, which receives all relays of "all hands" fires and above, is 154.430 (pl 186.2).

Shopping Venues

Now that you know where to find the frequencies and who's using them, here's how to find your way. Personally, I'm an online shopper. After you visit, you'll know why! New Jersey has the most densely populated roads in the United States. New York City has the most densely populated sidewalks in the United States. So really, you're out of luck when it comes to traffic, trust me.

However, should you find the need to embark on the three hour tour, I will make the following suggestions. If you would like to visit the malls, then New Jersey is the place to be, with everything from discount stores to some of the largest malls in the country. The sales tax in New York City is 8.6%, but in New Jersey,



A 55th Precinct car from the show "Third Watch"

you only have to donate 6% for sales tax. Also, the only thing cheap in Manhattan is the air, and believe it or not, they even have stores where you can pay for flavored air. A \$30 pair of jeans in NJ is \$45 or so in NYC.

If you would like to spend all your time in one place when shopping, then I would go to the Garden State Plaza. That is located at the intersection of Routes 4 and 17 in Paramus, Bergen County. With over 1,100 stores there's something for everyone. If you would like something smaller, then you can take a cruise to Paramus Park Mall on Route 17 North or Willowbrook Mall in Wayne at the intersections of Routes 23 and 46. If discount stores is your thing, then take a ride on Route 3 to Secaucus, Hudson County. Most of the town is scattered with large discount stores such as the Mikasa warehouse, DKNY, Polo, and other large brand names.

If you're hungry and tired of sitting around



in those "I'm with her" chairs in the clothing stores, then it's time to journey over to Manhattan. This is my suggestion for great food and sights. First let's get a bite to eat, you'll need it for the walk. There's no place like Chinatown on Canal St for Chinese food. It can be easily found by exiting the Holland Tunnel from NJ or taking any subway to the downtown area. If you like Italian, then Little Italy it is. Just make a left off Canal St. onto Mulberry and you're there. One of my favorite spots is Positano's immediately on your right hand side and then Bellissimo's for coffee and desert.

While you're in the neighborhood, you can stop into Engine 55 on Broome St just off Mulberry. The men there are real friendly and have a historic firehouse to boot. The average bill in the area runs about \$20 per person to \$50 per person.

These are the more specific areas, but if you just want something simple and fast, then you can grab any pizza place or McDonald's while site seeing. They're all over the place in Manhattan. But whatever you do, don't forget to grab a pretzel off a street vendor. You weren't in New York until you do.

Sight Seeing

For seeing the sights, here is a list of places that are always worth the trip:

- FDNY Museum -
278 Spring St near Hudson St
- F.A.O. Schwartz -
767 5th Ave near West 58th St (large famous toy store)
- Macy's -
151 West 34th ST near 7th Ave (pictures with Santa)
- NYPD Museum -
235 East 20th St near 3rd Ave
- Radio City Music Hall -
1260 6th Ave near West 50th St (home of the Rockets)
- Rockefeller Center -
West 49th St at 6th Ave (the famous tree)
- Sacks Fifth Avenue -
611 5th Ave at West 49th St (good window

displays)
World Trade Center Memorial Site -
West St and Vessey St.

Additional Resources

Now this is a MUST: visit <http://www.nofortourists.com> and purchase the book *N.F.T. Guide to New York City*. It's worth every penny. This book has a complete map of the city, then breaks down each section into smaller maps. Each map then lists the nearest police and fire stations with addresses, cross streets, and phone numbers. Also tells you the nearest ATM machines, hospitals, restaurants, photo shops, and other very useful information.

I use this when "buffing" the city and it has been a very invaluable resource! Also here are two good websites for frequency information: New York <http://www.n2nov.net> or for New Jersey <http://www.bergenscanner.com>

PORT AUTHORITY POLICE DEPT

Service	Freqs and pairs (pl tone)
Bus Terminal Police	470.563 473.563 (110.9)
Brooklyn Piers Ops/Maint	470.613 (110.9)
Central Police Desk	453.400 458.400 (110.9)
Newark Liberty Airport Police	866.238 821.238; 866.713 821.713 (110.9)
Newark Tower	118.300
Tower Ground Control	121.800
George Washington Bridge Police/Ops/Maint	453.800 458.800 (100.0)
Portables Only	470.563 470.563 Digital
Heliports Operations	123.050
Holland Tunnel Police/Ops/Maint	453.800 458.800 (123.0)
JFK Airport Police	866.113 821.113; 866.663 821.663; 868.600 823.600 (110.9)
Police	453.375 458.375 (100.0)
Operations	453.650 458.650 (100.0)
Tower Ground Control	121.900
JFK Tower	119.100
Laguardia Airport Police	453.650 458.650 (123.0)
Ops & Maintenance	151.115 (123.0)
Main Ground Control	121.700
Alternate Ground Ctrl	121.850
LGA Ground Control	118.700
Lincoln Tunnel Police	453.375 458.375 (123.0)
Ops & Maintenance	150.995 150.995 (110.9)
PATC Op & Security	153.775 (100.0)
PATH Police	161.040 (107.2)
Train Operations	160.470 (107.2)
Maintenance	161.460 (107.2)
Shap / Yard	161.535 (107.2)
Management	452.875 457.875 (110.9)
Police Safety	
Police	868.988 (100.0)
Mutual Aid - ICALL	866.013 821.013 (156.7)
Mutual Aid - ITAC	866.513 821.513 (156.7)
Mutual Aid - ITAC	867.013 822.013 (156.7)

Mutual Aid - ITAC 867.513
822.513 (156.7)
Mutual Aid - ITAC 868.013
823.013 (156.7)
Police 1 866.213 821.213
Police 2 866.813 821.813
Police 3 867.375 822.375
Police 4 868.600 823.600
Police 5 867.875 822.875
Police 6 868.550 823.550
Police 7 868.913 823.913
Police 866.075 821.075
Police 866.388 821.388
Police 868.100 823.100
Police 866.513 821.513
Police 868.013 823.013
Teleport Ops & Maintenance 470.588
473.588 (136.5)

**NEW YORK POLICE DEPT MANHATTAN
PRECINCTS**

Precinct Freq (pl tone)
1-5-7 476.5625R (100.0)
6-9 476.4375R (110.9)
10-13 476.3375R (123.0)
MN-17-MS 476.5875R (136.5)
19-23 476.3875R (151.4)
20-24-CPP 476.3125R (167.9)
25-28-32 476.6375R (186.2)
26-30 476.3625R (100.0)
33-34 476.8875R (110.9)

Special Operation Div 470.8375R
(136.5)

Traffic Division 470.8125R (123.0)
Citywide / 1 470.6875R (100.0)
Citywide / 2 470.7125R (110.9)
Citywide / 3 470.8625R (151.4)
Citywide / 4 470.8875R (123.0)

NEW YORK FIRE DEPT (FDNY) FREQS

Citywide 154.430 153.890 (186.2)
Queens 154.400 153.770 (186.2)
Brooklyn 154.370 153.950 (186.2)
Manhattan 154.250 154.010 (186.2)
Bronx 154.190 154.070 (186.2)
Staten Island 154.190 154.070 (186.2)

FDNY Fireground list:

TAC 1 486.1125
COMMAND 1 485.1875
TAC 2 486.2625
HT 4 487.2625
HT 5 487.1375
HT 6 485.2625
HT 7 486.1375
HT 8 485.0625
HT 9 DIG 486.0150
EMS FIRE 487.4875 (185.4)
BLDG RPT 483.0125 (173.8)
BLDG DIG 483.0000 (173.8)
MOB. RPT 484.7625 (173.8)
SUBWAY 1 460.5750 (110.9)
SUBWAY 2 460.6250 (103.5)
EMERGENCY 486.7375

NEW JERSEY AGENCIES:

Paramus (Garden State Plaza, Paramus Park
Mall)

Police 1: 460.500 146.2
Police 2: 460.075 146.2
Fire 1: 453.150 136.5

Secaucus (discount stores off of Route 3)

Police 1: 471.950 123.0
Fire: 156.165 D-162

Bergen County Police (Route 4 and 17)

Police 1: 477.1625 156.7

NJSP (Rte 80, Garden State Pkwy, NJ

Turnpike)
Motorola trunked system
(See page 29, July 2003 MT)
860.9625 859.9625 858.9625 857.9625

Uniden code: Station: Covers:
Type II
35760 4-comm Routes 280,
287, 80
27088 2-comm Garden State
Parkway
26832 Northstar Medevac
27024 NJ Turnpike

Radio Hobby Groups

The easiest way to hear what's going on
without reprogramming all your radios is by
monitoring the buff groups:

Metro Fire Radio:

Channel 1: 451.850 (114.8)
Channel 3: 452.175 (114.8)

Citywide Radio New York:

Channel 1: 461.225 (167.9)

Metro Traffic (Great for traffic reports in the
area)

Channel 1: 450.8125 (67.9)

NY- NJ Metro Malls

(courtesy of Bob Kozlarek nydxa@hotmail.net)

EDISON MENLO PARK
Mall 464.4375, 464.5375

HACKENSACK, NJ
Riverside Square Mall
463.925 Security
464.825 Mall Operations

PARAMUS, NJ
Bergen Mall
463.4375 Mall Operations
Garden State Plaza
463.5625 WPLF270 Mall Operations
464.850 WPLF270 Mall Operations
464.875 WPGS631 Mall Operations
154.625 KNAV412 Macy's
462.850 WNKE551 Macy's
464.100 Macy's

464.275 WNGS836 Macy's
463.4375 WNSF435 Nordstrom
463.5625 WNSF435 Nordstrom
463.8375 WNSF435 Nordstrom
464.0875 WNSF435 Nordstrom
464.2625 WNSF435 Nordstrom
464.6125 WNSF435 Nordstrom

Paramus Park Mall
463.865 Mall Operations
464.850 Mall Operations
464.475 WNLV652 Mall Ops
151.655 KWM314 Mall Ops
(Suspected old freq)

462.650 Macy's
464.100 Macy's
464.500 Macy's
464.6125 Sears
464.6375 Sears Fortunoff Rt. 17
464.775 WNLG840
465.000 WNLG840
Mall at 4, Paramus 464.5625
Livingston Mall 464.975
Lodi, NJ Home Depot 464.500
Toys R Us - Paramus 467.8125
Home Depot - National Use
461.2125, 463.2875, 464.6375

ROCKAWAY, NJ
Rockaway Town Square Mall
464.975 (PL 97.4)

SHORT HILLS
Mall @ Short Hills
464.8250

WAYNE, NJ
Willowbrook Mall
154.515 Mall Operations
463.5625 Mall Operations
464.6875 Mall Operations
464.775 Fortunoff
33.16 Macy's, no activity
151.745 Macy's
151.865 Macy's
151.895 Macy's
464.100 Macy's (very active)
464.6125 Sears
464.6375 Sears (inactive - suspect other
freqs in use)

Wayne Towne Center 464.925
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How I Came to Write for *Monitoring Times*

W. Clem Small, KR6A
Antenna Editor, *Monitoring Times*

I don't actually remember when or where I came upon my first copy of *Monitoring Times*. I think it was when I saw an *MT* advertisement in some radio-enthusiast magazine, and sent for a copy. Whatever the case, I was immediately hooked. Here was a magazine dedicated to radio from "DC to daylight," as they say. Its broad coverage appealed to me. That was 20 or so years ago, and I've been reading it ever since.

Not long after getting acquainted with *MT* I had an operation and found myself lying abed 24 hours a day for a while. In such a state you can do a lot of reading, and a lot of thinking. I noticed that Bob Grove was asking for readers to send him articles to put in his magazine. I had been really fascinated with radio technology all my life, I'd been a ham, an electronics technician, a radio-TV repairman, a military radio operator, a Civil Air Patrol radio operator, and a commercial radio-broadcast operator. And I had long had a fantasy of writing for radio magazines for a number of years, but I'd never gotten that fantasy off the ground. So I wrote an article, and sent it to Bob.

To my surprise, he published it! So I sent another, and he published that one, too. So I kept sending, and he kept publishing. Coincidentally, checks in payment for the articles kept coming too: they were a nice source of extra money. I wasn't intentionally trying to write an article for every issue, but after a while I realized that I had an article in something like 11 out of the last 12 issues. I began to feel like a real magazine writer!

This went on for some time, until at one point Bob decided to reorganize the magazine's format a bit. He sent his contributing writers a list of some columns he planned to include in *MT*, and asked which one of them we'd be interested in having assigned to us. I wanted to write about antennas, but as I looked the list over antennas weren't mentioned. So I had the temerity to



ANTENNA TALK

W. Clem Small KR6A

write and tell him that he needed an antenna column!

At the same time I modestly mentioned that, by the way, I was the ideal writer for that column. I told him that this was so because I had long been interested in antennas, I owned something like 40 technician-level books on antennas, a number of engineering antenna books, and a willingness to continue to learn from them. I also mentioned my interest in building and testing antennas, and in writing about them. To my surprise and delight Bob agreed to give it a shot, and we were

antenna topics

You can build it

off and running with *Antenna Topics* – the antenna column in the magazine you now hold in your hand (or computer).

I went through a period of settling in to the job: first under the guidance of Bob, then with the help of past *MT* managing-editor Larry Miller, and still later with Rachel Baughn, the current managing editor. During the time that I have been writing for *MT* I have also occasionally written for *Popular Communications*, *CQ*, and various other radio magazines. I fondly remember a very pleasant association with Rich Rosen, the

managing editor of *Ham Radio Magazine*, for which I often wrote until that fine journal ceased publication. For a while I was antenna editor of *US Scanner News* until that magazine's demise.

But through all this I continued with *Monitoring Times*: it was where I seemed to belong. Bob and the editors at *MT* always treated their writers with respect – as valued associates. I felt at home with *Monitoring Times*. And I enjoyed writing about antennas: a topic that still never ceases to intrigue me.

Inspiration, Perspiration, and Satisfaction

As you can guess, there is more to writing a column than sitting down and tapping out your ideas on a word processor. First you need to come up with the inspiration for a topic that appeals to you, and that you think will also interest your readers. After this inspiration stage comes the perspiration stage: reading and learning more about the antenna you're going to cover, and then building and testing the antenna.

Antenna building can be simple or surprisingly time-consuming depending on the project you are covering for the month. At times I may do some computer modeling of the antenna to check a pattern, or some other aspect of the antenna's predicted performance. Actually, some of my columns are on antenna-related topics or on antennas I have built before, and so for those months I may not do any building or testing.

After building and testing comes the writing. Writing may sound like the easy part, and in some ways it is – it's fun and a challenge to see how well you can put the ideas you have in your head down on paper (or monitor screen) so that someone else will understand what you are trying to say. But this stage isn't without its perspiration, too. For me, it requires thinking through what you want to say, then writing it, reading and editing what you wrote, leaving

it alone for a day or so, and then rereading and editing it some more. This last stage is usually repeated several times. Then when I am satisfied with it (or, more likely, when the deadline for getting the finished copy e-mailed in is upon me) I send it off.

Each month I conjure up what I hope is a thought-provoking question for readers – a “Radio Riddle” – and also include an informative antenna-related web site. In addition there’s a figure to be drawn for each column, and if you read my column you may notice that I still use the old-fashioned way of drawing figures: with a T-square, pen, ink, triangles, etc. I’ve tried computer drawing programs, but with them my figures always seem to look too manufactured, with no human touch.

By the way, before e-mail was common we used to have to type our articles up, draw the figures, and then send them in by snail mail. When the *MT* folks received it, days later, they had to re-type the whole manuscript from our copy into a printing program so it could be edited, pasted up, and sent to the printer. Computer scanners for copying graphics weren’t common then, so when I had everything ready, I would go to town, walk to the copy shop and copy the figure, then continue on to the post office and mail everything off. I like the e-mail way lots better!

But You’re Still Not Done!

When my copy of *MT* comes in the mail I

like to check out my column to see what it looks like in print. I don’t actually read the whole column, but even at that I sometimes see something that surprises me. It may be an error that somehow eluded me on all those re-readings, or a line in the figure that should have been erased, but which is embarrassingly still showing. And Rachel may have contributed her editorial touch by adding a clarifying statement or so, or by changing things somewhat here or there.

But even after your column appears in print you’re not done with it! Your readers respond with letters and e-mails saying a variety of things like: “I read and enjoy your column every month,” or “Can you help me select an antenna for my location...,” or “There is an error in the drawing of the groundplane reception pattern,” etc. I even remember once getting an interesting letter from Jacques d’Avignon several years back before he became an *MT* writer himself!

The feedback you get in those letters can be a great teacher, and it is all appreciated when given in good spirit. On the other hand, I’ll occasionally get a letter so weird I just don’t know what the person is talking about! But most letters are very cordial and worthwhile. Once a fellow actually enclosed a dollar bill with his letter telling me to go out, and have a drink on him!

And So

In retrospect, my years of writing *Antenna Topics* and my association with the folks at

Monitoring Times have been, and continue to be, both enjoyable and educational. I’ve had a lot of fun, done a lot of reading about, and a lot of working with antennas. I’ve also learned a bit about writing, and about antennas.

If you ever decide that you’d like to write* about the things in radio that interest you, then my advice is: “Go for it! But be careful. You’ll find that it can get in your blood, and you may find that it stays with you for a long, long time.”

* If you are interested in writing for *MT* you can get tips on how to get started by contacting Rachel Baughn, Managing Editor, *Monitoring Times*, 7540 Highway 64 West, Brasstown, NC 28902-0098, or editor@monitoringtimes.com. *Writers Guidelines* can also be found on the website at <http://www.monitoringtimes.com/html/mtwritgd.html>

** Editor’s note: Clem Small has been a member of the *MT* writing staff since November 1984. His *Antenna Handbook* has just been released in its second edition, available on CD from Grove Enterprises (see this month’s *What’s New* column for details).



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Still Riding the Airwaves: The USSR's Superpower Transmitters

By Bernd Trutenau

In the aftermath of the collapse of the Soviet Union, many high power HF and MW transmitters have been standing idle in the successor states since the end of 1991. Ten years later, some of them have returned to the air, such as in the Ukraine and Tajikistan.

These transmitters, with a power of up to 2500 kW on LW/MW and 1000 kW on shortwaves, are the products of a long and unique engineering history. They are designed and manufactured by what was once the world's largest transmitter production enterprise, the Komintern (Comintern) transmitter plant with headquarters in Leningrad (today's St. Petersburg). In the times of the Soviet Union, these transmitters carried Radio Moscow's Foreign Service with a powerful signal around the world. Some were used for jamming broadcasts from the West. Today they still transmit the Voice of Russia, but mixed with a variety of other programs from international broadcasters like VOA, Radio Liberty and Deutsche Welle.



Manufactured in the Komintern transmitter plant: a 500 kW "Vikhr" mediumwave transmitter, installed in Soviet times in the Sitkunai transmitting site, Lithuania.

Long Roots in Manufacturing

The history of the Komintern transmitter plant goes back to Czarist Russia where on the 16th (29th) November 1911 the statute for a "radiotelegraph laboratory" was signed, situated in the old Russian capital St. Petersburg. This laboratory began producing utility radio equipment for the Russian Navy and other purposes and was the first factory for industrial telecommunication components in Russia that was not under foreign ownership.

In 1922, four years after the fall of the monarchy and the establishment of the Soviet Union, the laboratory was renamed "Komintern Radiotelegraph Plant" and the production was shifted to tube engineering and low-frequency amplifiers, based on the vacuum tubes that were manufactured by the plant. Starting in 1924, the laboratory began to develop the first broadcasting transmitters.

The first model, "Maly Komintern" with 1.2 kW, was designed to operate on longwave frequencies from 700 to 1400 meters. Twenty-seven such transmitters were delivered to the various radiocenters in the USSR from 1924 to 1927. Many of them were soon boosted to 4-20 kW. In 1927, the successor type "Novyy Komintern" with 40 kW was installed in Moscow; in 1928 the first 100 kW transmitter was produced.

The development of even more powerful transmitters began to accelerate, and in 1933 the world's first 500 kW longwave transmitter was brought into service in Noginsk near Moscow, broadcasting on 172.5 kHz, with the callsign RV-1.

The Noginsk radio center

was one of the key transmitting stations in Russia and the location for the first powerful HF transmitter (callsign RV-96) with 60 kW, boosted to 120 kW in 1938.

The Uprooting of WW II

The beginning of the Second World War in 1939 meant a huge challenge for the Komintern plant. In 1941, the front line came closer to Moscow and Leningrad, and German fighters started to bomb the cities. Stalin decided to move the government out of Moscow and declared the more easterly located Kuybyshev (Samara) at the Volga river as a temporary capital. Specialists dismantled the transmitters in Noginsk and transported them by train to the Urals. Some parts went to a new transmitting center in Ufa, while the main equipment was brought to Kuybyshev.

Here in Novosemeykino, northeast of Kuybyshev, all efforts were concentrated to build the country's new main transmitting center. The work was completed in 1943 and the new station, named after the "People's Communications Commissariat," began broadcasting Radio Moscow programs to Europe on medium- and longwaves.

By switching two dozen 50 kW transmitters in parallel, the engineers achieved a power of 1200 kW, more than any other transmitter in the world at that time. The unit was equipped with a special mechanism that allowed to change the frequency within a few minutes. This was necessary in order to escape from jamming by transmitters on German soil. The whole complex was built as a huge bunker beneath the ground and included Radio Moscow's temporary studio facilities.

Also the RV-96 shortwave transmitter was removed from Noginsk and reinstalled in Sverdlovsk (now Yekaterinburg) where it laid the foundation for another transmitting center that is still in use today.

Post War Growth

After the end of the war, the Komintern facilities went through a period of constant reorganization. In 1946 the Central Design Office for high-power radio and specialized equipment development was founded on the basis of the Komintern facilities; in 1956 it was transformed to the State Union Central Design Office, and from then on Komintern fully concentrated on the production of high power transmitters for LW, MW and SW.

In 1966 the State Union Central Design Office was renamed Komintern Central Design Office; a year later it was named Komintern All-Union Research Institute for Power Radio Engineering with its own pilot-production plant, and finally in 1972, it received the name, the Komintern Research and Production Amalgamation. The Amalgamation included the All-Union Research Institute for Power Radio Engineering with the Komintern Transmitter Plant, as well as the "Volna" Plant and its Experimental Design Office.

The '60s and '70s marked the most active period in Soviet high power transmitter design and production. The Cold War was at its height and the planning began for new transmitting sites all over the USSR that would beam Radio Moscow program to all parts of the world. Many of these new sites were designed to also conduct jamming of broadcasts from Western radio stations.

In those years, many sites were built that now are well-known names for many DXers. These include (with today's names): Lviv and Mykolaiv in the Ukraine, Sasnovy in Belarus, Maiaac (Grigoriopol) in Moldova, Gavar (formerly Kamo) in Armenia, Yangiyul and Orzu in Tajikistan, Tashkent in Uzbekistan, and Russian sites like Bolshakovo (Kaliningrad), Tbilisskaya (Krasnodar), Samara (formerly Kuybyshev), Oyash (near Novosibirsk), Atamanovka (near Chita), and many more.

In the later years, the new sites, but also older facilities, were continuously modernized. The initial 50 kW SW transmitters were boosted to 100kW, then later to 200 kW ("Sneg-M"); new models of 250 ("PKV-250") and 500 kW were installed. Often the trans-

mitters were run in pairs to double the power.

The Komintern transmitter plant was part of the military-industrial complex and received all necessary funding for the development of new high power equipment. The product range included the transmitters "Iney," "Buran," "Shtorm-C" and the automated "Shtorm-D, as well as the air-cooled "Borey" transmitter for arid regions. "Condor" became the first 1000 kW superpower SW transmitter in the world. Its counterpart for long- and mediumwave was "Priliv-Priboy" with up to 2500 kW.

The Sky's the Limit

The search for equipment with even higher power knew no limits. Only practical considerations brought the engineers back to earth. During experiments in the late '70s which combined three 1000 kW shortwave transmitters (beamed toward the US), experts had to finally acknowledge that the radiated signal would suddenly disappear when the output reached 2000 kW. The reason: the radiation had burned a hole into the ionosphere and the signal was disappearing into the universe.

The high power Komintern transmitters were installed not only in the USSR, but also exported to foreign countries. India, North Korea and the German Democratic Republic received 1000 kW MW transmitters; some also received shortwave transmitters.

The Close of an Era

The end of the USSR in December 1991 resulted in a collapse of the high power broadcasting system in Russia and the successor states. With the transformation to a market economy, state-run radio stations like the Voice of Russia now had to pay for air time from their own budget and no longer were able to afford high powered transmitters. The leasing rates skyrocketed, not the least because the energy prices exploded. The Komintern transmitters were designed for operation under non-market conditions with low electricity prices. They consume a huge

amount of energy, with an efficiency rate of often less than 50%. As a result, the power of most transmitters was reduced down to half of the nominal figure.

Former Soviet high power radio centers outside of Russia were now administered by the telecom authorities in the newly independent states. Many of the facilities were shut down, some temporarily, some forever.

Others were involved in local conflicts like the radiocenter in Maiaac near Grigoriopol in Moldova. When Moldova became

independent in 1991, separatists declared the Transdnister Moldovan Republic on the eastern banks of the river Dniester. Separatist troops seized the transmitting center in Maiaac, and since that time it has not been under control of the Moldovan telecom authorities. Nonetheless, foreign broadcasters like Voice of Russia, Deutsche Welle, TWR and China Radio International are renting air time on this center, as it provides a good coverage in Southern Europe especially on mediumwave.

In the early 1990s, Moscow also formally handed over the property of the former Soviet facilities outside of Russia to each successor state. The relationship was renewed and agreements were signed that appointed Moscow to again take over the sale of air time and international frequency coordination of the high power HF and MW installations in countries like Belarus, Moldova, Armenia, Kazakhstan, Tajikistan and Uzbekistan.

This arrangement has brought many new customers like the VOA, Radio Liberty, Deutsche Welle, BBC, China Radio International and many others, including many "clandestine" radio programs that are frequent users of transmitters in Russia and the successor states of the former USSR. Especially on mediumwave, the old high power facilities are still in service, and some are back in operation again, beaming, for example, the IBB's Radio Free Afghanistan with 1000 kW from Orzu on 801 kHz in Tajikistan, or the Voice of Russia to Europe and Asia. On shortwave, 250 and 500 kW transmitters are the most commonly used power. Only seldom is a 1000 kW transmitter brought back into service, like beaming Radio Ukraine International to North America.

In Russia itself, the situation stabilized after the foundation of RTRN, the new national transmitter network operator, in 2001. It took over all transmitting centers and replaced the Soviet era system that was responsible for the chaos in the 1990s. For almost a decade, unreliable transmitter services and constant electricity cuts due to unpaid bills had been a daily picture. RTRN is run by a modern management and is aiming at top efficiency. As a result, several run-down facilities have been closed (such as in the Moscow area), and new equipment like DRM transmitters have been installed.

For the Komintern transmitter plant, the end of the Soviet Union also meant the end of an era. On 20th January 1992 the Komintern Research and Production Amalgamation was renamed the "Russian Institute for Power Radiobuilding" (RIPR). In 1995, after stock sharing and division into two joint-stock companies (JSC "MART" and JSC "RIPR"), the fields of expertise were divided: JSC "MART" is producing equipment for TV and FM broadcasting, while JSC "RIPR" turned to a new generation of automated utility transmitters based on the solid-state or tube amplifier devices for powers from 0.1 up to 100 kW. It no longer produces high power broadcasting transmitters.



Krasnyy Bor near St. Petersburg: a typical Russian transmitter hall with high power equipment from Komintern. The site has one 1000 and three 2000 kW LW/MW transmitters, as well as eighteen 200 kW SW transmitters that can be used in pairs.

Monitoring Times' Satellite TV Buyer's Guide

By Ken Reitz

It's December and that can only mean two things: Endless speculation on the outcome of college bowl games and the chance to watch them on your new satellite TV system! You'd have to be completely unplugged not to be reached by the ads promoting satellite TV, but, which should you buy? Is there really any difference between DISH Network and DirecTV? And, what-
ever happened to those big dish satellite systems?

The DBS World

It's a competitive world in the DBS (direct broadcast satellite) TV industry. New channels, new products, and new packages are constantly on the table from the two DBS contenders: DISH Network and DirecTV. Most of the ballyhoo now concerns High Definition TV (HDTV), Digital Video Recorders (DVR), the availability of local over-the-air channels and international programming packages. Everything has a price tag and, as with their cable-TV counterparts, DBS programming prices never come down.

There are some clouds on the DBS horizon. DirecTV has spent the last couple of years doing a financial high-wire act with take-over sharks such as Rupert Murdoch circling underneath. Indeed, DISH Network itself sought to buy DirecTV but has been unable to convince a skeptical FCC. In a more recent development the nation's largest cable system, Cablevision, has just launched its own service dubbed Rainbow DBS (see sidebar).

The C-band Option

The icon of TV entertainment in the '80s, the big black parabolic satellite dish, has fallen on hard times. Now numbering fewer than a million (compared with more than 20 million small dish systems) C-band* continues to be the system of choice for audio/videophiles and techno-geeks. In spite of its versatility C-band is also a part-time job. Compared to the set-it-and-forget-it DBS system, C-band users are constantly tinkering with their systems, replacing worn out parts, up-grading to better equipment and troubleshooting any number of common problems.

Still, for C-banders the picture's the thing. Analog channels viewed on a top grade TV surpass those of compressed digital DBS channels by a long shot. And no wonder: 36 MHz wide video channels deliver a beautifully crisp image. Where do you think the small dish programmers get their signals? That's right: C-band.

Big dish technology appears to be frozen with the introduction five years ago of Motorola's 4DTV receiver. The unit is capable of receiving standard analog C-band signals, encrypted VideoCipherII signals as well as DigiCipherII digital signals. Any functioning C-band receiver will

still work to receive analog signals and it's probable that existing C-band systems will continue to give service for many years to come. Motorola has also introduced an HDTV decoder which can be used in conjunction with the 4DTV receiver to watch HDTV programming on the big dish. None of the systems are compatible with the others.

Satellite TV Shopping

It seems contradictory, but prices for C-band systems are both cheap and expensive. Because big dish viewers are flocking to DBS at the rate of about ten thousand per month, used big dish systems can be had for little or no money. Yet, if you go to a satellite TV dealer to buy a new system you could spend thousands. This compares to basic DBS systems which are free if the buyer commits to a one year subscription. However, if a consumer wants the latest DBS HDTV and DVR technology small dish prices are not cheap either.

After installing either a big or small dish system, consumers are faced with a dizzying array of programming options ranging from \$10/month to whatever they can afford. Only C-band still allows *a la carte* or single channel subscriptions and because of this C-band subscriptions can cost considerably less per month than DBS subscriptions.

Local network TV channels are available on both DBS services for the top 75 markets and typically cost \$5.99/month extra. Network programming for C-band viewers is available only to consumers who are out of range of any network programming. And they won't take your word for it. Your claim must be proven according to an FCC mandated formula.

The Hardware

Installing a big dish system is a big deal and may take several days to complete if you do it yourself. DBS systems are very user friendly and can be installed in just a few hours by someone who has never put one in before. DBS dishes are so lightweight they attach easily to a gable or roof or they can be fixed to a small pole in any convenient location near the house. Most basic DBS systems which are part of the "free" promotion include free professional installation. The catch on the free system is that you must activate your system, usually within 30 days of purchase. If you don't, your credit card will be charged up to \$150.

If a dealer is installing your big dish system they'll typically activate any subscriptions you may want via either the VCI encryption module or, if you have a 4DTV system, any digital channels you may want. If you're doing it yourself, the programming provider you choose will acti-



vate the unit. You may subscribe to any number of programming packages or choose the channels you want *a la carte*, but there is usually a minimum number of channels required with *a la carte*.

High Definition

The latest hardware in satellite TV is for HDTV reception and there's a lot to learn. First, in order to view HDTV you'll need a TV set with HDTV capabilities. HDTV, among other things, means the 16:9 aspect ratio (width to height) on the screen as opposed to NTSC standard 4:3. While prices have come down dramatically, HDTV sets are still very expensive and it really pays to shop around. Some HDTV sets have built-in over-the-air HDTV tuners on which you can enjoy local programming on your new HDTV. As of press time there were 1,024 HDTV stations on the air in 204 markets. To find out the latest information on which areas have stations transmitting in HDTV, call signs and assigned HDTV channel numbers go to: <http://www.http://www.nab.org/newsroom/issues/digitaltv/dtvstations.asp>

Viewing HDTV on DBS is, as you might have guessed, an extra. DirecTV's HD Package includes ESPN HD, Discovery HD Theater, HDNet, HDNet Movies and costs \$10.99/month in addition to your regular subscription. Other HDTV sports events and movies are available on a pay-per-view basis. DISH Network offers a similar package for \$9.99/month. Other channels such as HBO-HDTV, Showtime HDTV and The Movie Channel HDTV are also available. Big dish HDTV offers the same but includes PBS-HDTV via either 4DTV's HDTV set-top or using an MPEGII-HDTV receiver. In either case PBS-HDTV is free.

Viewing DirecTV HDTV programming will require a DirecTV HD receiver and triple LNB, multi-satellite dish system (\$399) and a 1 year



commitment to any Total Choice programming and the DirecTV HD package. DISH HDTV programming requires a Model 6000U complete system (\$699.99) which includes the necessary separate dish pointed at their HDTV satellite. DISH also has an "entry level" HDTV receiver/decoder, the model 811, which sells for \$399.

Digital Recording

And, finally, there's the battle of the Digital Video Recorders. Both DISH Network and DirecTV have their own DVRs built in to their high-end receivers. The purpose of the DVR is similar to a VCR, but, because of the digital factor, it has far greater capabilities. These include extended recording, fast forward through commercials, archival organization, pause, automatic recording through the use of an integrated on-screen guide, and recording up to two programs while watching a third previously recorded show!

DISH offers the new high end DVR 921 with its 250 gigabyte hard drive for up to 180 hours of standard recording or 25 hours of HDTV for \$999. All these digital recording services require subscriptions, with the exception of some DISH Network DVRs. You'll have to read all of the fine print on all of the offers.

Final Comparisons

Basic programming packages are nearly identical no matter which service you choose. So, first take a close look at what's offered. For instance, DirecTV offers Trio and Newsworld International – two interesting channels not offered by DISH Network. On the other hand, DISH Network offers Free Speech TV which DirecTV does not. Neither DBS service offers PBS unless you pay for it in a local channels package. However, PBS is free on the big dish in both analog and digital formats.

Both DBS services offer a modest list of similar audio channels (though DISH Network includes eight Muzak channels in monaural!). The big dish has considerably more, including numerous news and talk radio channels, Yesterday USA the full-time, old-time radio channel, as well as C-SPAN Radio.

Both DBS services offer a certain amount of interactivity: Pay-per-view movies may be viewed and billed later to the customer; local weather conditions and week's forecast may be viewed on the interactive weather channel on the on-screen guide. DirecTV allows purchase of CDs and books via the remote control. You can also look up the current best seller book list and top 25 CDs. Expect these services to expand in the future.

All three systems allow subscribers to customize the on-screen guide. This eliminates the need to surf through dozens of programs in which you may not have any interest. All three systems allow "bookmarking" programs in the on-screen guide for recording or watching as a one-time, a

daily or weekly event.

Of the three systems, DISH Network has the most extensive list of international programming package – 11 to be exact. These include three tiers of Latino programming (DISH Latino, DISH Latino Dos, and DISH Latino Max), ranging from \$21.99/month to \$41.99/month. They also offer three Greek channels (\$36.99/month), two Russian channels (\$24.99/month), and additional packages in Chinese, Arabic and other languages; see their web site for details.

DirecTV and C-band provide the option to their subscribers for high speed Internet connectivity while DISH does not. DirecTV offers DirecWay (<http://directv.direcway.com/>), a service which requires a separate oval dish. Because it actually transmits to a satellite, a professional installation from a certified dealer is required. It does not use a phone line. Cost is \$599.98 up front and \$59.99/month thereafter or \$99.99/month for 15 months, which covers the cost of the equipment, installation and service. After the 15th month the fee is \$59.99/month for the service.

C-band also offers speeds from 10 to 20 times faster than standard dial-up using your existing C-band system or using a stand alone Ku-band dish. The high speed is for downloading through your dish; uploading is done through your phone line. The service, available through Skyvision, is called Cband.Net and also allows you to watch Free-to-Air MPEGII channels on your PC. Cost for the internal PCI card and C or Ku-band kit is free with a one year subscription which is \$29.95/month.

Last Word

DBS can be thought of as "wireless cable." The programming line-up on either is virtually identical. On a basic installation both DirecTV and DISH Network offer easy installation, trouble-free operation and low initial cost. Subscribers should expect years of worry-free entertainment.

Big dish satellite TV is still a hobby for the communications enthusiast. While it has all the elements of DBS-style cable-TV viewing it also offers the opportunity to explore the latest in satellite communications technology; to watch hundreds of channels not available on either of the small dish systems. With sports back hauls; satellite news gathering feeds; international broadcasts; analog, VCI1, DC11, and MPEGII audio and video services from more than 20 satellites on both the C and Ku-bands, it's easy to see why so many believe the big dish is still worth the trouble.

For More Information:

Details on DBS programming packages and hardware:

<http://www.directv.com>
<http://www.dishnetwork.com>
<http://www.skyvision.com> 800-500-9275

C-band programming packages:
National Programming Service
<http://www.dsinsps.com> 800-717-6959
Superstar/Netlink/TurnerVision
<http://www.superstar.com>,
<http://www.netlink.com>,
<http://www.turnervision.com>. 800-831-4641

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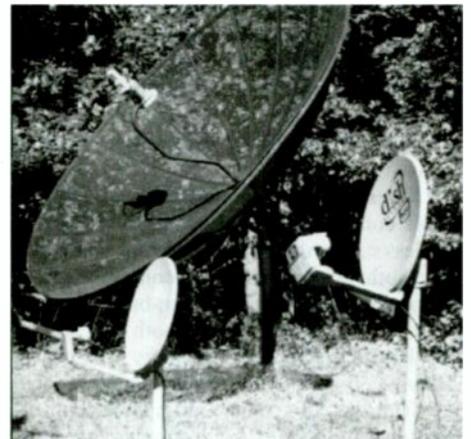
The nation's largest cable-TV system, Cablevision, which serves the Metro-New York area, has just launched a competitive DBS satellite service called Rainbow DBS. The service intends to be a major player on the fledgling HDTV scene marketing 39 HDTV channels, which includes their own package of 21 exclusive HDTV channels (known as VOOM), in addition to as many as 88 popular cable-TV channels. All this comes at a time when DISH and DirecTV have no more than seven such channels and most cable-TV systems offer even less. This is the sort of high stakes gambling which has characterized the DBS industry from the beginning.

VOOM is specifically targeting the small but growing number of home theater aficionados who have spent a great deal of money on their systems only to find a limited amount of programming available in the HDTV format. According to company press releases, VOOM hardware will include "...a satellite dish and specially designed set-top receiver manufactured by Motorola, as well as a digital antenna for local broadcast signals. In markets with local HDTV programming, local channels will be integrated into the same user interface with the VOOM offerings. VOOM will initially broadcast in MPEG-2, with an upgrade to MPEG-4 currently expected for the third quarter of 2004." The company expects to eventually broadcast more than 200 channels, including at least 39 HDTV services.

Rainbow DBS will initially be offered to the Northeast region of the country and expand to include all of the East Coast before being rolled-out nationwide. Industry sources indicate that sales directly to consumers will be handled by at least two well-known retail chains. As of press time there was no indication of hardware or program package pricing. Customers wishing to subscribe or learn more about the service may submit their name and e-mail address at <http://www.voom.com>.

and ask about "free" system promotions at many consumer electronics stores including Circuit City <http://www.circuitcity.com> and Best Buy <http://www.bestbuy.com>. Radio Shack typically offers DISH Network systems with a variety of promotions, see your local store for details or call 1-877-DISH-SHACK. You'll usually have to pay up front for either system, but the cost will be credited on your first bill.

* While most big dish programming, analog and digital, is found on the C-band there is some activity on the Ku-band and most big dish receivers can tune both bands. DBS frequencies are in the Ku-band but slightly higher in the band and circularly polarized.



DXing 2.4 GHz

By John Mayson

Many radio hobbyists enjoy DXing – that is, intercepting and identifying distant and exotic signals. Some of us search the bands below 500 kHz hunting for non-directional beacons (NDBs). Others monitor the mediumwave, FM, and television broadcast bands hunting for elusive signals. Scanner listeners find they can hear police and fire calls from distant states when conditions are right. So what's next for DXers? How about DXing 2.4 GHz?!

The Federal Communications Commission has assigned amateur, radiolocation, mobile satellite, radio determination satellite, mobile, and fixed radio services to the band between 2.4 and 2.5 GHz. Also sharing this swath of spectrum is the unlicensed Industrial, Scientific, and Medical (ISM) band. The Code of Federal Regulations Part 15 of Title 47 governs these unlicensed devices that include common household devices such as microwave ovens, cordless phones, and most importantly to us, the increasingly popular wireless computer networks. It is these networks that we will explore this month.

History

Radio-based computer networks are not a recent phenomenon. Amateur radio operators have used modes like RTTY and packet for some time. RTTY, or radio-teletype, isn't computerized *per se*, but it demonstrates sending data over radio. In 1971 the University of Hawaii created ALOHANET, the first wireless computer local area network (LAN).

ALOHANET came about after a Stanford University professor named Norm Abramson decided the surfing was better in Honolulu than in Palo Alto and joined the School of Engineering at the University of Hawaii. The system used 9600 baud modems and two 100 kHz bandwidth channels. The broadcast channel was 413.475 MHz and the random access channel was 407.350 MHz. An obvious question is why did they use two frequencies clearly in the federal government UHF band? The author can only guess that since the federal government (i.e., the Department of Defense) funds so much university research, the federal band was an obvious choice.

Over the years, computer networking protocols continued to evolve and by 1998 two wireless standards had surfaced. One was called Bluetooth. A consortium of communications companies that included Sweden-based Ericsson proposed the standard. Bluetooth was named after Harald Blåtand, a 10th century Viking king. "Blåtand" translates into "Bluetooth."

The second standard originated with the Institute of Electrical & Electronics Engineers

(IEEE) and received the rather bland technical designation IEEE 802.11. Despite a name that would make marketing people cringe, IEEE 802.11 has become the wireless LAN standard in the United States and beyond. The wireless community has nicknamed the IEEE standard to something easier on the vocal cords, "WiFi", which is short for "wireless fidelity." At present time there are three "flavors" of WiFi available to the consumer market: 802.11a, 802.11b, and 802.11g (see table 1).

Equipment

While some higher end communications receivers will tune the ISM band (see table 2), they are totally useless when it comes to monitoring 802.11 networks. Mandatory equipment includes: a computer, a WiFi network card (preferably one with an external antenna jack), and packet sniffing software. Optional equipment includes: an external antenna and a GPS.

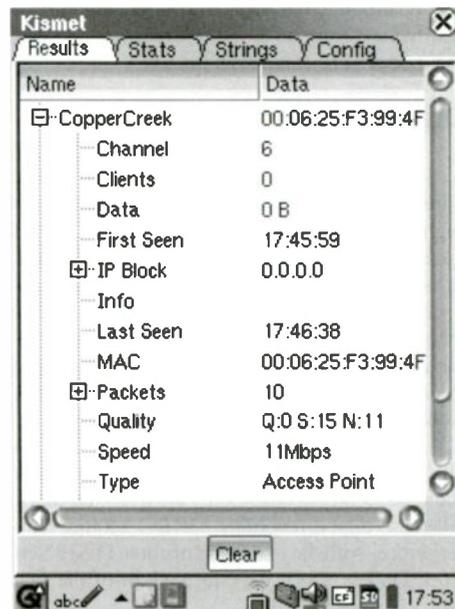
Table 2.

802.11 Wireless Frequencies

Ch.	Freq(GHz)		
1	2.412	2	2.417
3	2.422	4	2.427
5	2.432	6	2.437
7	2.442	8	2.447
9	2.452	10	2.457
11	2.462	12	2.467
13	2.472	14	2.484

The United States uses channels 1 through 11. Europe uses channels 1 through 13 except for France where only channels 10 through 13 are used. All 14 channels are used in Japan.

FCC regulations limit maximum output power of wireless devices to one watt. Most wireless equipment operates at a fraction of the power, some as low 20 milliwatts. This means you will have to travel to the signal rather than



QtKismet, a user friendly front end of kismet in action on a Sharp Zaurus.

let the signal come to you. Therefore, when selecting a computer you should consider something that's portable such as a laptop or even a PDA. You do not need a high-end processor or a lot of memory.

Taking portable computer around town to monitor new networks is a hobby unto itself and is known as "wardriving." If you don't own a car you are free to "warwalk" or "warcycle." Despite the hawkish name, most folks who wardrive are peaceful people who don't wish harm on anyone. Twenty years ago, long before anyone had considered home wireless networks, we had another misunderstood hobby called "wardialing" where a person with a computer and a modem would dial every possible phone number in sequence looking for open systems. You can thank the 1983 movie *War Games* for the term. If you're too

Table 1.

Types of 802.11

At present time there are three 802.11 standards used in the consumer market: 802.11a, 802.11b, and 802.11g. Here are the differences between the three:

	802.11b	802.11a	802.11g
Popularity	Ready available	New technology	New, but expanding
Speed	11 Mb/s*	54 Mb/s	54 Mb/s
Cost	\$	\$\$\$	\$\$
Frequency	2.4 GHz	5 GHz	2.4 GHz
Indoor range	100 to 150 feet	25 to 75 feet	100 to 150 feet
Public access	Everywhere	None	Very little, but backwards compatible with 802.11b
Compatibility	"The Standard"	Incompatible with b and g	Compatible with b, not with a

young to remember the movie, a teenager played by Matthew Broderick almost started the Third World War while dialing around.

Whoa, is this legal?

Yes, as long as you remain within the bounds set in this article you are completely legal. Wardriving consists of passively monitoring the WiFi band and detecting information that is broadcast in the non-encrypted packets. If you attempt to gain access to an open network without first receiving authorization from the owner, then you have crossed the line and are on your own.

Isn't this considered hacking?

Yes and no. How's that for an answer? Soapbox please:

Hackers are accused of everything from releasing destructive computer viruses to shutting down power grids. I disagree. *Criminals* with computers release destructive computer viruses and shut down power grids. We don't refer to drug dealers as "pharmacists." We don't confuse counterfeiters with "artists" or "engravers."

Hacking is the art and science of discovery with computers. It has nothing to do with crime. Yes, some people commit crimes with computers, but hackers are not synonymous with criminals.

I will now return the soapbox. Thank you.

Back to the radio aspect

I promised the good folks at *Monitoring Times* this would be a radio-related article and not com-

puter-related. But I first need to provide a basic overview of what it is we will be receiving and this requires a brief tutorial on 802.11.

Officially 802.11b provides a maximum bit rate of 11 Mb/s. In reality the maximum throughput is closer to 5.5 Mb/s. Why the discrepancy? 802.11 is not a very efficient protocol. All computer networks including 802.11 must broadcast more than just the data packets. The data packets need to know where they're going, where they originated, and other information beyond the scope of this article. Roughly 50% of the data passed over 802.11 is link layer overhead. Compare this to a cable modem where the overhead is around 10%.

Some 802.11 equipment vendors advertise 22 Mb/s speeds. Equipment such as this uses a proprietary chipset. While this is great for the average home user, if you do plan on wardriving, avoid such equipment. The packet sniffing software will not work with such a card. You, of course can, still detect and even access networks running at 22 MB/s even if your card only runs at 11 MB/s (you will operate at the lower speed). You just cannot use 22 Mb/s equipment to wardrive.

802.11 utilizes an encryption scheme known as "wired equivalent privacy" or WEP for short. WEP encrypts only the data packets and not the link layer packets. This means even while encrypted, an access point will still broadcast identification information such as the service set identifier (SSID) and media access control (MAC) address in the clear. These two pieces of information, in particular the MAC address, are key to identifying an access point.

An access point (AP) is simply the device that connects the Internet to the wireless world. Most home users connect their AP to their cable modem. They resemble very thin desktop scanners complete with an antenna, but no keypad. APs work right out of the box. This is a good and bad thing. It's good in that they're mindless to set up, but bad in that few users change their SSID, change the admin password, or enable WEP. Wardrivers frequently find SSIDs such as "default" or "linksys."

If a person did not bother to change their SSID, chances are they did not enable WEP or MAC address filtering, meaning anyone within range has access to their Internet connections. People with ill intent could introduce viruses or send hundreds of thousands of unsolicited commercial email messages with a nearly zero chance of being caught. Worse yet, some people are unknowingly hosting adult material or even illegal material on their hard drives through an open wireless LAN.

Every networking device in the world has a unique MAC address. This is a 12-character hex string usually written in the form 01:23:45:67:89:AB. Alert readers will note this provides 281,474,976,710,656 or over 281 trillion unique addresses. You can think of the MAC address as the call sign, something that will undoubtedly identify a particular AP. Yes, it is possible to spoof a MAC address, but for sake of this article we'll pretend everyone is honest.

Let's go wardriving

So far we have mentioned the computer

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(preferably a laptop or a PDA) and the wireless LAN card. The third item we need is software. The two most popular pieces of software is Netstumbler for Windows (<http://www.netstumbler.com>) and Kismet for Linux/Unix (<http://www.kismetwireless.net>). Before you go out and purchase any hardware, be sure to visit one of the two sites to verify which hardware will work with the software. And remember to avoid 22 Mb/s equipment. Both pieces of software are fairly straightforward to operate. What they do is scan across the appropriate frequencies (see table 2) and record pertinent information such as SSID, MAC address, channel, and whether WEP is enabled.

Can this get more boring?

In my experience wardriving was fun for about a day. Two things shocked me. One was how many APs in my community are wide open. The second is what people do use as SSIDs when they bother to change them. I've seen everything from physical addresses to words and phrases we can't print in this magazine.

My interest went from wardriving to this: How can ham radio operators and others interested in the radio hobby make use of what wardrivers have learned? What about an amateur radio only wireless LAN network in the 13-centimeter band (see table 3)?

And now the radio part!

Clever wardrivers incorporate a GPS into their setup. As they drive past an AP the software not only logs information broadcast by the AP, but also records the latitude and longitude. Various websites and wireless advocacy groups publish this information. This sounds like a useful way to test homebrew antennas and amplifiers! If you know the location and SSID of a particular AP, you can attempt to detect them at great distances with homebrew equipment. Remember that "great distances" is a relative term here. 802.11 typically has the same range as a household cordless phone. A mile would easily be termed "a great distance."

A word on amplifiers. Do not build an amplifier to boost the output signal of your AP or wireless LAN card. If you do insist on doing this, do not operate it while in the United States of America. While the FCC allows external antennas, external amplifiers are illegal, even if they keep the signal under the legal limit of one watt. However, there's no law against boosting the signal into your receiver.

What I love the most about the radio hobby is how many sub-hobbies exist. One of my favorites is antenna design and construction. I have built my share of what appear to be broadband attenuators, but there's nothing quite like the thrill and sense of accomplishment of a homebrew antenna that actually works. Even more exciting is how easy antenna construction for 2.4 GHz can be. You can build a high gain antenna with very simple and readily available items: a coffee can, wire, washers, and the appropriate connector.

First I stop by the supermarket and buy a 39 ounce can of coffee. When I get home I open the can and dump the contents into the garbage because I don't drink coffee. Being the good ham

Table 3. Amateur Radio 13 cm band.

13 Centimeters (2.3-2.31 and 2.39-2.45 GHz)	
2300-2302	Digital
2303.9-2304.2	QRP
2303.9-2304.1	CW
2304.1	National Calling frequency
2304.3-2403.4	Beacons
2304.5-2304.9	Crossband linear translators
2304.9-2305	Experimental beacons
2305-2306	FM Simplex
2305.2	FM Calling Frequency
2306-2309	Repeater inputs
2309-2310	Control & Auxiliary links
2390-2396	Television
2396-2399.5	Digital
2399.5-2400	Control & Auxiliary links
2400-2410	Satellites
2403-2408	Digital
2410-2413	Repeater outputs
2413-2418	Digital
2418-2430	Television
2430-2438	Satellites
2433-2438	Digital
2438-2450	Wide Band FX, TV, SS, etc.

Novice class:

1270-1295 MHz: CW, phone, Image, MCW, RTTY/Data (maximum power, 5 watts PEP)

All Amateurs except Novices:

1240-1300 MHz: CW, Phone, Image, MCW, RTTY/Data

Source: American Radio Relay League (ARRL)

radio geek that I am, I have N connectors on hand, but if I didn't, a visit to a local electronics store or mail order will get the correct parts into my hands.

Once I've collected all of the parts I point my web browser to <http://www.turnpoint.net/wireless/cantennahowto.html> to determine how to construct the antenna. If you're into antennas this is definitely the hobby for you! 2.4 GHz antennas are cheap and easy to construct.

In the United States we use WiFi channels 1 through 11, meaning the range of frequencies between 2.412 GHz and 2.462 GHz. Obviously the antenna should be tuned so the lower cut-off frequency is below 2.412 GHz and the higher cut-off frequency is above 2.462 GHz. If you're interested in only a particular channel you can select your can appropriately. Experiment!

The above mentioned website provides the guide wavelength in inches. The can itself should be 3/4 of the guide wavelength. It can be a little off. In general, longer cans will be more directional and provide higher gain than shorter cans (see figure 1).

Now drill or punch a hole with the center 1/4 of the guide wavelength from the bottom of the can. The hole should be the same diameter as your connector. Now the precision begins. Your piece of wire must stick out 1.21 inches from the connector (see figure 2). Few rulers are this accurate, but get as close as you can. Obviously, you can experiment with this length to see how it affects performance. Solder the wire in place and attach the connector to the can (see figure 3). Connect the connector to your wireless card and you're ready to go!

You will more than likely want to mount the "cantenna" to something. A camera tripod works well. If you're considering drilling into the can to attach a mounting bracket, keep in mind even a nut or a screw head can detune the



Figure 1: All of these cans will work. Experiment and discover which one works best for you.



Figure 2: Connector with 1.21" wire attached.



Figure 3: Connector installed on a Pringles can.



A Pringles can antenna in action.

antenna. Plastic tie-wraps work well for temporary setups.

Fortunately for me, Intel named my hometown of Austin, Texas, as the third most "unwired" city in America. This means Austin is third behind Portland, Oregon, and the San Francisco Bay area for wireless access that is publicly available. Even if your hometown is not on Intel's list, you're not out of luck. If you have a Starbucks, chances are they host a T-

Mobile hotspot. T-Mobile is not free; however, you can passively detect to your heart's content.

Suppose I want to access the Austin Public Library's wireless LAN. First I know I have permission because their website says so. Next, I wardrive and verify the branch closest to me does in fact have WiFi and it is in use. (Free, publicly accessible WiFi networks too often go down and it can be days or even weeks before someone gets around to resetting them. Remember, these networks are free, so give them a break!) Your new antenna should work perfectly, but if the AP isn't on you will never know. Check the hotspot first.

Amateur Radio Applications

The 13-centimeter ham radio band overlaps the ISM band where we find WiFi devices. Once you have mastered building antennas out of beef stew cans you can work off some of those excess calories by climbing a mountain, or even a hill, with 13-centimeter ham gear and your homebrew antenna and start DXing.

It's alarming that the Internet search engine Google turns up nothing about 13-centimeter repeaters, but plenty of dire warnings about hams being in danger of losing this band to commercial interests. Get your local ham radio club involved in 13-centimeters! Every ham radio licensee, including novices, has at least some access to this band. Use it or lose it!

A company called 4ATV offers 13-centime-

ter band television equipment. Your local ham radio club could possibly install a "tower cam" giving hams in the area a bird's eye view of the community. Weather spotters could use it to watch for ominous weather without getting out of their seats.

A 13-centimeter voice repeater could be the answer to overcrowded 2-meter and 70-centimeter bands. Sure, there's not a whole lot of commercially available 13-centimeter equipment on the market, but isn't that why you became a ham? You enjoy the smell of solder in the morning!

Microwave links, packet networks, even satellite are all available to hams on the 13-centimeter band. If you're a ham and interested in 802.11 networks, I strongly encourage you to hop on the 13-centimeter bandwagon and save this spectrum for continued amateur radio use!

The 2.4 GHz band is far more crowded than 5 GHz, especially in residential settings where microwave ovens, cordless phones, and other wireless devices are the norm. Speed degrades with distance. Outdoor ranges can extend over a mile, perhaps farther with the right antenna. DX anyone?

* Some equipment manufacturers offer 22 Mb/s equipment. This does truly operate at the advertised speed and is backward compatible with 11 MB/s equipment, but cannot be used to wardrive due to the proprietary chipset used in 22 Mb/s equipment.

Table 4. Explanation of acronyms and terms.

AP	Access Point, the equipment connecting the Internet to the airwaves
DX	Long distance communications or radio monitoring
GHz	Gigahertz, equivalent to 1000 MHz
ISM	Industrial, Scientific, and Medical radio band
LAN	Local Area Network
MAC	Media Access Control, a unique 12-character hex identifier of a piece of network equipment
Mb/s	Megabits per second
SSID	Service Set Identifier
WAP	Wireless Access Point, another term for "AP"
WEP	Wired Equivalent Privacy
WiFi	Wireless Fidelity, the common name for the 802.11 standard

Table 5. Web resources.

4ATV	http://www.4atv.com/
Advisorial Science Laboratory	http://www.adversarialscience.com/newindex.html
Antenna design	http://www.turnpoint.net/wireless/cantennahowto.html
More antenna design	http://www.seattlewireless.net/index.cgi/DirectionalWaveguide
Defcon Wireless Shootout	http://www.bluedonkey.org/wifi-shootout/
Intel's Most "Unwired" Cities	http://www.intel.com/products/mobiletechnology/unwiredcities.htm
Kismet	http://www.kismetwireless.net
Netstumbler	http://www.netstumbler.com
Wireless Guys	http://www.wirelessguys.com
Wireless Node Database Project	http://www.locfinder.com/

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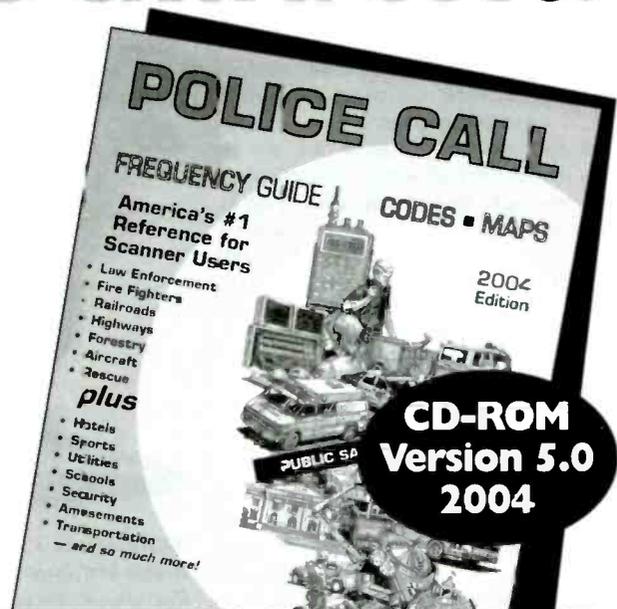
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Multimeter Basics for the Beginner

After the soldering iron (and de-soldering tool) the multimeter is probably the main tool that anyone interested in beginning electronics needs for troubleshooting. But, for beginners there's always been a certain amount of mystery surrounding the use of a multimeter. That stems mostly from the days when only expensive analog meters were available. It's like comparing slide rules to today's credit card sized calculators. I never could figure out how to use a slide rule, but I'm pretty handy with a simple electronic calculator. Today's digital multimeters make it so that, even with very little study, a beginner can use a multimeter for the simplest of applications.

The need for an introduction to multimeter basics was suggested by *MT* reader Tom Risher, who's been restoring old radios for nearly a decade. He says that when he first started out he had heard that the main thing to go wrong with antique radios was their capacitors. So he'd replace them. Sometimes he'd get lucky and find it was just some tubes which needed replacing. He also taught himself how to refinish wood and plastic cabinets. He'd done all of these restorations without once using a multimeter. He says, "...I didn't use a multimeter because I didn't have a clue on how to use one. And none of the little cheap manuals that came with the multimeters helped. I tried reading one of those books 'How To Use Your Multimeter' [but they] were written in such a complicated style that I was lost by page 2."

Tom goes on to say that he ran into an old-timer on the Internet who answered all of his multimeter questions without laughing at him. He says, "...The questions I had sounded like dumb questions so I was afraid to ask them. For example, one manual would advise: 'When testing your radio make sure the power is off.' So, I asked my old-timer the obvious dumb question: How can you test a radio if it has no power? He answered, 'Because the multimeter itself has the power from its battery and sends current through the resistor, capacitor, etc.' and I went, WOW!"

Tom continues, "...He also showed me the proper use of a multimeter. When done testing resistors he said, 'Never leave your meter on the ohms setting...because if you leave it on ohms and forget it's there then test an AC or DC current you've just fried

your brand new meter.' Wow! Again, nobody ever told me that. The same would happen if you left it on microamps then went to test amps. It has taught me a lot and I'm still learning. My point is that the 'literature' on multimeters assumes that the learner already knows all this and they start out at the intermediate level."

Tom is exactly right. I've run into the same thing. The skimpy little sheets provided with multimeters leave more than a little to be desired. And, he's right again about the books on the subject.

◆ Multimeters at The Shack

Multimeters come in a wide range of models and you'll find it's possible to spend a thousand dollars on a portable multimeter. However, I recommend beginners buy multimeters from Radio Shack for these reasons: their stores are everywhere; their basic multimeters are often on sale in the \$10-15 price range (see photos); they can be used with Radio Shack multimeter accessories; they've got a great returns policy in case of defective merchandise; and their manuals are on-line in PDF format.

In fact, that's not a bad place to begin. You can download or view any of their user's manuals and see just how useful (or useless) they are. With a cheap multimeter you can afford to make beginner's mistakes and not lose a lot of money in the "smoke test."

I've had the Radio Shack basic 8 range multimeter for 15 years and it still works great.



Radio Shack's Analog Display Compact 8 Range Multimeter (RS# 22-218). Bottom of the line multimeter is cheap, durable, but not easy for beginners to read. Sells for \$15 and is often sale priced for \$10. (Courtesy Radio Shack)

Aside from replacing the battery, the only other thing I've had to do is replace the original test leads which broke when I loaned it out. I also added a pair of heavy duty alligator clip adaptors (RS #270-354) which really come in handy especially if you want to monitor a circuit for any period of time while you do something else.



Radio Shack's Auto-ranging Multi-tester (RS# 22-802). Bottom of the line digital multimeter is auto-ranging and very easy for beginners to use. Sells for \$20 but often sale priced at \$15. (Courtesy Radio Shack)

I've also had the basic autoranging multimeter for many years. The unit I bought had no automatic shut off and the little watch batteries drained quickly if the meter was accidentally left on. Newer models have automatic shut off. The main advantage to this unit is that it's very small and it fits nicely in a shirt pocket. However, the flat function switch is easily bumped, the test leads are not durable or replaceable, the watch type batteries don't last very long and are more expensive than a AA or 9 volt battery which other similar units use.

◆ Tips on Using Your Multimeter

Always observe polarity convention. All meters have two test leads: red and black. Always check to see that the black test lead is in the hole indicated either by the black color or by a minus sign (-) indicating negative. The red lead goes into the hole marked



Radio Shack's 15 Range Digital Multimeter (RS# 22-810). Next level digital multimeter replaces the auto-ranging meter and sells for \$20. Has replaceable test lead but requires #23A 12 V battery. (Courtesy Radio Shack)

either as red or with a positive (+) sign. This may seem obvious but on some multimeters there are three holes and things can get confusing.

Observe maximum voltage ratings as written on the front of the meter housing or refer to the skimpy manual for hints on maximum voltage. If you are trying to check an unknown voltage, first set the dial for the maximum range. This is where an auto-ranging meter is handy; it automatically sets the range and gives a proper reading. On an analog meter you'll have to keep resetting the range until the needle reads in the proper range usually in the upper third of the scale.

If your meter isn't working, check to see if the battery is good, then check to see if the battery fuse is good. Some cheaper meters are not fused and incorrect operation could destroy such units immediately. If the unit has a fuse and it's been blown, replace it only with the same amp rated fuse. Remove the test leads and turn the unit off before replacing the battery or the fuse and observe correct polarity when replacing the battery.

Most of us don't use our multimeters enough to drain the battery; instead, it's more likely that a battery will stay in the meter long enough to leak, damaging the meter. Manufacturers recommend taking the battery out if you don't intend to use your meter for more than a week.



Radio Shack's 42 Range Auto Ranging Multimeter (RS #122-811) sells for \$50. When you're ready to move to the intermediate level this multimeter also has auto-shut off and auto polarity. It measures frequencies to 4 MHz, detect electric fields, has a low battery indicator, and uses a common 9 volt battery. (Courtesy Radio Shack)

When testing circuits or components always observe correct polarity. Remember, too, not to apply voltage to the terminals being measured while the range switch is in the "current" position or when the range switch is in the "ohms" position. If you're going to make resistance readings make sure power is disconnected to the device being tested and discharge the capacitors.

I found an interesting web site dealing with the topic of capacitor discharge at this URL: http://www.repairfaq.org/REPAIR/F_captest.html#CAPTEST_001. When you find that your skills have out-paced your meter, then you know it's time to upgrade.

◆ Meter Reader Reading

For decades Radio Shack published a very useful book on the subject of multimeters called "Using Your Meter: VOM and DVM Multimeters (RS #62-2039)." The book was written by Alvis J. Evans. The Shack has gotten out of the publishing business and this title is no longer available. However, it can still be found in some Radio Shack stores which still have unsold copies sitting around collecting dust. You'll have to do some searching.

I found the book very useful from the beginner's point of view with easy-to-read instructions on troubleshooting not only everyday electronic circuits, but automotive, household and telephone circuits as well.

Never attempt to read a manual like this straight through unless you have insomnia. There are many places in the book which lose me completely. But, there is a wealth of simply worded explanation. For example, we talked earlier about "bad" capacitors; he has three pages on the subject of shorted and leaky capacitors with several well drawn, simple illustrations explaining how to test for both conditions by using the multimeter as an ohmmeter and as a voltmeter.

Here's what I look for in a multimeter book: a good glossary of electrical and electronic terms; a lengthy and detailed index; many, clear, easy-to-read diagrams; it should be fairly recent, because advances in digital displays and semi-conductor circuitry make older books obsolete. If you can't find the Radio Shack book but you have a decent book store in your area, there'll be more than a few to choose from. Avoid wordy, thick textbooks designed for higher level education institutions unless you need a booster seat at your work bench.

And, finally, if you've learned some interesting tips on multimeter use please pass them along. That way we'll all learn!

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Q. *It is illegal for cellular-frequency-coverage scanners to be marketed to U.S. consumers, but not cordless-telephone-frequency-coverage scanners. Why the difference? (Bill Seamans, Pineville, LA)*

A. The difference is that manufacturers of cordless phones do not have a special-interest group like the cell-tel cartel to buy legislators to pass laws in their favor. It is just as unlawful to listen to cordless phones as it is to listen to cellular phones.

Q. *There seems to be some confusion regarding the current license-free, two-way radio services like MURS, FRS, itinerants, dot channels, etc. Can you help straighten these out? (Ron Blocker, Glenwood, IL)*

A. Until quite recently, CB was the only unlicensed two-way radio service (although it, too, originally required an FCC license), and toy walkie-talkies shared the 49 MHz band with cordless phones.

A couple of years ago, Radio Shack petitioned the FCC to create the unlicensed Family Radio Service (FRS) which shares several of its 462 and 467 MHz channels with the licensed General Mobile Radio Service (GMRS), but FRS is limited to 1/2 watt of power, and must use only the antenna that comes permanently attached to the radio.

In the Business Radio Service, several licensed itinerant frequencies are designed for low-power intercommunications among industries on the move. These 150 MHz- and 460 MHz-range frequencies are also low power, but utilize conventional hand-held transceivers with BNC antenna jacks and removable antennas. Motorola originally dot-colored their channel switches for easy identification. Red, for example, is 151.625 MHz.

Most recently, the FCC assigned five 150 MHz frequencies for license-free operation with two watts of power. This Multi-Use Radio Service (MURS) has not yet caught on, but is vastly improved over FRS from a range standpoint since the lower frequencies have better rough-terrain capability, the power is higher, and external rooftop antennas can be used.

While there have always been license-free Part 15 authorizations for very-low-power (typically under 0.1 watt), these are normally used for close-range purposes like wireless micro-

phones, cordless phones, video cameras, remote control and similar applications.

Inexpensive, license-free transmitters in the FM broadcast band (88.1-107.9 MHz FM) are readily available, although decades ago, the 1600-1700 kHz AM band, just above the standard broadcast band, was also used for low-power hobby and experimental purposes. But these are no longer made, and the broadcast band is now extended to 1700 kHz. There are many discrete VHF, UHF and microwave frequencies available for license-free applications.

Commercial hand-held transceivers are readily available to the public for marine and aircraft use, but these require licenses. Nonetheless, many buyers intentionally put them into unauthorized personal radio use such as hunting (especially poaching), trucking and camping.

The bottom line is that there are really only three license-free services currently practical for two-way communications: CB, FRS and MURS. CB utilizes channel 9 (27.205 MHz) for their emergency calls and channel 19 (27.185 MHz) for interstate use. There have been voluntary efforts among FRS users to establish channel 1 (462.5625 MHz) as a calling/emergency channel. No such channelization is planned for MURS at this time.

For more information on license-free radio communications, visit the FCC web site <http://wireless.fcc.gov/services/personal>.

Q. *I recently purchased a replacement wall switch for a clubhouse and note that it was stamped "For AC Use Only." What would be wrong with using it for DC? (Mark Burns, Terre Haute, IN)*

A. Absolutely nothing. At household AC voltages, a line switch rarely sees more than a few amps of current travel through its contacts. But if someone selects such a large switch for DC use, it is likely that the current application will be much higher, thus pitting or even welding the contacts from heat.

Q. *Why don't newer shortwave portables have the longwave radio spectrum? Why aren't new modes like DRM, DAB, Ibiqity, and DSP making better progress? What is your opinion of the best current or upcoming modes of transmission? (Email)*

A. In countries where the longwave band is actually used for broadcasting, these frequencies are included. But they aren't receivable in the US without external antennas like high wire antennas or loops, electrical noise interference on the lower frequencies is a growing problem, and it's a cost saver to eliminate an unused feature.

New modes require equipment changes for both the broadcaster and the listener, and some add subscription fees to receive the signals. In the sagging global economy, there is little incentive to change or upgrade. Shortwave broadcasters have suffered severe budget cuts, and the Internet and satellites provide a low-cost, reliable alternative for propagating their messages without the huge overhead of equipment required for radio transmissions.

Ultimately, however, digital modes will overcome analog. They don't suffer the distortional effects of atmospheric propagation, and in two-way systems, they are automatically error-correcting.

Q. *I have a little electric tester that looks like a pocket penlight, but with one prod on the end. If I stick the prod into the "hot" connection in a wall receptacle, a light comes on at the other end. It is rated from 90-600 volts. How does it work? (Mark Burns, Terre Haute, IN)*

A. It is basically an AC amplifier with very high impedance input, and a limiting diode to protect that delicate input from over-voltage. The amplifier drives a DC switch that turns the bulb on and off.

Your body is continually bathed in an AC voltage field from the wiring in your home; when you touch the prod to the hot AC outlet while holding the metal casing in your hand, the difference in voltage between you and the socket is sensed by the amplifier, switching on the light.

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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Wow, where did the year go? It is that time of year again, so we look at clever ideas as possible gifts for your radio hobby friends, or, of course, yourself. Here we go.

96 In a previous column, I touted the reserve power and flexibility of the Colman Powermate®. This puppy can offer you emergency lighting, and power to run your radios for a long time. It takes on new significance after the great blackout of 2003. This compact, but heavy, item has an 18 amp-hour, 12 volt battery. It can jumpstart your car, has two work lamps, and an air compressor. It also has two female 12-volt power outlets. The model # is PMJB161. I bought mine for about \$50 at NAPA auto parts.

Several other companies offer a similar product, but for much more money. One catalog charged \$199! Radio Shack sells a mini version for \$40. I do not recommend it because it does not have the same features or specifications. Look for the full featured unit at a good price, probably at auto parts, or discount stores.

This is a great power source, and can be justified for a family purchase because of the car starting feature, emergency lighting, and the air compressor to blow up sports equipment, etc. It has a permanent home behind my driver's seat. This is one of the best products I ever bought!

97 Another item I previously featured was the Rigrunner® DC power supply strip from West Mountain Radio, <http://www.westmountainradio.com>, or 1-203-853-8080. This system is built around the now standardized Anderson PowerPole® connectors. It's not cheap, but is well worth the \$109 price tag. I was very impressed, but had lamented they should add a master ON-Off switch. Well, they did that, and added an even better idea, a master switch with ON/OFF/Auto. In Auto mode, you connect your primary device (radio) to position #1 with all other station accessories on slots 2-9. When you turn off the primary radio, all the other accessories automatically turn off. Good move!

Those of us that live in rural areas are often subject to power outages. Every winter we have several ranging from days (my longest was six days), to an hour or two. There is not much to do in a dark house but listen to the radio. I make certain I have a good stock of batteries, especially AA batteries. I prefer the Nickel Metal Hydride, but alkalines will work. You can find some good deals at Wal-Mart and other super stores.

The bright idea? I can run the rechargeable

through my quick recharger with power drawn from my 12-volt deep cycle. In my October column I featured a new charger. I think found a better one. CCrane offers a really good battery charger for \$40. This is a quality unit featuring analyzing, and conditioning of both NiCads, and NiMH batteries in all sizes. Check it out at <http://www.CCrane.com>.

99 Another reassuring power product is an un-interruptible power supply (UPS). In addition to one for my computer, I have one for the radio receivers, and another for the transceivers. These provide surge protection as well as a backup power supply. Around \$40 at office supply stores.

100 Remember my battle cry: "Your radio hobby money is best spent to buy a better (resonant) antenna." You can do some research on antennas for a handheld at <http://www.strongsignals.net/>. Search the web for specialized antennas, and buy yourself a couple as stocking stuffers. I probably have 30 extra "specialty" antennas. Many sit in the coffee mug on the desk. I also use some plastic see-through parts trays. I have one for the BNCs and another for the SMAs.

(Note, I only recommend telescoping antennas for stationary use. On the move, they might break the antenna connection, or even worse, injure someone.) You do need to confirm that a new antenna will match up to the BNC and SMA receptacle on your particular radio. Third party products are not necessarily built to fit every radio. Check these sites:

<http://www.bncantenna.com/>,
<http://www.htantennas.com/>, and
http://www.cometantenna.com/maldol_antenna.htm.

101 Another stocking stuffer can be found at Radio Shack. They have two new AC to DC wall plugs 9v at 1300 mah, and 6volts at 1000 mah. These new RS are lighter than a feather, and only about a quarter of the size of the old style wall warts. And they are cheap!

102 For the SWLs, the "YO-YO-Tenna" is a simple wire antenna for 2-40 meters. Check it out at <http://www.qth.com/dwm/yoyodeluxe.html>. Only \$30 plus shipping. (Hint: MT has Yacht boy on sale for only \$129.)

Yacht Boy from Grove, new RS 9-volt power source and the YO-YO-Tenna.



103 If you are a ham radio operator, Yaesu has some \$50 off coupons for several of their radios including the VX-2R HT, and the mobile rig 8800, with \$300 off the 847 HF rig. You can print out a rebate coupon from <http://www.yaesu.com>. The rebate offer is good through December 31, 2003.

Last year in December, a price war broke out between some of the major ham radio dealers. I sense another "coupon war," so check with your dealer for bargains on all brands of radios. (Note: the small Yaesu VX-2R is not a trunking scanner, but for \$119, it has a thousand memories, and some sweet features. It will even fit in your shirt or pants pocket. Downloadable computer programming from <http://www.qsl.net/kc8unj/>).

104 Kenwood offers a new two meter VHF HT, the TH-K2AT for \$149.99. Free software is available at <http://www.kenwood.net>.

There are other good alternatives. Check the internet for bargains. Look for the Vertex-Yaesu VX-150 for around \$99, the Icom V8A for \$110, Icom T2H SPORT for \$85 and the Kenwood TH-22ATSK2B for \$129. Note that these last two come only with an AA battery case, and not a rechargeable battery. However, you can buy the battery from several internet dealers for about \$40.

In the US, it is OK to use a ham radio for listening, but you must be licensed to transmit. In some counties, it is illegal to even own a ham transceiver unless you are a licensed ham. Check your national and local laws.

105 Tired of having your hand held radio falling over while on the table? You need a metal stand. The best ones in the world are made by SSE in the UK. They can be found at <http://www.ssejim.co.uk>. Note all the specialized, one-of-a-kind products especially for monitoring the UHF air band 225-400 MHz.

106 Need a stocking stuffer? The ARRL repeater book (only \$10) and/or a CD of all Ham repeaters (\$40 plus shipping.) They have a great collection of books at <https://www.arrl.org/catalog/>.

107 Need last minute gifts? The Pro 96 of course! May I suggest Grove Enterprises at 1-800-438-8155, or <http://www.grove-ent.com/>. Limited budget? Get the new *Police Call 2004*. About \$20. It includes the CD ROM of the entire US frequency database.

Happy Holidays from my home to yours.

A Fond Farewell

South Florida police agencies that use "Q-Codes" and related signal codes have an end-of-shift procedure on the radio. Individual units advise the dispatcher of their status as being "Oh-Nine" (09), "Oh Six" (06). This signifies their last call has been cleared and they are back "In Service" (09), followed by the status code signifying they will "Transfer" and end their shift (06). This coding also means the unit will not take any additional calls, thus allowing the next shift and "new crew" to assume their responsibilities.

So too is it time for the *Scanning Report*, in its current format, to transfer with a 09-06. After 31 monthly columns, it is apparent that VHF-Hi and UHF conventional radio systems have lost importance in both the professional radio sales market and with radio hobbyists. Conventional systems, of course, have been overshadowed by 800 MHz trunked systems and various digital radio schemes.

This trend was last seen around forty years ago, when small to medium-sized VHF-Low Band simplex systems gave way to newer and larger VHF-Hi Band repeater systems in many geographic areas. Lesser milestones occurred when the 1970s brought the addition of UHF Band systems and the 1980s heralded conventional 800 MHz bandplans. By the mid-1980s, the next major trend was beginning: analog trunked radio systems.

Today's digital trunked radio systems have not only bolstered scanner design, manufacturing and sales, but also inspired scannists...young and old...to learn about new technologies and again enjoy the thrill of finding something new on the airwaves. It used to be just a new frequency, but now it's a new Control Channel or radio system, or perhaps a new Talkgroup I.D.

MT must reflect these trends in its pages, especially when reader interest toward a particular subject either diminishes or explodes. In this case, hobbyists are paying less attention to conventional systems while trunking, digital radios, and talkgroup databases have become increasingly hot topics. Beginning next month, Dan Veeneman will pilot a new *Scanning Report* column that combines his *Tracking the Trunks* series with conventional frequency issues. I wish Dan a static-free environment and I hope all the readers of this column will embrace these exciting changes in 2004!

◆ A Little Nostalgia

Each columnist brings a unique perspective to the hobby and perhaps an agenda to promote. In my case, I often divided topics of interest into segments not covered elsewhere...

"Who's Listening?" highlighted scannists and their individual contribution to the hobby. A common thread between all interviews was how the scanning community supported public safety issues in general, and emergency management incidents more specifically. Radio hobbyists are also doctors, attorneys, engineers, law enforcement officers, fire-rescue professionals, military veterans, retirees and students. They have an above-average interest in their communities and they volunteer toward a wide variety of public-service programs. They are professional and competent. They are leaders, not followers. They are, in my opinion, true patriots.

The scanning community is often unfairly targeted by narrowminded individuals who wish to restrict our communications access and label us in a negative manner. These charges are unfounded and disrespectful. Who's listening? You are, and there's nothing wrong about it.

"Bank Number One" was a segment about something I think all hobbyists should have. A single bank or a single scanner used for high-priority channels and unidentified frequencies of interest. When something big happens in town, Bank Number One will have all the key action.

"On Scene Commander" was the segment used to discuss monitoring targets that cannot be heard from home. If you really want to hear something completely, you have to travel. Of course, some jurisdictions restrict mobile or portable scanners, or even any scanner used outside of a home, and hobbyists must always comply with local regulations. For those who are able to travel, an on-scene scanning trip is usually quite an adventure. Low-power and obscure channels reveal behind-the-scenes communications, while the more powerful and well-known local channels round out the listening day.

The best on-scene adventure? For me, it's an airshow. Nothing beats the diversity of communications when you have event managers, concessionaires, law enforcement, fire-rescue, government services, air traffic control, aircraft safety, and the news media

all in one place at one time. A close second? Probably a NASCAR event or a high-speed, offshore powerboat race.

The most intense on-scene adventure? Nothing will have your eyes straining, your ears tingling, and your brain trying to sort out the massive communications effort required for a Space Shuttle launch. It's just impossible to convey the audio-visual "input," true information overload, and excitement of witnessing a launch in Florida. The setup is long and tedious, the risk of cancellation is great, and the main event only lasts a few minutes...but it's better than the Super Bowl (and there's no funky commercials)!

The most difficult on-scene adventure? I personally stay away from emergency scenes, major accidents, crime scenes, and similar events. Perimeter security is a great concern, and I have no business being there at the barricade line. Vehicular traffic is usually restricted from or already congested at these locations, and most significant communications can just as easily be heard from home. Remember, you're just a hobbyist. These scenes have real victims.

◆ Some Closing Thoughts on New Technology

Recent *Scanning Report* columns have discussed new wireless technologies and future uses of the radio spectrum. I received some feedback that asked why this was being covered, since we cannot hear any of these things on our scanners. The answer actually lies in our history. When radio hobbyists choose to learn about something new, opinions about potential new radios follow. In turn, if the "buzz" gets loud enough, radio manufacturers respond.

Will we ever get scanners or receivers that decode or display or monitor the vast array of digital communication systems coming to market in the next decade? I don't know. But, I certainly do remember my first VHF scanner, VHF-UHF scanner, VHF-Air scanner, UHF-Air scanner, 800 MHz scanner, and trunking scanner. How about tone decoders and frequency counters? Computer-controlled scanners? None of these devices would have been manufactured without a sincere and vocal hobbyist interest. If you want manufacturers to keep up with technology, you'll have to let 'em know.

❖ A Final Round of Mail!

From the mailbag, here's an interesting request. In part one of his letter, Mr. Robert E. Brock advises, "I have an old GE radio which covers 7 bands, which I use to monitor the aircraft and sometimes the fire departments. We live in Tempe, Arizona...at the Assisted Living Apartments. Sometimes the Tempe Fire trucks come here to check on people..."

"I have tried to monitor the Tempe Fire, but have been hearing the Phoenix Fire Department. I see that Tempe is [published] on 154.1450 for Tactical Command. Is that the dispatch channel or is this the repeater channel? How many fire channels does Tempe have and use?" Mr. Brock continues, "The fire channels are weak most of the time...my radio is tunable (analog)...I do not have a computer..."

Mr. Brock, you certainly face a challenge in monitoring these frequencies with a tunable radio! You'll need a steady hand and a discerning ear to tune all but the strongest channels. If your radio has an external antenna connection, even a window-mounted antenna will probably bring a dramatic improvement over the built-in whip. Here's the result of an Internet search for frequencies in the Tempe area.

The Fire Department is, in fact, dispatched by the City of Phoenix and uses these frequencies according to the informative website of MGH Distributing, a scanner retailer in the area (<http://www.mghusa.com/scanner/fire.html>):

- 154.190 Phoenix FD channel 1, Dispatch
- 154.250 Phoenix FD channel 2, Operations-East
- 154.280 Phoenix FD channel 4, Mutual Aid
- 154.145 Phoenix FD channel 7, Ops-Tempe
- 153.770 Phoenix FD channel 8, Ops-Tempe backup
- 460.575 Phoenix FD channel 9, HAZMAT

Our friend Robert Homuth adds these channels from his Arizona website at <http://www.kg7bz.com/azrepeaters/robert2.html>. You may also try your hand at tuning...

- 151.460 Fish and Game statewide repeaters
- 155.475 Police Intersystem
- 460.225 Highway Patrol car-to-car
- 460.525 EMSCOM
- 463.0-463.175 for hospital and paramedic channels

Over at <http://www.intouchonsite.com/scanner.htm>, Ron Gallegos provides an extensive frequency list covering Arizona's local, state, and federal agencies, including:

- 154.600 Tempe High School
- 154.965 Tempe Police, traffic control
- 155.685 Tempe Police, traffic control
- 155.835 Tempe Police, traffic control
- 460.375 Tempe Police, interagency

From part two of Mr. Brock's letter, "Sometimes I monitor the 135 MHz band. Generally, the 135 MHz band is quiet. Since my GE is small, the dial numbers are somewhat close together...it's hard to tell if I'm monitoring 135 or 130 or 132. As I hear some aircraft contacting Albuquerque [Center], are these ci-

vilian aircraft that are in the 135 MHz band?"

Mr. Brock, try tuning slowly along the entire VHF Aircraft band, from 118 to 137. Just as with public safety frequencies, stations that are closer and more powerful will be heard easier and louder on your radio. An external antenna will again enhance your search. This band is primarily for civilian use, but military aircraft may also use such channels. Try these for nearby Phoenix Sky Harbor Airport:

- 118.7 Tower
- 119.2 Approach/Departure
- 120.7 Approach/Departure
- 120.9 Tower
- 123.7 Approach/Departure
- 124.1 Approach/Departure
- 124.9 Approach/Departure
- 126.8 Approach/Departure
- 128.65 Approach/Departure

Concluding his letter, Mr. Brock relates his difficulty in hearing nearby forest fire activities. "I have tried to monitor the forest fire helicopters on 135.7 and other planes that were dumping the "red stuff" on the fires. I could not hear [published channels] 118.925, 118.95, 119.95, 119.975, 123.025, 123.075, or 135.975."

Again turning to the Internet, I found these channels listed at the slick, professionally-designed West Coast website of <http://www.freqofnature.com/> and the other websites mentioned above. Of course, activity will only be heavy during an actual fire suppression mission:

- 118.950 Tonto National Forest Aircraft
- 122.925 Tonto National Forest Aircraft
- 123.500 Tonto National Forest Aircraft
- 135.675 Tonto National Forest Aircraft
- 168.625 Tonto National Forest Air Guard
- 168.675 Tonto National Forest
- 168.725 Tonto National Forest Dispatch
- 170.500 Tonto National Forest Fire Net
- 171.500 Tonto National Forest Fire Net

❖ Have a Great Holiday Season!

MT is neither a huge corporate monster nor a sprawling government entity. It's a small, family-sized enterprise run on a first-name basis. The subscribers and readers are the lifeblood of this endeavor, and I encourage everyone to send in their frequency lists, participate in the online message boards, and support each columnist with your ideas and information. Topics that have been mentioned but not covered in previous *Scanning Report* columns may appear as feature articles or perhaps within other sections of MT.

It's been a real treat serving in this post, and I wish to thank Editor Rachel Baughn and Assistant Editor Larry Van Horn for their guidance, patience, teachings, and...did I say patience?

Since it's the holiday season, there's one more thing to mention: isn't it time for you to buy that new D-I-G-I-T-A-L trunking scanner, frequency counter, or radio software you've wanted since last summer? Come on, you know you want it!

Have a safe and fun 2004!
OUT.

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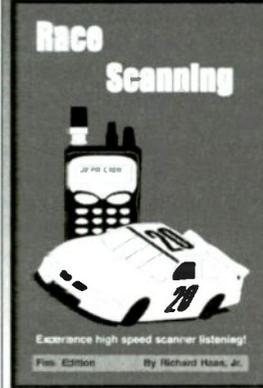
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More Reader Contributions

Scanning Canada continues to receive lots of mail from readers. Every letter and every e-mail received (whether complimentary – as most are – or a chiding correction to an error) is read thoroughly and appreciated. I try to respond quickly every time, so if you send e-mail and you don't hear back from me within a couple of days, please resend – the original probably fell through a hole in cyberspace (holes opening up to swallow spammers. Spam filtering is so tight now that some bona fide messages become lost).

One repeat contributor is Nicholas Robinson who sent in the following correction to an item that appeared in this column earlier in the year.

Nicholas from the Maritimes writes:

"Hi: A month or two ago you listed 153.4250 as the UNB (University of New Brunswick) police frequency, I believe the frequency that they use primarily is 167.4000 with an input of 171.7500. This is used by UNB and the St. Thomas University. I heard people identifying as "campus police" and "security" and I have no idea what the difference is between them, there are also many people identifying as portable 1, portable 5, etc. I just found this frequency Friday night and it was quite interesting. I listened for about an hour and just in that timeframe there was an assault, a theft, and a medical emergency. They may use the frequency you noted as a TAC channel but their main frequency is as noted above."

From British Columbia, George Clogg writes:

"I am a former UK journalist and BBC reporter living for the past 13 years on Salt Spring Island, BC. Congratulations on your most interesting feature – The Maritimes Scanning Site – into which you obviously did a lot of homework, and then presented very professionally."

Thank you for the compliments, George, but the honors go to the Maritimes website's webmaster Bill White, VA1WW.

In further correspondence George revealed that he spent some of his working years as a newspaper shipping reporter. He would obtain exclusive information about the ships he was covering by listening to his shortwave radio. Now that shortwave service for shipping has been mostly replaced by satellite services, George has turned his attention to scanning as a

hobby. From his retirement home on Salt Spring Island, one of British Columbia's Gulf Islands in the Georgia Strait, George will enjoy a lot of maritime traffic by listening to BC Ferries ships, Canadian Coast Guard vessels and a host of private boaters filling up the marine band with action. George has recently purchased an Icom handheld scanner that he can take on his travels. Good luck, George, and we hope to hear many future stories of scanning on the West Coast from you.

Richard from Montreal writes:

"Good day, I just saw your name in the October issue of *MT* and also your column. It's great (well thanks Richard - *ScanCan*). I have a lot of frequencies from Montreal, Quebec. All of my frequencies are active at the moment that I write. I would like to give you a few:

"Montreal Police special event frequencies which range from a parade to a man wanting to jump off a bridge (readers who have ever sat interminably in a traffic jam on one of the bridges linking the Island of Montreal to the south shore, will understand that this may be a common problem in that city – *ScanCan*): 410.2625, 410.9125, 410.3625, 410.7875, 411.3125

"Montreal subway security is 411.4375. Montreal Neurological Hospital 463.1250. Dorval airport 119.9000. All planes on the island of Montreal must sign on this frequency. It is also referred to as Montreal tower. (*Scanning Canada* reported that frequency back in May 2002 – thanks for the confirmation that it is still active – *ScanCan*).

"All of these frequencies are active up to this evening and have been active for quite some time. I have a lot more if you need any. I have been scanning since 1984. I read also that you have a special card that you send for snail mail. I would like to know if I qualify."

Well, Richard, you don't have to use snail mail to qualify for the *Scanning Canada* thank you card. For your information and that of all readers of this column; just send in your contribution by whatever means you can. If you include your own snail mail address I will send a card off to you in the mail.

◆ HMCS Haida

A well known feature of Toronto's waterfront, Canada's museum warship *HMCS Haida*, was moved last summer. Her new berth is a few miles down the lakeshore in Hamilton, Ontario. *Scanning Canada* received bad news following her refit and re-opening to the public. The federal government has banned amateur radio operation from her radio room. This was a very popular pastime for local hams before the move. Strong protests have been sent to the government, but so far all complaints are falling on deaf ears in Ottawa. Regrettably, another popular monitoring target seems to have disappeared from the spectrum.



John Forrest (VA3USN) aboard *HMCS Haida* in happier times.

◆ Seasons Greetings

Once again the seasons have turned full circle and we are back into the dark months of winter and the holiday season. I suppose that it is reasonable to assume that *Monitoring Times* is also read in the southern hemisphere. As a US based magazine that circulates strongly in Canada and perhaps in Europe, we may too easily overlook the fact that some readers may be enjoying this time of year on the beach.

Anyway, whether you are on the beach in the antipodes, or enjoying the season in an ice hotel in Quebec, *Scanning Canada* wishes you all the best through the holiday season. If you believe in Santa, then believe that he is going to leave a brand new digital scanner under the tree for you. You can always wish! Until the new year, best wishes and happy scanning eh?

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Globe Drops SITOR Services

Globe Wireless, the big player in United States high-end maritime commercial traffic, dropped all support of Simplex Telex Over Radio (SITOR) last August first. This includes all narrowband direct printing (NBDP) traffic to and from ships. It also includes the acceptance, forwarding, and delivery of traditional Telex (Telegraph Exchange) messages in SITOR mode A. Finally, it includes whatever Mode B broadcasts were going out over Globe's many stations.

Globe Wireless, of course, is the American company that made a major commitment to worldwide high-frequency (HF) maritime radio during the phase-in of the largely satellite-based GMDSS (Global Maritime Distress and Safety System). Starting with one station, KFS, they built up the world's leading maritime HF network, continuing the existence of a radio service with a proud, 100-year history of preserving life at sea. Along with KFS, other historic US call signs such as WCC, WNU, and KPH were saved from the kind of disappearance encountered in several other countries.

Nothing stays the same, however. The market came to prefer computer e-mail, as exchanged in commercially modified versions of such formerly amateur radio networking modes as Clover and PACTOR (Packet Teleprinting Over Radio). Telex, a store-and-forward telegram system using dedicated machines, routing codes, and a good deal of automation, became old fashioned, despite its unquestioned robustness and familiarity. Meanwhile, Globe had some ownership changes, and became much more focused on real-time computer networking combining HF with satellites and heavy partnering with other communication companies.

This, of course, turned out to be pretty much where maritime radio was headed anyway. US Morse code traffic had already pretty much vanished after the compulsory requirement for that mode expired in early 1999. By July of that year, Globe, already the last hold-out with its "Superstation," pulled the plug.

This date, of course, is considered to be the end of commercial Morse in the United States. It is commemorated yearly with special operations at the old KPH station in Point Reyes, CA, which was acquired for the National Seashore when Globe moved operations

to its "HF Supersite" in Dixon, CA. Now that teleprinting has joined Morse in the Globe radio museum, one has to wonder if similar special operations will commemorate its partial demise.

It's "partial," because other stations such as WLO, in Alabama, still support SITOR. Remember that Globe Wireless is aimed at the largest commercial vessels.

A Globe spokesman gave several reasons for that company's move. Telex was declining fast. Any remnants of the worldwide auto-forward network were quickly vanishing, with the closure of such major stations as Portishead Radio in the UK. Also, given SITOR's lack of commercial potential, Globe had decided that its slow, 100-baud, information rate was eating up too much air time for too little communication. The spokesman used a metaphor about how you wouldn't allow bicycles on the information superhighway. In their opinion, SITOR was in the way.

Now the bicycle is gone. Globe's worldwide stations are merely data nodes in a great digital network, as they forever spit their PACTOR-like markers into the ether. The future is here, this particular market has voted, and people will no longer get in the way.

◆ Is Telex really dead?

In maritime radio, probably yes. However, many landline Telex networks, and your occasional radio net, are still very much in use. On the radio, we see something somewhat similar in all those routing indicators used by military services in the North Atlantic Treaty Organization (NATO). The French, in particular, are heavy users of these.

Also a form of one-way broadcast Telex survives in the important Navtex (Navigational Telex) system, used to deliver maritime safety, weather, and information bulletins. This remains a compulsory part of the GMDSS component known as SafetyNet. The SITOR mode on HF is also compulsory in certain situations.

Like most SITOR broadcasts, Navtex uses Mode B, also known as FEC, for Forward Error Correction. Coastal stations identify with single letters, as part of a 4-character group at the beginning of the broadcast. This character group identifies station, subject type (one letter), and message number (two digits). Automated printers use this

group to identify and sort out wanted stations and subjects, and also to skip messages they have already received.

Hobby-level computer programs that decode SITOR-B will work with Navtex, minus the automated features. AMTOR (Amateur Teleprinting Over Radio) is, for our purposes, the same thing, and so its software will work, too.

Navtex has long used 518 kilohertz (kHz), an international frequency below HF and at the top of the formerly compulsory mediumwave band. Since Navtex has found such wide acceptance, additional frequencies are being added. 424 kHz is allocated as a second frequency, and it is used in a few places as an alternate frequency to 518. 490 kHz is provided for local use in any language or alphabet – as opposed to the otherwise standard English and ITA-2, the International Telegraph Alphabet number 2 used by SITOR. For example, some Japanese Navtex will use a different character set. 490 kHz is also used a lot in Europe.

On HF, 4209.5 kHz is internationally allocated for long-range reception, and was recently approved for this use in the United States. Hopefully, use of this channel will increase.

◆ More on Honolulu Weatherfax

In the September column, it was noted incorrectly that the Honolulu weather FAX station, KVM 70, was operated by the US Department of Defense. In fact, records show the license holder to be the US Department of Commerce, specifically, NOAA, the National Oceanic and Atmospheric Administration. NOAA is the parent agency to the National Weather Service, which produces US weather forecasts, and the charts that are broadcast by FAX.

The confusion might have come from the fact that other US transmitters are operated by the Coast Guard, but the Guard notes that KVM 70 is not. Anyway, the station's address is: National Weather Service, 2525 Correa Road, Suite 250, Honolulu, HI, 98822-2219, USA.

Thanks to C. Brown for catching this.

Good holidays, and enjoy the winter propagation.

ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
ARQ-E3	French ARQ teleprinting system
AWACS	Airborne Warning and Control System
CAMSLANT	Communication Area Master Station, Atlantic
CW	Morse code telegraphy ("Continuous Wave")
DEA	US Drug Enforcement Administration
DSC	Digital Selective Calling
E10A	Israeli phonetic numbers, callup-only or abnormal
EAM	Emergency Action Message
EOC	Emergency Operations Center
FAX	Radiofacsimile
FBI	US Federal Bureau of Investigation
FEC	Forward Error Correction teleprinting system
FEMA	US Federal Emergency Management Agency
HFDL	High-Frequency Data Link
HF-GCS	High-Frequency Global Communications System
LDOC	Long Distance Operational Control
LSB	Lower Sideband
MARS	Military Affiliate Radio System
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
PACTOR	Packet Teleprinting Over Radio
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SAM	Special Air Mission
SHARES	Shared Resources, US interagency 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
VOLMET	Aviation weather broadcasts ("Flying Weather")

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations (encrypted, usually unidentified, broadcasts thought to be intelligence-related) are identified in () with their ENIGMA station designators, as issued by the European Numbers Intelligence Gathering and Monitoring Association.

1888.0	IPD-Civitavecchia Radio, Italy, weather in Italian at 1937. (Patrice Privat-France)	4500.0	Perron-MD)
1925.0	IPL-Livorno Radio, weather in Italian at 1938. (Privat-France)	5211.0	AFA2SW-US Air Force MARS, Region 2 Net, with NNN0TWT, AFA2YR, AFA2WP, AFA2BT, AFA2TN, and AFA3XM, starting at 0040. (Cleary-SC)
2182.0	NLYL-US Navy vessel <i>Loyal</i> , working an unheard station at 2208. (Mark Cleary-SC)	5399.6	Headcap 22-US Civil Air Patrol National Headquarters, checking in with WGY 912 (FEMA, Mt. Weather, VA) at 0115. (Cleary-SC)
2370.0	Echo Foxtrot-US Navy, tracking net with Foxtrot and Papa, at 0229. (Cleary-SC)	5616.0	Echo Whisky-US Navy, taking a report from Tango, an aircraft, and Raid 95, a tanker, at 0026, then reporting an emergency transmission at 0126. (Cleary-SC)
2680.0	IDC-Cagliari Radio, weather in Italian at 1941. (Privat-France)	5696.0	Gander-Atlantic oceanic air control, working flights at 0250. (Williams-AL)
2719.0	IZN-Porto Torres Radio, weather in Italian at 1942. (Privat-France)	5708.0	Commsta Kodiak-US Coast Guard, AK, working CG Rescue 6021, at 0630. CAMSLANT Chesapeake-USCG, working CG 6031, at 2344. (Allan Stern-FL)
3349.0	NNN0FAM-US Navy-Marine Corps MARS, traffic net with NNN0HNB and NNN0PXL, at 0021. (Cleary-SC)	5732.0	Reach 9167-US Air Force, Air Mobility Command, with ALE initiated patch to Charleston AFB, diverting with an engine problem, at 0057. (Cleary-SC)
4149.0	Unid-Station in Jacksonville, FL, taking positions and weather reports from vessels, at 0505. (Barry Williams-AL) [Probably the tugboat net, control station WPE. -Hugh]	6449.7	Panther-US DEA, Bahamas, ALE-initiated voice contact with 17C at 2251. (Cleary-SC)
4274.0	XSU-Yantai Radio, China, CW marker at 2312. (Bob Hall-RSA)	6491.5	PWZ99-Brazilian Navy, Rio de Janeiro, RTTY weather at 0620. (Hall-RSA)
4346.0	CWA-Cerrito Radio, Uruguay, CW marker at 2308. (Hall-RSA)	6491.5	LOR-Argentina Navy, Puerto Belgrano, with RTTY coastal information in Spanish, at 0626. (Hall-RSA)
4372.0	Siscom (sounded like)-US Navy, troubleshooting data links for many warships evacuating hurricane Isabel, very busy frequency, at 0700. (Hugh Stegman-CA)	6586.0	New York-Atlantic air route control, clearing Iberia 6122 to Madrid, at 2350. (Stern-FL)
4403.4	LSD836-Globe Wireless, Argentine, Globedata marker at 2300. (Hall-RSA)	6697.0	Free Land-US military, with a 28-character EAM simulcast on 8992 and 11244, at 0407 and 0437. (Jeff Haverlah-TX)
4426.0	CAMSLANT-US Coast Guard, VA, working Cutter Oak, at 0032. (Cleary-SC)	6721.0	Reach 221-US Air Force, with an ALE initiated patch to Hilda Ops, at 2135. (Cleary-SC)
4490.0	KGD34NCC-SHARES National Coordination Center, VA, calling NNN0ELA, US Navy-Marine Corps MARS, in ALE at 1750. (Ron	6736.0	BT9P-UK military training unit, Cranwell, with aviation weather at 0921. (Privat-France)
		6912.0	SYN2-Israeli intelligence, AM callup only (E10A), at 0250 and 0350. (Williams-AL)
		7475.0	FREDGAS-Washington Gas & Light Company, MD, sounding in LSB ALE, at 1658. (Perron-MD)
		7508.0	ZSJ-South African Navy, with RTTY gale warnings at 1025. (Hall-RSA)
		7527.0	Hammer-Probably US Customs Service, CA, working 41S and 41SK, at 1831. Panther-DEA, Bahamas, working 25C. (Cleary-SC)
		7650.0	T12137-Ohio National Guard, Canton, ALE sound at 1543. (Perron-MD)
		7805.0	04CO1NC-Possibly Concord, NH, EOC, sounding in ALE at 2243. (Perron-MD)
		7903.5	QT5-FBI, Quantico, VA, ALE sound at 1621. (Perron-MD)
		7992.0	HFB-UK Royal Signals, Hereford, UK, sounding in ALE at 2324. (Perron-MD)
		8337.6	Stingray 31-US Coast Guard, joint interdiction with Shark 20 at 0050. Tomcat 21-US joint task force, possibly Coast Guard, interdiction operations with Dolphin 45 and Shark 10 (probable USCG), at 0114. (Cleary-SC) [News stories indicate the SHARK ## callsign was being used by the Coast Guard on migrant searches. -Hugh]
		8502.0	XSG-Shanghai Radio, China, CW marker then "up," sending an unknown calling vessel to the working channel, at 1959. (Privat-France)
		8570.0	PWZ33-Brazilian Navy, Rio de Janeiro, 5-figure groups in PACTOR, at 2045. (Hall-RSA)
		8723.3	Radionaval Horta-Portuguese Navy, Azores, working unknown station at 2040. (Privat-France)
		8859.0	LD2-Angolan Ministry of Information, Luanda Norte, calling HLA (Ministry of Defense), in ALE at 2343. (Perron-MD)
		8861.0	Dakar-Oceanic air control, Senegal, working flights at 0300. (Williams-AL)
		8906.0	Reach 551-US Air Force, working New York at 2303. (Williams-AL)
		8912.0	Ping Pong-US Customs Service, TX, working D23, off Nicaragua, at 2318. (Cleary-SC)
		8920.0	Unid-Spanish-speaking male, rogering a message from an unknown station, at 0018. (Perron-MD)
		8939.0	Rostov Volmet-Aviation weather in Russian, at 1627. (Privat-France)
		8971.0	Tiger 21-US military, passing Spare Group report to Goldenhawk

- (US Navy, ME), at 2046. Red Talon 711, with Spare Group for Fiddle (US Navy, FL), at 2235. (Cleary-SC)
- 8983.0 CAMSLANT-US Coast Guard, diverting "V-8-U" to a plane crash emergency, at 1732. CAMSLANT working CG 1706, on a search at 2142. (Cleary-SC)
- 8989.0 Unid-Spanish-speaking net control station, taking check-ins from unid stations at 0015. (Perron-MD) Canforce 4186-Canadian Forces, patch via Trenton to Operations, at 0026. Reach 437T, US Air Force, working Hilda and SAM Command, leaving Guantanamo at 0122. (Cleary-SC)
- 8992.0 Alabaster-US military, with an EAM simulcast on 11244 and 13155, at 1825. Back Bench-US military, with an EAM simulcast on 6697, at 1955. (Haverlah-TX) Andrews-US Air Force HF-GCS control, MD, with a Skyking broadcast at 2045. (Steve O'Connor-NJ)
- 9007.0 Sentry 41-US Air Force AWACS, patch via Trenton to Raymond 24 (Tinker AFB, OK), at 2120. Rescue 419-Canadian aircraft, patch via Trenton to RCC (Rescue Coordination Center), at 2154. (Cleary-SC)
- 9010.0 Unid-Probably Brazilian Air Force, working "Aircraft 05" in Portuguese, at 0005. (Perron-MD)
- 9016.0 Bread-US military, asking Beefcorn for a patch at 0134. (Cleary-SC)
- 9023.0 Navy PG 332, patch via Andrews AFB to Point Mugu, CA, at 1518. (Cleary-SC)
- 9031.0 Canforce 1516-Canadian Forces, working Architect (Royal Air Force, UK), for weather, at 1713. (Privat-France)
- 9183.5 NY1-FBI, New York City, calling QT1, Quantico, in ALE at 1512. WF1, Washington, DC Field Office, ALE sounding at 1743. (Perron-MD)
- 9315.0 ALR-Algerian Oil/Gas Net, Alrar, ALE sounding at 0150. (Perron-MD)
- 10192.5 DRHM-German Navy vessel, working Wilhelmshaven headquarters at 1630. (Privat-France)
- 10242.0 45CS-Probable US Customs, informing Panther of a coke bust, at 1957. D41-ALE address of US military, then voice with Jackknife, US Customs in FL, at 2339. (Cleary-SC)
- 10285.0 RNOUSLR1-Algerian Oil/Gas Net, Rhourde Nous, sounding in LSB ALE, at 0420. (Perron-MD) LECAIRE-Possible French embassy, calling CER41 in ALE, at 1815. (Privat-France)
- 10608.0 Coast Guard 1720-US Coast Guard, calling Group Miami at 0021. (Cleary-SC)
- 10993.6 Unid-US Coast Guard, calling Group Key West, no joy, also plenty of secure voice, at 1426. (Larry Van Horn-NC) "J-1-X"-US Coast Guard, reporting a raft near Cuba to "Base C-8-Z," clear and secure, at 2023. (Stern-FL)
- 11010.0 ERMRIO-Brazilian Navy, Rio de Janeiro, calling FUNIAO (Frigate Uniao), in ALE at 0035, again at 2302. (Perron-MD)
- 11175.0 SAM 204-US Air Force distinguished visitor flight, patching SAM Command via PR HF-GCS, at 0126. (Cleary-SC) Acid Rock-US military (spelled callsign), calling Mainsail [Group call: any ground station this net. -Hugh] and raising Andrews for a patch, at 1655. Jackl 74-US Air Force, self-identified as a C-130, patch via Andrews to Kirtland Dispatch, at 1908. (Haverlah-TX) Reach 872Y-US Air Force C-130 enroute to Lajes, patch to Operations and Metro, at 2042. (O'Connor-NJ) Ethyl 75-US Air Force tanker, patch to McGuire, at 2319. (Stern-FL)
- 11204.0 Unid-Typically sour fishermen, griping about weather and lousy fishing areas, in LSB at 0127. (Williams-AL)
- 11220.0 SAM 6517-US Air Force, working Andrews at 2307. (Cleary-SC)
- 11232.0 Canforce 4460-Canadian Forces, patch via Trenton to Wing Ops at 2129. (Cleary-SC)
- 11242.0 Andrews-US Air Force, MD, with a 28-character EAM simulcast on 8992 and 15016, at 2047. (O'Connor-NJ)
- 11244.0 Mandatory-US military, tried a couple of Mainsail calls with no joy, at 1854. (Haverlah-TX)
- 11282.0 San Francisco-Pacific oceanic air control, CA, working flights at 0125. (Williams-AL)
- 11291.0 Dakar-Oceanic air control, Senegal, working flights at 0123. (Williams-AL)
- 11300.0 Unknown airliner, calling Mogadishu at 0130. (Williams-AL)
- 11384.0 UPS6727-United Parcel Service cargo aircraft, position in HFDL for Shannon, at 1631. (Privat-France)
- 11387.0 Sydney Volmet-Aviation weather at 2004. (Privat-France)
- 11494.0 13C-US joint task force, working Panther at 0028. (Cleary-SC)
- 12191.0 SCLC512-Venezuelan Army 512th Infantry, calling CLC 51 in ALE, at 2336. (Perron-MD)
- 12567.0 UAWG-Russian motor vessel Atchinsk, working unknown station in RTTY, at 0825. (Privat-France)
- 12568.0 UDHL-Russian motor vessel Staryi Arbat, RTTY at 0835. (Privat-France)
- 13155.0 Sea Train-US military, with an EAM simulcast on 6697, 8992, and 11244, at 0437. Sling Shot-US military, with a 28-character EAM simulcast on 6697, 8992, and 11244, at 1523. Alabaster-US military, with EAM simulcast on 11244, at 1725. (Haverlah-TX)
- 13282.0 Hong Kong Volmet-Aviation weather at 1916. (Privat-France)
- 13333.0 Speedbird 6907-British Airways, patch via Speedbird LDOC at 1927. (Privat-France)
- 13530.0 INDEPEN3-Colombian Navy Corvette *Independiente*, sounding in LSB ALE, at 0424. (Perron-MD)
- 13927.0 AFA1LJ-US Air Force MARS, patch with Josa 399, at 0003. (Cleary-SC) AFA1EN-US Air Force MARS, IN, patches with Longhorn at 2321 and 2329. AFA1EN, radio check with Quest, a tanker on the ground at Grissom Air Reserve Base, IN, went to 4557 for better ground wave, at 2359. (Stern-FL)
- 14686.0 Atlas-US DEA contract communication facility, working aircraft Flint 420, at 1937. (Cleary-SC)
- 14731.7 RFFIC-French Navy, Paris, with an ARQ-E3 message in French to all stations, at 0830. (Hall-RSA)
- 14926.7 RFTJ-French Forces, Dakar, Senegal, ARQ-E3 routing message at 1350. (Watson-UK)
- 14982.5 Tashkent Meteo, Russia, with FAX weather charts at 1412. (Watson-UK)
- 15851.0 FAAZJX-US Federal Aviation Administration, Jacksonville, FL, ALE sound at 1947. (Perron-MD)
- 15921.0 LECAIRE-French Embassy, Cairo, Egypt, calling Khartoum in ALE, at 0732. AMMAN, Jordan, calling "CER41" in ALE, at 1024. (Privat-France)
- 16014.0 RFVILGD-French Navy vessel *La Grandiere*, ARQ-E3 traffic in 5-letter groups to RFHIC, Noumea, at 0800. RFVI-French Navy, Le Port, ARQ-E3 traffic in 5-letter groups to RFQPM, Djibouti, at 1136. (Hall-RSA)
- 16014.4 RFVIC-French Forces, La Reunion, weather in ARQ-E3 at 1530. RFVITT-French Forces, Mayotte, with many ARQ-E3 messages, starting at 1752. (Privat-France)
- 16213.7 Unid-Egyptian MFA, Cairo, with ARQ messages in Arabic, at 1641. (Hall-RSA)
- 16223.7 Unid-Egyptian MFA, Cairo, with a National Day message in French, for embassies in Rwanda, Togo, and Burundi, at 1710. (Privat-France)
- 16417.0 Unid-Sounded like Russian-speaking male, parallel (or spurious) on 16527, at 1010. (Williams-AL)
- 16804.5 Unid-Ship trying to call Globe Wireless in SITOR-A, which Globe no longer accepts, and on a DSC-only distress and safety frequency anyway, at 1508. (Watson-UK)
- 16986.0 CTP-Portuguese Navy, RTTY marker at 1440. (Privat-France)
- 17487.0 NAVEVERETT-US Navy, probably Everett, WA, ALE sound at 0129. (Stegman-LA)
- 18060.2 VMW-Wiluna Meteo, Australia, clear FAX wind chart at 0926. (Hall-RSA)
- 18666.0 MM1-FBI, Miami, FL, calling SJ1 (San Juan, PR) in ALE at 1548. OC1, Oklahoma City, calling HO1 (Honolulu, HI) in ALE, at 1558. (Perron-MD)
- 19131.0 Shark 20-Possible US Coast Guard, asking Atlas (DEA contract facility) about status of Coast Guard 6566, at 2033. (Cleary-SC)
- 19724.5 UIW-Kaliningrad Radio, Russia, with RTTY navigation warnings at 1626. (Hall-RSA)
- 20086.8 wsgzpkp-Egyptian Embassy, Kinshasa, Congo, with 5-letter groups for MFA Cairo, in both FEC and ARQ, at 1000. (Hall-RSA)
- 20179.5 RFFKAGE-French Navy, Brest, with 5-letter groups in ARQ-E3 for several warships, plus RFFKE (Brest) and RFFLA (Toulon), at 1215. (Hall-RSA)
- 20780.0 RFGW-French MFA, Paris, several 5-letter-group messages in FEC, at 1233. (Hall-RSA)
- 22461.4 8PO-Globe Wireless, Barbados, strong Globedata markers at 120. (Hall-RSA)

WPE, WDX SWL Call Signs

These SWL calls were issued by now defunct publications such as *Popular Electronics* and were discussed in a thread on the *swl at qth.net* forum. Duane B. Fischer pointed out: "The SWL call sign is not issued by the FCC and is not to be construed as any sort of radio identifier. The call was for personal ego, it served no other purpose. A sort of PR gimmick by publications to make shortwave listeners feel special by giving them their own personal identifier. Not a bad thing, but not to be confused with an official call sign issued by the FCC.

"I am not sure if anyone is now issuing them or not. I investigated this topic eighteen months ago and found the records for the former WPE and WDX calls, but the man who formerly worked for *Popular Electronics* [Hank Bennett] is elderly and is determined to take his set of 3X5 cards to the grave with him. He is unable to issue or keep track of them any more, nor has he in nearly twenty years, but it is his right to do with them as he pleases.

"My interest was in trying to recover the original calls, because many former holders who are now fifty+ have lost their certificate, or forgotten their call, and I hoped to put together a database to help them

and to reprint a new certificate with their original call. It turned out to be more work than it was worth, unfortunately."

"I don't understand what purpose an SWL call serves, aside from being some way a dying electronics hobby magazine can make a few extra bucks from people interested in a dying hobby," responded Damon Cassell.

Bruce in Valrico, FL, added: "SWL call signs are still issued by several sources. One in particular is CRB Books [advertised in *MT*]. Also there is a website of Shortwave Amateur Radio Listeners which also issues call signs (<http://members.shaw.ca/SWARL/>) And see: <http://users.skynet.be/ONL4299/SWL%20Callsigns.htm> <http://www.pg7v.net/english/swlreport.asp>

Ben Loveless, WB9FGO, ex-WPEJLQ, says there is a good website devoted to the "WPE" calls, <http://www.qsl.net/wb1gfh/swl.html> Also includes a general history of the program.

Pete Costello adds another one, a collection of SWL Call Signs and their owners, not limited to *Popular Electronics*, or the USA: <http://kc5jk.tripod.com/sitebuildercontent/sitebuilderfiles/swlcs.txt>

AFGHANISTAN US PsyOps, Bagram: I can hear 9000 daily, sometimes good but often badly interfered by RTTY. Sounds like AM mode, both sidebands, perhaps a bit reduced carrier. Best around 15-16 UT; believe sign-off around 1830. Mostly local music, very short announcements in Dari/Pashtu. Had disappeared from 7000 sometime in June, maybe moved then to 9000. On 7000 ID was "Radyo Mau'lumati" (Jari Savolainen, Finland, DX Listening Digest) 9000, formerly Information Radio, now IDs as "Peace Radio," Radyo-e Soleh in Dori (Dave Kernick, UK, DXLD)

[non] R. Amani, 15615, *1632-1730* Fridays only, late start with ID, Dari until 1702, then Pashtu, 1726-1727 statement in Russian and a Russian song (Vashek Korinek, RSA, and Anker Petersen, Denmark, DSWCI DX Window) Brokered via Merlin, Armavir, Russia, 100 kW, 104° (Wolfgang Büschel, DXLD) Contact info on website: Afghanistan Peace Association, 41-36 College Point Blvd., Suite #2A, Flushing, NY 11355; also gives a P.O. Box 926540, Flushing, NY 11354 under "Membership," but P. O. Box 926520 under "Contributions." No mention of R. Amani as such (Jerry Berg, MA, NASWA Flashsheet)

ALASKA KNLS, B-03 part 1 until 30 Nov, English: 0800-0900 and 1300-1400 both on 9690 (Website via Michael Beesley, World DX Club via Alan Roe) Winter changes not yet posted at presstime; see <http://www.knls.org>

ANDAMAN ISLANDS 7115, AIR Port Blair, 0815-0930", English news. 0900 report in Hindi on Pakistan and Iraq, 0930 IS, ID, in the absence of Fak2, Indonesia (Roland Schulze, Philippines, DSWCI DX Window)

ARGENTINA 2380 harmonic, LRA15/R. Nacional San Miguel, 0859-0905 Sept 24. Tuned here totally by accident and found this harmonic! Wanted 3280 Napo. Canned announcement with music, time ticks right on Top of Hour, mentioned Argentina (Dave Valko, PA, Cumbre DX)

2760, unID harmonic at 0100 nonstop music, no announcements, 0134 national anthem and early sign-off; 2 x 1380, but which? Finally IDed days later at 1045 as "AM 1380 La Voz," but location in Argentina unknown; has música chamamesa on Sat (Horacio Nigro, Uruguay, Conexión Digital)

Pirate on 6151.72, Radiodifusión Argentina Libre, 0128 music and ID, 0205 Radio Bosques e-mail address (Nicolás Eramo, Argentina, Play-DX) 6151.73, at 0232 and 0253 ID as "R. Bosques, desde Buenos Aires, en la República Argentina," but at 0233 as "RAL, Radiodifusión Argentina Libre." From 0254 began relays of LS5 Radio Rivadavia up to 0321+ (Gabriel Iván Barrera, Argentina, dxing.info) Operator of R. Bosques is Alejandro García, heard most days after 0130. Slogan is Radiodifusión Argentina Libre. Generally broadcast Argentine and Uruguayan protest music (Victor Heredia, Mercedes Sosa, Joan Manuel Serrat, Alfredo Zitarrosa, Leon Gieco, etc.). Report only to radio_bosques@yahoo.com.ar (Nicolás Eramo, Argentina, Cumbre DX) Also IDed with both names when it used to be on 11420. Then R. Bosques moved to 6192.74, heard from *0115; operator Jorge García called to say he will stick to this frequency, active sporadically around 1000-1100, and after 0100; location is Avellaneda in Buenos Aires province. Announcements say RAL had been on since 1999 in Spanish because "we don't want to learn English" (Gabriel Iván Barrera, Buenos Aires, Conexión Digital)

R. Baluarte, Puerto Iguazú, was inactive for several weeks but heard again in mid-Oct on 6215.08 until 0300* with Brazilian religious programming in Portuguese (Nicolás Eramo,

Argentina, DXLD)

AUSTRALIA Major target for me at Grayland WA DXpedition in early Oct was ARDS, 5050v, definitely heard on third morning after tentative receptions in 0900-1000 period until blocked by China. First date was on 5049.94, second on 5049.96, third on 5049.98 with ID at 0858; use USB only to avoid loud utility on LSB (Walter (Volodya) Salmani, MD, DXLD)

(Christian) Voice International, B-03 in English via 250 kW Darwin: 0900-1100 11955, 1000-1400 13685, 1400-1800 13635, 1800-2100 11685, 2100-2300 9795.

And relays of R. Australia: 1400-1600 11750, 2200-2400 13620, 0000-0130 17775 (via Wolfgang Büschel, DXLD)

AUSTRIA Austrian Radio B-03 includes to WNA via Sackville 1630-1730 17865; direct to SAm 0030-0130 13730; CAm 0130-0230 9870; ENAm 0130-0230 7325 (via Eric Zhou, BCLNEWS.IT via WWDXC) Presumably still German quarter-hours alternating with English (gh)

BELGIUM [and non] RVi B-03 English includes: 1830 Eu 7330- Russia, ME 5910-Germany; 2030 Eu 7330-Russia; 2200 ENAm 11730-Bonaire, 0500 WNA 9590-Bonaire (Frans Vossen, RVi Radio World)

[non] Sat Oct 11, TDPRadio started weekly Belgian Dance Music on 7560 at 2000-2100; see <http://www.tdpradio.com> (Ludo Maes, TDP) Initial DJ was Daniël Versmissen (Hermod Pedersen, HCDCX) Nonstop house music. Site probably Norway or SW Russia, as with most TDP brokered broadcasts (Silvain Domen, Belgium, DXLD) Even Romania 7145 had a much better audio signal. TDP-R reminds me of the bad Stolnik, Bulgaria and Samara, Russia transmissions. Compared to powerful 7380 signal of R Maryia, via Armavir, Russia, the location should be more northerly (Wolfgang Büschel, DXLD)

BRAZIL Some deputies and senators want to do away with the fixed schedule of Voz do Brasil, an hour at 2200/2100 UT, transforming it into spots of 1.5 to 3 minutes, which would be circulated to the some 3000 radio stations in the country, according to Folha de São Paulo via Sarmento Campos (Célio Romais, @tvidade DX) Show has already been modernized. A lot of interior stations relay by picking it up on other stations. Only about 700 of them could get it via internet, studios show (SRDXC News)

BURMA [non] Democratic V. of Burma, B-03 via Germany, DTK T-Systems 100 kW on 5945 at 2330-0030 70 degrees daily (DTK B-03 via Wolfgang Büschel, DXLD)

CANADA CBC NQS, 9625, program schedule: <http://north.cbc.ca/north/content/shortwave.pdf> (Bill Westenhaver, QC, DXLD)

CENTRAL AFRICAN REPUBLIC [non] It began as an otherwise unID test loop from Merlin, Woolferton UK to Waf at 1900-2000 on behalf of "HDL," first heard Sept. 21 on 15545, sandwiched between VOA in Kurdish via Germany until 1900, and HCJB in German via Ecuador from 2000. Finally on Sept. 24 regular programming began in French (Wolfgang Büschel, Germany) Is a relay of Radio Ndeke Luka from Bangui, Central African Republic (see p. 134 of WRTN 2003). They announce both FM and SW; French alternates with vernaculars. Link to R. Ndeke Luka is on <http://www.hirondelle.org> as in "HDL" (Vashek Korinek, RSA, DSWCI) Very strong in Alberta, news in French, highlife music, 1947 English, "a radio station from North to South making it from Central African Republic - FM makes the difference" (Ed Kusalik, Cumbre DX) How ironic (gh)

French IDs mentioning FM 100.8 and SW 15545.

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

Once known as Radio MINURCA (Jari Savolainen, Finland, DXLD) R. Minurca, in French and Sango, ceased in Feb 2000 after playing its rôle in restoring peace and organizing presidential elections (Jean-Michel Aubier informations) *1859:30-1958*, same half-hour program aired twice (Rich D'Angelo, PA, NASWA Flashsheet)

COSTA RICA Spanish heard on RFPI 7445 is new bilingual English/Spanish Pueblos Sin Fronteras, Tue-Fri 1830-1900, plus repeats 6, 12, 18 hours later (Naomi Fowler, RFPI Fiesta) RFPI resumed live streaming in Oct, Shoutcast via a microwave internet connection, but it was cut off after a week. Planned to resume via a cable connection from newly procured downtown San José office (Franklin Seiberling, IA, DXLD) Awaited decision on how and when RFPI would relocate premises from University campus (Vista)

CROATIA [non] HRT, B-03 via DTK T-Systems 100 kW, Jülich, Germany, again violating Region 2 with 40m broadcasts on the hamband: daily on 7285, 2300-0359 AM, 0000-0359 ENAM, 0200-0559 WNAM; also 9470 0500-0759 NZ, 0600-0959 AU (DTK B-03 via Wolfgang Büschel, DXLD)

CUBA 2140.00 (harmonic 2 x 1070) CMKS, Radio Trincherá Anti-imperialista, Guantanamo, 0814-0902, finally got the canned ID at 0900 over a three morning period. Over an instrumental version of Guantanamo. Consistently good signal strength every morning. Bob Wilkner in Florida verified the // 1070 (Mark Mohrmann, VT, DXLD)

CYPRUS [non] Sonnet Radio Europe will be testing on SW from the VT Merlin transmitter in Norway at 1900-2000 UT Friday Dec 12 with 400 kW, and 1900-2100 Dec 26 with 500 kW with an overall summary of programs Sonnet Radio will be carrying daily from Feb, 1900-0100 UT, including DX Zone Sun 2305-2400. No return postage required for QSLs during test period. Sonnet Radio, Mediterranean Plaza, Building 10, Unit 2 Antieou Street, Larnaca Bay, 7080, Cyprus. Provisional schedule and frequency at <http://www.rtidigital.com/index3.htm> (Mike Taylor, Sonnet Radio)

CZECH REPUBLIC [non] R. Praga announced it would test 11665 via Ascension Oct 6-12, and would be in regular use from Oct 26, at 0000-0030 (Lenildo C. Silva, Conexión Digital) Then Jana Andráková of RP gave two different frequencies in one message, 11655 and 11615. Instead of Praga I heard Merlin's test loop on 11665 at 0000 (Rubén Guillermo Margenat, Argentina, DXLD) Merlin dumped the IS loop that was made famous in the R. Afghanistan broadcasts via Norway, during breakdowns in transmission; now it's classical guitar with some string instruments (Joe Hanlon, NJ, World of Radio)

DOMINICAN REPUBLIC On 3749.77 at 0947-1015, religious songs and preaching, 1004 mentioning San Francisco de Macoris, so tentatively third harmonic of HIBC, La Voz del Progreso, 1250, on a morning ham QRM was missing, 1015 weakening with sunrise (Mark Mohrmann, VT, DXLD)

ECUADOR 5040, La Voz del Upano, carrier from 0958 UT, YL in Spanish with Santa Maria meditations, prayers. 1023 ID (Roger Chambers, NY) Roger and I agree that his report last month of La Voz de Yopal, Colombia on 5040, may have been this instead (gh)

EGYPT R. Cairo B-03 English: 1215-1330 SEAs 17670 500 kW 90 degrees (alternate 15445); 1630-1830 SAF 9855 250 196; 2030-2200 Waf 15375 100 250; 2115-2245 WEU 9985 250 325; 2300-0030 NAM 11725 500 330 & 0200-0330 11780 500 330 (Observer, Bulgaria)

EL SALVADOR R. Imperial, near 17835 causing a low het with something else, 1346 music and religious talk in Spanish (Glenn Hauser, OK, DXLD)

ETHIOPIA R. Ethiopia, in Afar on 11802.5, fair, QRM from Rai on 11800, three rings of a bell at 1400, news. Did not make out ID (Ron Troto, IL, DXLD) Checked 11802.5 at 1457. R. Ethiopia with closing announcement at 1459-1500* in Arabic. Good here (Jari Savolainen, Finland, Cumbre DX) 11803.3v, R. Ethiopia 1359-1431. Xylophone-like IS, then 3 chimes. Drifted up to 11803.34 by 1430. // 9561.16, which had drifted downward slightly by 1430 (John Wilkins, CO, ibid.)

FRANCE RFI's budget for 2004 is being increased by 2 megaeuros (Jean-Michel Aubier informations)

GERMANY [and non] DW's only B-03 English broadcast to NAM is DRM: 2200-2230 9800 via Zackville. We pick a few analogs to elsewhere which should be audible here: 0400-0500 C&Eaf 9710 Germany, 9545 Rwanda; 0500-0600 C&Saf 9565 & 12045 Rwanda, 11805 Germany, 15410 UAE; 0600-0700 Waf 7225 Portugal and/or Germany, 11785 Germany, 15410 Rwanda; 1600-1700 SAs 11695 Germany; 1900-2000 Eaf 11865 & 13590 Germany; 2000-2100 C&Saf 13590 & 15205 Germany; 2100-2200 Waf 9615 Germany, 15410 Rwanda. From experience, the last one should be best, aimed inadvertently at NAM beyond Waf (via Alokesh Gupta, India)

GUAM B03 KTRW in English: M-F 0740-0900, Sat & Sun 0730-0900 on 15205 263 degrees; M-F 0745-0930, Sat & Sun 0815-0930 165 degrees, daily 1445-1545 285 degrees, all on 15330 (via Hansjoerg Biener, WWDXC)

GUATEMALA R. Cultural: Wayne Berger, CE, tells me bath 3300 and 5955 are QRT. Electricity is very expensive and there are very few listeners on shortwave nowadays (Hans Johnson, Cumbre DX)

HONDURAS R. Misiones Internacionales, 3340 last heard Sept 28 until 0502*, then missing for at least two weeks (Brian Alexander, PA, DXLD) Before that HRMI was eager to get DX reports, planned to resume 5890 by yearend, as well as 5010, 3340 (Elmer Escoto, Honduras, DSWCI DX-Window)

HUNGARY R. Budapest B-03 28-min English: Eu 1600 Sun 6025 9585; rest daily: 2000 3975 6025; 2200 6025; SAF 2200 11965; NAM 0200 & 0330 9835 (Observer, Bulgaria)

INDIA Prasar Bharati plans 24-h AIR news radio, not on FM, but SW, diverting transmitters from external services not being utilized optimally. [Morning] broadcast in Burmese, on for 50 years was discontinued and no one complained! "We are resorting to SW for the simple reason that it covers the whole country," says CEO, K. S. Sarma (Economic Times via Ulis Fleming, Cumbre DX) AIR External Services temporarily suspended Burmese at 0100-0130 9950 11870 13630 and Tibetan at 0130-0200 on 9565 11900 13700. Chinese musical jamming of the absent Tibetan service continued anyway. Evening services in these will remain (Jose Jacob, VU2JOS/AT0J, dx_india)

AIR National Channel, 9425 heard one night from 1925 varying instead above 9277, including 1935 English News (Graham Powell, Online DX Logbook, <http://www.shortwave.org.uk>)

INDONESIA New VCI English from Oct 1 with CIRAF zones: 2000-2100 15150 27SE; 0200-0300 11785/9525 41NE; SE; NW; SW [ex 0100-0200]; 0800-0900 9525 49NE; 58NE; SE (via Lim Kwet Hian, Jakarta, Cumbre DX) 0200 on 9525 and 15150 (ex-11785); 15150 is a poor choice then due to Chinese jamming (Alan Davies, Bali, ibid.) "Kang Guru Radio English" program on 9680 at 0700-0730 (Roland Schulze, Philippines, BC-DX)

3785v, unLD new private relaying FM around 1200-1252*, several dates in mid-Sept, sounded like "Radio Suara de Badal," Kendari.

RRI Biak regular on 4919.0 ex-6153, 0910-1200, *2000-2140 with Islamic and Christian programming (Roland Schulze, Philippines, DSWCI DX Window)

IRELAND Reflections Europe details: 3910 500 W, Full wavelength dipole + reflector; 6295 2 kW, 1.5 wavelength co-linear; 12255 200 W, 4 element directional East (via Hans Johnson, Cumbre DX)

Brother Stair schedule in mid-Oct showed him "24/7 on 7465, Radio Mission Intl. to Europe, Scandinavia through France" - what could that be, a pirate or secret site? (gh) Heard at 1500 via Javaradio Europe (Hans Johnson, Cumbredx) From Ireland; used to carry Laser Hot Hits, lately religious; unlicensed. Same site continues to carry LHH on 4025 6219 and 9385 (Mike Barraclough, Cumbre DX)

ISRAEL DST ended Oct 3, after which English on SW was heard at 0500, 1110, 1800 and 2000 (IBA via Doni Rosenzweig, DXLD)

ITALY Rai International doesn't relay regularly any domestic service since May 14, when Caltanissetta site closed down; however, some programs are available (sometimes also live relay of Radio 2) in 0630-1300 slot on 9670 and 11800 from Roma Prato Smeraldo. It's possible Prato Smeraldo will close at the end of the year, and no more SW transmission from Italy (...only IRRS) (Roberto Scaglione, Sicily) Prato Smeraldo 6060 carries Notturmo Italiano 2300-0600; has a tinny sound compared to MW, caused by tight highpass filters, cut-off hardly lower than 200 Hz (Kai Ludwig, Germany, DXLD)

[and non] RAI B-03, English: 0055-0115 Nam 9675 11800; 0445-0500 Naf 5965 6100 7230; 1935-1955 WEu 5965 9755; 2025-2045 E/NEaf 5985 9515 11880; 2205-2230 As/FE 11895. Italian to Ams: 0130-0230 6110 11765 via Ascension; 0130-0315 9675 9840 11800 12030; 1400-1425 17780 21520; 1830-1905 15250 17780; 2240-0055 9675 9840 11800 12030. Sundays 1350-1730, news or sports: 9670 21520 21535 21710 (via Andreas Volk, Wolfgang Bueschel, Alan Roe)

On Oct 3, IRRS tested two transmitters, switching from 20 kW to 100 kW at 2000 on 5775, but no break audible. Modulation was USB with reduced carrier, telcom-like audio quality noticeably below broadcast standard; did not sound like a professional 100 kW transmitter (Kai Ludwig, Germany, DXLD) 100 kW to be regular on Fridays 1900-2030 UT, winter timing (Ron Norton, NEXUS-IBA support via bcfnws.it) 100 kW on 5775 will be extended to 2000-2300, on Dec 26 (Ron Norton, NEXUS-IBA, DXLD) So IRRS has their own 100 kW in Milan, rather than hiring time at other sites? Why doesn't IRRS confirm or deny claims like the following? (gh) For two years IRRS has claimed to transmit from Milano with 100 kW, but in reality the 100 kW belongs to Deutsche Telekom, which doesn't operate from Milano (Dario Monferini, Milano, Play-DX)

KASHMIR [non] Radio Sedaye Kashmir, clandestine from India: 6100 0230-0330 repeated at 1430-1530; and on 9890 at 0730-0830. First 40 minutes in Urdu, rest in some other language (Jose Jacob, India, Cumbre DX) Maybe this with tone under Malaysia from 1425 (Hans Johnson, Cody WY, Cumbredx)

LATVIA Laser Radio UK changed name for SW service via Ulbroka, 100 kW on 9290, to Euronet Radio <http://www.euronetradio.com> - began by carrying the Dutch based alternative music internet station R. Seagull, Sats 1000-1500, shifted for B-03 to 1100-1600 UT (Bernd Trutenau, DXLD) Other non-SW activities continue to be branded Laser Radio (via Mike Terry, BDXC-UK) Chris Bent, one of the DJs, who records his program at his B&B in Nova Scotia, says Seagull is a new name for R. Caroline in Holland (Jem Cullen, ARDXC)

LITHUANIA R. Ezra starts a new series of weekly broadcasts Sun 30 Nov, towards Eu, Naf, ME on 7560 at 1900-1930 via Sitkunai. R. Ezra is the voice of the World Karate Movement and the first and only counter-missionary radio station in the world. Reception reports are very welcome and a QSL certificate will be issued to any correct reports, only by fax or e-mail to radioezra@ntlworld.com. Details on air and at <http://www.radioezra.com>. To commemorate new image and purpose, special QSL cards will be issued to the first ten reception reports received (John D. Hill, UK, Station Owner, DXLD) Karaim, a Jewish sect, places the ultimate responsibility of interpreting the Bible on each individual (World Karate Movement <http://www.karaites.info> via gh)

MALAYSIA Best way to get R. Malaysia Sabah, 5979.4 is to listen to their local news at 1315; 1322 ID, 1327 news ended, short theme a few times and at 1328 pulled plug. RTM Sarawak, Kuching on 4895 and 7270 were in // at 1255 with singing and at 1300 presumed national news. SibU 6050 seemed also // but audio kept dropping out to open carrier. 5965, RTM Kuala Lumpur with national news at 1305 // 4895 (Hans Johnson, WY, Cumbredx)

15295 at 0802, V. of Malaysia in English, world news from EAs and beyond. Very clear, "You are listening to the Voice of Malaysia" ID (Ralph Famularo, Japan, DXLD)

MEXICO Many more reports of XERTA, 4810, followed the batch last month, but its total reactivity lasted only one week in mid-Sept (gh)

XERAMX missing from 9705 at 1330 but found on 9970 with large distorted spur, impossible to pin down carrier frequency; no match found around 9440 (Glenn Hauser, OK, DXLD)

MOLDOVA R. Pridnestrovyia extended SW service, on 5960 in mid-Oct; had been only on Wed, English at 1600 (Erich Bergmann, A-DX via Kai Ludwig) English now observed M-F 1600-1620, followed at 1620-1640 by: M & W German, T & T French, F more English (Mike Barraclough, UK) Winter time shift to 1700?

NETHERLANDS Major changes in RN's schedule from B-03: budget cuts caused 40% reduction in SW hours. Most two-hour broadcasts reduced to one, fewer repeats of Newline and features, and start moved to top of hour. No cuts in Internet or satellite streams, available 24 hours anyway. Feature programs available on demand on Internet for 7 days after first transmission. English to NAM, sites not specified, but guessed: 1200-1300 5965 [Sackville], 1900-2100 [Sat/Sun] 15315 [Bonaire], 17725, 17875 [Sackville?], 0000-0100 9845, 0100-0200 6165, 0400-0500 6165, 9590 [all Bonaire]. Daily service to Af at 1900-2100 might also be audible on 17810 if via Bonaire (via Andy Sennitt, Media Network blog)

Sorry to lose later 1430 to NAM on 15220 - it provided great reception from coast to coast. 5965 never as good, very early for much of the Ams. Grateful for new weekend at 1900, the best SW signal in NAM at that hour, when we usually just get weaker signals meant for Af (Steve Shaffer, RN blog)

Programming changes, too: Sincerely Yours, the mailbag, ended in October; Sound Fountain and Aural Tapestry, which have been seasonally alternating, merged into a single program, Vox Humana (Richard D. Cuff, Easy Listening, NASWA Journal) Will the Sincerely Yours text website remain, with listeners'

Shortwave Broadcasting

letters posted and responses/answers given? I hope so! It would lessen the impact and sadness of losing the program I faithfully listened to each week (Will Martin, MO, DXLD)

Research File continues each Mon, no longer repeated Thu. EuroQuest now Tue, meaning A Good Life moves to Fri. Music 52-15 has ended its current run. Wed sees our Weekly Documentary, but no longer a repeat of Dutch Horizons: this now airs on Thu. Amsterdam Forum remains on Sat and Vox Humana on Sun (Radio Netherlands web site via John Norfolk, DXLD)

NEW ZEALAND More than three weeks after its sole SW transmitter was silenced, RNZI announced that the cause was apparently a lightning hit on the transmitter itself, not merely the antennas. Replacement parts had to be ordered from Europe (via Larry Nebron, CA) Meanwhile, the temporary relay via R. Australia on 9580 at 1700 continued (gh) Returned Oct 15, testing on scheduled frequencies on and off (Chuck Albertson, WA, Bruce MacGibbon, OR, Chuck Bolland, FL, DXLD)

New on the RNZI schedule is What's Going On, arts and entertainment from National Radio, M-F 0506-0530 (Richard D. Cuff, Easy Listening, Oct NASWA Journal)

RNZI B-03 until 28.3.04, all daily:
1650-1750 6095 NEpac
1751-1850 11980 NEpac
1851-2239 15265 Pac/Eu
2240-0359 17675 Pac/WNAM
0400-0705 15340 Pac/Eu/CNAM
0706-1105 11675 Pac/CNAM
1106-1259 15530 NWPac/ETimor/SEAs
1300-1649 6095 Pac

(Website via Michael Beesley, World DX Club via Alan Roe)

NIGERIA V. of Nigeria, English: 0500-1100 17800, 1100-2000 15120, 2000-2300 17800 (Observer, Bulgaria) R. Nigeria, Abuja on 7275 believed to be used only to relay network news of 0600, 1500, 1800, 2100 (Chris Greenway, Accra, Ghana, BDXC-UK Communication)

NORWAY Back somewhere around 1962 or so Dad bought me that ill-fated Hallicrafters 38E with which I learned to speak Spanish with a certain swagger and Cuban accent. One reason I wanted the radio was to listen to Norwegian, which I was then (and still am) learning out of a book. Now I learn that as of 31 Dec 2003, Norsk Rikskringkasting will cease all SW from Sveio and Kvitsøy sites. They already rent time to R. Denmark, and they're cutting back "the number of SW transmissions to give more time to other broadcasters." I don't think it'll be the same, downloading the programs on my computer. (Nils R. Bull Young, W8JIN, La Estancia de los Guajolotes Sonrientes via QRP-L reflector via Ed Tanton N4XY, swl@qth.net) New customer: see CYPUR non

PARAGUAY Gala nacional is a new program on R. Nacional, including SW, Thursdays at 2300-0100 Fridays; themes from the Paraguayan songbook (Diario ABC Color Digital, via Conexión Digital) That would be 9737v, but anybody heard it lately? (Glenn Hauser, DXLD)

PERU On 5459.00, Radio Panorama, Recopampa, reactivated, heard at 0000; WRTH had listed on 5907. Greatly enjoyed their music program Potencia Tropical with cumbia, Cristián Castro. But heavy QRM from R. Balivar on 5460.33.

R. Onda Imperial, Cusco, also reactivated! 5055.19 at 0135, weak but clear ID in fútbol; see <http://www.ondaimperial.pe.net/> (Björn Malm, Quito, Ecuador - SWB América Latina) Check out the chicas! (Dario Monferini, Play-DX)

From 0020 on 6536 I am hearing R. La Poderosa, formerly called R. San Miguel, Sondor. Same as heard in March as "R. Difusor Huancabamba, la poderosa." SW schedule announced as 2300-0200. New address for reports: Calle Ayabaco s/n, Barrio La Via, Huancabamba, Piura, Perú (Rafael Rodríguez, Colombia, Conexión Digital) At 2144, announcer Federico Ibáñez made clear that Rdif. Huancabamba no longer exists! But he was the manager of that station. Perhaps the change is to drum up new clients (Alfredo Cañote, Perú, *ibid.*) Rdif. La Poderosa, Huancabamba, 6535.97, 0025-0108*, OA folk music, IDs, next night 0100-0204*, abrupt sign-offs (Brian Alexander, PA, DXLD)

3027v, R. Municipal, Distrito de Huanorchal, Provincia de Otuzco, Departamento de La Libertad at 1000-1100, ID with comunicadoos to people living in these distritos: La Fortuna, El Milagro, La Tuna, Tres Piedras, La Esperanza and Loma Grande in Despertar Andino. MW harmonic? (Björn Malm, SWB América Latina, Ecuador, DXLD) Also announces FM 105.3 (Alfredo Cañote, Perú, *ibid.*)

3172.69, R. Municipal, Panao, OA harp music with M vocalist, 1009 ID (Dave Valko, PA DXpedition, Cumbre DX)

PHILIPPINES 9619.20, PBS, Marulas, Valenzuela, 0230-0940*, ex 9582.3. Tagalog "DZRM Radio Magazin," 0300 ID: "PBS." VG modulation (Roland Schulze, Philippines, DSWCI DX Window)

ROMANIA RRI B-03 English involves many time changes, mostly one UT hour earlier than later: 0100-0156 6040 9510 9530 11740; 0300-0356 6040 9515; 0700-0726 11775 15105; 1300-1356 15170 17720 17745; 1700-1726 9570 11940; 2030-2056 6110 7105; 2200-2256 5975 7250 11830; 2300-2356 11840 11940 15145 15370 (Observer, Bulgaria)

SLOVAKIA RSI B-03 English half-hours: 0100 NAM 5930, CAM 7230, SAM 9440; 0700 Au/OC 13715 15460 17550; 1730 & 1930 WEu 5915 6055 7345 (via Swopan Chakrobarty, DXLD)

SOMALIA I met with the Minister of Info and Telecomms about Somalia using human resources to operate a worldwide SW service which would help bring the country together using all news sources that have developed around the country. This would also give a voice to Africa and to the positive aspect of Islam and to developing nations. The Minister will approach USA, EU, Russian and other representatives to build such a facility in peaceful Puntland to get on air immediately and which can be expanded into the 4th worldwide broadcaster after BBC, VOA and Radio Moscow (Sam Voron via Björn Fransson, DXLD)

SOUTH AFRICA TWR B-03 from here shows only one English broadcast, daily to Nigeria 0600-0615 on 11640 (via Dr Hansjoerg Biener via Wolfgang Bueschel via Alan Roe)

SPAIN Spurs from REE in Spanish from fundamental 11890 at 0500-0655 every 90 kHz above and below: on 12250/12160/12070/11980 and 11800/11710/11620/11530 (Observer, Bulgaria)

SWEDEN [and non] R. Sweden B-03 English: 0130-0200 Au/As 9435; 0230-0300 & 0330-0400 NAM 9495-Canada; 1330-1400 As 9430 17505, 18960 NAM; 1430-1500 ME/At/As 17505, NAM 18960; 1830-1900 Eu exc Sun 1179 9375; 2030-2100 Eu/As 1179 6065 9400 (alt 9415); 2230-2300 Eu 1179 6065. Among the

Swedish broadcasts are relays: 0000-0030 & 0100-0130 SAM, 0200-0230 & 0300-0330 NAM all 9495-Canada. At 0100 also on 12060 Madagascar to Au/As (via Wolfgang Bueschel, Alan Roe) English in DRM: 1330 via R. Netherlands on 9815; 2330 via RCI on 9800 (George Wood, SCDX/MediaScan) **THAILAND** R. Thailand, World Service B-03 English: 0000-0030 9680 Af; 0030-0100 13695 ENAm; 0300-0330 15460 WNAM; 0530-0600 13780 Eu; 1230-1300 9810 SEAs; 1900-2000 9535 & 2030-2045 9535 Eu (via Alokesh Gupta, India)

TIBET 9490, China Tibet People's Broadcasting Co., 1100 English, Tibet promo, news, features, music, in the clear and quite readable most days (Steve George, MA, Cumbredx) Holy Tibet program in English at 1100 presented by same YL I've heard in previous years, fair on 9490 but use LSB to avoid splatter. Parallels: 4905 (good), 4920 (poor under co-channel), 5240 (poor), 6200 (fair), and 7385 (poor). Length varies from 15 to 30 minutes. Also at 1630 on 9490 about equal to co-channel probable VOR. // 7385 fair, but in the clear. 4905 (poor), 6200 best (Walter (Volodya) Salmaniw, MD, Grayland WA DXpedition, DXLD) 4920, 1110-1130, V. of Holy Tibet program, YL with talks, Chinese music between items, good signal the too much "sweeper" to fully understand content, // 4905, 5240 both fair/poor (Scott R Barbour Jr., NH, DXLD)

UGANDA [non] R. Rhino International Africa, 17555 via Germany, from *1500, opening theme is Trini López' version of "If I Had a Hammer..." heard on several occasions (Glenn Hauser, OK, DXLD)

UKRAINE RUI B03 tentative, English hours: 2200 on 5840, Kharkiv 290°, 100 kW to WEu; 0100 & 0400 on 5905, Mykolaiv, 314°, 1000 kW to NAM; 1200 on 15520, Kharkiv, 262°, 100 kW to WEu (Alexander Yegorov, Kiev via Kraig Krist, George Poppin, DXLD)

USA Bernard H. Kamenske, 75, a champion for journalistic integrity of VOA, which he left as chief news editor in 1981 after his much-publicized battle for objective reporting, died Sept. 25 at Suburban Hospital. Mr. Kamenske, who started working at VOA in 1955 and became chief news editor in 1974, was credited with helping establish its charter governing news accuracy and objectivity. He spoke out against those favoring a more combative, anti-Communist edge in its news broadcasts to citizens living in Communist-controlled countries during the Cold War (Washington Post via Kraig Krist)

I am working on improving quality of WJIE. We are now delivering signal to the transmitter by subcarrier and purchased a new remote control, so there should be vast improvements. Reports are wanted so we can define our coverage area, and a special QSL card is available. Reactivated in late September on 13595, and reverted to legal call of WJCR. Email morgan@wjie.org or P O Box 197309, Louisville KY, 40259 (Morgan Freeman, WJIE, DXLD)

WWRB heard two nights in early Oct around 0500 not only on 6890 but // 6980 with hate-everybody call-in program (Harold Frogde, MI, MARE) WWRB Global-4 is fully operational, mostly on 12172. Our aircraft Communications / Navigation group is developing very quickly! It is actually more lucrative and financially stable than the broadcasting business (Dave Frantz, WWRB, Manchester TN, DXLD)

WBCQ added 5105 to 7415 for World of Radio UT Man 0415, now 0515, but at first 5105 ran very low power (Michael Ketter, WBCQ)

[non] Since RN has cut back its broadcasts, with Banaire 6165 not opening in English until 0100, a new client relays via there - Adventist World Radio, resuming Spanish on SW, 2300-0100 for the Antilles, per 8-03 schedule (via Ernesto N. Hernández, México, DXLD)

R. Africa International, Methodist from New York, 8-03 via Germany, 100 kW: 0400-0559 9815 160 degrees; 0600-0800 11690 190; 1700-1859 13820 145 and 11735 160 (via Wolfgang Bueschel) Part English, part French

URUGUAY 6140.1, R. Monte Carlo, 0943 news about Uruguay and S. America, 0958 "Monte Carlo" jingle, then clear ID. Fair (Nobuo Takeno, Yamagata, Japan, Cumbredx) 6042.5, R. Sarandi Spart, Montevideo, 2239-2305, songs, ads, pops and talks on spart (Carlos Gonçalves, Portugal, DSWCI DX Window)

VENEZUELA Observatorio Caigal got a \$282,000 grant to re-equip itself, so its official time signals should become more accurate after Dec 31, via telephone as well as 5000 kHz. There is too much light pollution for astronomical observations at the observatory (Morelia Morillo M., El Universal, Venezuela, via Horacio Nigro, Conexión Digital) YTO missing again from 5000, hopefully this time for rejuvenating the equipment (José Elias Díaz Gómez, Venezuela, Conexión Digital)

Ecós del Torbes is still active on SW 4980, but only in the daytime around 1400-1900, explaining why DXers are not reporting it, says Takayuki Inoue Nazaki on a visit there (José Elias Díaz Gómez, Conexión Digital)

R. Táchira, 4830, seems to run later on UT Mons until 0404, to serve all Nueva Granada with the program Música y costumbres de Colombia, from 0100 (Adán González, Venezuela, DXLD) Also noted on a UT Mon, including English IDs at 0203, 0302, 0359 (Brian Alexander, PA, DXLD)

VIETNAM [non] On 7380, Degar Voice, 1300, opening instrumental music, 1302 "Montagnard Foundation Incorporation" and "Degar Voice" mentioned in English, then into language. Fair/good signal with almost unnoticeable siren jammer in background and occasional ute chatter (John Wilkins, CO, Cumbre DX) Radio of the Voice of the Degar People via Chita, Russia, e-mail thankyou note from v/s Kok Ksor, President of the Montagnard Foundation Inc (MFI). Says he usually presents the program, produced by MFI, in turn financed by the Transnational Radical Party of which he is a General Council member. There is a connection, though unclear, with Radicale Radio in Italy, and with an unnamed HQ in London (Merlin?) which Kok Ksor contacts in case of reception problems. Reply in 16 hours from degar@montagnard-foundation.org (David Foster, Australia, via BC-DX)

WESTERN SAHARA [non] Polisario Front's National Radio of the SADR, at 2350 very strong on 7460 plus 1550 and 700 kHz (Alan Pennington, UK, BDXC-UK) 7460 also much stronger than before, booming in at 0600-0630+ in Arabic (Noel R. Green, NW England, Cumbredx)

ZAMBIA Christian Voice, B-03, 100 kW in English: 0300-0600 6065, 0600-1500 9865, 1500-0300 4965 (Observer, Bulgaria)

ZANZIBAR 11734.1, R. Tanzania Zanzibar, already in English when tuned in at 1757 (Walter (Volodya) Salmaniw, MD, Grayland WA DXpedition, DXLD) Another day in Swahili right up to the news in English at 1800 (Chris Greenway, Kenya, DXLD)

ZIMBABWE [non] London-based SW Radio Africa, daily at 1600-1900 via South Africa was to replace 4880 with the summer frequency of 6145 from 26 October (© Radio Netherlands Media Network) Until the Next, Best of DX and 73 de Glenn)

0015 UTC on 15150

THAILAND: VOA relay. Multilingual service including bits of English. News bulletins with Chinese music in background, possibly Chinese music jammer? **Radio Thailand** 15395, 0035 with IDs, program info and regional Asian music. Noted same jammer on 9355 at 1836. (Stewart MacKenzie, Huntington Beach, CA) **BBC Thailand relay** 11955, 0030-0037. (Rich D'Angelo, NASWA Flash Sheet)

0102 UTC on 6134.81

BOLIVIA: Radio Santa Cruz. Mix in Spanish and Aymara with regional mentions. Bolivian style music mixing with Brazil's **Radio Aparecida**. (GVH, Brasstown, NC) Bolivia's **Em Pio XII** 5952.39 with discussion on democracy to mentions of **Radio Fides** twice to "Em Pio XII" identification. **Radio Dif Tropico** 6037.5, 2330-2355 (Robert Wilkner, FL/HCDX) **Radio Santa Ana** 4650.35, 2242-2246; **Radio Yura** 4716.79, 0106-0130 **Radio San Gabriel** 6080.06, 0858-0906. (Nicholas Eramo, Buenos Aires, ARG/HCDX) **Radio Paititi** 4681.08, 2356-0037. Bolivian's audible between 0015-0020; **Radio Perla del Acre** 4600.32; **Radio Nor Andina** 4460.84; **Radio Bambamarca** 4426.79. (Dave Valko, PA/Cumbre DX)

0103 UTC on 6925 USB

PIRATE: Sunshine Radio. '60s and '70s classic tunes with 33333 SINPO. **Oxycontin Radio** 6926, 0212-0226*. ID as, "80 mg Surround Sound-this is Oxycontin Radio." Mentions of this the last show for awhile. 0222* with ragtime piano music. Unid pirate on 6950 USB, 0214-0240 with segments on Marcell Ledbetter, and biscuits. No ID. **Big Thunder Radio** 6950 USB, 012-0157*; **KROW** 6950 USB, *0200-0230. (Joe Wood, Gray, TN)

0240 UTC on 3359

COSTA RICA: Radio Exterior Espana relay. Latin vocals to four time pips and lady's ID and news. Good signal on this unusual frequency. (D'Angelo, PA/NASWA) Relay noted 3350, 0450-0455 with IDs and flamenco music. (Wood, TN) Relay noted 17850, 1755. (MacKenzie, CA)

0505 UTC on 11820

NEW ZEALAND: Radio NZ Intl. Local news and weather to item on gun control in Marshall Islands. Rugby commentary at 0523 and talk of lady high jumper. (Wood, TN)

0526 UTC on 9600

UAE: AWR. African style music to AWR identification, abruptly off the air at 0528. (MacKenzie, CA)

0737 UTC on 7260

VANUATU: Radio Vanuatu. News mix of Bislama and English. News on Papua New Guinea and other Pacific areas. Station identification 0738 into pop style music. (Patrick Martin, Seaside, OR) Observed 0810-0820 with pops and freq announcement for SW, MW and FM. (Van Horn, NC)

0845 UTC on 3291

GUYANA: Voice of. Hindu/subcontinental music at tune-in. Pop and hip hop vocals to "good morning from Georgetown." Station ID and morning time check. Greetings and personal messages of birthdays and anniversaries. (Sam Wright, Biloxi, MS)

1040 UTC on 4781.4

ECUADOR: Radio Oriental. Spanish music program to lady's local time check and identification. Ecuador's **La Voz del Upano** 5040, 1048+; **Radio Federacion** 4960, 2329. (Arnaldo Slaen, Buenos Aires, ARG) **HCJB** 15115, 1100 with two hours monitored to 1300*. (Bob Fraser, Cohasset, MA) **Radio El Buen Pastor** 4815, 1020-1045. Quechua programming with IDs and composina music and messages. Station ID with freq mention. (Van Horn, NC) **Radio Quito** 4919, 0843-0845. (Eramo, ARG/Cumbre)

1045 UTC on 4869.97

INDONESIA: RRI Wamena. Nonstop soft Indo Lagu to time ticks at 1100. "Canned" ID at 1122 and back to music. Interference from RRI Sorong. Indo's logged; **RRI Sorong** 4870.93, 1058; **RRI Fak Fak** (tent.) 4789.98, 1104-1120. (Dave Valko, PA/Cumbre DX) **Voice of Indonesia** 9525, 1016-1037; 15150, 2028-2106* (D'Angelo, PA/NASWA)

1051 UTC on 6105

BOLIVIA: Radio Panamericana. Spanish national news to regional time check. Interview to beautiful station jingle and more news as "Panamericana presenta...las noticias junto con CNN." SINPO 43443. Radio Fides 9625, 1110-1125. (Slaen, ARG)

1056 UTC on 3335

PAPUA NEW GUINEA: Radio East Sepik. Possible religious service at tune-in. English news at 1100 recheck. All programming // with 3290 **Radio Central**. Other PNGs audible this hour; **Radio Simbu** 3275; **Radio Western Highlands** 3275; **Radio Madang** 3260; **Radio West New Britain** 3235; **Radio Sandaun** 3205; **Radio Enga** 2410. (Valko, PA/Cumbre)

1636 UTC on 15680

GERMANY: Voice of Hope. Christian programming with interference from co-channel oriental music. Fair signal. **Radio Africa Int'l** via Germany 15715, 1720-1740 with text on AIDS in southern Africa. (Wood, TN) **Russian Radio Intl** via Germany 17705, 1428-1500*. (D'Angelo, PA/NASWA) **Voice of Croatia** via Germany 9925, 2258-2307. (Wood, TN)

1740 UTC on 15209

SAUDI ARABIA: BSKSA. Koran recitations at tune in, extending to 1758. Arabic identification with frequency quote. // 13710 (SINPO 23222) Both frequencies off at 1759. BSKSA audible 11820 // 15230 with Arabic news text and speech (or commentary) at 1810. (Van Horn, NC) Logged 11820, 1958-2005 with fair-good Arabic service. (Wood, TN)

1925 UTC on 15476

ANTARCTICA: Radio Nacional Arcangel San Gabriel, Base Antarctica Esperanza. Very nice Argentina folk music to talks about the Rio Negro region. IDs with frequency quote. SINPO 44444. (Slaen, ARG) 15476, 0100-0205. including pop music and IDs from male/female announcers. Fair-poor quality for Spanish announcements. (Frank Hillton, Charleston, SC)

1958 UTC on 17860

RWANDA: Deutsche Welle relay. German service with conversations to ID at 1954. Musical interlude and feature. Parallel programming on 11795, 9735, via Germany. (MacKenzie, CA)

2005 UTC on 13700

MADAGASCAR: R. Netherlands relay. World to African newscast, // 17605, 21590. (MacKenzie, CA)

2020 UTC on 13615

USA: Wewn. Station identification into pop religious music. (Fraser, MA) Station 13615, 2150-2200 ID as, "Wewn Global Catholic Radio" into rosary. (Wood, TN)

2230 UTC on 12000

TURKEY: Voice of. Pop music program for Turkish service. Station ID with freq quote and email address at 2246. Sign off 2250 with English ID and greeting, to piano interval signal. (Wood, TN) 9830, 2245 Turkish classical music. (Fraser, MA) Spanish VOT 15150, 1627-1735. (Slaen, ARG)

2235 UTC on 6250.34

EQUATORIAL GUINEA: Radio Nacional. Spanish text to Spanish ballads. "Radio Malabo" identification to national anthem and 2302*. Fair signal quality SIO 322. (Banks, TX)

2250 UTC on 12050

EGYPT: Egyptian Radio. Announcer duo's Arabic/English mix and mentions of Islam teachings. (Wood, TN) **Radio Cairo** 9990, 2234-2245. Surprisingly excellent audio with no fading to ID, anthem to 2241*. (Robert, Montgomery, PA/NASWA)

2334 UTC on 5030

BURKINA FASO: Radio Burkina. French pop and rap tunes. Classic '50s music to 2356 as host closes program. Station identification to closing announcements and orchestral anthem. Fair signal. (D'Angelo, PA/NASWA)

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

Electronic QSLing, Sign of the Future

Get used to it. As stations face budget and personnel cuts, QSL collectors are finding electronic QSLing via their email to be an alternative trend used by shortwave, clandestine, pirate and medium wave stations.

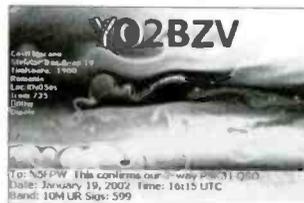
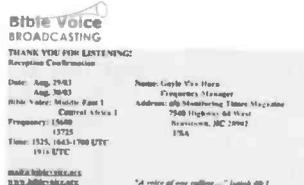
Electronic QSLing is a topic that continues to dismay and inflame collectors that prefer a personal reply. Stations currently eQSLing include China Radio International, Radio Havana, Armed Forces Radio, Deutsche Welle, Radio Romania International, Radio Budapest, Voice of Russia, and many others. Unfortunately, the list broadens each month, as do tempers!

One alternative I've started using is my cut and paste magic. Using your favorite word processing program, cut and paste your QSL verification into a blank page. Adjust the font using a decorative style and add color to the text. Colored or acid-free de-

signer printer paper is readily available at discount chains or office supply stores. Slipped into a top-loading document protector, it improves the appearance over a stale email message.

Amateur radio operators have an alternative to collecting QSLs. By registering at *The Electronic QSL Card Centre* <http://www.eQSLcc.com>, hams can send or receive electronic QSLs. The service costs nothing and collectors can print their own colored card on their computer printer. Cards are about the same size as a normal sized QSL card, and the service has attracted a huge following with 28 million eQSLs from 291 countries currently online. Check their website for additional links, Country List, and more. Step One begins with your free registration and Signup Code via email confirmation.

Electronic QSLing may not be the preferred response, but surely an eQSL is better than none. Get creative and keep *MT* informed of your replies!



AMATEUR RADIO

Nevis Island-V47NS (NA-104) 40 meters SSB. Full data card via QSL Manager, Michael R. Treister, W9NY. Received in 103 days for an SASE. QSL address: 2400 N. Lakeview Ave., Chicago, IL 60614. 40 meter country # 19. (Larry Van Horn, NC)

Norfolk Island-VK9NS (OC-005) 20 meters SSB. Full data color card. Received in 30 days for a Euro nested self-addressed-envelope and two US dollars. Direct QSL address: Jim Smith, VK9NS, P.O. Box 90, Norfolk Island NOR 2899, Australia. DXCC # 165, 20 meters # 75. (Van Horn, NC)

Tasmania Island, Australia-VKGG (OC-006) 20 meters SSB. Full data card via QSL Manager, Eberhard Diebel, DL8NU. Received in 15 days for a Euro nested self-addressed-envelope and two US dollars. QSL address: Heinrich-Heine-Str. 12, D-73614 Schorndorf, Germany. IOTA # 99. (Van Horn, NC)

CLANDESTINE

Radio Rhino International Africa, 17555 kHz. Full data confirmation letter from Godfrey Ayoo-RRIA Director. Received in one day via email to; info@radiorhino.org. Website: <http://www.radiorhino.org>. Station address: Voice of Voiceless International-Uganda e.V, c/o Allerwelthaus, Koernerstrasse 77-79, D-50823 Koln, Germany. Station heard daily *1500-1556*. (Gayle VH, NC)

Denge Mesopotamya via TDP, 11530 kHz. Full data card signed with illegible signature. Received in 13 months for an English report. Station address: P.O. Box 1, 2310 Rijkevorsel, Belgium. (Arnaldo Slaen, Buenos Aires, Argentina)

CZECH REPUBLIC

Radio Prague, 7345 kHz. Full data motorcycle card initialed, plus stickers and frig magnets. Received in 20 days for an English report and two US dollars. Station address: English Language Service,

Vinohradska 12, 12099 Prague, Czech Republic. (Joe Squashic, Wake Forest, NC)

ECUADOR

HCBJ, 15115 kHz. Full data Volcano Cotopaxi signed by Curt Cole, plus schedule, pamphlet, and handwritten note. Received in 120 days for an English report. Station address: c/o English Language Service, Casilla 17-17-691, Quito, Ecuador. Website: <http://www.hcjb.org>. (John Vercellino, Downers Grove, IL)

ITALY

IRRS, 5780 kHz. Full data QSL card unsigned. Received for an English report to; P.O. box 10980, 1-20110 Milano, Italy. (Emmanuel Ezeani, Sokota, Nigeria/HCDX)

MEDIUM WAVE

KLFF, 890 kHz AM, Arroyo Grande. Full data verification letter signed by Jon Fugler-General Manager, plus an earlier email reply. Received in 360 days for an AM report. Station address: P.O. Box 1561, San Luis Obispo, CA 93406. (Patrick Martin, Seaside, OR)

KZMP, 1540 kHz AM. Partial data letter signed by Scott Savage-General Manager. Received in nine days for tape air check of top-of-the-hour identification, plus one US dollar (returned). Station address: 5307 E. Mockingbird Lane, Suite 500, Dallas, TX 75206. (Patrick Griffith, Westminster, CO)

WDSS, 1680 kHz AM. Color Radio Disney half-sheet confirmation with AM logo, unsigned. Received in 58 days for an AM report and one US dollar. Station address: 3777 44th Street SE, Grand Rapids, MI 49512. (Griffith, CO)

WWL, 870 kHz. Full data letter signed by Joseph Pollet-Director of Engineering, plus station literature and coverage map. Received in 13 days for an AM report. Station is a real flame thrower in the early dawn

hours. Station address: Entercom Enterprises, 1450 Poydras Street, Suite 440, New Orleans, LA 70112. (Joe Wood, Gray, TN)

New Zealand, Southern Star, 963 kHz AM. Full data Radio Rhema/Southern Star QSL card and note from Stewart Jenke-Engineer. Received in 23 days for a taped cassette report. Station address: Rhema Broadcasting Group, Inc., Private Bag 92-636, Auckland, New Zealand. N.Z. QSL # 109. (Martin, OR)

PIRATE

AMPB, 6925 kHz USB. Partial data handwritten note on info sheet, signed by DJ Capt. Fred. Received in three weeks for an SASE and one US dollar. QSL maildrop: Assn. Of Micro-Power Broadcasters, PMB 22, 2018 Shattuck Avenue, Berkley, CA 94704. (Bill Wilkins, Springfield, MO)

Crazy Wave Radio (Europe) 6275 kHz. Full data card signed by Cris Ise and station literature. Received in 40 days for a pirate report and one U.S. dollar. Transmission was 18 watts! QSL maildrop: SRS Germany, CWR, P.O. Box 1136, DE-06201 Mersburg, Germany. (Wood, TN) great catch, Joel! - ed.

QATAR

Radio Qatar, 7210 kHz.. Full data folder card signal by Jassim Mohammed Al-Qattan-Head of Public Relations. Received in four months for an English report. Station address: Qatar Radio & TV Corporation, P.O. box 3939, Doha, Qatar. (Cesar Perez Dioses, Chimbota, Peru/HCDX)

TURKEY

Voice of, 12000 kHz. Full data unsigned QSL card. Received in 47 days for an English report and two US dollars. Station address: P.O. Box 333, 06.443 Yenesehir, Ankara, Turkey. (Squashic, NC)

Season Greetings from QSL Report

“Shortwave” Without Shortwave

Once upon a time, *shortwave* and *international broadcasting* were synonymous, fully interchangeable terms; but that is no longer the case. Today, shortwave is just one of several distribution technologies that can be employed by international broadcasters. Even shortwave has “split” into two *platforms* – traditional analogue and emerging digital (Digital Radio Mondiale – DRM).

This is all to the good because, as useful as shortwave is, it is not ubiquitous and not all who should hear the fine programming of international public broadcasting will hear it if shortwave is the only means of delivery.

As asserted in this space previously, the crucial challenge being posed to each international broadcaster involves developing a strategy that utilizes a mix of these technologies in a way which best employs limited resources and offers the best opportunities to reach and expand their target audiences.

◆ Enter WRN

This is, broadly speaking, the adopted mission of the **World Radio Network (WRN)**, based in London. You may have heard of WRN, if only from some mention of it in a station announcement. Coordinately, WRN also seeks to fulfill the rising demand from listeners for increased radio choice by emphasizing use of digital delivery platforms. It has two main operational divisions: *WRN Broadcast*, which operates the WRN branded networks (more on this later); and *WRN Transmission*, which offers transmission services to a broad range of media companies and organizations.

Since many, if not most, transmission facilities now exist independently of the broadcast station content providers, the task of finding effective outlets for that product has become much more complicated. WRN can offer its clients economical access to digital and analogue satellites, terrestrial relays via FM, medium wave and digital radio, digital streaming via the internet, and IP, ISDN and fiber connectivity, as well as other outlets through airtime acquisition and brokerage.

There’s also *WRN Consulting*, a media consultancy division established to assist media organizations in developing effective strategies to meet their broadcasting goals.

◆ WRN Broadcast

What will be of prime interest to radio listeners, however, is WRN’s *Broadcast* (or

perhaps more correctly “*Re-Broadcast*”) arm. WRN directly relays the services and programming of dozens of international broadcasters, primarily via satellite and internet streaming.

WRN was founded eleven years ago. This is a lithe (about 25 employees), ambitious, and innovative organization based in London that recognizes both the unique value of international broadcasting as well as the daunting task it faces today in competing with other forms of media. As Tim Ayris, Marketing and Rebroadcasting Manager for WRN, aptly puts

Table 1: WRN Content Partners

(*available on WRN English for NA, +on WRN Multilingual for NA)
 Banns Radio International* (Denmark)
 CBC Radio
 Channel Africa*
 China Radio International*
 Deutsche Welle*
 Die Stimme der Hoffnung
 Earth and Sky* (astronomy report)
 Feature Story News (FSN)*
 France Bleu Radio Corse Frequenza Mora
 Glenn Hauser* (World of Radio)
 Hamburger Lokalradio
 HCJB
 Israel Radio*
 NHK World Radio Japan
 NDR
 NPR
 Ö1 - Österreich 1 International
 PBS
 PRI
 Radio Australia*
 Radio Austria International
 Radio Budapest* +
 Radio Bulgaria
 Radio Canada International*
 Radio Guangdong*
 Radio Korea International*
 Radio Netherlands*
 Radio New Zealand International*
 Radio Polonia* +
 Radio Prague* +
 Radio Slovakia International*
 Radio Sweden*
 Radio Television Marocaine
 RTE Ireland*
 RVI* (Flanders International Radio)
 This Way Out (gay/lesbian magazine)
 United Nations Radio*
 Vatican Radio*
 Voice of Russia* +
 Voice of the Mediterranean
 Voice of Turkey
 Voices of Innovation* (tech report)
 Wales Radio International*
 WRN*
 YLE Radio Finland+

Table 2: WRN Broadcast Services

WRN English
 for North America
 for South America
 for Africa/Middle East
 for Asia/Pacific
 for Europe
 on Worldspace AfriStar
 on Worldspace AsiaStar
 WRN Multilingual
 for North America
 for South America
 for Africa/Middle East
 for Asia/Pacific
 on Worldspace Afristar
 WRN Deutsch
 WRN Russkij
 WRN Francois

it, “In order to survive, international broadcasters are going to have to be clever.”

In other words, international broadcasters are going to have to understand that they are – in the main – niche broadcasters, see each other more as partners than competitors, and become skilled in using the several distribution platforms now available to them to best effect. WRN seeks to provide much of that dexterity, efficiently and affordably.

◆ Building Relationships

Table 1 lists the fifteen “24/7” service options offered by WRN. Broadcasters can purchase fifteen, thirty, and sixty minute slots on one or more of these networks. There is a published rate card, but in actuality each relationship is negotiated and the costs end up being governed as much by a broadcaster’s

continued on page 66

Software for the Shortwave Listener...

Radio Listener's Database	NOW FREE
SWBC Schedules - Broadcast frequencies and programs updated monthly*	NOW FREE
Smart R8 Control - for the Drake R8/R8A/R8B	\$60
Smart Icom Control - for IC-R75	\$60
Smart NRD Control - for NRD-535/545	\$60
Smart Kenwood Control - for R-5000	\$60
Smart Audio Control - Scope, spectrum analyzer	\$35

FineWare

11252 Cardinal Drive * Remington, VA 22734-2032
 fineware@fineware-sw1.com * www.fineware-sw1.com

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

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

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

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions.

But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

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

Target Areas

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

Choose a program or station you want to hear.

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

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

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

MT MONITORING TEAM

Gayle Van Horn John Figliozzi
 Frequency Manager Program Manager
 gaylevanhorn@monitoringtimes.com johnfigliozzi@monitoringtimes.com

Mark Fine, VA
 markfine@monitoringtimes.com

Program Highlights

John Figliozzi

◆ Dec. 10 Special Broadcasts

In a statement issued on October 15, the International Society for Human Rights (IGFM-ISHR) has proposed to all shortwave radio stations that a five minute broadcast to all political prisoners and prisoners of conscience around the world be made on December 10, the anniversary date of the UN Human Rights Declaration, at the same time on all frequencies and in all languages.

◆ Holiday Listening Tips

If past practice can be a guide, here are some of the special programs you might expect to hear on shortwave to mark the Christmas and Hannukah seasons.

BBC – A special play or two on *Play of the Week* and seasonal stories on *Off the Shelf*; the *Festival of Nine Lessons and Carols* broadcast live on Christmas Eve and re-broadcast on Christmas Day.

RCI – A week or so of seasonally themed stories during *As It Happens* culminates in a reading of "The Shepherd", as recorded by the late Alan Maitland. Special programming depicts Christmas in Canada on Christmas Day. (In addition, the entire CBC Radio One schedule is carried on **CBC North Quebec**—9625 kHz.)

R. Australia – RA relays ABC Local Radio and ABC Radio National domestic services on Christmas Eve and Day to impart some essences of a "down-under, summer" Christmas to its listeners. (*Melbourne is 16 hours ahead of New York.*)

RNZI – National Radio's special programming may be heard in the days leading up to, and including, Christmas and New Years' days. Be the first to ring in the New Year in your neighborhood by tuning in at 1100 UT Dec. 31. (*New Zealand is 18 hours ahead of New York.*)

VOA – Special concerts and plays, as well as reports from around the country, have been Holiday fare in the past.

Expect special programs from **R. Sweden**, **R. Prague**, **R. Slovakia Int.**, **RVi Belgium**, **R. Netherlands**, **R. Budapest**, **R. Austria Int.**, **R. Exterior de Espana**, **Israel Radio**, **Vatican Radio** and **DW's** English and German services emphasizing holiday local flavor. The **Voice of Russia** emphasizes Orthodox Christian celebrations which peak in early January.

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

0000	0007		Sierra Leone, SLBS	3316da		
0000	0015	vl	Cambodia, National Radio Of	11940as		
0000	0015		Japan, Radio	13650as		17810as
0000	0028	mtwhfa	Serbia & Montenegro, RSCG	9580na		
0000	0030		Egypt, Radio Cairo	11725na		
0000	0030	DRM	Netherlands, Radio	15525na		
0000	0030		Thailand, Radio	9680af		
0000	0030		UK, BBC World Service	3915as	11945as	
			17615as			
0000	0030		USA, Voice of America	7215va	9890va	11760va
			15185va 15290va	17740va	17820va	
0000	0045		India, All India Radio	9705as	9950as	11620as
			13605as			
0000	0057		Canada, Radio Canada Intl	5960na	9590na	
			9755as 11895as			
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, Radio	9660pa	15240pa	
			15415as 17580pa	17750as	17775as	17795va
			21725as			
0000	0100		Australia, Voice Intl	17775as		
0000	0100	vl	Batswana, Radio	4820do	4830al	
0000	0100		Bulgaria, Radio	7400na	9400na	
0000	0100		Canada, CBC Northern Service	9625do		
0000	0100		Canada, CFRX Toronto ON	6070do		
0000	0100		Canada, CFPV Calgary AB	6030do		
0000	0100		Canada, CKZN St John's NF	6160do		
0000	0100		Canada, CKZU Vancouver BC	6160do		
0000	0100		Costa Rica, Radio for Peace Intl	7445am	15038va	
0000	0100		Costa Rica, University Network	5030am	6150am	
			7375am 9725a	11870am	13750na	
0000	0100	1st a	Finland, Scandinavian Weekend Radio	11690eu	5990eu	
			11690eu			
0000	0100		Germany, Deutsche Welle	7290as	9880cs	
0000	0100		Guyana, Voice of	3291do	5950do	
0000	0100		Japan, Radio	6145na		
0000	0100		Malaysia, Radio	7295do		
0000	0100		Namibia, Namibian BC Corp	6060af 6175al	3270af	3290af
			Netherlands, Radio	9845na		
0000	0100		New Zealand, Radio NZ Intl	17675pa		
0000	0100		Sierra Leone, Radio UNAMSIL	6139af		
0000	0100		Singapore, Mediacorp Radio	6150do		
0000	0100	vl	Solomon Islands, SIBC	5020do	9545do	
0000	0100		Spain, Radio Exterior Espana	15385am		
0000	0100		UK, BBC World Service	5970as	5975va	
			6195as 9410as	9740as	9825sa	11955as
			12095as 15280as	15310as	15360as	17790as
0000	0100		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb 6350usb	7507usb	10320usb	12335usb
			12579usb	13362usb	13855usb	
0000	0100		USA, KAJJ Dallas TX	13815va		
0000	0100		USA, KATN Salt Lake City UT	15590na		
0000	0100		USA, KWHR Naalehu HI	17510as		
0000	0100	twhfa	USA, Voice of America	5995am	6130am	7405am
			9455am 9775om	11695am	13790am	
0000	0100		USA, WBCQ Kennebunk ME	9330na	5105na	7415na
			9330na			
0000	0100		USA, WBOH Newport NC	5920am		
0000	0100		USA, WEWN Birmingham AL	5825va		
0000	0100		USA, WHRA Greenbush ME	7580va		
0000	0100		USA, WHRI Noblesville IN	5745va	7315am	
0000	0100		USA, WINB Red Lion PA	12160am		
0000	0100	sm	USA, WRMI Miami FL	9955am		
0000	0100	twhfa	USA, WRMI Miami FL	7385na		
0000	0100	mwf	USA, WSHB Cypress Creek SC	7535am		
0000	0100	mwf	USA, WSHB Cypress Creek SC	9430am		
0000	0100		USA, WTJC Newport NC	9370na		
0000	0100	sm	USA, WWBS Macan GA	11910na		
0000	0100		USA, WWCR Nashville TN	3210na	5070na	
			5935na 7465na			
0000	0100		USA, WWRB Manchester TN	5050na	5085na	
			6890na			
0000	0100		USA, WYFR Okeechobee FL	11720sa	6085na	9505na
			11720sa			
0000	0100	vl	Vanuatu, Radio	3945al	7260do	
0005	0015	sm	Austria, Radio Austria Intl	13730sa		
0015	0020		Austria, Radio Austria Intl	13730sa		
0020	0030	twhfa	Austria, Radio Austria Intl	13730sa		
0030	0100		Iran, Voice of the Islamic Rep	9590na	11920na	
0030	0100		Lithuania, Radio Vilnius	9855al	11690na	
0030	0100		Sri Lanka, SIBC	6005as	9770as	15745as
0030	0100		Thailand, Radio	13695na		
0030	0100		UAE, Bible Voice	7180as		
0035	0045	sm	Austria, Radio Austria Intl	13730sa		
0038	0050		Croatia, Voice of	7285sa		
0045	0050		Austria, Radio Austria Intl	13730sa		

0045	0100		Pakistan, Radio	11650as	15625as	
0050	0100	twhfa	Austria, Radio Austria Intl	13730sa	13730sa	
0055	0100		Italy, RAI Intl	9675na	11800na	

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

0100	0115		Italy, RAI Intl	9675na	11800na	
0100	0115		Pakistan, Radio	11650as	15625as	
0100	0120		Kyrgyz, Kyrgyz Radio		4010as	4795as
0100	0127		Czech Rep, Radio Prague Intl		6200na	7345na
0100	0127		Slavakia, Radio Slavakia Intl		5930na	7230ca
			9440sa			
0100	0127		Vietnam, Voice of	6175na		
0100	0130		Australia, Voice Intl	17775as		
0100	0130	s	Germany, Universal Life		9435as	
0100	0130	twhfa	USA, Voice of America	5995am	6130am	7405am
			9455am 9775am	13790am		
0100	0130		Uzbekistan, Radio Tashkent Intl		7190as	9715as
0100	0156		China, China Radio Intl		9580na	9790na
0100	0156		North Korea, Voice of	3560as	6195as	7140am
			11580am 13760am	11735am	15180am	
0100	0156		Romania, Radio Romania Intl		6040na	9510na
			9530na 11740na			
0100	0200		Anguilla, Caribbean Beacon		6090am	
0100	0200		Australia, ABC NT Katherine		5025do	
0100	0200		Australia, ABC NT Tennant Creek		4910do	
0100	0200		Australia, Radio	9660pa	12080va	15240pa
			15415as 17580pa	17750as	17775va	17795va
			21725as			
0100	0200	vl	Batswana, Radio	4820do	4830al	
0100	0200		Canada, CBC Northern Service	9625do		
0100	0200		Canada, CFRX Toronto ON	6070do		
0100	0200		Canada, CFPV Calgary AB	6030do		
0100	0200		Canada, CKZN St John's NF	6160do		
0100	0200		Canada, CKZU Vancouver BC	6160do		
0100	0200		Costa Rica, Radio for Peace Intl	7445am	15038va	
0100	0200		Costa Rica, University Network	5030am	6150am	
			7375am 9725a	11870am	13750na	
0100	0200		Cuba, Radio Havana	6000na	9820na	
0100	0200	1st a	Finland, Scandinavian Weekend Radio	11690eu	5990eu	
			11690eu			
0100	0200		Guyana, Voice of	3291do	5950do	
0100	0200		Iran, Voice of the Islamic Rep		9590na	11920na
0100	0200		Japan, Radio	11860as	11880va	15325as
			17560va 17685pa	17810as	17835as	17845as
0100	0200		Malaysia, Radio	7295do		
0100	0200		Namibia, Namibian BC Corp	6060af 6175al	3270of	3290af
			Netherlands, Radio	6165na		
0100	0200		New Zealand, Radio NZ Intl	17675pa		
0100	0200		Sierra Leone, Radio UNAMSIL	6139af		
0100	0200		Singapore, Mediacorp Radio	6150do		
0100	0200	vl	Solomon Islands, SIBC	5020do	9545do	
0100	0200		Sri Lanka, SIBC	6005as	9770as	15745as
0100	0200		Taiwan, Radio Taiwan Intl		15600eu	
0100	0200		UK, BBC World Service	5975va	6195as	
			9410as 9525am	9825sa	11955cs	15190sa
			15280as 15310as	15360as	17790as	
0100	0200		Ukraine, Radio Ukraine Intl		5905na	
0100	0200		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb 6350usb	7507usb	10320usb	12335usb
			12579usb	13362usb	13855usb	
0100	0200		USA, KAJJ Dallas TX	13815va		
0100	0200		USA, KJES Vado NM	7555na		
0100	0200		USA, KATN Salt Lake City UT		7505na	
0100	0200		USA, KWHR Naalehu HI		17510as	
0100	0200		USA, Voice of America	7200va	7255va	9850va
			11705va 11820va	15250va	15290va	17740va
			17820va			
0100	0200		USA, WBCQ Kennebunk ME	9330na	5105na	7415na
			9330na			
0100	0200		USA, WBOH Newport NC	5920am		
0100	0200		USA, WEWN Birmingham AL	5825va		
0100	0200		USA, WHRA Greenbush ME	7580va		
0100	0200		USA, WHRI Noblesville IN	5745va	7315om	
0100	0200		USA, WINB Red Lion PA	12160am		
0100	0200	sm	USA, WRMI Miami FL	9955am		
0100	0200	twhfa	USA, WRMI Miami FL	7385na		
0100	0200		USA, WSHB Cypress Creek SC	7535na		
0100	0200	m	USA, WSHB Cypress Creek SC	9430am		
0100	0200		USA, WTJC Newport NC	9370na		
0100	0200		USA, WWCR Nashville TN	3210na	5070na	
			5935na 7465na			
0100	0200		USA, WWRB Manchester TN	5050na	5085na	
			6890na			
0100	0200		USA, WYFR Okeechobee FL	15060as	6065na	9505na
			15060as			
0100	0200	vl	Vanuatu, Radio	3945al	7260do	
0105	0112		Croatia, Voice of	7285na		
0105	0115	sm	Austria, Radio Austria Intl		7325am	9870am
0115	0120		Austria, Radio Austria Intl		7325am	9870am

SELECTED PROGRAMMING BEGINS ON PAGE 55

Shortwave Guide



0120	0130	twfha	Austria, Radio Austria Intl	7325am	9870am
0130	0200		Australia, HCJB 15555pa		
0130	0200		Iraq, Radio Iraq Intl 6175irr	9687irr	11787irr
0130	0200		Sweden, Radio 9435va		
0130	0200		UK, RTE Radio 6155ca		
0130	0200	twfha	USA, Voice of America 5995am 13740am	6130am	9455va
0135	0145	sm	Austria, Radio Austria Intl	7325am	9870am
0140	0200		Vatican City, Vatican Radio	9650am	12055as
0145	0150		Austria, Radio Austria Intl	7325am	9870am
0145	0200	twfha	Albania, Radio Tirana Intl	6115na	7160eu

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

0200	0210		Bangladesh, Bangla Betar	4882as	
0200	0227		Czech Rep, Radio Prague Intl	6200na	7345na
0200	0227		Iran, Voice of the Islamic Rep	9590na	11920na
0200	0228		Hungary, Radio Budapest	9835na	
0200	0230	sm w fa	Belarus, Radio Belarus Intl	5970eu	7210eu
0200	0230		UAE, Bible Voice 9610as		
0200	0230	a	UK, Wales Radio Intl 9795na		
0200	0230		USA, KJES Vado NM 7555na		
0200	0256		North Korea, Voice of 4405as	11845as	15230as
0200	0256		South Korea, Radio Korea Intl 15575na	9560am	11810as
0200	0259		Canada, Radio Canada Intl 11725am 15150as 17860am	6040am	9755am
0200	0300		Anguilla, Caribbean Beacon	6090am	
0200	0300	twfha	Argentina, RAE 11710am		
0200	0300		Australia, ABC NT Alice Springs	2310irr	4835do
0200	0300		Australia, ABC NT Katherine	5025do	
0200	0300		Australia, ABC NT Tennant Creek	4910do	
0200	0300		Australia, HCJB 15555pa		
0200	0300		Australia, Radio 9660pa 15415as 15515va 17580pa	12080va	15240pa
0200	0300		Australia, Radio 9660pa 15415as 15515va 17580pa	17750as	21725as
0200	0300	vi	Austria, AWR Europe 7230as		
0200	0300		Botswana, Radio 4820do	4830al	
0200	0300		Canada, CBC Northern Service	9625do	
0200	0300		Canada, CFRX Toronto ON	6070do	
0200	0300		Canada, CFPV Calgary AB	6030do	
0200	0300		Canada, CKZN St John's NF	6160do	
0200	0300		Canada, CKZU Vancouver BC	6160do	
0200	0300		Costa Rica, Radio for Peace Intl	7445am	15038va
0200	0300		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am
0200	0300		Cuba, Radio Havana 6000na	13750na	
0200	0300	1st a	Egypt, Radio Cairo 11780na	9820na	
0200	0300		Finland, Scandinavian Weekend 11720eu	Radio	5980eu
0200	0300		Guyana, Voice of 3291do	5950do	
0200	0300		Indonesia, Voice of 9525as	11785as	
0200	0300		Malaysia, Radio 7295do		
0200	0300		Myanmar, Radio 7185do		
0200	0300		Namibia, Namibian BC Corp 6090af 6175al	3270af	3290af
0200	0300		New Zealand, Radio NZ Intl	17675pa	
0200	0300	os	Philippines, Radio Pilipinas 15270me	12015me	15120me
0200	0300		Russia, Voice of 5995me 9765na 15445na 15595na	6155na	7180na
0200	0300		Sierra Leone, Radio UNAMSIL	6139af	
0200	0300		Singapore, Mediacorp Radio	6150do	
0200	0300	vi	Solomon Islands, SIBC 5020do	9545do	
0200	0300		Sri Lanka, SIBC 6005as	9770as	15745as
0200	0300		Taiwan, Radio Taiwan Intl 11875as 15320as	5950na	9680na
0200	0300		UK, BBC World Service 9525am 9750af 9825sa 15190sa 15280as 15310as	5975va	9410as
0200	0300		USA, Armed Forces Radio 5765usb 6350usb 7507usb 12579usb 13362usb	4319usb	5446usb
0200	0300		USA, KAUJ Dallas TX 5755va	10320usb	12335usb
0200	0300		USA, KTBN Salt Lake City UT	7505na	
0200	0300		USA, KWHR Naalehu HI	17510as	
0200	0300		USA, Voice of America 7200va 11705va 11705va 11820va 17740va 17820va	7255va	9850va
0200	0300		USA, WBCQ Kennebunk ME 9330na	15250va	15290va
0200	0300		USA, WBOH Newport NC	5105na	7415na
0200	0300		USA, WEWN Birmingham AL	5920am	
0200	0300		USA, WHRA Greenbush ME	5825va	
0200	0300		USA, WHRI Noblesville IN	7580va	
0200	0300		USA, WINB Red Lion PA	5745va	7315am
0200	0300		USA, WRMI Miami FL 7385na	12160am	
0200	0300	sm	USA, WSHB Cypress Creek SC	7535na	
0200	0300	mh	USA, WSHB Cypress Creek SC	9430co	
0200	0300		USA, WTJC Newport NC	9370na	
0200	0300		USA, WWCR Nashville TN 5935na 7465na	3210na	5070na
0200	0300		USA, WWRB Manchester TN 6890na	5050na	5085na
0200	0300		USA, WYFR Okeechobee FL 9505na 9985sa 11855ca	5985na	6065na

0205	0220		Croatia, Voice of 7285na		
0215	0220		Nepal, Radio 3230as	5005as	
0230	0257		Vietnam, Voice of 6175na		
0230	0300	twfha	Albania, Radio Tirana Intl	6115na	7160eu
0230	0300		Sweden, Radio 9495na		
0250	0300		Vatican City, Vatican Radio	7305am	9605am
0250	0300		Zambia, Radio 4910do		

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

0300	0310		Vatican City, Vatican Radio 9660af	7305am	9605am
0300	0330		Australia, HCJB 15555pa		
0300	0330		Austria, AWR Europe 7230as		
0300	0330		Egypt, Radio Cairo 11780na		
0300	0330	stwhfc/vl	Mexico, Radio Mexico Intl	9705am	11770am
0300	0330	as	Philippines, Radio Pilipinas 15270me	12015me	15120me
0300	0330		South Africa, Chunnel Africa	6035af	
0300	0330		Thailand, Radio 15460na		
0300	0350		UAE, Radio Dubai 12025na 17890na	13675na	15400na
0300	0356		China, China Radio Intl	9690na	9790na
0300	0356		North Korea, Voice of 3560as 9345as	6195as	7140as
0300	0356		Romania, Radio Romania Intl	6040na	9515na
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 9660pa 15415as 15515va 17580pa	12080va	15240pa
0300	0400	vi	Botswana, Radio 4820do	4830al	7255do
0300	0400		Bulgaria, Radio 7400na	9400na	
0300	0400		Canada, CBC Northern Service	9625do	
0300	0400		Canada, CFRX Toronto ON	6070do	
0300	0400		Canada, CFPV Calgary AB	6030do	
0300	0400		Canada, CKZN St John's NF	6160do	
0300	0400		Canada, CKZU Vancouver BC	6160do	
0300	0400		Costa Rica, Radio for Peace Intl	7445am	15038va
0300	0400		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am
0300	0400		Cuba, Radio Havana 6000na	13750na	17645as
0300	0400	1st a	Finland, Scandinavian Weekend 11720eu	Radio	5980eu
0300	0400		Guyana, Voice of 3291do	5950do	
0300	0400		Japan, Radio 21610pa		
0300	0400		Malaysia, Radio 7295do		
0300	0400		Malaysia, Voice of 6175as 15295au	9665as	9750as
0300	0400		Namibia, Namibian BC Corp 6090af 6175ol	3270af	3290af
0300	0400		Oman, Radio 15355af		
0300	0400		Russia, Voice of 6155na 15445na 15595na	7180na	7350na
0300	0400		Sierra Leone, Radio UNAMSIL	6139af	
0300	0400		Singapore, Mediacorp Radio	6150do	
0300	0400	vi	Solomon Islands, SIBC 5020do	9545do	
0300	0400		Sri Lanka, SIBC 6005as	9770as	15745as
0300	0400		Taiwan, Radio Taiwan Intl 15215sa 15320as	5950na	9680na
0300	0400		Uganda, Radio 4976do	5026do	7196do
0300	0400	DRM	UK, BBC World Service	11955na	
0300	0400		UK, BBC World Service 6005af 6190af 6195eu 9525am 9750af 11760va 15310as 15360as 15575as 17790as 21660as	3255af	5975va
0300	0400		USA, Armed Forces Radio 5765usb 6350usb 7507usb 12579usb 13362usb	7160af	9410va
0300	0400		USA, KAUJ Dallas TX 5755va	11765af	15280af
0300	0400		USA, KTBN Salt Lake City UT	17760as	12035af
0300	0400		USA, KWHR Naalehu HI	1760af	9410va
0300	0400		USA, Voice of America 4960af 7265af 7290af 7340af 9885af	7160af	9410va
0300	0400		USA, WBCQ Kennebunk ME 9330na	7415af	9575af
0300	0400		USA, WBOH Newport NC	5105na	7415na
0300	0400		USA, WEWN Birmingham AL	5920am	
0300	0400		USA, WHRA Greenbush ME	5825va	
0300	0400		USA, WHRI Noblesville IN	7580va	
0300	0400		USA, WINB Red Lion PA	5745va	7315am
0300	0400		USA, WRMI Bethel PA 9465eu	12160am	
0300	0400	smtwht	USA, WRMI Miami FL 7385na		
0300	0400	m	USA, WSHB Cypress Creek SC	5850eu	7535eu
0300	0400		USA, WTJC Newport NC	9370na	
0300	0400		USA, WWCR Nashville TN 5935na 7465na	3210na	5070na
0300	0400		USA, WWRB Manchester TN 6890na	5050na	5085na
0300	0400		USA, WYFR Okeechobee FL 11740sa	6065na	9505na

Shortwave Guide

0300	0400	Zambia, Radio	4910do		
0300	0400	Zambia, Radio Christian Voice	6065do		
0300	0400	vi Zimbabwe, ZBC Corp	5975do		
0305	0312	Croatia, Voice of	7285na		
0310	0330	Vatican City, Vatican Radio	9660af		
0330	0357	Vietnam, Voice of	6175na		
0330	0358	Hungary, Radio Budapest	9835na		
0330	0400	Malaysia, Radio Malaysia Kota Kinabalu	5979do		
0330	0400	Sweden, Radio	9495na		
0330	0400	UK, BBC World Service	15420af		
0345	0400	Tajikistan, Tajik Radio	7245as		

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

0400	0427	Czech Rep, Radio Prague Intl	6200na	7345na	
0400	0430	France, Radio France Intl	9550af	11700af	
		11910af			
0400	0430	stwhfa/vl Mexico, Radio Mexico Intl	9705am	11770am	
0400	0430	South Africa, Channel Africa	5955af		
0400	0430	Sri Lanka, SLBC	6005as	9770as	15745as
0400	0445	USA, WYFR Okeechobee FL	6065na		9505na
0400	0450	Turkey, Voice of	6020va	7240eu	
0400	0456	China, China Radio Intl	9560na		9755na
0400	0500	Anguilla, Caribbean Beacon	6090am		
0400	0500	Australia, ABC NT Alice Springs	2310irr		4835do
0400	0500	Australia, ABC NT Katherine	5025do		
0400	0500	Australia, ABC NT Tennant Creek	4910do		
0400	0500	Australia, Radio	9660pa	12080va	15240pa
		15415as 15515va 17580pa	12080va	17750as	21725as
			15415as	17580pa	21725as
0400	0500	vi Botswana, Radio	4820do	4830af	7255ao
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, Radio for Peace Intl	7445am		15038va
0400	0500	Costa Rica, University Network	5030am		6150am
		7375am 9725sa 11870am	13750na		17645as
0400	0500	Cuba, Radio Havana	6000na	9820na	
0400	0500	1st a Finland, Scandinavian Weekend Radio	11720eu		5980eu
		11720eu			
0400	0500	Germany, Deutsche Welle	6180af		9545af
		9710af			
0400	0500	Germany, Overcomer Ministries	9770au		
0400	0500	Guyana, Voice of	3291do	5950do	
0400	0500	Malaysia, Radio	7295do		
0400	0500	Malaysia, Radio Malaysia Kota Kinabalu	9665as	5979do	9750as
0400	0500	Malaysia, Voice of	6175as		
		15295as			
0400	0500	Namibia, Namibian BC Corp	3270af		3290cf
		6090af 6175af			
0400	0500	Netherlands, Radio	6165na	9590na	
0400	0500	New Zealand, Radio NZ Intl	15340pa		
0400	0500	Russia, Voice of	7125na		7240na
		7350na 12010na 15445na	15595na		
0400	0500	Sierra Leone, Radio UNAMSIL	6139af		
0400	0500	Singapore, Mediacorp Radio	6150do		
0400	0500	vi Solomon Islands, SIBC	5020do	9545do	
0400	0500	Uganda, Radio	4976do		7196do
0400	0500	UK, BBC World Service	3255af	5975va	
		6005af 6135am 6190af	6195va	7160af	
		9410va 11760va 11765af	12035af	15280as	
		15310as 15360as 15420af	15575as	17790as	
		21660as			
0400	0500	Ukraine, Radio Ukraine Intl	5905na		
0400	0500	USA, Armed Forces Radio	4319usb		5446usb
		5765usb 6350usb 7507usb	10320usb		12335usb
		12579usb 13362usb	13855usb		
0400	0500	USA, KAIJ Dallas TX	5755va		
0400	0500	USA, KTBN Salt Lake City UT	7505na		
0400	0500	USA, KWHR Naalehu HI	17780as		
0400	0500	USA, Voice of America	4960af	6080af	7170va
		7290af 7415af 9475af	9575af		9885af
		15205va			
0400	0500	m USA, WBCQ Kennebunk ME	5105na		
0400	0500	iwthfa USA, WBCQ Kennebunk ME	9330na		
0400	0500	USA, WBOH Newport NC	5920am		
0400	0500	USA, WEWN Birmingham AL	5825na		
0400	0500	USA, WHRA Greenbush ME	7580va		
0400	0500	USA, WHRI Noblesville IN	5745va		7315am
0400	0500	USA, WINB Red Lion PA	12160am		
0400	0500	smtwhf USA, WMLK Bethel PA	9465eu		
0400	0500	USA, WRMI Miami FL	7385na		
0400	0500	m'ha USA, WSHB Cypress Creek SC	12020va		
0400	0500	USA, WTJC Newport NC	9370na		
0400	0500	USA, WWCR Nashville TN	3210na		5070na
		5935na 7465na			
0400	0500	USA, WWRB Manchester TN	5050na		5085na
		6890na			
0400	0500	USA, WYFR Okeechobee FL	7355eu		
0400	0500	Zambia, Radio	4910do		
0400	0500	Zambia, Radio Christian Voice	6065do		
0400	0500	vi Zimbabwe, ZBC Corp	5975do		
0405	0500	USA, WYFR Okeechobee FL	9715ca		
0427	0500	sm: a Madagascar, AWR	12060af		
0430	0457	Czech Rep, Radio Prague Intl	9865va		11600va

0430	0458	Serbia & Montenegro, RSCG	9580na		
0430	0500	DRM/ as Netherlands, Radio	15400pa		
0430	0500	Nigeria, Radio/Enugu	6025do		
0430	0500	Nigeria, Radio/Ibadan	6050do		6090do
0430	0500	Nigeria, Radio/Kaduna	4770do		
0430	0500	Nigeria, Radio/Lagos	3326do		4990do
0430	0500	mtwhf Swaziland, TWR	4775af		6120af
0438	0450	Croatia, Voice of	7285na		
0445	0500	Italy, RAI Intl	5965af		6100af 7230af

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

0500	0515	Israel, Kol Isroel	9435va	11605va	17600va
0500	0520	Vatican City, Vatican Radio	7250eu 9660af	4005eu	5890eu
			11625af	15570af	
0500	0525	Belgium, Radio Vlaanderen Intl		9590na	
0500	0530	France, Radio France Intl		15155af	17800af
0500	0530	DRM/ as Netherlands, Radio	15400pa		
0500	0530	South Africa, AWR Africa		5960af	6115af
0500	0530	South Africa, Channel Africa		11710af	
0500	0530	UK, BBC World Service		15280as	
0500	0556	China, China Radio Intl		9560na	
0500	0600	Anguilla, Caribbean Beacon		6090am	
0500	0600	Australia, ABC NT Alice Springs		2310irr	4835do
0500	0600	Australia, ABC NT Katherine		5025do	
0500	0600	Australia, ABC NT Tennant Creek		4910do	
0500	0600	Australia, Radio	9660pa	12080va	15240pa
		15415as 15515va 17580pa	12080va	17750as	21725as
0500	0600	mtwhf Bhutan, Bhutan BC Service	5030af		6035do
0500	0600	vi Botswana, Radio	4820do	4830af	7255do
0500	0600	Canada, CFRX Toronto ON	6070do		
0500	0600	Canada, CKZN St John's NF	6160do		
0500	0600	Canada, CKZU Vancouver BC	6160do		
0500	0600	Costa Rica, Radio for Peace Intl	7445am		15038va
0500	0600	Costa Rica, University Network	5030am		6150am
		7375am 9725sa 11870am	13750na		17645as
0500	0600	Cuba, Radio Havana	9550am	9820na	
0500	0600	1st a Finland, Scandinavian Weekend Radio	11720eu		6170eu
		11720eu			
0500	0600	1st a Finland, Scandinavian Weekend Radio	11720eu		6170va
		11720eu			
0500	0600	Germany, Deutsche Welle	9565af		11805af
		12045af 5410af			
0500	0600	Germany, Overcomer Ministries	9770au		
0500	0600	Guyana, Voice of	3291do	5950do	
0500	0600	Japan, Radio	5975eu	6110na	7230eu
		11715eu 1760as 15195as	17810as		21755pa
0500	0600	Kuwait, Radio	15110as		
0500	0600	Malaysia, Radio	7295do		
0500	0600	Malaysia, Radio Malaysia Kota Kinabalu	9665as	5979do	9750as
0500	0600	Malaysia, Voice of	6175as		
		15295as			
0500	0600	Namibia, Namibian BC Corp	6060af		6175af 6175af
0500	0600	New Zealand, Radio NZ Intl	15340pa		
0500	0600	Nigeria, Radio/Enugu	6025do		
0500	0600	Nigeria, Radio/Ibadan	6050do		6090do
0500	0600	Nigeria, Radio/Kaduna	4770do		
0500	0600	Nigeria, Radio/Lagos	3326do		4990do
0500	0600	Nigeria, Voice of	17800af		
0500	0600	Russia, Voice of	7125na		7180na 7240na
		12010na 5445na			
0500	0600	Sierra Leone, Radio UNAMSIL	6139af		
0500	0600	Singapore, Mediacorp Radio	6150do		
0500	0600	vi Solomon Islands, SIBC	5020do	9545do	
0500	0600	mtwhf Swaziland, TWR	6120af		
0500	0600	Swaziland, TWR	7205af		9500af
0500	0600	Uganda, Radio	4976do		5026do 7196do
0500	0600	UK, BBC World Service	6005af		6135am
		6190af 6195va 7160af	9410va		11760va
		11765af 11940af 11955as	15420af		15565va
		15575va 17640af 17885af			
0500	0600	USA, Armed Forces Radio	4319usb		5446usb
		5765usb 6350usb 7507usb	10320usb		12335usb
		12579usb 13362usb	13855usb		
0500	0600	USA, KAIJ Dallas TX	5755va		
0500	0600	USA, KTBN Salt Lake City UT	7505na		
0500	0600	USA, KWHR Naalehu HI	17780as		
0500	0600	USA, Voice of America	6035af	6080af	6105af
		7170va 7295af 9700va	11825va		11835af
		13710af 15205va			
0500	0600	USA, WBCQ Kennebunk ME	5105na		7415na
0500	0600	USA, WBOH Newport NC	5920am		
0500	0600	USA, WEWN Birmingham AL	5825na		7570va
0500	0600	USA, WHRA Greenbush ME	11730af		
0500	0600	USA, WHRI Noblesville IN	5745va		7315am
0500	0600	USA, WINB Red Lion PA	12160am		
0500	0600	smtwhf USA, WMLK Bethel PA	9465eu		
0500	0600	USA, WRMI Miami FL	7385na		
0500	0600	m USA, WSHB Cypress Creek SC	7535eu		
0500	0600	USA, WSHB Cypress Creek SC	12020af		
0500	0600	USA, WTJC Newport NC	9370na		
0500	0600	USA, WWCR Nashville TN	3210na		5070na
		5935na 7560na			
0500	0600	USA, WWRB Manchester TN	5050na		5085na
		6890na			

Shortwave Guide



0500	0600	USA, WYFR Okeechobee FL	6855eu	7520eu
0500	0600	Zambia, Radio Christian Voice	6065do	
0500	0600	vi Zimbabwe, ZBC Corp 5975do		
0505	0512	Croatia, Voice of 9470pa		
0515	0525	Rwanda, Radio 6005do		
0520	0530	Vatican City, Vatican Radio 15570af	9660af	11625af
0525	0600	vi Ghana, Ghana BC Corp	4915do	
0530	0550	UAE, Radio Dubai 13675au	15435su	17830au
		21700au		
0530	0600	Georgia, Radio Georgia	11805eu	
0530	0600	South Africa, AWR Africa	15345af	
0530	0600	Thailand, Radio 13780eu		

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

0600	0615	South Africa, TWR 11640of		
0600	0630	France, Radio France Intl 21620af	11665of	17800af
0600	0630	South Africa, AWR Africa	15345af	
0600	0630	mtwhf South Africa, Channel Africa	15215af	
0600	0630	Swaziland, TWR 6120af		
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 9660pa	12080vo	15240pa
		15415as 15515vo 17580pa	17750as	21725as
0600	0700	vi Botswana, Radio 4820do	4830al	7255do
0600	0700	Canada, CFRX Toronto ON	6070do	
0600	0700	Canada, CFVP Calgary AB	6030do	
0600	0700	Canada, CKZN St John's NF	6160do	
0600	0700	Canada, CKZU Vancouver BC	6160do	
0600	0700	Costa Rica, Radio for Peace Intl	7445am	15038va
0600	0700	Costa Rica, University Network	5030am	6150am
		7375am 9725sa 11870am	13750na	17645as
0600	0700	Cuba, Radio Havana 9550am	9820na	
0600	0700	1st a Finland, Scandinavian Weekend Radio 11720eu		6170eu
0600	0700	Germany, Deutsche Welle 11785af 15410af 21675af	6140eu	7225af
0600	0700	vi Ghana, Ghana BC Corp	4915do	
0600	0700	Guyana, Voice of 3291do	5950do	
0600	0700	Japan, Radio 11690na	11740as	17870as
0600	0700	DRM Kuwait, Radio 15110as		
0600	0700	Kuwait, Radio 15110as		
0600	0700	Liberia, ELWA 4760do		
0600	0700	Malaysia, Radio 7295do		
0600	0700	Malaysia, Voice of 6175as	9665as	9750as
		15295au		
0600	0700	Namibia, Namibian BC Corp	6060af	6175al
0600	0700	New Zealand, Radio NZ Intl	15340pa	
0600	0700	Nigeria, Radio/Abuja 7275do		
0600	0700	Nigeria, Radio/Enugu 6025do		
0600	0700	Nigeria, Radio/Ibadan	6050do	
0600	0700	Nigeria, Radio/Kaduna	4770do	6090do
0600	0700	Nigeria, Radio/Lagos 3326do	4990do	
0600	0700	Nigeria, Voice of 17800af		
0600	0700	Russia, Voice of 21790pa		
0600	0700	Sierra Leone, Radio UNAMSIL	6139af	
0600	0700	Singapore, MediCorp Radio	6150do	
0600	0700	vi Solomon Islands, SIBC 5020do	9545do	
0600	0700	Swaziland, TWR 7205af	9500af	
0600	0700as	UK, BBC World Service	17885af	
0600	0700	UK, BBC World Service	6055af	6190af
		6195eu 7160af 9410va	11765af	11940af
		11955as 12095va 15310as	15360as	15400af
		15565va 15575va 17790as	17640af	21660as
0600	0700	USA, Armed Forces Radio	4319usb	5446usb
		5765usb 6350usb 7507usb	10320usb	12335usb
		12579usb 13362usb	13855usb	
0600	0700	USA, KAIJ Dallas TX 5755vo		
0600	0700	USA, KTNB Salt Lake City UT	7505na	
0600	0700	USA, KWHR Naalehu HI	17780as	
0600	0700	USA, Voice of America 5995va	6035af	6080af
		6105af 7170va 7295af	11825va	11835af
		11930va 11995af 15205va		
0600	0700	mtwhf USA, WBCQ Kennebunk ME	5105na	
0600	0700	USA, WBOH Newport NC	5920am	
0600	0700	USA, WEWN Birmingham AL	5825na	7570va
0600	0700	USA, WHRA Greenbush ME	11730af	
0600	0700	USA, WHRI Noblesville IN	5745va	7315am
0600	0700	USA, WINB Red Lion PA	12160am	
0600	0700	USA, WRMI Miami FL 7385na		
0600	0700	mwfo USA, WSHB Cypress Creek SC	7535af	
0600	0700	USA, WTJC Newport NC	9370na	
0600	0700	USA, WWCR Nashville TN	3210na	5070na
		5935na 7560na		
0600	0700	USA, WYFR Okeechobee FL 11580eu	7355eu	11530eu
0600	0700	vi Vanuatu, Radio 3945al	4960do	
0600	0700	Yemen, Rep of Yemen Radio	9780me	
0600	0700	Zambia, Radio Christian Voice	9865do	
0600	0700	vi Zimbabwe, ZBC Corp 5975do		
0605	0620	s Austria, Radio Austria Intl	17870me	

0630	0645	mtwhf	Vatican City, Vatican Radio	4005eu	5890eu
			6185eu 7250eu 9645eu	11740eu	15595eu
0630	0700	as	Vatican City, Vatican Radio	11625af	15570af
0630	2000	mtwha	Germany, AWR Europe	9840eu	
0635	0650	s	Austria, Radio Austria Intl	17870me	
0638	0650		Croatia, Voice of 9470pa		
0645	0700	as	Germany, TWR 6045eu		
0655	0700	mtwhf	Germany, TWR 6045eu		

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

0700	0705		New Zealand, Radio NZ Intl	15340pa	
0700	0726		Romania, Radio Romania Intl	11775na	15105na
0700	0727		Slovakia, Radio Slovakia Intl 17550au	13715au	15460au
0700	0730	a	Tibet, Xizong PBS 9490as	9580as	
0700	0745		USA, WYFR Okeechobee FL	7355eu	
0700	0750		Germany, TWR 6045eu		
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, Radio 9660pa	12080vo	15240va
			15415as 17580pa 17750as	21725as	
0700	0800	vi	Botswana, Radio 4820do	4830al	7255do
0700	0800		Canada, CFRX Toronto ON	6070do	
0700	0800		Canada, CFVP Calgary AB	6030do	
0700	0800		Canada, CKZN St John's NF	6160do	
0700	0800		Canada, CKZU Vancouver BC	6160do	
0700	0800		Costa Rica, Radio for Peace Intl	7445am	15038va
0700	0800		Costa Rica, University Network	5030am	6150am
			7375am 9725sa 11870am	13750na	17645as
0700	0800		Eat Guinea, Radio Africa	15184af	
0700	0800	1st a	Finland, Scandinavian Weekend Radio 11720eu		6170eu
0700	0800		France, Radio France Intl	15605af	
0700	0800		Germany, Deutsche Welle	6140eu	21675af
0700	0800	vi	Ghana, Ghana BC Corp	4915do	
0700	0800		Guyana, Voice of 3291do	5950do	
0700	0800	DRM	Kuwait, Radio 15110as		
0700	0800		Kuwait, Radio 15110as		
0700	0800		Liberia, ELWA 4760do		
0700	0800		Malaysia, Radio 7295do		
0700	0800		Malaysia, Radio Malaysia Kota Kinabalu	5979do	
0700	0800		Malaysia, Voice of 6175as	9665as	9750as
			15295au		
0700	0800		Myanmar, Radio 9730do		
0700	0800		Nigeria, Voice of 17800af		
0700	0800		Papua New Guinea, NBC	4890do	9675irr
0700	0800		Russia, Voice of 21790pa		
0700	0800		Sierra Leone, Radio UNAMSIL	6139af	
0700	0800		Singapore, MediCorp Radio	6150do	
0700	0800	vi	Solomon Islands, SIBC 5020do	9545do	
0700	0800		Swaziland, TWR 7205af	9500af	
0700	0800		Taiwan, Radio Taiwan Intl	5950na	
0700	0800as		UK, BBC World Service	6005af	
0700	0800		UK, BBC World Service	6190af	9410eu
			11760va 11765af 11955as	12095va	15310as
			15360as 15400af 15485va	15565va	17640me
			17790as 21660as		
0700	0800		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb 7507usb	10320usb	12335usb
			12579usb 13362usb	13855usb	
0700	0800		USA, KAIJ Dallas TX 5755vo		
0700	0800		USA, KTNB Salt Lake City UT	7505na	
0700	0800		USA, KWHR Naalehu HI	11565pa	17780as
0700	0800		USA, WBCQ Kennebunk ME	7415na	
0700	0800		USA, WBOH Newport NC	5920am	
0700	0800		USA, WEWN Birmingham AL	5825na	7570va
0700	0800		USA, WHRA Greenbush ME	11730af	
0700	0800		USA, WHRI Noblesville IN	5745va	7315am
0700	0800		USA, WINB Red Lion PA	12160am	
0700	0800	smtwhf	USA, WRMI Miami FL 7385na		
0700	0800		USA, WMLK Bethel PA 9465eu		
0700	0800		USA, WRMI Miami FL 7385na		
0700	0800	th	USA, WSHB Cypress Creek SC	7535af	
0700	0800	mtwhas	USA, WSHB Cypress Creek SC	9845pa	
0700	0800		USA, WTJC Newport NC	9370na	
0700	0800		USA, WWCR Nashville TN	3210na	5070na
			5935na 7560na		
0700	0800		USA, WYFR Okeechobee FL	9985eu	
0700	0800	vi	Vanuatu, Radio 3945al	4960do	
0700	0800		Zambia, Radio Christian Voice	9865do	
0705	0712		Croatia, Voice of 9470au		
0706	0800		New Zealand, Radio NZ Intl	11675pa	
0730	0800		Australia, HCJB 11750pa		
0730	0800		Bulgaria, Radio 11600eu	13600eu	
0730	0800		Georgia, Radio Georgia	11910eu	
0730	0800	as	Guam, TWR/KTWR 15205as		
0730	0800		Switzerland, Swiss Radio Intl 17665va	9885va	13790va
0730	0800	as	UK, BBC World Service	15575va	
0740	0800	mtwhf	Guam, TWR/KTWR 15205as		
0745	0800	as	Albania, TWR 12070eu		
0745	0800		Guam, TWR/KTWR 15330as		
0745	0800	as	Manaco, TWR 9870eu		

Shortwave Guide



0750 0800 smtwhf Germany, TWR 6045eu
 0755 0800 mtwhf Albania, TWR 12070eu
 0755 0800 mtwhf Monaco, TWR 9870eu

0830 0900 Switzerland, Swiss Radio Intl 21770va
 0838 0850 Croatia, Voice of 9470ou
 0840 0850 Turkmenistan, Turkmen Radio 4930as

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

0800 0804 Pakistan, Radio 17825eu 21465eu
 0800 0820 smtwhf Germany, TWR 6045eu
 0800 0825 Belgium, Radio Vlaanderen Intl 5985eu
 0800 0825 Malaysia, Voice of 9665as 9750as
 15295au
 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 Malaysia, Radio Malaysia Kota Kinabalu 5979do
 0800 0830 Myanmar, Radio 9730do
 0800 0830 mtwhfa Tajikistan, Tajik Radio 7245as
 0800 0850 a Albania, TWR 12070eu
 0800 0850 a Monaco, TWR 9870eu
 0800 0900 mtwhfs Albania, TWR 12070eu
 0800 0900 Anguilla, Caribbean Beacon 6090am
 0800 0900 Australia, ABC NT Alice Springs 2310irr 4835do
 0800 0900 Australia, HCJB 11750pa
 0800 0900as Australia, Radio 17750as
 0800 0900 Australia, Radio 5995pa 9580va 9710pa
 11880as 12080va 15240va 15415as 15240va
 15415as 17750as 21725as
 0800 0900 mtwhf Bhutan, Bhutan BC Service 5030al 6035do
 0800 0900 vl Botswana, Radio 4820do 4830al 7255do
 0800 0900 Canada, CFRX Toronto ON 6070do
 0800 0900 Canada, CFVP Calgary AB 6030do
 0800 0900 Canada, CKZN St John's NF 6160do
 0800 0900 Canada, CKZU Vancouver BC 6160do
 0800 0900 Costa Rica, Radio for Peace Intl 7445am 15038va
 0800 0900 Costa Rica, University Network 5030am 6150am
 7375am 9725sa 11870am 13750na 17645as
 0800 0900 Eqt Guinea, Radio Africa 15184af
 0800 0900 1st a Finland, Scandinavian Weekend Radio 6170eu
 11690eu
 0800 0900 Germany, Deutsche Welle 6140eu 15440eu
 21675af
 0800 0900 vl Ghana Ghana BC Corp 4915do
 0800 0900 as Guam, TWR/KTWR 15205as
 0800 0900 Guam, TWR/KTWR 15330as
 0800 0900 mtwhf Guam, TWR/KTWR 15205as
 0800 0900 Guyana, Voice of 3291do 5950do
 0800 0900 Indonesia, Voice of 9525pa
 0800 0900 Liberia, ELWA 4760do
 0800 0900 m-f/ DRM Luxembourg, RTL Radio Lutzeburg 6095eu
 0800 0900 Malaysia, Radio 7295do
 0800 0900 mtwhfs Monaco, TWR 9870eu
 0800 0900 New Zealand, Radio NZ Intl 11675pa
 0800 0900 Nigeria, Voice of 17800af
 0800 0900 Papua New Guinea, NBC 4890do 9675irr
 0800 0900 Russia, Voice of 17495pa 17525pa 17665pa
 21790pa
 0800 0900 Sierra Leone, Radio UNAMSIL 6139af
 0800 0900 Singapore, Mediacorp Radio 6150do
 0800 0900 vl Solomon Islands, SIBC 5020do 9545do
 0800 0900 a South Africa, Radio League 9750af 21560af
 0800 0900 South Korea, Radio Korea Intl 9570am 13670eu
 0800 0900 Swaziland, TWR 7205af 9500af
 0800 0900 as UK, BBC World Service 15575va
 0800 0900 UK, BBC World Service 6190af 940eu
 11760va 11955as 12095eu 15310as 15360as
 15400af 15485va 15565va 17640va 17790as
 17830af 17885af 21470af 21660as
 0800 0900 USA, Armed Forces Radio 4319usb 5446usb
 5765usb 6350usb 7507usb 10320usb 12335usb
 12579usb 13362usb 13855usb
 0800 0900 USA, KAIJ Dallas TX 5755va
 0800 0900 USA, KNLS Anchor Point AK 9690as
 0800 0900 USA, KTNB Salt Lake City UT 7505na
 0800 0900 USA, KWHR Naalehu HI 11565pa 17780as
 0800 0900 USA, WBCQ Kennebunk ME 7415na
 0800 0900 USA, WBOH Newport NC 5920am
 0800 0900 USA, WEWN Birmingham AL 5825na
 0800 0900 USA, WHRI Noblesville IN 5745va 7315am
 0800 0900 USA, WINB Red Lion PA 12160am
 0800 0900 smtwhf USA, WMLK Bethel PA 9465eu
 0800 0900 as USA, WRMI Miami FL 7385na
 0800 0900 USA, WSHB Cypress Creek SC 7535eu 9845pa
 0800 0900 USA, WTJC Newport NC 9370na
 0800 0900 USA, WWCR Nashville TN 3210na 5070na
 5935na 7560na
 0800 0900 USA, WYFR Okeechobee FL 9985eu
 0800 0900 vl Vanuatu, Radio 3945al 4960do
 0800 0900 Zambia, Radio Christian Voice 6065do
 0810 0830 s Armenia, Voice of 4810eu 15270as
 0815 0900 as Guam, TWR/KTWR 15330as
 0830 0900 Australia, ABC NT Katherine 2485do
 0830 0900 Australia, ABC NT Tennant Creek 2325do
 0830 0900 Austria, AWR Europe 9660af 17670af
 0830 0900 Georgia, Radio Georgia 11910me
 0830 0900 Lithuania, Radio Vilnius 9710eu

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

0900 0915 as Guam, TWR/KTWR 15330as
 0900 0920 mtwhfs Albania, TWR 12070eu
 0900 0920 s Monaco, TWR 9870eu
 0900 0930 as Australia, Radio 17750as
 0900 0930 Austria, AWR Europe 17670af
 0900 0930 mtwhf Guam, TWR/KTWR 15330as
 0900 0930 as/vl Italy, IRRS 13840va
 0900 0956 China, China Radio Intl 17690pa 15210pa
 0900 1000 Anguilla, Caribbean Beacon 6090am
 0900 1000 Australia, ABC NT Alice Springs 2310do 4835irr
 0900 1000 Australia, ABC NT Katherine 2485do
 0900 1000 Australia, ABC NT Tennant Creek 2325do
 0900 1000 Australia, HCJB 11750pa
 0900 1000 Australia, Radio 9580va 11880as 15240as
 17750as 21820as
 0900 1000 Australia, Voice Intl 11955as
 0900 1000 vl Botswana, Radio 4820do 4830al 7255do
 0900 1000 Canada, CFRX Toronto ON 6070do
 0900 1000 Canada, CFVP Calgary AB 6030do
 0900 1000 Canada, CKZN St John's NF 6160do
 0900 1000 Canada, CKZU Vancouver BC 6160do
 0900 1000 Costa Rica, Radio for Peace Intl 7445am 15038va
 0900 1000 Costa Rica, University Network 5030am 6150am
 7375am 9725sa 11870am 13750na 17645as
 0900 1000 Eqt Guinea, Radio Africa 15184af
 0900 1000 1st a Finland, Scandinavian Weekend Radio 6170eu
 11690eu
 0900 1000 DRM Germany, Deutsche Welle 15440eu
 0900 1000 Germany, Deutsche Welle 6140eu 15440eu
 21675af
 0900 1000 Guyana, Voice of 3291do 5950do
 0900 1000 m-f/ DRM Luxembourg, RTL Radio Lutzeburg 6095eu
 0900 1000 Malaysia, Radio 7295do
 0900 1000 mtwhfa Malta, Voice of the Mediterranean 9630as
 0900 1000 New Zealand, Radio NZ Intl 11675pa
 0900 1000 Nigeria, Voice of 17800af
 0900 1000 Palau, Voice of Hope 15725as
 0900 1000 Papua New Guinea, NBC 4890do 9675irr
 0900 1000 Russia, Voice of 17495pa 17525pa 17665pa
 0900 1000 Singapore, Mediacorp Radio 6150do
 0900 1000 vl Solomon Islands, SIBC 5020do 9545do
 0900 1000 s UAE, Radio UNMEE 21790af
 0900 1000 DRM UK, BBC World Service 7370eu
 0900 1000 UK, BBC World Service 6190af 940eu
 9605as 9740as 11760va 12095eu 15190as
 15310as 5360as 15400af 15485va 15565va
 15575va 7640va 17760as 17790as 17830af
 17885af 21470af 21660as
 0900 1000 USA, Armed Forces Radio 4319usb 5446usb
 5765usb 6350usb 7507usb 10320usb 12335usb
 12579usb 13362usb 13855usb
 0900 1000 USA, KAIJ Dallas TX 5755va
 0900 1000 USA, KTNB Salt Lake City UT 7505nc
 0900 1000 USA, KWHR Naalehu HI 11565pa 17780as
 0900 1000 USA, WBCQ Kennebunk ME 7415na
 0900 1000 USA, WBOH Newport NC 5920am
 0900 1000 USA, WEWN Birmingham AL 5825na
 0900 1000 USA, WHRA Greenbush ME 11730af
 0900 1000 USA, WRMI Miami FL 9955am
 0900 1000 USA, WTJC Newport NC 9370na
 0900 1000 USA, WWCR Nashville TN 3210na 5070na
 5935na 7560na
 0900 1000 vl Vanuatu, Radio 3945al 4960do
 0900 1000 mt hfa Vatican City, Vatican Radio 5890eu
 0900 1000 Zambia, Radio Christian Voice 6065do
 0930 1000 asmwhf Greece, Voice of 12105eu 15630eu
 0930 1000 DRM Netherlands, Radio 9590eu

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

1000 1027 Vietnam, Voice of 9840as 12020as
 1000 1029 Czech Rep, Radio Prague Intl 21745va
 1000 1030 Germany, Deutsche Welle 6140eu 6205as
 15190as 15440eu 17820as
 1000 1030 Guam, AWR 11705as
 1000 1030 Mongolia, Voice of 12085as
 1000 1030 UK, BBC World Service 9605as 15360as
 1000 1030 UK, RTE Radio 15280au
 1000 1045 USA, KWHR Naalehu HI 9930as 11565pa
 1000 1056 China, China Radio Intl 17690pa 15210pa
 1000 1056 North Korea, Voice of 3560as 9335am 11710am
 11735as 13650as
 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 11750pa

Shortwave Guide



1000	1100		Australia, Radio 17750as 21820as	9580va	11880as	15240as
1000	1100		Australia, Voice Intl	11955as	13685as	
1000	1100	as	Bhutan, Bhutan BC Service	5030af	6035do	
1000	1100		Canada, CFRX Toronto ON	6070do		
1000	1100		Canada, CFVP Calgary AB	6030do		
1000	1100		Canada, CKZN St John's NF	6160da		
1000	1100		Canada, CKZU Vancouver BC	6160do		
1000	1100		Costa Rica, Radio for Peace Intl	7445am	15038va	
1000	1100		Costa Rica, University Network	5030am	6150am	
1000	1100		7375am 9725sa 11870am	13750na	17645as	
1000	1100		Eat Guinea, Radio Africa	15184af		
1000	1100	1st a	Finland, Scandinavian Weekend Radio		6170eu	
1000	1100	DRM	Germany, Deutsche Welle		6140eu	15440eu
1000	1100		Guam, AWR	11900as		
1000	1100		Guyana, Voice of	3291do	5949do	
1000	1100		India, All India Radio	13695as	15020as	15260as
1000	1100		15410as 17510au 17800as	17895au		
1000	1100		Japan, Radio	6120na	9695as	11730as
1000	1100		17585eu 21755pa			
1000	1100	m-/f/ DRM	Luxembourg, RTL Radio Lutzebuerg	6095eu		
1000	1100		Malaysia, Radio	7295da		
1000	1100		Netherlands, Radio	7260va	9785va	12065va
1000	1100	DRM	Netherlands, Radio	9590eu		
1000	1100		New Zealand, Radio NZ Intl		11675pa	
1000	1100		Palau, Voice of Hope	15725as		
1000	1100		Papua New Guinea, NBC		4890do	9675irr
1000	1100		Singapore, MediCorp Radio	6150do		
1000	1100	vi	Solomon Islands, SIBC 5020do	9545do		
1000	1100		South Africa, Radio Veritas	7240af		
1000	1100	as	UK, BBC World Service	15190sa	15400af	
1000	1100		UK, BBC World Service	6190af	6195va	
1000	1100		9740as 11760va 12095eu	15310eu	15485va	
1000	1100		15565va 15575va 17640va	17830af	17790as	
1000	1100	DRM	17885af 21470af 21660as			
1000	1100	m/ DRM	UK, BBC World Service		7320eu	
1000	1100		UK, Christian Voice	9760eu		
1000	1100		USA, Armed Forces Radio		4319usb	5446usb
1000	1100		5765usb 6350usb 7507usb	10320usb	12335usb	
1000	1100		12579usb	13362usb	13855usb	
1000	1100		USA, KAIJ Dallas TX	5755va		
1000	1100		USA, KATN Salt Lake City UT		7505na	
1000	1100		USA, WBOH Newport NC		5920am	
1000	1100		USA, WEWN Birmingham AL		5825na	
1000	1100		USA, WHRI Noblesville IN		9495am	9850na
1000	1100		USA, WINB Red Lion PA		13570am	
1000	1100		USA, WJIE Louisville KY		13595am	
1000	1100	mtfhas	USA, WRMI Miami FL 9955am			
1000	1100	a	USA, WSHB Cypress Creek SC		11780as	
1000	1100		USA, WSHB Cypress Creek SC		9455am	
1000	1100		USA, WTJC Newport NC		9370na	
1000	1100		USA, WWCN Nashville TN		5070na	5935na
1000	1100		7560na 9475na			
1000	1100		USA, WYFR Okeechobee FL		5950sa	
1000	1100		Zambia, Radio Christian Voice		6065da	
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9704do
1030	1100		Germany, Deutsche Welle	6140eu	15440eu	
1030	1100		Iran, Voice of the Islamic Rep	15450as	15550as	
1030	1100		15600as 21470as 21730as			
1030	1100		UAE, Radio Dubai	13675eu	15395eu	17865eu
1030	1100		21605eu			
1030	1100	t	UAE, Radio UNMEE	21550af		
1045	1100	as	USA, KWHR Naalehu HI		11565pa	
1045	1100		USA, KWHR Naalehu HI		9930as	

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

1100	1104		Pakistan, Radio	17825eu	21465eu	
1100	1105		New Zealand, Radio NZ Intl		15530pa	
1100	1127		Iran, Voice of the Islamic Rep	15600as 21470as 21730as	15450as	15550as
1100	1127		Vietnam, Voice of	7285as		
1100	1130		Australia, HCJB	11750pa		
1100	1130	as	Bhutan, Bhutan BC Service		5030af	6035do
1100	1130		Tibet, Xizang PBS	4905as	4920as	6200as
1100	1130	t	7385as 9490as			
1100	1130	mtwhf	UAE, Radio UNMEE	21550af		
1100	1200		UK, BBC World Service		15400af	17790sa
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, Radio	5995pa	6020pa	9475as
1100	1200		9580va 11650va 11880as	12080va	15240va	
1100	1200		21820as			
1100	1200		Australia, Voice Intl	13685as		
1100	1200		Canada, CBC Northern Service		9625do	
1100	1200		Canada, CFRX Toronto ON		6070do	
1100	1200		Canada, CFVP Calgary AB		6030do	
1100	1200		Canada, CKZN St John's NF		6160do	
1100	1200		Canada, CKZU Vancouver BC		6160do	
1100	1200		Costa Rica, Radio for Peace Intl	7445om	15038va	
1100	1200		Costa Rica, University Network	5030am	6150am	

1100	1200		Ecuador, HCJB	21455va		
1100	1200	1st a	Finland, Scandinavian Weekend Radio		6170eu	
1100	1200	DRM	Germany, Deutsche Welle		15440eu	
1100	1200		Germany, Deutsche Welle		6140eu	15440eu
1100	1200	as/vl	17670as 21650as			
1100	1200		Italy, IRRS	13840va		
1100	1200		Japan, Radio	6120na	9695as	11730as
1100	1200	m-/f/ DRM	Luxembourg, RTL Radio Lutzebuerg	6095eu		
1100	1200		Malaysia, Radio	7295do		
1100	1200	DRM	Netherlands, Radio	9590eu		
1100	1200		Papua New Guinea, NBC		4890do	9675irr
1100	1200	DRM	Singapore, Radio Singapore Intl		6150as	9600as
1100	1200		UK, BBC World Service		7320eu	9410eu
1100	1200		UK, BBC World Service		6190af	6195va
1100	1200		9740as 11760va 11940af		12095eu	15190va
1100	1200		15310as 15485va 15565va		15575va	17640va
1100	1200		17830af 17885af 21470af		21660as	
1100	1200		USA, Armed Forces Radio		4319usb	5446usb
1100	1200		5765usb 6350usb 7507usb	10320usb	12335usb	
1100	1200		12579usb	13362usb	13855usb	
1100	1200		USA, KAIJ Dallas TX	5755va		
1100	1200	as	USA, KATN Salt Lake City UT		7505na	
1100	1200		USA, KWHR Naalehu HI		11565pa	
1100	1200		USA, WBOH Newport NC		5920am	
1100	1200		USA, WEWN Birmingham AL		5825na	
1100	1200		USA, WHRI Noblesville IN		9495am	9850na
1100	1200		USA, WINB Red Lion PA		13570am	
1100	1200		USA, WJIE Louisville KY		13595am	
1100	1200	fas	USA, WRMI Miami FL 9955am			
1100	1200		USA, WSHB Cypress Creek SC		6095am	
1100	1200		USA, WTJC Newport NC		9370na	
1100	1200		USA, WWCN Nashville TN		5070na	5935na
1100	1200		7560na 15825na			
1100	1200		USA, WYFR Okeechobee FL		5950na	9555sa
1100	1200		11725ca 11830na			
1100	1200		Zambia, Radio Christian Voice		6065do	
1106	1200		New Zealand, Radio NZ Intl		15530pa	
1115	1130		Israel, Kol Israel	15640va	17525va	
1115	1145		Nepal, Radio	3230as	5005as	
1130	1155		Belgium, Radio Vlaanderen Intl		9945as	
1130	1157		Czech Rep, Radio Prague Intl		11640eu	21745va
1130	1200		South Korea, Radio Korea Intl		9650na	
1130	1200	f	Vatican City, Vatican Radio		15595va	17515va

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

1200	1230	vi	Samalia, Radio Galkayo		6980va	
1200	1215	vi	Cambodia, National Radio Of		11940as	
1200	1230		France, Radio France Intl		17815af	21620af
1200	1230	DRM	25820af			
1200	1230		Netherlands, Radio	9590eu		
1200	1230		South Korea, Radio Korea Intl		9650na	
1200	1230		Uzbekistan, Radio Tashkent Intl		7285as	9715as
1200	1245		15295as 17775as			
1200	1256		USA, WYFR Okeechobee FL		5950na	
1200	1256		China, China Radio Intl		9730as	9760pa
1200	1259		11760pa 11980as 15415pa			
1200	1259		Canada, Radio Canada Intl		9795as	11730as
1200	1259		New Zealand, Radio NZ Intl		15530pa	
1200	1259		Poland, Radio Polonia		9525as	11820eu
1200	1300		Anguilla, Caribbean Beacon		11775am	
1200	1300		Australia, ABC NT Alice Springs		2310do	4835irr
1200	1300		Australia, ABC NT Katherine		2485do	
1200	1300		Australia, ABC NT Tennant Creek		2325do	
1200	1300		Australia, Radio	5995pa	6020pa	9475as
1200	1300		9580va 11650va 11880as	12080as	21820as	
1200	1300		Australia, Voice Intl	13685as		
1200	1300		Canada, CBC Northern Service		9625do	
1200	1300		Canada, CFRX Toronto ON		6070do	
1200	1300		Canada, CFVP Calgary AB		6030do	
1200	1300		Canada, CKZN St John's NF		6160do	
1200	1300		Canada, CKZU Vancouver BC		6160do	
1200	1300		China, Voice of Hope	13590as		
1200	1300		Costa Rica, Radio for Peace Intl	7445am	15038va	
1200	1300		Costa Rica, University Network	5030am	6150am	
1200	1300		7375am 9725sa 11870am	13750na	17645as	
1200	1300	1st a	Ecuador, HCJB	21455va		
1200	1300		Finland, Scandinavian Weekend Radio		6170eu	
1200	1300		11690eu			
1200	1300	DRM	Germany, Deutsche Welle		9655eu	
1200	1300		Germany, Deutsche Welle		9655eu	15440eu
1200	1300		Germany, Overcomer Ministries		6110eu	
1200	1300	as/vl	Italy, IRRS	13840va		
1200	1300		Jordan, Radio	11690eu		
1200	1300	m-/f/ DRM	Luxembourg, RTL Radio Lutzebuerg	6095eu		
1200	1300		Malaysia, Radio	7295do		
1200	1300		Netherlands, Radio	9595na		
12						

Shortwave Guide



1200	1300		9740as 11760va 11940af 15310as 15485va 15565va 17790as 17830af 17885af	12095eu 15190va 15575va 17640va 21470af 21660as	
1200	1300		Ukraine, Radio Ukraine Intl USA, Armed Forces Radio	15520eu 4319usb	5446usb 12335usb
1200	1300		5765usb 6350usb 7507usb 12579usb 13362usb	10320usb 13855usb	
1200	1300		USA, KAIJ Dallas TX 5755va		
1200	1300		USA, KTNB Salt Lake City UT	7505na	
1200	1300	as	USA, KWHR Naalehu HI	11565pa	
1200	1300		USA, KWHR Naalehu HI	9930as	
1200	1300		USA, Voice of America 6110va	9645va	9760va
1200	1300		11705va 11715va 15250va	15425va	
1200	1300	mtwhf	USA, WBCQ Kennebunk ME	17495na	
1200	1300		USA, WBOH Newport NC	5920am	
1200	1300		USA, WEWN Birmingham AL	5825na	
1200	1300		USA, WHRI Noblesville IN	9495am	9850na
1200	1300		USA, WINB Red Lion PA	13570am	
1200	1300		USA, WJIE Louisville KY	13595am	
1200	1300		USA, WRMI Miami FL 15725na		
1200	1300		USA, WSHB Cypress Creek SC	9585va	
1200	1300	a	USA, WSHB Cypress Creek SC	9455am	
1200	1300		USA, WTJC Newport NC	9370na	
1200	1300		USA, WWCR Nashville TN	5070na	5935na
1200	1300		7560na		
1200	1300		USA, WYFR Okeechobee FL	11830na	11970ca
1200	1300		13695na		
1200	1300		Zambia, Radio Christian Voice	6065do	
1215	1300		Egypt, Radio Cairo	17670as	
1230	1257		Vietnam, Voice of	9840as	12020as
1230	1300		Australia, HCJB	15390pa	
1230	1300		Bangladesh, Bangla Betar	7185as	9550as
1230	1300		Bulgaria, Radio	11700eu	
1230	1300		Sri Lanka, SLBC	6005as	15745as
1230	1300		Thailand, Radio	9810as	
1230	1300		UAE, Gospel For Asia	15590as	
1230	1300		UK, Wales Radio Intl	17845au	
1240	1255	f	Greece, Voice of	11730na	12110eu 15630eu
			15650au		

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

1300	1310	mtwhfa	Turkmenistan, Turkmen Radio	5015as	
1300	1330		Ecuador, HCJB	21455va	
1300	1330		Egypt, Radio Cairo	17670as	
1300	1330		UAE, Gospel For Asia	15590as	
1300	1345		USA, WYFR Okeechobee FL	11970na	
1300	1356		China, China Radio Intl	7405na 9570na	
			11760pa 11900pa 11980as	15180as 17720na	
1300	1356		North Korea, Voice of 4405as	9335na 11335eu	
			11710am 13760eu 15245eu		
1300	1356		Romania, Radio Romania Intl	15170eu 17720eu	
			17745eu		
1300	1400		Anguilla, Caribbean Beacon	11775am	
1300	1400		Australia, HCJB	15390pa	
1300	1400		Australia, Radio	5995pa	6020pa 9580va
			11650va 11660as 21820as		
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		China, Voice of Hope	13590as	
1300	1400		Costa Rica, Radio for Peace Intl	7445am	15038va
1300	1400		Costa Rica, University Network	5030am	6150am
			7375am 9725as 11870am	13750na 17645as	
1300	1400	1st a	Finland, Scandinavian Weekend Radio	6170eu	
			11690eu		
1300	1400	DRM	Germany, Deutsche Welle	9655eu	
1300	1400		Germany, Deutsche Welle	6140eu	9655eu
			15440eu		
1300	1400		Germany, Overcomer Ministries	6110eu	13810me
1300	1400		Jordan, Radio	11690eu	
1300	1400	m-f/ DRM	Luxembourg, RTL Radio Lutzeburg	6095eu	
1300	1400		Malaysia, Radio	7295do	
1300	1400		New Zealand, Radio NZ Intl	6095pa	
1300	1400		Papua New Guinea, NBC	4890do	9675irr
1300	1400	DRM	Russia, Voice of	15780eu	
1300	1400		Singapore, Radio Singapore Intl	6150as	9600as
1300	1400	os	South Africa, Channel Africa	11780af	21620af
			21760af		
1300	1400		South Korea, Radio Korea Intl	9570am	13670am
1300	1400		Sri Lanka, SLBC	6005as	15745as
1300	1400	DRM	UK, BBC World Service	7320eu	
1300	1400		UK, BBC World Service	6190af	6195va
			9740as 11760va 11940af	12095eu 15190va	
			15310as 15420af 15485va	15565va 15575va	
			17640va 17790as 17830af	17885af 21470af	
			21660as		
1300	1400		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb 7507usb	10320usb	12335usb
			12579usb 13362usb	13855usb	

1300	1400		USA, KAIJ Dallas TX	5755va	
1300	1400		USA, KJES Vado NM	11715na	
1300	1400		USA, KNLS Anchor Point AK	9690as	
1300	1400		USA, KTNB Salt Lake City UT	7505na	
1300	1400		USA, KWHR Naalehu HI	9930as	
1300	1400		USA, Voice of America 6110va	9760va	11705va
			15425va		
1300	1400		USA, WBCQ Kennebunk ME	17495na	
1300	1400		USA, WBOH Newport NC	5920am	
1300	1400		USA, WEWN Birmingham AL	9955na	
1300	1400		USA, WHRA Greenbush ME	17560af	
1300	1400		USA, WHRI Noblesville IN	9850na	15105am
1300	1400		USA, WINB Red Lion PA	13570am	
1300	1400		USA, WJIE Louisville KY	13595am	
1300	1400		USA, WRMI Miami FL 15725na		
1300	1400		USA, WSHB Cypress Creek SC	7340as	
1300	1400	as	USA, WSHB Cypress Creek SC	9430na	
1300	1400	f	USA, WSHB Cypress Creek SC	9455ca	
1300	1400		USA, WTJC Newport NC	9370na	
1300	1400		USA, WWCE Nashville TN	5935na	7560na
			12160na		
1300	1400		USA, WYFR Okeechobee FL	11560as	11740na
			11830na		
1300	1400		Zambia, Radio Christian Voice	6065do	
1305	1315	as	Austria, Radio Austria Intl	17855as	
1305	1315		Azerbaijan, Voice of	6110eu	9155eu
1315	1320		Austria, Radio Austria Intl	17855as	
1320	1330	mtwhf	Austria, Radio Austria Intl	17855as	
1330	1350		UAE, Radio Dubai	13630eu	13675eu 15395eu
			17865eu 21605eu		
1330	1357		Vietnam, Voice of	7100eu	9730eu
1330	1400	mtwha	Guam, AWR	15660as	
1330	1400		Guam, AWR	11755as	
1330	1400		India, All India Radio	9690as	13710as
1330	1400		Sweden, Radio	9430va	17505va 18960va
1330	1400		Turkey, Voice of	15155va	15195eu
1330	1400		UAE, AWR Africa	9860as	15235as
1330	1400		Uzbekistan, Radio Tashkent Intl	7285as	9715as
			15295as 17775as		
1335	1345	as	Austria, Radio Austria Intl	17855as	
1345	1350		Austria, Radio Austria Intl	17855as	
1345	1400	mtwhf	Austria, Radio Austria Intl	17855as	

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

1400	1420		Turkey, Voice of	15155as	15195eu
1400	1429		Czech Rep Radio Prague Intl		21745va
1400	1430	vl	Mexico, Radio Mexico Intl		9705am 11770am
1400	1430		Thailand, Radio	9560as	
1400	1455	as	South Africa, Channel Africa	21760af	11780af 21620af
			21760af		
1400	1456		China, China Radio Intl	7405na	11675as
			11765as 11765as 13685af	15125af	17220na
1400	1500		Anguilla, Caribbean Beacon	11775am	
1400	1500		Australia, HCJB	15390pa	
1400	1500		Australia, Radio	5995va	6080pa 9580va
			11650va 11660as		
1400	1500		Australia, Voice Intl	11750as	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	13655am
			17820am		
1400	1500		China, Voice of Hope	13590as	
1400	1500		Costa Rica, Radio for Peace Intl	7445am	15038va
1400	1500		Costa Rica, University Network	5030am	6150am
			7375am 9725as 11870am	13750na 17645as	
1400	1500	1st a	Finland, Scandinavian Weekend Radio	6170eu	
			11690eu		
1400	1500		France, Radio France Intl	11610as	17515as
1400	1500		Germany, Deutsche Welle	6140eu	
1400	1500	a	Germany, Overcomer Ministries	6110eu	13810me
1400	1500		India, All India Radio	9690as	13710as
1400	1500		Japan, Radio	7200as	9845as 11840va
			17755va		
1400	1500		Jordan, Radio	11690eu	
1400	1500	m-f/ DRM	Luxembourg, RTL Radio Lutzeburg	6095eu	
1400	1500		Netherlands, Radio	12070as	12080as 15595as
1400	1500		New Zealand, Radio NZ Intl	6095pa	
1400	1500		Oman, Radio	6085eu	
1400	1500	DRM	Russia, Voice of	15780eu	
1400	1500		Singapore, Mediacorp Radio	6150do	
1400	1500		Sri Lanka, SLBC	6005as	9770as 15745as
1400	1500		Taiwan, Radio Taiwan Intl	15265as	
1400	1500	DRM	UK, BBC World Service	7320eu	
1400	1500		UK, BBC World Service	6190af	6195as
			9740as 11940af 12095eu	15190va 15310as	
			15485va 15565va 15575va	17640va 17790as	
			17830af 21470af 21660af		
1400	1500		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb 7507usb	10320usb	12335usb
			12579usb 13362usb	13855usb	
1400	1500		USA, KAIJ Dallas TX	13815va	

Shortwave Guide



1400	1500	USA, KJES Vado NM	11715na		
1400	1500	USA, KTBN Salt Lake City UT	7505na		
1400	1500	USA, Voice of America	6110va	7125va	9645va
			9760va	11705va	15205va
1400	1500	USA, WBCQ Kennebunk ME	17495na		
1400	1500	USA, WBOH Newport NC	5920am		
1400	1500	USA, WEWN Birmingham AL	9955na		
1400	1500	USA, WHRA Greenbush ME	17560af		
1400	1500	USA, WHRI Noblesville IN	9850am	15105am	
1400	1500	USA, WINB Red Lion PA	13570am		
1400	1500	USA, WJIE Louisville KY	13595am		
1400	1500	USA, WRMI Miami FL	15725na		
1400	1500	USA, WTJC Newport NC	9370na		
1400	1500	USA, WWCR Nashville TN	9475na	12160na	
			13845na	15825na	
1400	1500	USA, WYFR Okeechobee FL	11560as	11740na	
			11830na	17760am	
1400	1500	Zambia, Radio Christian Voice	6065do		
1415	1420	Nepal, Radio	3230as	5005as	
1430	1500	Germany, Pan American BC	15650me		
1430	1500	Myanmar, Radio	5040do	5985do	
1430	1500	Sweden, Radio	17505va	18960do	
1445	1500	Guam, TWR/KTWR	15330as		

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

1500	1530	vi	Mexico, Radio Mexico Intl	9705am	11770am
1500	1530		Mongolia, Voice of	12015eu	
1500	1530		South Africa, Channel Africa	17770af	
1500	1530		Sri Lanka, SLBC	6005as	15745as
1500	1530		UK, BBC World Service	11860af	15420af
1500	1545		Guam, TWR/KTWR	15330as	
1500	1556		China, China Radio Intl	7160as	9785as
				13685af	15125af
1500	1556		North Korea, Voice of	4405as	9335am
				11710am	13760eu
1500	1559		Canada, Radio Canada Intl	9515am	9635as
				11935as	13655am
1500	1600		Anguilla, Caribbean Beacon	11775am	
1500	1600		Australia, HCJB	15390pa	
1500	1600		Australia, Radio	5995va	6080pa
				9580va	11650va
1500	1600		Australia, Voice Intl	11750as	13635as
1500	1600		Canada, CBC Northern Service	9625da	13685as
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		Costa Rica, Radio for Peace Intl	7445am	15038va
1500	1600		Costa Rica, University Network	5030am	6150am
				7375am	9725sa
1500	1600	1st a	Finland, Scandinavian Weekend Radio	11870am	13750na
				11720eu	5990eu
1500	1600		Germany, Deutsche Welle	6140eu	
1500	1600	smtwhf	Germany, Overcomer Ministries	6110eu	13810me
1500	1600	s	Germany, Pan American BC	15650me	
1500	1600	s	Ireland, Reflections Europe	3910eu	6295eu
				12255eu	
1500	1600		Japan, Radio	7200as	9505am
				9845as	9750as
1500	1600		Jordan, Radio	11690na	
1500	1600	m-f/ DRM	Luxembourg, RTL Radio Lutzebuerg	6095eu	
1500	1600		Myanmar, Radio	5040do	5985do
1500	1600		Netherlands, Radio	12070as	12080as
1500	1600		New Zealand, Radio NZ Intl	6095pa	15595as
1500	1600	DRM	Russia, Voice of	15780eu	
				6205as	7260as
1500	1600		Singapore, Mediacorp Radio	6150do	7315as
1500	1600		UK, BBC World Service	5975as	6190af
				6195as	9410eu
				15190va	15310as
				15575va	17790as
				21660af	17830af
1500	1600		USA, Armed Forces Radio	4319usb	5446usb
				5765usb	6350usb
				12579usb	13362usb
1500	1600		USA, KAIJ Dallas TX	13815va	
1500	1600		USA, KTBN Salt Lake City UT	15590na	
1500	1600		USA, KWHR Naalehu HI	9930as	
1500	1600		USA, Voice of America	6110va	7125va
				9645va	9760va
				15395va	15460va
1500	1600		USA, WBCQ Kennebunk ME	17495na	
1500	1600		USA, WBOH Newport NC	5920am	
1500	1600		USA, WEWN Birmingham AL	9955na	
1500	1600		USA, WHRA Greenbush ME	17650af	
1500	1600		USA, WHRI Noblesville IN	13760va	15105am
1500	1600		USA, WINB Red Lion PA	13570am	
1500	1600		USA, WJIE Louisville KY	13595am	
1500	1600	smtwhf	USA, WMLK Bethel PA	9465eu	
1500	1600		USA, WRMI Miami FL	15725na	
1500	1600		USA, WTJC Newport NC	9370na	
1500	1600		USA, WWCR Nashville TN	9475na	12160na
				13845na	15825na

1500	1600		USA, WYFR Okeechobee FL	6280as	11830na
				17760am	
1500	1600		Zambia, Radio Christian Voice	4965do	
1515	1600	as	Germany, Bible Voice BC Network	15680me	
1515	1600	a	Vatican City, Vatican Radio	13765as	15235as
1530	1545		Bangladesh, Bangla Betar	4882as	
1530	1545		India, All India Radio	4910as	9910as
1530	1600		Georgia, Radio Georgia	6180me	11740as
1530	1600	mtwhf	Germany, Bible Voice BC Network	17655as	
1530	1600		Germany, IBRA Radio	15715me	
1530	1600		Iran, Voice of the Islamic Rep	7245eu	9635as
				11775as	
1530	1600		UAE, AWR Africa	15225as	
1540	1550		Turkmenistan, Turkmen Radio	4930do	
1545	1600	s h	Bangladesh, Bangla Betar	4882as	

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

1600	1615		Pakistan, Radio	11570va	15065va	15725va
				17720va		
1600	1620	mtwhf	Moldova, Radio Pridnestrovye	5960eu		
1600	1627		Iran, Voice of the Islamic Rep	7245eu	9635as	
				11775as		
1600	1627		Vietnam, Voice of	7100as	9730as	
1600	1628	s	Hungary, Radio Budapest	6025eu	9585eu	
1600	1630		Jordan, Radio	11690na		
1600	1630		South Africa, Channel Africa	9525af		
1600	1630		UAE, Gospel For Asia	11695as		
1600	1635		UAE, Radio Dubai	13630eu	13675eu	15395eu
				17865eu	21605eu	
1600	1645		USA, WYFR Okeechobee FL	17790na		
1600	1649		New Zealand, Radio NZ Intl	6095pa		
1600	1656		North Korea, Voice of	3560as	9975af	11710af
1600	1657		China, China Radio Intl	9570as	9695af	
				13685af	11910af	
1600	1659	as	Canada, Radio Canada Intl	9515am	13655am	
				17820am		
1600	1700		Anguilla, Caribbean Beacon	11775am		
1600	1700		Australia, HCJB	15390pa		
1600	1700		Australia, Radio	5995va	6080pa	9475as
				9580va	11650va	
1600	1700		Australia, Voice Intl	13635as		
1600	1700		Canada, CBC Northern Service	9625do		
1600	1700		Canada, CFRX Toronto ON	6070do		
1600	1700		Canada, CFVP Calgary AB	6030do		
1600	1700		Canada, CKZN St John's NF	6160do		
1600	1700		Canada, CKZU Vancouver BC	6160do		
1600	1700		Costa Rica, Radio for Peace Intl	7445am	15038va	
1600	1700		Costa Rica, University Network	5030am	6150am	
				7375am	9725sa	
1600	1700		Ethiopia, Radio	5990af	13750na	17645as
				9560af	9704af	11800af
1600	1700	1st a	Finland, Scandinavian Weekend Radio	5990eu		
				11720eu		
1600	1700		France, Radio France Intl	9730af	11615af	
				11995af	12015af	
				15160af	15605af	17605af
				17850af		
1600	1700		Germany, Bible Voice BC Network	15680me		
1600	1700	DRM	Germany, Deutsche Welle	6140eu	7125eu	
1600	1700		Germany, Deutsche Welle	6140eu	6170as	
				7225as	11695as	
1600	1700	a	Germany, Overcomer Ministries	6110eu		
1600	1700	a	Greece, Voice of	9420eu	15630eu	17705na
1600	1700		Guam, AWR	15495as		
1600	1700	s	Ireland, Reflections Europe	3910eu	6295eu	
				12255eu		
1600	1700	DRM	Russia, Voice of	15780eu		
1600	1700		Russia, Voice of	4940va	4965va	4975va
				6005me	7260as	9830me
1600	1700		South Africa, Radio Veritas	3230af		
1600	1700		South Korea, Radio Korea Intl	5975om	9515af	
				9870af		
1600	1700		Taiwan, Radio Taiwan Intl	11550as		
1600	1700		UK, BBC World Service	3915as	5975as	
				6190af	6195as	7160as
				11940af	12095va	15190as
				15485eu	15565va	17790as
				21660af		
1600	1700	vi	UK, Sudan Radio Service	17630va		
1600	1700		USA, Armed Forces Radio	4319usb	5446usb	
				5765usb	6350usb	10320usb
				12579usb	13362usb	12335usb
1600	1700		USA, KAIJ Dallas TX	13815va		
1600	1700		USA, KTBN Salt Lake City UT	15590na		
1600	1700		USA, KWHR Naalehu HI	9930as		
1600	1700		USA, Voice of America	6035af	6110va	7125va
				9575va	9645va	9760va
				15205va	15225af	15395va
				17640va	17715af	17895af
1600	1700		USA, WBCQ Kennebunk ME	17495na		
1600	1700		USA, WBOH Newport NC	5920am		
1600	1700		USA, WEWN Birmingham AL	13615na	17635af	
1600	1700		USA, WHRA Greenbush ME	17650af		
1600	1700		USA, WHRI Noblesville IN	13760va	15105am	
1600	1700		USA, WINB Red Lion PA	13570am		

Shortwave Guide



1600	1700		USA, WJIE Louisville KY	13595am	
1600	1700	smrwhf	USA, WMLK Bethel PA 9465eu		
1600	1700		USA, WRMI Miami FL 15725na		
1600	1700	a	USA, WSHB Cypress Creek SC	17665af	
1600	1700		USA, WTJC Newport NC	9370na	
1600	1700		USA, WWCR Nashville TN	9475na	12160na
			13845na 15825na		
1600	1700		USA, WWRB Manchester TN	9320na	12172na
1600	1700		USA, WYFR Okeechobee FL	6280eu	11830na
			11865na 17760am 18980eu	21455eu	
1600	1700		Zambia, Radio Christian Voice	4965do	
1605	1610	as	Austria, Radio Austria Intl	17865na	
1610	1620		Austria, Radio Austria Intl	17865na	
1615	1630		Vatican City, Vatican Radio	4005eu	5890eu
			7250eu 9645eu 15595eu		
1615	1700		UK, BBC World Service	15420af	
1620	1625	mtwhf	Austria, Radio Austria Intl	17865na	
1630	1700		Egypt, Radio Cairo	9855af	
1630	1700		Guam, AWR	11980as	
1630	1700	as	UK, BBC World Service	11860af	21490af
1635	1640	as	Austria, Radio Austria Intl	17865na	
1640	1650		Austria, Radio Austria Intl	17865na	
1645	1700		Tajikistan, Tajik Radio	7245as	
1650	1655	mtwhf	Austria, Radio Austria Intl	17865na	
1650	1700		New Zealand, Radio NZ Intl	6095pa	

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

1700	1726		Romania, Radio Romania Intl	9570eu	11940eu
1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485af
1700	1727		Vietnam, Voice of	9725eu	
1700	1730		France, Radio France Intl	15605af	17605af
1700	1730		Guam, AWR	11560me	
1700	1730	vl	Somalia, Radio Galkayo	6980va	
1700	1730		South Africa, Channel Africa	15265af	
1700	1730		UK, BBC World Service	6005af	9630af
1700	1750		New Zealand, Radio NZ Intl	6095pa	
1700	1756		China, China Radio Intl	9570af	9695af
			11900af 11920af		
1700	1759		Poland, Radio Polonia	5995eu	7285eu
1700	1800		Anguilla, Caribbean Beacon	11775am	
1700	1800		Australia, Radio	5995va	6080pa 9475as
			9580va 9815pa 11880va		
1700	1800		Australia, Voice Intl	13635as	
1700	1800		Canada, CBC Northern Service	9625do	
1700	1800		Canada, CFRX Toronto ON	6070do	
1700	1800		Canada, CFVP Calgary AB	6030do	
1700	1800		Canada, CKZN St John's NF	6160do	
1700	1800		Canada, CKZU Vancouver BC	6160do	
1700	1800		Costa Rica, Radio for Peace Intl	7445am	15038va
1700	1800		Costa Rica, University Network	5030am	6150am
			7375am 9725sa 11870am	13750na	17645as
1700	1800		Egypt, Radio Cairo	9855af	
1700	1800		Eat Guinea, Radio Africa	7189af	15184af
1700	1800	1st a	Finland, Scandinavian Weekend Radio	5990eu	6170eu
			11720eu		
1700	1800	as	Germany, Bible Voice BC Network	15405me	
1700	1800	DRM	Germany, Deutsche Welle	7125eu	
1700	1800		Germany, Deutsche Welle	6140eu	
1700	1800		Germany, Radio Africa Intl	11735af	13820af
1700	1800		Japan, Radio	9535am	11970eu 15355af
1700	1800		Russia, Voice of	5910as	9545as 9830af
1700	1800		South Africa, Radio Veritas	3230af	
1700	1800		UK, BBC World Service	3255af	3915as
			5975as 6190af 6195va	7160as	9410va
			9510as 11940af 12095va	15310as	15400af
			15420af 15565va 17830af	21470af	21660as
1700	1800	vl	UK, Sudan Radio Service	17660va	
1700	1800		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb 7507usb	10320usb	12335usb
			12579usb	13855usb	
1700	1800		USA, KAIJ Dallas TX	13815va	
1700	1800		USA, KTBN Salt Lake City UT	15590na	
1700	1800		USA, Voice of America	6040va	6110va 7125va
			9645va 9760va 13710af	15205va	15240af
			15395va 15445af 17895af		
1700	1800	mtwhf	USA, Voice of America	5990va	6045va 9525va
			9795va 11955va 12005va	13600af	15255va
1700	1800		USA, WBCQ Kennebunk ME	17495na	
1700	1800		USA, WBOH Newport NC	5920am	
1700	1800		USA, WEWN Birmingham AL	13615na	17635af
1700	1800		USA, WHRA Greenbush ME	17650af	
1700	1800		USA, WHRI Noblesville IN	9495am	13760va
1700	1800		USA, WINB Red Lion PA	13570am	
1700	1800		USA, WJIE Louisville KY	13595am	
1700	1800	smrwhf	USA, WMLK Bethel PA 9465eu		
1700	1800		USA, WRMI Miami FL 15725na		
1700	1800	to	USA, WSHB Cypress Creek SC	17505af	
1700	1800		USA, WTJC Newport NC	9370na	
1700	1800		USA, WWCR Nashville TN	9475na	12160na
			13845na 15825na		
1700	1800		USA, WWRB Manchester TN	9320na	12172na
1700	1800		USA, WYFR Okeechobee FL	18980eu	21455eu
1700	1800		Zambia, Radio Christian Voice	4965do	
1730	1745		Israel, Kol Israel	11605va	17545va

1730	1745		Libya, Voice of Africa	15660af	17880af
1730	1745	mtwhf	UK, United Nations Radio	17810af	7150af 15495me
1730	1800		Georgia, Radio Georgia		11910eu
1730	1800		Guam, AWR	9385me	
1730	1800		Liberia, ELWA	4760do	
1730	1800	mtwhfa	Malta, Voice of the Mediterranean		6110eu
1730	1800		Philippines, Radio Pilipinas		11720me 11890me
			15190me		
1730	1800		Slovakia, Radio Slovakia Intl		5915eu 6055eu
			7345eu		
1730	1800		Swaziland, TWR	3200af	9500af
1730	1800		Switzerland, Swiss Radio Intl		9755va 11810va
			15555 skd1203		
1730	1800		Vatican City, Vatican Radio		13765af 15570af
			17515af		
1735	1745	vl/th	Paraguay, Radio Nacional		9739sa
1745	1800		Bangladesh, Bangla Betar		7185eu 9550eu
			15520eu		
1745	1800		India, All India Radio	7410eu	9445af 9950eu
			11620eu 11935af 13605af		15075af 15155af
			17670af		
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		Germany, Bible Voice BC Network		13845me
1800	1827		Czech Rep, Radio Prague Intl		5930eu 9415va
1800	1827		Vietnam, Voice of	7100eu	9725eu 9730af
1800	1830		Egypt, Radio Cairo	9855af	
1800	1830	s	Germany, Universal Life		15750af
1800	1830		South Africa, AWR Africa		5960af 7265af
1800	1830		South Africa, Channel Africa		15265af
1800	1830		UK, BBC World Service		5975as
1800	1830		UK, RTE Radio	15585me	
1800	1850		New Zealand, Radio NZ Intl		11980pa
1800	1900		Anguilla, Caribbean Beacon		11775am
1800	1900	mtwhf	Argentina, RAE	9690eu	15345eu
1800	1900		Australia, HCJB	11765pa	
1800	1900		Australia, Radio	6080pa	7240va 9475as
			9580va 9815pa 11880va		
1800	1900		Australia, Voice Intl	11685as	
1800	1900		Bangladesh, Bangla Betar		7185eu 9550eu
			15520eu		
1800	1900		Canada, CBC Northern Service		9625do
1800	1900		Canada, CFRX Toronto ON		6070do
1800	1900		Canada, CFVP Calgary AB		6030do
1800	1900		Canada, CKZN St John's NF		6160do
1800	1900		Canada, CKZU Vancouver BC		6160do
1800	1900		Costa Rica, Radio for Peace Intl		7445am 15038va
1800	1900		Costa Rica, University Network		5030am 6150am
			7375am 9725sa 11870am		13750na 17645as
1800	1900		Eat Guinea, Radio Africa		7189af 15184af
1800	1900	1st a	Finland, Scandinavian Weekend Radio		6170eu
			11720eu		
1800	1900		Germany, Bible Voice BC Network		6010eu
1800	1900	DRM	Germany, Deutsche Welle		6140eu
1800	1900		Germany, Radio Africa Intl		11735af 13820af
1800	1900	s	Greece, Voice of	9420eu	15630eu 17705na
1800	1900		India, All India Radio	7410eu	9445af 9950eu
			11620eu 11935af 13605af		15075va 15155af
			17670af		
1800	1900	s	Ireland, Reflections Europe		3910eu 6295eu
			12255eu		
1800	1900		Kuwait, Radio	11990va	
1800	1900		Latvia, Laser Radio	9290eu	
1800	1900		Liberia, ELWA	4760do	
1800	1900		Netherlands, Radio	6020af	9895af 11655af
1800	1900		Nigeria, Voice of	15120af	
1800	1900		Philippines, Radio Pilipinas		11720me 11890me
			15190me		
1800	1900		Russia, Voice of	5910as	5945as 7290eu
			9830af 11510af		
1800	1900	as	Russia, Voice of	5950eu	6175eu
1800	1900		Sierra Leone, Radio UNAMSIL		6139af
1800	1900		South Africa, AWR Africa		11985af
1800	1900	s	South Africa, Radio League		3215af
1800	1900	as	South Africa, Radio Lusofonia		3345af
1800	1900		South Africa, Radio Veritas		3230af
1800	1900		Swaziland, TWR	3200af	9500af
1800	1900		UK, BBC World Service		3255af 6190af
			6195va 9410va 9510as		12095va 15310as
			15400af 15420af 17830af		21470af
1800	1900		USA, Armed Forces Radio		4319usb 5446usb
			5765usb 6350usb 7507usb		10320usb 12335usb
			12579usb		13855usb
1800	1900		USA, KAIJ Dallas TX	13815va	
1800	1900		USA, KJES Vado NM	15385na	
1800	1900		USA, KTBN Salt Lake City UT		15590na
1800	1900		USA, Voice of America	6035af	6040va 9760va
			9885va 11975af 13710af		15240va 15580af
			17895af		
1800	1900	s	USA, WBCQ Kennebunk ME		7415na
1800	1900		USA, WBCQ Kennebunk ME		17495na

Shortwave Guide



1800	1900	USA, WBOH Newport NC	5920am	
1800	1900	USA, WEWN Birmingham AL	13615na	15440af
1800	1900	USA, WHRA Greenbush ME	17650af	
1800	1900	USA, WHRI Noblesville IN	9495am	13760va
1800	1900	USA, WRMB Red Lion PA	13570am	
1800	1900	USA, WJIE Louisville KY	13595am	
1800	1900	smtwhf USA, WMLK Bethel PA 9465eu		
1800	1900	USA, WRMI Miami FL 15725na		
1800	1900	a USA, WSHB Cypress Creek SC	15665eu	17505af
1800	1900	USA, WTJC Newport NC	9370na	
1800	1900	USA, WWCN Nashville TN	9475na	12160na
		13845na 15825na		
1800	1900	USA, WWRB Manchester TN	9320na	12172na
1800	1900	USA, WYFR Okeechobee FL	18980eu	
1800	1900	Yemen, Rep of Yemen Radio	9780me	
1800	1900	Zambia, Radio Christian Voice	4965do	
1830	1845	Germany, IBRA Radio 15695af		
1830	1845	Rwanda, Radio 6005do		
1830	1855	Greece, Voice of 12110eu		
1830	1858	Serbia & Montenegro, RSCG	6100eu	
1830	1900	Belgium, Radio Vlaanderen Intl	5910va	7330eu
		13790va		
1830	1900	Bulgaria, Radio 5800eu	7500eu	
1830	1900	Georgia, Radio Georgia	11760eu	
1830	1900	Sweden, Radio 9375eu		
1830	1900	UK, BBC World Service	6005af	9630af
1830	1900	UK, RTE Radio 13640na	21630af	
1845	1900	Albania, Radio Tirana Intl	7210eu	9520eu
1845	1900	Congo, RTV Congalaise	4765af	5985af
1851	1900	New Zealand, Radio NZ Intl	15265pa	

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

1900	1927	Vietnam, Voice of 7100eu	9730eu	
1900	1930	s Germany, Bible Voice BC Network	5970eu	
1900	1930	s Germany, Universal Life	15565me	
1900	1930	mtwhf Nigeria, Radio Jakada Intl	15170af	
1900	1930	Philippines, Radio Pilipinas	11720me	11890me
		15190me		
1900	1945	India, All India Radio 7410eu	9445af	9950eu
		11620eu 11935af 13605af	15075af	15155af
		17670af		
1900	1945	Iraq, Radio Iraq Intl 6175irr	9687irr	11787irr
1900	1945	USA, WYFR Okeechobee FL	15115eu	15565eu
		18980eu		
1900	1956	China, China Radio Intl	9440af	13790af
1900	1956	North Korea, Voice of 4405as	7505eu	11335eu
		13760eu 15245eu		
1900	2000	Anguilla, Caribbean Beacon	11775am	
1900	2000	Australia, HCJB 11765pa		
1900	2000	Australia, Radio 6080pa	7240va	9500as
		9580va 9815pa 11880va		
1900	2000	vi Australia, Voice Intl 11685as		
1900	2000	Botswana, Radio 4820do	4830af	
1900	2000	Canada, CBC Northern Service	9625do	
1900	2000	Canada, CFRX Toronto ON	6070do	
1900	2000	Canada, CFVP Calgary AB	6030do	
1900	2000	Canada, CKZN St John's NF	6160do	
1900	2000	Canada, CKZU Vancouver BC	6160do	
1900	2000	Costa Rica, Radio for Peace Intl	7445am	15038va
1900	2000	Costa Rica, University Network	5030am	6150am
		7375am 9725sa 11870am	13750na	17645as
1900	2000	Eqt Guinea, Radio Africa	7189af	15184af
1900	2000	Finland, Scandinavian Weekend Radio	5990eu	
		11690eu		
1900	2000	fas Germany, Bible Voice BC Network	13710me	13725af
1900	2000	Germany, Deutsche Welle	6180af	11865af
		13590af 13780af		
1900	2000	vi Ghana, Ghana BC Corp	4915do	
1900	2000	Kuwait, Radio 11990va		
1900	2000	Latvia, Laser Radio 9290eu		
1900	2000	Liberia, ELWA 4760do		
1900	2000	Malaysia, Radio 7295do		
1900	2000	Namibia, Namibian BC Corp	6060af	6175af
1900	2000	as Netherlands, Radio 15315na	17725na	17875na
1900	2000	Netherlands, Radio 7120af	9895af	11655af
		17810af		
1900	2000	New Zealand, Radio NZ Intl	15265pa	
1900	2000	Nigeria, Radio/Enugu 6025do		
1900	2000	Nigeria, Radio/Ibadan	6050do	
1900	2000	Nigeria, Radio/Kaduna	4770do	6090do
1900	2000	Nigeria, Radio/Lagos 3326do	4990do	
1900	2000	Nigeria, Voice of 17800af		
1900	2000	Russia, Voice of 6175eu	6235eu	7335af
		7360eu 7290eu 11510af		
1900	2000	Sierra Leone, Radio UNAMSIL	6139af	
1900	2000	Sierra Leone, SLBS 3316do		
1900	2000	vi Solomon Islands, SIBC 5020do	9545do	
1900	2000	South Korea, Radio Korea Intl	5975am	7275eu
1900	2000	a Sri Lanka, SLBC 6010am		
1900	2000	Swaziland, TWR 3200af		
1900	2000	Thailand, Radio 9535eu		
1900	2000	Uganda, Radio 4976do	5026do	7196do

1900	2000	UK, BBC World Service	3255af	6005af
		6190af 6195va 9410va	9630af	12095af
		15310me 15400af 17830af	21470af	
1900	2000	UK, Gospel For Asia 15590af		
1900	2000	USA, Armed Forces Radio	4319usb	5446usb
		5765usb 6350usb 7507usb	10320usb	12335usb
		12579usb 13362usb	13855usb	
1900	2000	USA, KAIJ Dallas TX 13815va		
1900	2000	USA, KTBN Salt Lake City UT	15590na	
1900	2000	USA, Voice of America 4950af	6035af	7415af
		9525va 9690va 9760va	9785va	11870va
		11975af 12015va 13640va	13710af	15180va
		15240af 15580af 17895af		
1900	2000	s USA, WBCQ Kennebunk ME	7415na	17495na
1900	2000	USA, WBOH Newport NC	5920am	
1900	2000	USA, WEWN Birmingham AL	13615na	15440af
1900	2000	USA, WHRA Greenbush ME	17650af	
1900	2000	USA, WHRI Noblesville IN	9495am	13760va
1900	2000	USA, WINB Red Lion PA	13570am	
1900	2000	USA, WJIE Louisville KY	13595am	
1900	2000	smtwhf USA, WMLK Bethel PA 9465eu		
1900	2000	USA, WRMI Miami FL 15725na		
1900	2000	a USA, WSHB Cypress Creek SC	15665eu	
1900	2000	USA, WSHB Cypress Creek SC	17505af	
1900	2000	USA, WTJC Newport NC	9370na	
1900	2000	USA, WWCN Nashville TN	9475na	12160na
		13845na 15825na		
1900	2000	USA, WWRB Manchester TN	9320na	12172na
1900	2000	vi Vanuatu, Radio 3945af	7260do	
1900	2000	Zambia, Radio Christian Voice	4965do	
1900	2000	Zimbabwe, ZBC Corp 5975do		
1915	1925	Rwanda, Radio 6005do		
1923	1930	vi Libya, Voice of Africa 15105af	15315af	
1930	2000	t h Belarus, Radio Belarus Intl	7105eu	7210eu
1930	2000	mtwha Germany, AWR Europe	11845eu	
1930	2000	Iran, Voice of the Islamic Rep	9800eu	11670eu
		11750eu 11860eu		
1930	2000	Papua New Guinea, NBC	4890do	9675irr
1930	2000	Slovakia, Radio Slovakia Intl	5915eu	6055eu
		7345eu		
1930	2000	Switzerland, Swiss Radio Intl	9820va	11920va
		13660va 17660va		
1930	2000	Turkey, Voice of 5980eu		
1935	1955	Italy, RAI Intl 5965eu	9755eu	
1940	1945	Turkmenistan, Turkmen Radio	4930as	
1940	2000	mtwh'a Armenia, Voice of 4810eu	9960eu	
1950	2000	Vatican City, Vatican Radio	4005eu	5890eu
		7350eu		

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

2000	2010	Vatican City, Vatican Radio	4005eu	5890eu
		7250eu 9660af 11625af	13765af	
2000	2020	Turkey, Voice of 5980eu		
2000	2027	Iran, Voice of the Islamic Rep	9800eu	11670eu
		11750eu 11860eu		
2000	2028	Hungary, Radio Budapest	3975eu	6025eu
2000	2030	Mongolia, Voice of 12015eu		
2000	2030	DRM Vatican City, Vatican Radio	9800eu	
2000	2045	Swaziland, TWR 3200af		
2000	2056	China, China Radio Intl	9440af	11640af
		13630af 15110eu 17790eu		
2000	2059	mtwh' Spain, Radio Exterior Espana	9570af	15290eu
2000	2100	Anguilla, Caribbean Beacon	11775am	
2000	2100	as Australia, Radio 6080pa	7240va	
2000	2100	Australia, Radio 9500as	9580va	9815pa
		11880va 12080va		
2000	2100	vi Australia, Voice Intl 11685as		
2000	2100	Botswana, Radio 4820do	4830af	
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	Costa Rica, Radio for Peace Intl	7445am	15038va
2000	2100	Costa Rica, University Network	5030am	6150am
		7375am 9725sa 11870am	13750na	17645as
2000	2100	Eqt Guinea, Radio Africa	7189af	15184af
2000	2100	1st a Finland, Scandinavian Weekend Radio	5990eu	
		11690eu		
2000	2100	Germany, Deutsche Welle	13590af	13780af
		15205af 15410af		
2000	2100	vi Germany, Overcomer Ministries	9595eu	
2000	2100	Ghana, Ghana BC Corp	4915do	
2000	2100	Indonesia, Voice of 15150eu		
2000	2100	s Ireland, Reflections Europe	3910eu	6295eu
		12255eu		
2000	2100	vi Italy, IRRS 5775va		
2000	2100	Kuwait, Radio 11990va		
2000	2100	Latvia, Laser Radio 9290eu		
2000	2100	Liberia, ELWA 4760do		
2000	2100	Malaysia, Radio 7295do		
2000	2100	mtwha Malta, Voice of the Mediterranean	7440eu	
2000	2100	Namibia, Namibian BC Corp	3270af	3290af

Shortwave Guide

2000	2100	as	6060af 6175af	17725na	17875na	
2000	2100		Netherlands, Radio 15315na	9895af	11655af	
			Netherlands, Radio 7120af			
			17810af			
2000	2100		New Zealand, Radio NZ Intl	15265pa		
2000	2100		Nigeria, Radio/Enugu 6025do			
2000	2100		Nigeria, Radio/Ibadan	6050do		
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do	
2000	2100		Nigeria, Radio/Lagos 3326do	4990do		
2000	2100		Nigeria, Voice of 17800af			
2000	2100		Papua New Guinea, NBC	4890do	9675irr	
2000	2100		Russia, Voice of 6145eu	6235eu	7290eu	
			7360eu			
2000	2100		Sierra Leone, Radio UNAMSIL	6139af		
2000	2100		Sierra Leone, SLBS 3316do			
2000	2100	vl	Salomon Islands, SIBC 5020do	9545do		
2000	2100		South Africa, AWR Africa	15295af		
2000	2100		Syria, Radio Damascus	12085eu	13610eu	
2000	2100		Uganda, Radio 4976do	5026do	7196do	
2000	2100		UK, AWR Europe 15385af			
2000	2100		UK, BBC World Service	3255af	6005af	
			6190af 6195va 9410va	9630af	12095af	
			15400af 17830af			
2000	2100		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb 6350usb 7507usb	10320usb	12335usb	
			12579usb 13362usb	13855usb		
2000	2100		USA, KAIJ Dallas TX 13815va			
2000	2100		USA, KTBN Salt Lake City UT	15590na		
2000	2100		USA, Voice of America 4950af	6035af	6095va	
			7415af 9690va 7415af	9690va	9760va	
			11855af 11975af 13710af	15240af	15580af	
			17885af 17895af			
2000	2100		USA, WBCQ Kennebunk ME	7415na	9330na	
			17495na			
2000	2100		USA, WBOH Newport NC	5920am		
2000	2100		USA, WEWN Birmingham AL	13615na	17595af	
2000	2100		USA, WHRA Greenbush ME	17650as		
2000	2100		USA, WHRI Noblesville IN	5745va	9495am	
2000	2100		USA, WINB Red Lion PA	13570am		
2000	2100		USA, WJIE Louisville KY	13595am		
2000	2100		USA, WRMI Miami FL 15725na			
2000	2100	mwfs	USA, WSHB Cypress Creek SC	15665af		
2000	2100		USA, WTJC Newport NC	9370na		
2000	2100		USA, WWCR Nashville TN	9475na	12160na	
			13845na 15825na			
2000	2100		USA, WWRB Manchester TN	9320na	12172na	
2000	2100		USA, WYFR Okeechobee FL	5810eu	7580eu	
			15565af 17575sa			
2000	2100	vl	Vanuatu, Radio 3945af	7260do		
2000	2100		Zambia, Radio Christian Voice	4965do		
2000	2100	vl	Zimbabwe, ZBC Corp 5975do			
2010	2030		Vatican City, Vatican Radio	9660af	11625af	
			13765af			
2025	2045		Italy, RAI Intl 5985af	9515af	11880af	
2030	2045		Thailand, Radio 9535eu			
2030	2056	vl	Burundi, Radio 6140af			
2030	2056		Romania, Radio Romania Intl	6110eu	7105eu	
2030	2057		Uzbekistan, Radio Tashkent Intl	5025eu	9545eu	
			11905eu			
2030	2057		Vietnam, Voice of 7100eu	9730eu		
2030	2100	th	Belarus, Radio Belarus Intl	7105eu	7210eu	
2030	2100		Belgium, Radio Vlaanderen Intl	7330eu		
2030	2100		Cuba, Radio Havana 11760na			
2030	2100		Egypt, Radio Cairo 15375af			
2030	2100	DFM	Netherlands, Radio 9800eu			
2030	2100		Sweden, Radio 6065va	9400va	9415af	
2030	2100	f	UK, Wales Radio Intl 7325eu			
2030	2100	as	USA, Voice of America 4950af			
2045	2100		India, All India Radio 7410eu	9445eu	9575cu	
			9910au 9950eu 11620va	11715au		

2100 UTC - 4PM EST / 3PM CST / 1PM PST

2100	2127		Czech Rep, Radio Prague Intl	5930eu	9430va	
2100	2128		Serbia & Montenegro, RSCG	6100eu		
2100	2130		China, China Radio Intl	11640af	1363caf	
			15110eu 17790eu			
2100	2130		Cuba, Radio Havana 11760na			
2100	2130	mtwhf	South Korea, Radio Korea Intl	3955eu		
2100	2130		UK, BBC World Service	15390am		
2100	2156		North Korea, Voice of 4405as	7505eu	11335eu	
			13760eu 15245eu			
2100	2159		Canada, Radio Canada Intl	5850va	7235va	
			7425va 9770va 9805va	13650va		
2100	2159	as	Spain, Radio Exterior Espana	9570af	9840eu	
2100	2200		Anguilla, Caribbean Beacon	11775am		
2100	2200		Australia, Radio 7240va	9500as	9580va	
			9660pa 11880va 12080va	17715va	21740va	
2100	2200		Australia, Voice Intl 9795as			
2100	2200	vl	Austria, AWR Europe 9660af			
2100	2200		Botswana, Radio 4820do	4830af		
2100	2200		Canada, CBC Northern Service	9625do		
2100	2200		Canada, CFRX Toronto ON	6070do		
2100	2200		Canada, CFPV Calgary AB	6030do		

2100	2200		Canada, CKZN St John's NF	6160dc		
2100	2200		Canada, CKZU Vancouver BC	6160dc		
2100	2200	vl/ DRM	Canada, Radio Canada Intl	9800eu		
2100	2200		Costa Rica, Radio for Peace Intl	7445am	15038va	
2100	2200		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa 11870am	13750na	17645as	
2100	2200		Egypt, Radio Cairo 15375af			
2100	2200		Eqt Guinea, Radio Africa	7189af	15184af	
2100	2200	1st a	Finland, Scandinavian Weekend Radio		5990eu	
			11690eu			
2100	2200		Germany, Deutsche Welle	9615af	13780af	
			15410af			
2100	2200	vl	Ghana, Ghana BC Corp	4915dc		
2100	2200		Guyana, Voice of 5949do			
2100	2200		India, All India Radio 7410eu	9445eu	9575au	
			9910au 9950eu 11620va	11715cu		
2100	2200	s	Ireland, Reflections Europe	3910eu	6295eu	
			12255eu			
2100	2200	vl	Italy, IRRS 5775va			
			6090eu	6180eu	11855af	
			11920va 17825na 21670as			
2100	2200		Latvia, Lasee Radio 9290eu			
2100	2200		Liberia, ELWA 4760do			
2100	2200		Malaysia, Radio 7295do			
2100	2200	vl	Mexico, Radio Mexico Intl	9705am	11770am	
2100	2200		Namibia, Namibian BC Corp	3270af	3290af	
			6060af 6175af			
2100	2200		New Zealand, Radio NZ Intl	15265pa		
2100	2200		Nigeria, Radio/Abuja 7275do			
2100	2200		Nigeria, Radio/Enugu 6025do			
2100	2200		Nigeria, Radio/Ibadan	6050do		
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do	
2100	2200		Nigeria, Radio/Lagos 3326do	4990do		
2100	2200		Nigeria, Voice of 17800af			
2100	2200		Papua New Guinea, NBC	4890do	9675irr	
2100	2200		Russia, Voice of 6235eu	7290eu	7360eu	
2100	2200		Sierra Leone, Radio UNAMSIL	6139af		
2100	2200		Sierra Leone, SLBS 3316do			
2100	2200		Syria, Radio Damascus	12085eu	13610eu	
2100	2200		UK, BBC World Service	3255af	3915as	
			5965as 5975sa 6005af	6110as	6135am	
			6190af 6195va 9410va	12095sa	15400af	
			17830af			
2100	2200		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb 6350usb 7507usb	10320usb	12335usb	
			12579usb 13362usb	13855usb		
2100	2200		USA, KAIJ Dallas TX 13815va			
2100	2200		USA, KTBN Salt Lake City UT	15590na		
2100	2200		USA, Voice of America 6035af	6040vc	6095va	
			7415af 9595va 9670va	9760va	11870va	
			11975af 13710af 15185va	15240af	15580af	
			17735va 17820va 17895af			
2100	2200		USA, WBCQ Kennebunk ME	7415na	9330na	
			17495na			
2100	2200		USA, WBOH Newport NC	5920am		
2100	2200		USA, WEWN Birmingham AL	13615na	17595af	
2100	2200		USA, WHRA Greenbush ME	17650af		
2100	2200		USA, WHRI Noblesville IN	5745va	9495am	
2100	2200		USA, WINB Red Lion PA	13570am		
2100	2200		USA, WJIE Louisville KY	7490am		
2100	2200		USA, WRMI Miami FL 15725na			
2100	2200	asm	USA, WSHB Cypress Creek SC	11650eu		
2100	2200	f	USA, WSHB Cypress Creek SC	15665af		
2100	2200		USA, WTJC Newport NC	9370na		
2100	2200		USA, WWCR Nashville TN	7465na	9475na	
			12160na 13845na			
2100	2200		USA, WWRB Manchester TN	9320na	12172na	
2100	2200		USA, WYFR Okeechobee FL	5810eu	7580eu	
			11740na 15565af 17575sa			
2100	2200	vl	Vanuatu, Radio 3945af	7260do		
2100	2200		Zambia, Radio Christian Voice	4965do		
2100	2200	vl	Zimbabwe, ZBC Corp 5975do			
2115	2145	mtwhf	UK, BBC World Service	11675am		
2115	2200		Egypt, Radio Cairo 9985eu			
2123	2130	vl	Libya, Voice of Africa 15105af	15315af		
2130	2156		China, China Radio Intl	15110eu	17790eu	
2130	2158		Uzbekistan, Radio Tashkent Intl	5025eu	9545eu	
			11905eu			
2130	2200	twhfa	Albania, Radio Tirana Intl	7130eu	9540eu	
2130	2200		Australia, ABC NT Alice Springs	2310do	4835irr	
2130	2200		Australia, ABC NT Katherine	5025do		
2130	2200		Australia, ABC NT Tennant Creek	4910do		
2130	2200		Guam, AVR 11980as			
2130	2200	mtha	Guam, AVR 12010as			
2130	2200		Iran, Voice of the Islamic Rep	9870au	13665au	
2130	2200		Turkey, Voice of 9525as			
2130	2200	tf	UK, BBC World Service	11680sa		

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

2200	2220		Turkey, Voice of 9525as			
2200	2227		Iran, Voice of the			

Shortwave Guide



						2300 UTC - 6PM EST / 5PM CST / 3PM PST	
2200	2229	Canada, Radio Canada Intl	5850va	6045va			
		9770va 12005va					
2200	2230	DRM Germany, Deutsche Welle	9800eu				
2200	2230	Germany, Deutsche Welle	6180as	6225as			
		9800na					
2200	2230	India, All India Radio 7410eu	9445eu	9575au			
		9910au 9950eu 11620va	11715au				
2200	2230	s Ireland, Reflections Europe	3910eu	6295eu			
		12255eu					
2200	2230	twfhas/vl Italy, IRRS 5775va					
2200	2230	mtwhf/vl Mexico, Radio Mexico Intl	9705am	11770am			
2200	2230	Papua New Guinea, NBC	4890do	9675sirr			
2200	2230	mtwhf USA, Voice of America 6035af	7415af	11655af			
		11975af 13710af					
2200	2239	New Zealand, Radio NZ Intl	15265po				
2200	2245	Egypt, Radio Cairo 9985eu					
2200	2245	USA, WYFR Okeechobee FL	7580eu	21525af			
2200	2256	China, China Radio Intl	7175eu				
2200	2256	Romania, Radio Romania Intl	5975eu	7250eu			
		11830eu					
2200	2300	Anguilla, Caribbean Beacon	6090am				
2200	2300	Australia, ABC NT Alice Springs	2310do	4835sirr			
2200	2300	Australia, ABC NT Katherine	5025do				
2200	2300	Australia, ABC NT Tennant Creek	4910do				
2200	2300	Australia, Radio 9660va	12080va	13620va			
		15230as 17715va 17795va	21740va				
2200	2300	Australia, Voice Intl 9795as	13650as	17775as			
2200	2300	vi Belgium, Radio Vlaanderen Intl	11730na				
2200	2300	Botswana, Radio 4820do	4830al				
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, Radio for Peace Intl	7445am	15038va			
2200	2300	Costa Rica, University Network	5030am	6150am			
		7375am 9725sa 11870am	13750na	17645as			
2200	2300	Eqt Guinea, Radio Africa	7189af	5184al			
2200	2300	1st a Finland, Scandinavian Weekend Radio	5990eu				
		11690eu					
2200	2300	vi Ghana, Ghana BC Corp	4915do				
2200	2300	Guyana, Voice of 3291do	5949do				
2200	2300	Malaysia, Radio 7295do					
2200	2300	Namibia, Namibian BC Corp	3270af	3290af			
		6060af 6175al					
2200	2300	Nigeria, Radio/Enugu 6025do					
2200	2300	Nigeria, Radio/Ibadan	6050do				
2200	2300	Nigeria, Radio/Kaduna	4770do	6090do			
2200	2300	Nigeria, Radio/Lagos 3326do	4990do				
2200	2300	Nigeria, Voice of 1780af					
2200	2300	Sierra Leone, Radio UNAMSIL	6139af				
2200	2300	Sierra Leone, SLBS 3316do					
2200	2300	vi Solomon Islands, SIBC 5020do	9545do				
2200	2300	Taiwan, Radio Taiwan Intl	15600eu				
2200	2300	UK, BBC World Service	5965as	5975sa			
		6135am 6195va 9740as	11685as	12095sa			
		15400af 17830af					
2200	2300	Ukraine, Radio Ukraine Intl	5840eu				
2200	2300	USA, Armed Forces Radio	4319usb	5446usb			
		5765usb 6350usb 7507usb	10320usb	12335usb			
		12579usb 13362usb	13855usb				
2200	2300	USA, KAJI Dallas TX	13815va				
2200	2300	USA, KTBN Salt Lake City UT	15590na				
2200	2300	USA, KWHR Naalehu HI	17510as				
2200	2300	USA, Voice of America 7215va	9705va	9890va			
		11760va 15185va 15290va	15305va	17735va			
		17820va					
2200	2300	USA, WBCQ Kennebunk ME	5105na	7415na			
		9330na					
2200	2300	USA, WBOH Newport NC	5920am				
2200	2300	USA, WEWN Birmingham AL	9975na	17595af			
2200	2300	USA, WHRA Greenbush ME	17650af				
2200	2300	vi USA, WHRI Noblesville IN	5745va	9495am			
2200	2300	USA, WINB Red Lion PA	13570am				
2200	2300	USA, WRMI Miami FL 15725na					
2200	2300	s USA, WSHB Cypress Creek SC	7510eu				
2200	2300	ws USA, WSHB Cypress Creek SC	15285sa				
2200	2300	USA, WTJC Newport NC	9370na				
2200	2300	USA, WWCR Nashville TN	5070na	7465na			
		9475na 13845na					
2200	2300	USA, WWRB Manchester TN	9320na	12172na			
2200	2300	USA, WYFR Okeechobee FL	11740na				
2200	2300	vi Vanuatu, Radio 3945al	7260do				
2200	2300	Zambia, Radio Christian Voice	4965do				
2205	2230	Nigeria, Radio/Enugu 6025do					
2205	2230	Nigeria, Radio/Ibadan	6050do				
2205	2230	Nigeria, Radio/Kaduna	4770do	6090do			
2205	2230	Nigeria, Radio/Lagos 3326do	4990do				
2230	2257	Canada, Radio Canada Intl	5960am	9590am			
2230	2300	11865am					
2230	2300	s USA, Voice of America 6180va	7205va	9780va			
2230	2300	ws USA, Voice of America 11735va	15110va				
2230	2300	USA, WYFR Okeechobee FL	11740na				
2230	2300	Turkey, Voice of 6015va	9655va				
2230	2300	China, China Radio Intl	5990na	13680na			
2230	2300	Romania, Radio Romania Intl	11840eu	11940na			
		15145na 15370na					
2304	0000	USA, WYFR Okeechobee FL	15400sa				
2305	2312	Croatia, Voice of 7285sa					
2320	2330	Kyrgyz, Kyrgyz Radio	4010as	4795as			
2330	0000	Canada, Radio Canada Intl	5960na	9590na			
2330	0000	Lithuania, Radio Vilnius	9875na				
2330	0000	DRM Netherlands, Radio 15525eu					
2330	0000	UK, BBC World Service	6035as	17830af			
2330	0000	USA, Voice of America 6180va	7130va	7205va			
		9620va 9780va 11735va	11805va	13640va			
		15110va 15205va					
2330	2345	Iraq, Radio Iraq Intl	11787sirr				
2330	2357	Czech Rep, Radio Prague Intl	5915na	7345na			
2330	2357	Vietnam, Voice of 9840as	12020as				
2330	0000	Switzerland, Swiss Radio Intl	9885sa	11660sa			

Headnotes:

- BBCWS stream abbreviations:** (am)=Americas; (eas)=East Asia. **Suggested frequencies for North America:** (am) - 1000-1400 6195, 1100-1700 15190, 2100-0500 5975, 2100-0000 6135, 2100-0300 12095, 0000-0300 9825, 0100-0400 9525, 0400-0600 6135. (eas) - 1100-1600 9740, 1100-1400 17760.
- Deutsche Welle will have changed frequencies for the B03 season after print deadline for this issue, so it was not yet clear which transmissions and frequencies (if any) will offer acceptable reception of DW in North America. We'll check and report back in January's issue; but you can check for yourself by referring to the time and frequency list in this Shortwave Guide and testing reception of all DW frequencies of your location (and, of course, reporting your results to us).**

0000 UTC / 7pm E / 4pm P - Page 43 Freqs

NEWSCASTS (*extended)

0000	BBCWS(am)	D	News
	R. Australia	D	World News
	R. Canada Int.	D	News
	R. Japan	D	World News
	R. Netherlands	S/M	News
	R. New Zealand Int. D		News
	Spanish Foreign R... T-A		Ibero-American News*
	VOA News Now	T-A	News*

CURRENT AFFAIRS MAGAZINES/Features

0000	R. Netherlands	T-A	Newsline
0005	BBCWS(am)	T-A	Outlook
	R. Canada Int.	T-A	As It Happens (from 2330)
0006	R. Netherlands	M	Wide Angle (one topic focus)
0010	R. Australia	H	Background Briefing (documentaries)
0015	R. Japan	T-A	44 Minutes
	VOA News Now	T-A	Focus (one story in depth)
0030	R. Canada Int.	H	Dispatches

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)

0005	R. Australia	A	The Business Report
0030	R. Netherlands	A	A Good Life (development issues)

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0005	R. Canada Int.	S	Quirks & Quarks
	R. New Zealand Int. A		Digital Life
0010	R. Australia	T	The Science Show
0030	R. Australia	A	Ockham's Razor (opinion)
	R. Netherlands	T	The Research File
0034	R. Australia	S	Ockham's Razor

ARTS AND CULTURE

0000	Spanish Foreign R... M		Window on Spain
0005	R. New Zealand Int. S		At the Movies
0010	R. Australia	M	Awayel (Aboriginal life/culture)
0030	R. Netherlands	M	Vox Humana
	R. New Zealand Int. S		Bookmarks
0035	Spanish Foreign R... H		Entremeses (food & travel)

LOCAL LIVES & VIEWS

0006	R. Netherlands	S	Europe Unzipped (weekly review)
0010	R. Australia	W	The National Interest (politics)
	..... F		Hindsight (social history)
	..... M		Weekend Japonology
0125	R. Netherlands	S	Insight (commentary)
0030	R. Australia	A	Country Breakfast (rural Australia)
	R. Netherlands	W	EuroQuest (Europe in context)
	..... F		Dutch Horizons
0033	VOA News Now	T-A	Coast to Coast

INFORMATIONAL FEATURES

0006	BBCWS(am)	M	Documentaries
0030	R. Netherlands	S	Amsterdam Forum (topical discussion)
	..... H		Documentary
0045	R. Australia	A	Lingua Franca (about language)
0047	Spanish Foreign R... T-A		Spanish Language Course

0054	R. Japan	M	Sights & Sounds of Japan
MUSIC			
0000	WBCQ(7415kHz)	A	Last Discs Radio Show
0005	R. Australia	S	Keys to Music (music appreciation)
	R. Canada Int.	M	Global Village (world/folk)
	R. New Zealand Int. M-F		Wayne's Music (nostalgia)
0010	R. Japan	T-A	Songs for Everyone
ENTERTAINMENT			
0000	WBCQ Maine	M	Le Show
0006	BBCWS(am)	S	Pick of the World (BBC's best)
0030	R. New Zealand Int. A		Comedy Zone
0032	BBCWS(am)	M	Quiz or panel game
0045	BBCWS(am)	T-A	Off the Shelf (readings)

SWL, MEDIA & COMMUNICATIONS

0000	WBCQ Maine	S	Real Amateur Radio Show
	..... H		Off the Hook
0030	R. for Peace Int.	M	World of Radio
	..... W		Counterspin
0035	Spanish Foreign R... S/T		Radio Waves
0045	R. Bulgaria	A	R. Bulgaria Calling

LISTENER CONTACT/INTERACTIVE

0010	R. Japan	S	Hello from Tokyo
0030	R. Australia	A	Feedback
	R. for Peace Int.	S	RFPI Mailbag
0035	Spanish Foreign R... A		Radio Club
0045	BBCWS(am)	S	Write On

SPORT

0023	VOA News Now	T-A	Sports
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0100 UTC / 8pm E / 5pm P - Page 43 Freqs

NEWSCASTS (*extended)

0100	BBCWS(am)	D	News
	China R. Int.	D	News & Reports*
	R. Australia	D	News
	R. Habana Cuba	D	News
	R. Netherlands	S/M	News
	R. New Zealand Int. D		News
	R. Prague	D	News
	R. Ukraine Int.	D	News
	VOA News Now	T-A	News & Reports*
	Voice of Vietnam	D	News
0130	RTE, Ireland	T-S	The News at Six*
	VOA Spec. Eng.	T-A	News

CURRENT AFFAIRS MAGAZINES/Features

0100	R. Netherlands	T-A	Newsline
0105	R. Australia	S	Correspondents' Report
	..... A		Asia Pacific Weekend Edition
0106	BBCWS(am)	F	Assignment (behind the news)
	R. Netherlands	M	Wide Angle (one topic focus)
0110	China R. Int.	S	Report on Developing Countries
	R. Australia	M-F	Asia Pacific
	R. Habana Cuba	M	Weekly Review
	R. Habana Cuba	T-S	Viewpoint
0115	VOA News Now	A	VOA News Review
0140	R. Habana Cuba	A	Weekly Review
	VOA Spec. Eng.	A	In the News
0145	VOA News Now	T-F	Dateline

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)

0115	R. Prague	F	Economic Report
	Voice of Vietnam	F	Vietnam Economy
0130	China R. Int.	T	Biz China
	R. Netherlands	A	A Good Life (development)
0132	BBCWS(am)	F	The Music Biz
0133	VOA News Now	T-F	Business News
0140	VOA Spec. Eng.	T	Development Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0105	R. New Zealand Int. A		Eureka!
0115	China R. Int.	A	Cutting Edge
0130	R. Australia	M	The Health Report
	R. Netherlands	T	Research File
	R. New Zealand Int. A		Health [or Environment] Matters

0140	VOA Spec. Eng.	W	Agriculture Today
	..... H		Health Report
	..... A		Environment Report
0145	VOA Spec. Eng.	W	Science in the News
	..... H		Explorations
0150	R. Habana Cuba	M	Breakthrough
ARTS AND CULTURE			
0106	BBCWS(am)	W	Masterpiece (cultural ideas)
0115	R. Prague	M	Czech Books (fortnightly)
	..... A		The Arts
	Voice of Vietnam	W	Culture & Society
0120	China R. Int.	S	In the Spotlight
	Voice of Vietnam	A	Literature & Arts
0130	R. Netherlands	M	Vox Humana
	R. Ukraine Int.	M	Roots
0145	VOA Spec. Eng.	A	American Stories
	..... H		The Making of a Nation

LOCAL LIVES & VIEWS

0105	R. Austria Int.	S/M	Insight Central Europe
	R. New Zealand Int. M-F		In Touch with New Zealand
	R. Prague	S	Insight Central Europe
	..... T-A		Current Affairs
	Voice of Vietnam	D	Current Affairs
0106	R. Netherlands	S	Europe Unzipped (weekly review)
0110	R. Ukraine Int.	T-A	Ukraine Today
	Voice of Vietnam	T	Vietnam: Land and People
	A		Rural Vietnam
0115	R. Austria Int.	T-A	Report from Austria
	R. Prague	W	Witness (oral history)
0120	R. Prague	W	One on One (interview)
	..... H		Czechs in History [or] Spotlight (places)
0125	R. Netherlands	S	Insight (commentary)
0130	China R. Int.	M	People in the Know
	..... W		China Horizons
	..... H		Voices from Other Lands
	..... F		Life in China
	R. Australia	A	The Lounge (interesting people)
	R. Netherlands	W	EuroQuest (Europe in context)
	..... F		Dutch Horizons
0135	R. Austria Int.	S/M	Insight Central Europe
0140	R. Habana Cuba	T/H/F	Caribbean Outlook
0145	R. Austria Int.	T-A	Report from Austria
	VOA Spec. Eng.	T	This is America
	..... F		Making of a Nation
	..... A		American Mosaic

INFORMATIONAL FEATURES

0105	R. New Zealand Int. S		Documentaries
0106	BBCWS(am)	M	Everywoman (magazine)
	..... T/H		Documentaries
0130	R. Australia	T	The Law Report
	..... W		The Religion Report
	R. Netherlands	S	Amsterdam Forum
	..... H		Documentary
	R. for Peace Int.	S	Alternative Radio
0140	VOA Spec. Eng.	F	Education Report

MUSIC

0100	WBCQ Maine	S	A Different Kind of Oldies Show
0106	BBCWS(am)	S	Top of the Pops (UK music charts)
0110	R. Ukraine Int.	M	Music from Ukraine
0120	Voice of Vietnam	S	Vietnamese Music
0130	RTE Ireland	M	Easy Sunday (light music)
0132	BBCWS(am)	T	The Music Feature (documentaries)
	..... W		White Label (new music reviewed)
	..... H		Charlie Gillett (world)
	..... A		John Peel (an eclectic mix)

ENTERTAINMENT

0100	WBCQ Maine	M	Radio NY International (to 0400)
	..... A		Allan Weiner Worldwide
0110	Voice of Vietnam	M	Sunday Show
0130	BBCWS(am)	M	Westway Omnibus (drama serial)

SWL, MEDIA & COMMUNICATIONS

0100	R. for Peace Int.	W	World of Radio
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Shortwave Guide



0115 R. Ukraine Int. S Whole World on Radio Dial
 0130 R. Australia H The Media Report
 R. for Peace Int. A World of Radio
 0140 R. Habana Cuba S/W DXers Unlimited

LISTENER CONTACT/INTERACTIVE

0105 R. Prague M Mailbox
 0115 Voice of Vietnam H Letterbox
 0125 R. Austria Int. S/A Listener Letters
 0130 China R. Int. A Listeners' Garden
 R. for Peace Int. W RFPI Mailbag
 R. Ukraine Int. S Hello from Kiev
 0140 R. Habana Cuba M Mailbag Show
 0155 R. Austria Int. S/A Listener Letters

SPORT

0105 R. Australia S/A Grandstand (live sport)*
 0106 BBCWS(am) A Sports International (documentaries)
 0123 VOA News Now T-A Sports Report
 0130 R. Australia F The Sports Factor
 RTE Ireland S Sportsnews
 0135 R. Habana Cuba T-A Time Out
 0135 R. New Zealand Int. S/A Live Sport (occasional)
 *special service on 9660, 12080, 17580, 21725 kHz.

0200 UTC / 9pm E / 6pm P - Page 44 Freqs

NEWSCASTS (*extended)

0200 BBCWS(am) D News
 R. Australia D News
 R. Budapest D News
 R. Canada Int. D News
 R. Habana Cuba D News
 R. Korea Int. D News
 R. New Zealand Int. D News
 R. Prague D News
 R. Taiwan Int. D News
 Voice of Russia D News
 0230 Voice of Vietnam D News

CURRENT AFFAIRS MAGAZINES/Features

0205 R. Australia A Background Briefing (documentaries)
 0210 R. Australia M-F The World Today
 R. Korea Int. T-A News Commentary
 0211 Voice of Russia S News and Views
 M Sunday Panorama
 T-A Commonwealth Update
 0215 R. Korea Int. T-A Seoul Calling
 0230 R. Sweden T-A 60 Degrees North

BUSINESS/ECONOMICS (also in News-casts & Current Affairs)

0205 R. Budapest M Europe Unlimited (trade-monthly)
 R. Canada Int. S Business Sense
 0215 R. Prague F Economic Report
 0235 R. Canada Int. F Business Sense
 0245 Voice of Vietnam F Vietnam Economy

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0206 BBCWS(am) T Health Matters
 W Go Digital
 H Discovery (research)
 F One Planet (ecology)
 A Science in Action
 0235 R. Canada Int. S/A Sci-Tech File
 0245 R. Sweden F Greenscan (ecology-2nd wk.)
 Heartbeat (health-3rd wk.)

ARTS AND CULTURE

0205 R. Budapest M Spotlight (monthly)
 0206 BBCWS(am) M The Ticket (reports/performances)
 0215 R. Prague M Czech Books (fortnightly)
 A The Arts
 R. Taiwan Int. T Culture Express
 0230 R. Sweden S Spectrum (3rd wk.)
 0232 BBCWS(am) F The Word (considering literature)
 World Book Club (book & author) [last wk.]
 0235 R. Canada Int. M/H Spotlight
 0245 Voice of Vietnam W Culture & Society
 0250 Voice of Vietnam A Literature and Arts

LOCAL LIVES & VIEWS

0205 R. Budapest S Insight Central Europe
 M Heading for Hungary

(monthly) T-A Hungary Today
 R. Canada Int. T-A Canada Today
 R. New Zealand Int. M-F In Touch with New Zealand (from 0105)
 R. Prague S Magazine (local color)
 T-A Current Affairs
 0215 R. Prague S Letter from Prague
 W Witness (oral history)
 R. Taiwan Int. S Hakka World (Hakka culture)

..... W Taiwan Today
 H Discover Taiwan
 F Taipei Magazine
 0220 R. Prague S/W One on One (interview)
 0230 R. Korea Int. T Korea Today & Tomorrow
 W Korean Kaleidoscope (society)
 H Wonderful Korea (travel)
 F Seoul Report (from the capital)
 R. Sweden S Network Europe (magazine-1st wk.)
 Sweden Today (2nd wk.)
 discussion-4th wk.)
 0232 Voice of Russia S Moscow Yesterday and Today
 0235 R. Canada Int. T Media Zone (journalists' perspective)
 0245 R. Sweden W Close Up (profiles-1st wk.)
 F Nordic Lights (1st wk.)
 A The S-Files (things Swedish-4th wk.)
 T Review of the Newsweek
 Voice of Vietnam T Vietnam: Land & People
 A Rural Vietnam
 0254 Voice of Russia H Russia: People and Events

..... H Moscow Yesterday and Today
 F Seoul Report (from the capital)
 R. Sweden S Network Europe
 Sweden Today (2nd wk.)
 Studios 49 (topical)
 0232 Voice of Russia S Moscow Yesterday and Today
 0235 R. Canada Int. T Media Zone (journalists' perspective)
 0245 R. Sweden W Close Up (profiles-1st wk.)
 F Nordic Lights (1st wk.)
 A The S-Files (things Swedish-4th wk.)
 T Review of the Newsweek
 Voice of Vietnam T Vietnam: Land & People
 A Rural Vietnam
 0254 Voice of Russia H Russia: People and Events

INFORMATIONAL FEATURES

0200 R. for Peace Int. M New Dimensions
 0205 R. New Zealand Int. S RPM (international documentaries)
 0232 Voice of Russia A Christian Message from Moscow
 0235 R. Habana Cuba S The World of Stamps
 0245 BBCWS(am) H Heart & Soul (beliefs & values)
 A What's the Problem? (advice)
 R. Taiwan Int. M-F Let's Learn Chinese

MUSIC

0205 R. New Zealand Int. A Home Grown (Kiwii music)
 0210 R. Habana Cuba M From Habana
 R. Korea Int. M Korean Pop Interactive S
 0215 R. Prague S Encore (classical monthly)
 Magic Carpet (world music monthly)
 R. Taiwan Int. M Jade Bells & Bamboo Pipes (traditional)
 0230 R. Habana Cuba M The Jazz Place [or] Top Tens
 R. New Zealand Int. A Musical Chairs (artist profile)
 R. Sweden M Sounds Nordic (exc. 1st wk.)
 0232 BBCWS(am) W Music Review (explorations)
 Voice of Russia T Folk Box
 W Jazz Show
 H Musical Portraits
 F Music Around Us
 0246 Voice of Russia F Music At Your Request
 0250 Voice of Vietnam S Music (Vietnamese)

ENTERTAINMENT

0200 WBCQ Maine S Marion's Attic (vin-ages recordings)
 0201 BBCWS(am) S Play of the Week (radio theatre)
 0205 R. Australia S Margaret Throsby (interview w/music)
 0232 BBCWS(am) T Quiz or panel game
 H/A Westway (drama serial)
 Voice of Russia M Timelines
 0240 Voice of Vietnam M Sunday Show

SWL, MEDIA & COMMUNICATIONS

0200 R. for Peace Int. F Continent of Media
 0220 R. Budapest A DX Corner

LISTENER CONTACT/INTERACTIVE

0205 R. Budapest M And the Gatepost (monthly)
 R. Canada Int. M Maple Leaf Mailbag
 R. Prague M Mailbox
 0210 R. Korea Int. S Worldwide Friendship
 0230 R. for Peace Int. A RFPI Mailbag
 R. Sweden M In Touch with Stockholm (1st wk.)
 R. Taiwan Int. S Mailbag Time
 0235 R. Canada Int. W Maple Leaf Mailbag
 0245 Voice of Vietnam H Letterbox

SPORT

0200 R. New Zealand Int. S/A Live Sport (occasional)
 0205 BBCWS(am) H Sports International (magazine)
 R. Australia S/A Grandstand (live sports action*)
 0245 R. Sweden T Sports-cast
 (*special on 9660, 12080, 17580, 21725 kHz. only.)

0300 UTC / 10pm E / 7pm P - Page 44 Freqs

NEWSCASTS (*extended)

0300 BBCWS(am) S/A News
 M-F The World Today*
 China R. Int. D News & Reports
 R. Australia D News
 R. Habana Cuba D News
 R. New Zealand Int. S/A News
 M-F Pacific Regional News
 R. Taiwan Int. D News
 Voice of Russia D News
 0330 R. Budapest D News
 Voice of Vietnam D News

CURRENT AFFAIRS MAGAZINES/Features

0306 BBCWS(am) S From Our Own Correspondent
 A Assignment (inside the news)
 0310 China R. Int. S Report on Developing Countries
 R. Habana Cuba M Weekly Review
 R. New Zealand Int. M-F Dateline Pacific
 0315 R. Habana Cuba T-S Viewpoint
 0330 R. New Zealand Int. F Pacific Correspondent
 R. Sweden T-A 60 Degrees North
 0332 BBCWS(am) S The Interview (ideas & trends)
 0340 R. Habana Cuba T/H/F Carib-bean Outlook
 A Weekly Review
 0345 BBCWS(am) TWFA Analysis
 H From Our Own Correspondent
 R. Sweden A Review of the Newsweek

BUSINESS/ECONOMICS (also in News-casts & Current Affairs)

0315 R. Taiwan Int. M Taiwan Economic Journal
 0330 China R. Int. T Biz China
 R. New Zealand Int. W Tradewinds
 0332 BBCWS(am) M World Business Review
 T-A World Business Report
 0335 R. Budapest M Europe Unlimited (trade-monthly)
 0345 Voice of Vietnam F Vietnam Economy

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0315 China R. Int. A Cutting Edge
 0345 R. Sweden F Greenscan (ecology-2nd wk.)
 Heartbeat (health-3rd wk.)
 0350 R. Habana Cuba M Breakthrough

ARTS AND CULTURE

0315 R. Taiwan Int. F Taiwan Gourmet
 0320 China R. Int. S In the Spotlight
 0330 R. Sweden S Spectrum (3rd wk.)
 0335 R. Budapest M Spotlight (monthly)
 0345 Voice of Vietnam W Culture and Society
 0350 Voice of Vietnam A Literature & Arts

LOCAL LIVES & VIEWS

0305 R. Australia A Rural Reporter (the outback)
 0315 R. Taiwan Int. S Hakka World (Hakka culture)

Shortwave Guide



0400 UTC / 11pm E / 8pm P - Page 45 Freqs

.....	H	News Talk
.....	A	Kaleidoscope
0320	R. Australia	M-F Life Matters (Aussie social issues)
0330	China R. Int.	M People in the Know
.....	W	China Horizons
.....	H	Voices from Other Lands
.....	F	Life in China
.....	S	Network Europe
.....	S	(magazine-1st wk)
.....	S	Sweden Today (2nd wk)
.....	S	Studio 49 (topical discussion-4th wk)
0332	Voice of Russia	M This is Russia
.....	T	Kaleidoscope (events)
.....	H	Moscow Yesterday and Today
0335	R. Budapest	S Insight Central Europe
.....	M	Heading for Hungary
.....	T-A	Hungary Today
0345	R. Sweden	W Close Up (profiles - 1st wk.)
.....	F	Nordic Lights (1st wk.)
.....	F	The S-Files (things Swedish-4th wk)
.....	A	Review of the Newsweek
.....	T	Vietnam: Land and People
.....	A	Rural Vietnam
0354	Voice of Russia	W Russia: People & Events

INFORMATIONAL FEATURES

0330	R. Australia	S All in the Mind (the brain)
0332	Voice of Russia	F Russian by Radio
0345	BBCWS(am)	M The Instant Guide (quick background)
.....	R. Taiwan Int.	M-F Let's Learn Chinese

MUSIC

0305	R. New Zealand Int.	A Home Grown (from 0205)
0315	R. Taiwan Int.	T Jade Bells & Bamboo Pipes (traditional)
0330	R. Australia	S Music Deli (international)
.....	A	Australian Country Style
.....	R. New Zealand Int.	M New Music Releases
.....	R. Sweden	M Sounds Nordic (rock-exc. 1st wk.)
0332	Voice of Russia	S Songs from Russia
.....	W	Musical Portraits
0350	Voice of Vietnam	S Music (Vietnamese)

ENTERTAINMENT

0305	R. New Zealand Int.	S Sunday Drama (radio theatre)
0332	Voice of Russia	A Audio Book Club
0340	Voice of Vietnam	M Sunday Show

SWL, MEDIA & COMMUNICATIONS

0300	WWCR Tennessee	S DX Partyline (5070 kHz)
.....	KWHR Hawaii	M DXing with Cumbre
0310	R. New Zealand Int.	M RNZI Talk (biweekly)
.....	A	Mailbox (biweekly)
0330	WHRA Maine	S DXing with Cumbre (7580 kHz)
.....	M	DXing with Cumbre (5745 kHz)
.....	S	World of Radio (5070 kHz)
0340	R. Habana Cuba	S/W DXers Unlimited
0345	R. Bulgaria	S R. Bulgaria Calling
0350	R. Budapest	A DX Corner

LISTENER CONTACT/INTERACTIVE

0305	R. Australia	S Feedback
0330	China R. Int.	A Listeners' Garden
.....	R. Sweden	M In Touch with Stockholm (1st wk.)
.....	R. Taiwan Int.	A Mailbag Time
0335	R. Budapest	M And the Gatepost (monthly)
0340	R. Habana Cuba	M Mailbag Show
0345	Voice of Vietnam	H Letterbox
0346	Voice of Russia	S You Write to Moscow

SPORT

0300	R. Australia	S/A Grandstand (live action)*
.....	R. New Zealand Int.	S/A Live Sport (occasional)
0310	R. Australia	M-F Regional Sports Report
0330	R. New Zealand Int.	H The World in Sport
0335	R. Habana Cuba	T-A Time Out
0345	R. Sweden	T Sportskan

(*special on 9660, 12080, 17580, 21725 kHz. only)

NEWSCASTS (*extended)

0400	BBCWS(am)	S/M World Briefing*
.....	M-A	News
.....	D	News & Reports
.....	D	News
.....	D	News
.....	S/M	News
.....	D	News

CURRENT AFFAIRS MAGAZINES/Features

0400	R. Netherlands	T-A Newline
.....	R. for Peace Int.	T-A Democracy Now!
0405	R. New Zealand Int.	M-F Checkpoint
0406	BBCWS(am)	M Talking Point (interactive discussion)
.....	T-A	Outlook (magazine)
0410	China R. Int.	S Report on Developing Countries

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)

0415	R. Prague	F Economic Report
0430	China R. Int.	T Biz China
.....	R. Netherlands	A A Good Life (development)
0432	BBCWS(am)	S Global Business

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0405	R. Australia	S All in the Mind (the brain)
0415	China R. Int.	A Cutting Edge
0430	R. Netherlands	T Research File

ARTS AND CULTURE

0415	R. Prague	M Czech Books (fortnightly)
.....	A	The Arts
0420	China R. Int.	S In the Spotlight
0430	R. Netherlands	M Vox Humanc
0432	Voice of Russia	W/F Russian history/culture program

LOCAL LIVES & VIEWS

0405	R. Prague	S Magazine (local color)
.....	T-A	Current Affairs
0406	R. Netherlands	S Europe Unzipped (weekly review)
0408	RvI Belgium	M Tourism in Flanders
0410	R. New Zealand Int.	A Tagata o te Moana (Pacific magazine)
0415	R. Prague	S Letter from Prague
.....	W	Witness (oral history)
0420	R. Prague	S/W One on One (interview)
.....	H	Czechs in History or Spotlight (places)
0425	R. Netherlands	S Insight (commentary)
0430	China R. Int.	M People in the Know
.....	W	China Horizons
.....	H	Voices from Other Lands
.....	F	Life in China
.....	S	The Lounge (interesting people)
.....	W	EuroQuest (Europe in Context)
.....	F	Dutch Horizons
0435	R. Netherlands	S Europe Unzipped

INFORMATIONAL FEATURES

0410	R. New Zealand Int.	S Feature on religion/spirituality
0430	R. Netherlands	S Amsterdam Forum (topical discussion)
.....	H	Documentary
0432	Voice of Russia	T/H/A Century 20th
0435	R. Habana Cuba	S The World of Stamps

MUSIC

0405	R. Australia	A The Music Show
0410	R. Habana Cuba	M From Habana
0411	Voice of Russia	S Music & Musicians
0415	R. Prague	S Encore (classical monthly)
.....	S	Magic Carpet (world music monthly)
0430	R. Habana Cuba	M The Jazz Place [or] Top Tens
0440	R. New Zealand Int.	S Jazz Spotlight

ENTERTAINMENT

0400	WBCQ(7415 kHz.)	S You Are What You Think (satire)
0406	BBCWS(am)	A Pick of the World (BBC's best)
0410	R. Australia	M-F Margaret Throsby (interview w/music)
0432	Voice of Russia	M Audio Book Club
0445	BECWS(am)	T-A Off the Shelf (readings)

SWL, MEDIA & COMMUNICATIONS

0400	R. for Peace Int.	S Counterspin
.....	WWCR Tennessee	S Spectrum (5070 kHz)
0430	WHRI Indiana	M DXing with Cumbre (7315 kHz)

LISTENER CONTACT/INTERACTIVE

0405	R. Prague	M Mailbox
0430	China R. Int.	A Listeners' Garden
0445	BBCWS(am)	A Write On

SPORT

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

0500 UTC / 12am E / 9pm P - Page 45 Freqs

NEWSCASTS (*extended)

0500	BBCWS(am)	D World Briefing*
.....	China R. Int.	D News & Reports
.....	R. Australia	D News
.....	R. Habana Cuba	D News
.....	R. Japan	D News
.....	R. New Zealand Int.	D News
.....	RvI, Belgium	T-A News
.....	Voice of Nigeria	S/A News
.....	Voice of Russia	D News
0530	BBCWS(am)	M-F The World Today*
0545	R. New Zealand Int.	M-F Pacific News

CURRENT AFFAIRS MAGAZINES/Features

0500	Voice of Nigeria	M-F VON Scope
0505	R. New Zealand Int.	M-F Worldwatch
0510	China R. Int.	S Report on Developing Countries
.....	R. Habana Cuba	M Weekly Review
0515	R. Habana Cuba	T-S Viewpoint
.....	R. Japan	M-F 44 Minutes
0520	R. New Zealand Int.	M-F Pacific Report
0530	R. New Zealand Int.	M Letter from America (Alistair Cooke)
0540	R. Habana Cuba	T/H/F Caribbean Outlook
.....	A	Weekly Review

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)

0511	Voice of Russia	H Newmarket
0530	China R. Int.	T Biz China
0545	R. Australia	A Business Weekend

SCIENCE/TECHNOLOGY (incl. Health & Environment)

0511	Voice of Russia	W/A Science and Engineering
0515	China R. Int.	A Cutting Edge
0550	R. Habana Cuba	M Breakthrough

ARTS AND CULTURE

0520	China R. Int.	S In the Spotlight
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LOCAL LIVES & VIEWS

0504	RvI, Belgium	T-A Flanders Today (variety magazine)
0505	R. New Zealand Int.	S Mana Korero (Maori magazine)
0508	RvI, Belgium	M Tourism in Flanders
0510	R. Australia	M-F Pacific Beat (islands magazine)
0530	China R. Int.	M People in the Know
.....	W	China Horizons
.....	H	Voices from Other Lands
.....	F	Life in China
.....	T-H	Today in Parliament
0532	BBCWS(am)	A People & Politics (Parliament)
.....	W	Moscow Yesterday and Today

INFORMATIONAL FEATURES

0500	R. for Peace Int.	H Alternative Radio
0505	R. Australia	S The Europeans
0530	R. Australia	S The Ark (religious history)
0532	BBCWS(am)	S Reporting Religion

Shortwave Guide



MUSIC
 0500 R.Vi, Belgium S Music from Flanders
 0505 R. Australia A The Music Show
 (cont'd.)
 R. New Zealand Int. A The Mix
 Voice of Nigeria A VON Link-Up (requests)
 0510 R. Japan S Pop Joins the World
 0511 Voice of Russia S/M Musical Portraits
 0532 Voice of Russia M Jazz Show
 T Music Around Us
 H Folk Box
 0547 Voice of Russia T Music At Your Request

ENTERTAINMENT
 0500 WBCQ Maine M-A Amos 'n Andy (classic comedy)
 0530 Voice of Nigeria D Moving On (variety)
 0532 Voice of Russia F Audio Book Club
 S/A Timelines
 0545 R. New Zealand Int. M-F Storytime

SWL, MEDIA & COMMUNICATIONS
 0500 R.Vi, Belgium M Radio World
 WBCQ Maine S Tom & Darryl
 WWCN Tennessee S Cyber Line (digital)
 0505 Voice of Nigeria S This Week on VON
 0530 WHRA Maine A DXing with Cumbre
 (7580 kHz)
 R. for Peace Int. S Continent of Media
 0540 R. Habana Cuba S/W DXers Unlimited
 0545 WBCQ Maine M World of Radio

LISTENER CONTACT/INTERACTIVE
 0510 R. Japan A Hella from Tokyo
 0511 Voice of Russia T/F Moscow Mailbag
 0514 R.Vi, Belgium M Brussels 1043
 0530 China R. Int. A Listeners' Garden
 0540 R. Habana Cuba M Mailbag Shaw

SPORT
 0500 R. Australia S/A Grandstand (live action)*
 0520 BBCWS(am) D Sports Roundup
 0535 R. Habana Cuba T-A Time Out
 R. New Zealand Int. S/A Live Sport (on occasion)
 (*special on 9660, 12080, 17580, 21725 kHz. only.)

0600 UTC / 1am E / 10pm P - Page 46 Freqs

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

CURRENT AFFAIRS MAGAZINES/Features
 0615 R. Japan M-F Asian Top News (region's radio)
 0630 Voice of Nigeria S In the News
 A News Maker

SCIENCE/TECHNOLOGY (incl. Health & Environment)
 0620 R. Australia M Ockham's Razor
 (opinion)
 T In Conversation
 0630 R. Australia S In Conversation

ARTS AND CULTURE
 0605 R. Australia S The Arts
 0620 R. Australia F The Maker

LOCAL LIVES & VIEWS
 0610 R. Japan S Weekend Japanology
 0635 R. Australia F The Lounge (interesting people)
 R. New Zealand Int. S This Week in Parliament
 0645 Voice of Nigeria A Window on Abuja
 0654 R. Japan S Sights & Sounds of Japan

INFORMATIONAL FEATURES
 0605 R. Australia S The Europeans
 R. New Zealand Int. S One in Five (disabilities)
 0620 R. Australia W Lingua Franca (about language)
 H The Ark (religious history)
 0625 R. Japan T Let's Try Japanese
 H Brush Up Your Japanese
 0635 R. Habana Cuba S World of Stamps

MUSIC
 0610 R. Habana Cuba M From Havana (Cuban

musicians)
 R. Japan M-F Songs for Everyone
 A Pop Joins the World
 0625 R. Japan M Japan Music Treasure
 Box
 W Japan Musicscape
 F Music Beat (pop)
 0630 R. Australia A Hit Mix
 R. Habana Cuba M The Jazz Place [or] Top Tens
 0635 R. Australia M Hit Mix
 T Music Deli (international)
 W Jazz Notes
 H Australia Country Style

ENTERTAINMENT
 0600 WBCQ Maine S Juliet's Wild Kingdom
 0605 R. New Zealand Int. A Saturday Night (variety)

SWL, MEDIA & COMMUNICATIONS
 0600 KWHR Hawaii A DXing with Cumbre
 (17780 kHz)
 R. for Peace Int. W Counterspin
 0630 R. for Peace Int. M World of Radio

LISTENER CONTACT/INTERACTIVE
 0600 R. for Peace Int. S RFPI Mailbag
 0605 R. Australia A Feedback

SPORT
 0600 R. Australia S/A Grandstand (live action)*
 0610 R. Australia M-F Regional Sports Report
 0635 R. New Zealand Int. S/A Live Sport (on occasion)
 (*special on 9660, 12080, 17580, 21725 kHz. only.)

1000 UTC / 5am E / 2am P - Page 47 Freqs

NEWSCASTS (*extended)
 1000 BBCWS(am) S/A News
 M-F World Update*
 R. Australia D News
 R. New Zealand Int. D News
 VOA News Now D News & Reports*

CURRENT AFFAIRS MAGAZINES/Features
 1005 R. Australia M-F Asia Pacific
 A Background Briefing
 (documentary)

1006 BBCWS(am) S From Our Own
 Correspondent
 A Assignment (inside the news)
 1032 BBCWS(am) A The Interview (ideas & trends)
 1034 VOA News Now F/A On the Line (US foreign policy)
 1055 R. Australia A Correspondent's Notebook

SCIENCE/TECHNOLOGY (incl. Health & Environment)
 1030 R. Australia M Health Report

LOCAL LIVES & VIEWS
 1005 R. New Zealand Int. T-H Today in Parliament
 1034 VOA News Now S-H Main Street

INFORMATIONAL FEATURES
 1030 R. Australia T Law Report
 W Religion Report
 1032 BBCWS(am) S Reporting Religion

MUSIC
 1005 R. Australia S Keys to Music (music appreciation)
 R. New Zealand Int. S Nightcap
 M The Mix
 F Jazz
 A Music 'til Midnight
 1010 R. New Zealand Int. T Showtime (show music)
 W In a Mellow Tone
 H Beale Street Caravan
 (jazz)

SWL, MEDIA & COMMUNICATIONS
 1000 KWHR Hawaii A DXing with Cumbre
 (11565 kHz)
 1030 R. Australia H Media Report
 1040 VOA News Now S Kim Elliott (w/in Main St., time approx.)

SPORT
 1030 R. Australia F Sports Factor

1100 UTC / 6am E / 3am P - Page 48 Freqs

NEWSCASTS (*extended)
 1100 BBCWS(am) D World Briefing*
 BBCWS(eas) M-A News
 R. Australia D News
 R. Japan D News
 R. New Zealand Int. S/A News
 M-F Pacific Regional News
 1120 BBCWS(am) D British News
 1130 R. Korea Int. D News

CURRENT AFFAIRS MAGAZINES/Features
 1105 BBCWS(am) M-F Caribbean Morning Report
 R. Australia S Correspondents' Report
 M-A Asia Pacific
 1106 BBCWS(eas) M-F Outlook (magazine)
 1108 R. New Zealand Int. M-F Dateline Pacific
 1115 R. Japan M-F Asian Top News (region's radio)
 1132 BBCWS(am) S The Instant Guide (quick background)
 1145 R. Korea Int. M-F Seoul Calling

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
 1130 R. New Zealand Int. T Tradewinds
 1132 BBCWS(am) M-F World Business Report

ARTS AND CULTURE
 1105 R. Australia S The Arts
 1106 BBCWS(am) A The Ticket (reports/performances)

LOCAL LIVES & VIEWS
 1105 R. New Zealand Int. S/A NZ Forces Radio
 1115 BBCWS(am) M-F Caribbean Magazine
 1130 R. Australia M-F Bush Telegraph (rural life)
 R. New Zealand Int. H Pacific Correspondent

INFORMATIONAL FEATURES
 1125 R. Japan T Let's Learn Japanese
 H Brush Up Your Japanese
 1130 R. Australia A The Europeans
 1132 BBCWS(eas) S Reporting Religion

MUSIC
 1110 R. Japan M-F Songs for Everyone
 A Pop Joins the World
 1125 R. Japan M Japan Music Treasure
 Box
 W Japan Musicscape
 F Music Beat (pop)
 1140 R. Korea Int. S Korean Pop Interactive

ENTERTAINMENT
 1100 BBCWS(eas) S Play of the Week (radio theatre)(cont'd)
 1145 BBCWS(am) M-F Off the Shelf (readings)

SWL, MEDIA & COMMUNICATIONS
 1130 R. New Zealand Int. M Mailbox (fortnightly)
 M RNZI Talk (fortnightly)

LISTENER CONTACT/INTERACTIVE
 1110 R. Japan S Hello From Tokyo
 1140 R. Korea Int. A Worldwide Friendship

SPORT
 1110 BBCWS(am) M-F Sports Caribbean
 1130 R. New Zealand Int. W The World in Sport
 F Sports Story
 1132 BBCWS(am) A World Football (global soccer)
 1145 BBCWS(am) S-F Sports Roundup

1200 UTC / 7am E / 4am P - Page 48 Freqs

NEWSCASTS (*extended)
 1200 BBCWS(am)(eas) D Newshour*
 R. Australia D News
 R. Netherlands S/A News
 R. New Zealand Int. S/A News
 M-F Late Edition*

CURRENT AFFAIRS MAGAZINES/Features
 1200 R. Netherlands M-F Newslines
 1206 R. Netherlands S Wide Angle (one topic focus)
 1210 BBCWS(am) M-F Caribbean Morning Report
 1230 R. Sweden M-F 60 Degrees North

Shortwave Guide

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
 1205 BBCWS(am) M-F Caribbean Business
 1230 R. Netherlands F A Good Life (development issues)

SCIENCE/TECHNOLOGY (incl. Health & Environment)
 1230 R. Netherlands M Research File
 1245 R. Sweden H Greenscan (ecology-2nd wk.)
 H Heartbeat (3rd wk.)

ARTS AND CULTURE
 1230 R. Netherlands S Vox Humana
 R. Sweden A Spectrum (3rd wk.)

LOCAL LIVES & VIEWS
 1205 R. Australia M-H Late Night Live (discussion)
 R. New Zealand Int. A NZ Forces Radio
 1206 R. Netherlands A Europe Unzipped (weekly review)
 1225 R. Netherlands A Insight (commentary)
 1220 BBCWS(am) M-F Caribbean Magazine
 1230 R. Netherlands T EuroQuest (Europe in context)
 H Dutch Horizons
 R. Sweden A Network Europe (magazine-1st wk.)
 H Sweden Today (2nd wk.)
 T Studio 49 (discussion-4th)
 1245 R. Sweden T Close-Up (profiles-1st wk.)
 H Nordic Lights (1st wk.)
 F The S-Files (things Swedish-4th)
 F Review of the Newsweek

INFORMATIONAL FEATURES
 1205 R. Australia S The Spirit of Things (spiritual matters)
 1230 R. Netherlands W Documentary
 A Amsterdam Forum (topical discussion)

MUSIC
 1205 R. Australia F Sound Quality (innovative)
 A The Music Show
 1230 R. Sweden S Sounds Nordic (rock-exc. 1st wk.)

ENTERTAINMENT
 1205 BBCWS(eas) A Quote, Unquote (or other game/quiz)

SWL, MEDIA & COMMUNICATIONS
 1200 R. for Peace Int. W Counterspin
 1230 HCJB Ecuador A DX Partyline
 R. for Peace Int. M World of Radio

LISTENER CONTACT/INTERACTIVE
 1230 R. Sweden S In Touch with Stockholm (1st wk.)

SPORT
 1205 R. New Zealand Int. S Sportsworld (weekend review)
 1245 R. Sweden M Sportsman

1300 UTC / 8am E / 5am P - Page 49 Freqs

NEWSCASTS
 1300 BBCWS(am)(eas) D News
 China R. Int. D News & Reports*
 R. Australia D News
 R. Canada Int. M-F News
 R. New Zealand Int. S/A News
 M-F Pacific Regional News
 1332 BBCWS(eas) M-F British News

CURRENT AFFAIRS MAGAZINES/Features
 1305 R. Canada Int. M-F The Current
 1306 BBCWS(am) M-F Outlook
 BBCWS(eas) S Fram Our Own Correspondent
 H Assignment (inside the news)
 1308 R. New Zealand Int. M-F Dateline Pacific
 1310 China R. Int. S Report on Developing Countries
 1330 R. Sweden M-F 60 Degrees North
 1355 R. Australia S Perspective (informed commentary)

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
 1330 China R. Int. T Biz China
 R. New Zealand Int. T Tradewinds

SCIENCE/TECHNOLOGY (incl. Health & Environment)
 1305 R. Australia S The Science Show
 1315 China R. Int. A Cutting Edge
 1345 R. Sweden H Greenscan (ecology-2nd wk.)
 H Heartbeat (health-3rd wk.)

Arts/Culture
 1306 BBCWS(eas) T Masterpiece (cultural ideas)
 1320 China R. Int. S In the Spotlight
 1330 R. Sweden A Spectrum (3rd Sat.)

LOCAL LIVES & VIEWS
 1330 China R. Int. M People in the Know
 W China Horizons
 H Voices from Other Lands
 F Life in China
 R. New Zealand Int. H Pacific Correspondent
 R. Sweden A Network Europe (magazine-1st wk.)
 H Sweden Today (2nd wk.)
 1345 R. Sweden T Studio 49 (discussion-4th wk.)
 H Close Up (profiles - 1st wk.)
 F Nordic Lights (1st wk.)
 H The S-Files (things Swedish-4th wk.)
 F Review of the Newsweek

INFORMATIONAL FEATURES
 1306 BBCWS(am) S Documentaries
 BBCWS(eas) M/W Documentaries
 1332 BBCWS(am) S In Praise of God (worship service)
 BBCWS(eas) S Reporting Religion

MUSIC
 1301 BBCWS(eas) A In Concert (classical recitals)
 1305 R. Australia S The Music Show (from 1205)
 M-F The Planet (international)
 VOA News Now S/A Jazz America
 M American Gold (oldies)
 T Roots & Branches (folk)
 W Classic Rock
 H Top 20
 F Country Hits
 1308 R. New Zealand Int. S Wayne's Music (nostalgia)
 A New Music Releases
 1330 R. New Zealand Int. A Hymns
 R. Sweden S Sounds Nordic (rock/pop-exc. 1st wk.)

ENTERTAINMENT
 1306 BBCWS(am) A Pick of the World (BBC's best)
 1345 BBCWS(am) M-F Off the Shelf (readings)

SWL, MEDIA & COMMUNICATIONS
 1300 R. for Peace Int. W World of Radio
 1330 R. New Zealand Int. M Mailbox (fortnightly)
 RNZI Talk (fortnightly)
 R. for Peace Int. A World of Radio
 WHRI Indiana A DXing with Cømbre (15105 kHz)

LISTENER CONTACT/INTERACTIVE
 1330 China R. Int. A Listeners' Garden
 R. for Peace Int. W RFPI Mailbag
 R. Sweden S In Touch with Stockholm (1st wk.)
 1345 BBCWS(am) A Write On

SPORT
 1310 R. Australia M-F Regional Sports Report
 1330 R. New Zealand Int. W The World in Sport
 F Sports Story
 1345 BBCWS(eas) M-H Sports Roundup
 F Football Extra
 R. Sweden M Sportscan

1400 UTC / 9am E / 6am P - Page 49 Freqs

NEWSCASTS (*extended)
 1400 BBCWS(am) D News

BBCWS(eas) S/A News
 China R. Int. D News & Reports*
 R. Australia D News
 R. Canada Int. D News
 R. Japan D News
 R. Prague D News
 1432 BBCWS(eas) M-F Newshour*

CJRRRENT AFFAIRS MAGAZINES/Features
 1400 BBCWS(eas) M-F East Asia Today
 1406 BBCWS(am)(eas) S Talking Point (interactive discussion)
 BBCWS(am) H Assignment (inside the news)
 1410 China R. Int. S Report on Developing Countries
 1415 R. Japan M-F 44 Minutes
 1430 R. Sweden M-F 60 Degrees North

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)
 1410 China R. Int. T Biz China
 1415 R. Prague W Economic Report
 1432 BBCWS(am) H The Music Biz

SCIENCE/TECHNOLOGY (incl. Health & Environment)
 1415 China R. Int. A Cutting Edge
 1445 R. Sweden H Greenscan (ecology-2nd wk.)
 H Heartbeat (health-3rd wk.)

ARTS AND CULTURE
 1405 R. Australia S Books & Writing
 1406 BBCWS(am) M Masterpiece (cultural ideas)
 1415 R. Prague F The Arts
 A Czech Books (fortnightly)
 1420 China R. Int. S In the Spotlight
 1430 R. Sweden S Spectrum (3rd wk.)

LOCAL LIVES & VIEWS
 1405 R. Canada Int. S The Sunday Edition (interviews/documentaries)
 M-F Sounds Like Canada
 A The House (Parliament)
 R. Prague M-F Current Affairs
 A Insight Central Europe

1410 R. Japan A Weekend Japonology
 1415 R. Prague T Witness (oral history)
 1420 R. Prague T One on One (interview)
 W Czechs in History [or] Spotlight (places)
 1430 China R. Int. M People in the Know
 W China Horizons
 H Voices from Other Lands
 F Life in China
 R. Canada Int. W C'est la Vie (French Canada)
 R. Sweden A Network Europe (Europe magazine-1st wk.)
 H Sweden Today (2nd wk.)
 T Studio 49 (discussion-4th wk.)
 1445 R. Sweden T Close Up (profiles-1st wk.)
 H Nordic Lights (1st wk.)
 F The S-Files (things Swedish-4th wk.)
 1454 R. Japan A Review of the Newsweek
 A Sights & Sounds of Japan

INFORMATIONAL FEATURES
 1400 R. for Peace Int. M New Dimensions
 1405 R. Australia A The Comfort Zone (design & ritual)
 1406 BBCWS(am) M/W Documentaries
 1430 R. for Peace Int. A Disability Radio
 A Worldwide

MUSIC
 1405 R. Japan S Pop Joins the World
 1430 R. Sweden S Sounds Nordic (rock/pop-exc. 1st wk.)
 1432 BBCWS(am) M The Music Feature (documentaries)
 T White Label (new music reviewed)
 W Charlie Gillett (world)
 F John Peel (eclectic mix)

ENTERTAINMENT
 1405 R. Australia M-F Margaret Throsby (interview w/music)

Shortwave Guide



SWL, MEDIA & COMMUNICATIONS

1400 R. for Peace Int. W Continent of Media
1430 R. for Peace Int. S Far Right Radio Review

LISTENER CONTACT/INTERACTIVE

1400 R. for Peace Int. A RFPI Mailbag
1405 R. Prague S Mailbox
1430 China R. Int. A Listeners' Garden
R. Sweden S In Touch with Stockholm
(1st wk.)

SPORT

1406 BBCWS(am) F Sports International
(documentaries)
BBCWS(am)(eas) A Sportsworld (live action)
1445 R. Sweden M Sportscan

1500 UTC / 10am E / 7am P - Page 50 Freqs

NEWSCASTS

1500 BBCWS(am)(eas) D News
China R. Int. D News
R. Australia D News
R. Canada Int. D News

CURRENT AFFAIRS MAGAZINES/Features

1505 R. Australia M-F Asia Pacific
1506 BBCWS(am) S Assignment (inside the news)
BBCWS(eas) S Documentaries
1510 China R. Int. S Report on Developing Countries

Business/Finance (also in Newscasts & Current Affairs)

1530 China R. Int. T Biz China
1555 R. Australia S Business Weekend

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1506 BBCWS(am)(eas) M Health Matters
..... T Go Digital
..... W Discovery (research)
..... H One Planet (ecology)
..... F Science in Action
(magazine)

1515 China R. Int. A Cutting Edge
1530 R. Australia M The Health Report

ARTS AND CULTURE

1520 China R. Int. S In the Spotlight
1532 BBCWS(am)(eas) H The Word (considering literature)
..... & author||last wk.] World Book Club (book

LOCAL LIVES & VIEWS

1505 R. Canada Int. S The Sunday Edition
(from 1405)
..... M-F Sounds Like Canada
1530 China R. Int. M People in the Know
..... W China Horizons
..... H Voices from Other Lands
..... F Life in China
1532 BBCWS(am)(eas) S People & Politics
(Parliament)

INFORMATIONAL FEATURES

1505 R. Australia S Encounter (spiritual beliefs)
R. Canada Int. M Workology (about working)
..... T-F Out Front (first person views)
1530 R. Australia T Law Report
..... W Religion Report
1545 BBCWS(am)(eas) W Heart & Soul (beliefs & values)
..... F What's the Problem
(advice)

MUSIC

1505 R. Australia A Nocturne (music of the millenia)
1532 BBCWS(am) T Music Review
(explorations)

ENTERTAINMENT

1505 R. Canada Int. A Vinyl Cafe (music/humor)
1532 BBCWS(am)(eas) M Quiz or panel game
..... W/F Westway (drama serial)

SWL, MEDIA & COMMUNICATIONS

1500 R. for Peace Int. S Far Right Radio Review

1530 R. Australia H The Media Report

LISTENER CONTACT/INTERACTIVE

1530 China R. Int. A Listeners' Garden

SPORT

1505 BBCWS(am)(eas) A Sportsworld (from 1405)
1530 R. Australia F The Sports Factor

1600 UTC / 11am E / 8am P - Page 50 Freqs

NEWSCASTS (*extended)

1600 BBCWS(am) S-F World Briefing*
..... A News
R. Australia D News
R. Canada Int. S/A News
1620 BBCWS(am) S-F British News

CURRENT AFFAIRS MAGAZINES/Features

1600 R. for Peace Int. M-F Democracy Now!
1615 R. Austria Int. M-F Report from Austria
1645 BBCWS(am) S The Instant Guide (quick background)
..... M/T/H/F Analysis
..... W From Our Own Correspondent
1645 R. Austria Int. M-F Report from Austria

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)

1632 BBCWS(am) S World Business Review
..... M-F World Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1605 R. Canada Int. A Quirks and Quarks

LOCAL LIVES & VIEWS

1605 R. Australia S The National Interest
..... M-F Bush Telegraph rural life
R. Austria Int. S/A Insight Central Europe
R. Canada Int. S The Sunday Edition
(from 1405)
1630 R. Austria Int. S Letter from Austria
..... A Insight Central Europe
1635 R. Austria Int. S/A Insight Central Europe

INFORMATIONAL FEATURES

1605 R. Australia T The Comfort Zone
(homes/gardens/food)

MUSIC

1605 R. Australia A Nocturne (from 1505)

SWL, MEDIA & COMMUNICATIONS

1600 KWHR Hawaii A DXing with Cumbre (9930 kHz)
R. for Peace Int. A Counterspin
WHRI Indiana A DXing with Cumbre
(13760 kHz)

LISTENER CONTACT/INTERACTIVE

1625 R. Austria Int. S/A Listener Letters
1655 R. Austria Int. S/A Listener Letters

SPORT

1606 BBCWS(am) S/A Sportsworld (live action)
1640 BBCWS(am) M-F Sports Roundup

1700 UTC / 12pm E / 9am P - Page 51 Freqs

NEWSCASTS (*extended)

1700 R. Australia D News
R. Japan D News

CURRENT AFFAIRS MAGAZINES/Features

1700 R. Africa Int. D Reports, features, music
1715 R. Japan M-F 44 Minutes

LOCAL LIVES & VIEWS

1705 R. Australia M-F Australia Talks Back
(notional call-in)

INFORMATIONAL FEATURES

1700 R. for Peace Int. W Alternative Radio
1705 R. Australia A The Spirit of Things
(spiritual matters)

MUSIC

1704 R. Austria Int. S My Music with Paul Catty
1705 R. Australia S Sound Quality

(innovative)
1710 R. Japan M-F Songs for Everyone
A Pop Joins the World
1730 VOA Africa S Music Time in Africa

SWL, MEDIA & COMMUNICATIONS

1730 R. for Peace Int. A World of Radio

LISTENER CONTACT/INTERACTIVE

1706 VOA Africa M-F Talk to America (listener phone-in)
1710 R. Japan S Hello from Tokyo

1900 UTC / 2pm E / 11am P - Page 52 Freqs

NEWSCASTS

1900 R. Australia D News
1930 R. Netherlands S/A News

CURRENT AFFAIRS MAGAZINES/Features

1936 R. Netherlands S Wide Angle (one topic focus)

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)

1930 R. Australia A The Business Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

1905 R. Australia A Earthbeat (environment)

ARTS AND CULTURE

1900 R. Netherlands A Vox Humana

LOCAL LIVES & VIEWS

1905 R. Australia F Rural Reporter
1910 R. Australia S-H Pacific Beat (islands magazine)
1936 R. Netherlands A Europe Unzipped
(weekly review)
1955 R. Netherlands A Insight (commentary)

INFORMATIONAL FEATURES

1900 R. Netherlands S Documentary

MUSIC

1930 R. Australia F Australian Country Style

SPORT

1929 R. Australia S-H Sport

2000 UTC / 3pm E / 12pm P - Page 52 Freqs

NEWSCASTS

2030 R. Netherlands S/A News

Current Affairs Magazine/Features

2036 R. Netherlands S Wide Angle (one topic focus)

SCIENCE/TECHNOLOGY (incl. Health & Environment)

2030 R. Australia F The Buzz (technology)

ARTS AND CULTURE

2000 R. Netherlands S Vox Humana

LOCAL LIVES & VIEWS

2005 R. Australia F Pacific Review
..... A Australia All Over
(nationwide)
2010 R. Australia S-H Pacific Beat (islands magazine)
2036 R. Netherlands A Europe Unzipped
(weekly review)

INFORMATIONAL FEATURES

2000 R. Netherlands A Amsterdam Forum
(topical discussion)

SPORT

2029 R. Australia S-H Sport

2100 UTC / 4pm E / 1pm P - Page 53 Freqs

NEWSCASTS (*extended)

2100 BBCWS(am) D Newshour*
R. Australia D News
R. Japan D News
R. Prague D News

CURRENT AFFAIRS MAGAZINES/Features

2110 R. Australia S-H AM (morning news

Shortwave Guide

2115 R. Japan M-F Asian Top News (region's radio)

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)

2130 R. Australia T Innovations (new products)

SCIENCE/TECHNOLOGY (incl. Health & Environment)
2130 R. Australia M Earthbeat (environment)
..... H All in the Mind (the brain)
..... F In Conversation

ARTS AND CULTURE

2115 R. Prague S Czech Books (fortnightly)

LOCAL LIVES & VIEWS

2105 R. Australia A Australia All Over (from 2005)

R. Prague M-F Current Affairs

2110 R. Japan A Magazine (local color)

2115 BBCWS(am) M-F Weekend Japanology

R. Prague T Witness (oral history)

2120 R. Prague M Letter from Prague

..... T/A Talking Point

..... W One on One (interview)

..... T/A Spotlight (places)

2130 BBCWS(am) T/F Calling the Falklands

R. Australia S Country Breakfast (rural issues)

..... H Rural Reporter

2154 R. Japan A Sights & Sounds of Japan

(*special service on 5975, 6135, 11675, 15390 kHz. only)

(^special service on 11680 kHz.)

INFORMATIONAL FEATURES

2115 R. Japan T Let's Learn Japanese

..... H Brush Up Your Japanese

2130 R. Australia W Religion Report

MUSIC

2105 VOA News Now S/A Jazz America

..... M American Gold (oldies)

..... T Roots & Branches (folk)

..... W Classic Rock

..... H Top 20

..... F Country Hits

2110 R. Japan S Pop Joins the World

..... M-F Songs for Everyone

2115 R. Prague A Encore (classical-monthly)

..... M Magic Carpet (world-monthly)

2125 R. Japan M Japan Music Treasure

..... W Japan Muscapes

..... F Music Beat

SWL, MEDIA & COMMUNICATIONS

2100 WWCR Tennessee H DX Partyline

2130 W World of Radio (15825 kHz)

LISTENER CONTACT/INTERACTIVE

2105 R. Australia F Feedback

2200 UTC / 5pm E / 2pm P - Page 53 Freqs

NEWSCASTS (*extended)

2200 BBCWS(am) D News

R. Australia D News

RVi Belgium M-F News

2230 R. Prague D News

CURRENT AFFAIRS MAGAZINES/Features

2200 R. for Peace Int. M-F Democracy Now!

2205 R. Australia F Asia Pacific

..... A Correspondents' Report

2210 R. Australia S-H AM

2230 R. Australia F AM Saturday

SCIENCE/TECHNOLOGY (incl. Health & Environment)

2206 BBCWS(am) M Health Matters

..... T Go Digital

..... W Discovery (research)

..... H One Planet (ecology)

..... F Science in Action (magazine)

ARTS AND CULTURE

2232 BBCWS(am) H The Word (considering literature)

..... S World Book Club (book & author)[last wk.]

2245 R. Prague S Czech Books (fortnightly)

..... F The Arts

LOCAL LIVES & VIEWS

2204 RVi Belgium M-F Flanders Today (variety magazine)

2208 RVi Belgium S Tourism in Flanders

2235 R. Prague S Letter from Prague

..... M-F Newsview

..... A Insight Central Europe

2240 R. Australia S Australia Wide (national news)

2245 R. Prague T Witness (oral history)

..... M Letter from Prague

2250 R. Prague M Talking Point (Czech issues)

..... T/A One on One (interview)

..... W Czechs in History [or] Spotlight (places)

INFORMATIONAL FEATURES

2206 BBCWS(am) S Documentaries

2232 BBCWS(am) S In Praise of God (worship service)

2245 BBCWS(am) W Heart & Soul (beliefs & values)

..... F What's the Problem? (advice)

MUSIC

2200 RVi Belgium A Music from Flanders

2232 BBCWS(am) T Music Review (explorations)

2230 R. Australia A Music Deli (international)

ENTERTAINMENT

2200 WBCQ(7415kHz) S Radio Free Euphoria

..... M Jean Shepherd

..... F Pan Global Wireless

2201 BBCWS(am) A Play of the Week (radio theatre)

2230 WBCQ(7415kHz) F The Pub Sungeis

2232 BBCWS(am) M Quiz or panel game

..... W/F Westway (drama serial)

SWL, MEDIA & COMMUNICATIONS

2200 R. for Peace Int. A Counterspin

RVi Belgium S Radio World

WHRA Maine F DXing with Cumbre (17650 kHz)

WHRI Indiana S DXing with Cumbre (5745 kHz)

2230 WHRA Maine A DXing with Cumbre (17650 kHz)

LISTENER CONTACT/INTERACTIVE

2214 RVi Belgium S Brussels 1043

2235 R. Prague S Mailbox

2300 UTC / 6pm E / 3pm P - Page 54 Freqs

NEWSCASTS (*extended)

2300 BBCWS(am) D The World Today*

China R. Int. D News & Reports*

R. Australia D News

R. Canada Int. M-F The World at Six*

R. New Zealand Int. S-H Midday Report*

2330 R. Prague D News

CURRENT AFFAIRS MAGAZINES/Features

2300 R. Canada Int. S/A The World This Weekend

2310 China R. Int. A Report on Developing Countries

R. Australia S-H Asia Pacific

2330 R. Canada Int. M-F As It Happens

2332 BBCWS(am) A The Interview (ideas & trends)

BUSINESS/ECONOMICS (also in Newscasts & Current Affairs)

2330 China R. Int. M Biz China

R. Australia S The Business Report

..... A Innovations

2332 BBCWS(am) F Global Business

2345 R. Prague H Economic Report

SCIENCE/TECHNOLOGY (incl. Health & Environment)

2305 R. Australia A All in the Mind (the brain)

2315 China R. Int. F Cutting Edge

2330 R. Australia H The Buzz (technology)

ARTS AND CULTURE

2320 China R. Int. A In the Spotlight

2330 R. Australia W The Arts

2345 R. Prague F The Arts

..... A Czech Books (fortnightly)

LOCAL LIVES & VIEWS

2312 R. New Zealand Int. F Focus on Politics

..... A This Week in Parliament

2330 China R. Int. S People in the Know

..... T Chino Horizons

..... W Voices from Other Lands

..... H Life in China

R. Australia T Rural Reporter (outback)

R. New Zealand Int. A Spectrum (life in NZ)

2335 R. Prague S Letter from Prague

..... M-F Newsview

..... A Magazine

2345 R. Prague A Letter from Prague

..... T Witness (oral history)

2350 R. Prague T/A One on One (interview)

..... W Czechs in History [or] Spotlight (places)

INFORMATIONAL FEATURES

2300 R. for Peace Int. W Alternative Radio

2330 R. Australia M The Europeans

MUSIC

2330 R. Australia F Hit Mix

R. New Zealand Int. F The Sampler (latest CDs)

2345 R. Prague A Encore (classical-monthly)

..... M Magic Carpet (world-monthly)

ENTERTAINMENT

2300 WBCQ Maine A Radio Timtron Worldwide

2330 R. Canada Int. A Madly Off in All

Directions (comedy/satire)

WBCQ Maine H Uncle Ed's Musical

..... F Memories

..... F WDCD

SWL, MEDIA & COMMUNICATIONS

2300 WBCQ Maine W World of Radio

2330 R. Australia H Media Report

R. for Peace Int. A Confinement of Media

WHRI Indiana A DXing with Cumbre (9495 kHz)

LISTENER CONTACT/INTERACTIVE

2330 China R. Int. F Listeners' Garden

2340 R. Prague S Mailbox

SPORT

2330 R. Canada Int. S The Inside Track

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

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Monitoring Fort Leonard Wood

Located near Waynesville, Missouri, Fort Leonard Wood and the U.S. Army Maneuver Support Center (MANSCEN) is the home of the U.S. Army Engineer, Military Police and Chemical Corps Schools, the Third Basic Combat Training Brigade, and Joint Training Detachments from the U.S. Marine Corps, Navy and Air Force.

Fort Leonard Wood is situated in the heart of the Ozarks, and is comprised of 63,000 acres of land which is approximately 98 square miles adjacent to the Mark Twain National Forest. Fort Leonard Wood is an inter-service training center and trains soldiers, sailors, airmen, marines and international students.

Recently, Mark Meece (N81CW) traveled from his home in Franklin, Ohio, and checked on the status of the UHF trunk system in use on the base. Mark confirmed some of the frequency information we already had, and here is what we now know about the Fort Leonard Wood trunked system.

Trunk System: EDACS Wide
 Frequencies: 406.1625 406.9625
 407.3625 408.1625 409.2375

Talkgroups:

AFS Decimal	Usage
04-041 545	Housekeeping
04-042 546	Maintenance
04-062 562	Unknown user/usage
04-103 595	Unknown user/usage
05-047 679	Unknown user/usage
05-071 697	Unknown user/usage
05-121 737	Unknown user/usage
06-104 852	MOPAC? Base
06-123 867	Unknown user/usage
06-124 868	Unknown user/usage
06-126 870	Unknown user/usage
06-134 876	Unknown user/usage

Conventional Frequencies Monitored:
 165.0625 Military Police/Security
 173.5125 Military Police
 317.5000 "RAYTHEON 159"
 392.2000 ACM Flight of 4

To complete our look at Fort Leonard Wood, in addition to the material above, below is the profile from the new edition of the *Grove Military Frequency Directory* on CD-ROM which will be available after the first of the year. (Be sure to watch the pages of *Monitoring Times* and the Grove website for availability.)

◆ **Fort Leonard Wood, Missouri**

Assigned Units:
 1st Engineer Brigade, 169th Engineer Battal-

ion, 35th Engineer Battalion, 5th Engineer Battalion, 554th Engineer Battalion, 577th Engineer Battalion, 58th Transportation Battalion, 399th Army Band, 3rd Training Brigade, 43d Adjutant General, Libby NCO Academy, Drill Sergeant School, Law Enforcement Command, M.P. Alpha Company (Permanent Party), M.P. Bravo Company (Officer Basic), M.P. Charlie Company (Officer Advanced), U.S. Army Chemical School

LAND MOBILE SERVICES:

1st Engineering Brigade/544 Engineering Battalion USA 150.500
 150.575
 5th Engineering Battalion Administrative Net USA 139.2625 139.3125 139.3375
 139.3875
 Administrative Net USA 143.250
 143.275 143.300 143.325 149.650
 165.0875
 AAFES Delivery Service USA
 173.8375
 Aircraft Crash Net USA 173.4875
 ANG Fire/Crash Net USAF
 163.4625
 Base Operations (Also Waynesville Regional Airport) USA 40.950
 Engineering Administrative Net USA
 143.175 143.225
 Cannon Range Control USAF/USA
 36.450 46.650 139.175 139.450 (AM Mode) 148.025
 Criminal Investigation Division (CID) USA
 141.325 164.9875 165.0375/
 173.5875 171.3875 173.150
 DEH Maintenance USA 170.175
 Energy Control System-Data USA
 150.550
 EOD Team Operations USA
 139.150 150.700
 Fire Alarm System-Data USA
 138.925
 Fire Department USA 143.225
 171.975/173.8125
 Fire Department - Fireground USA
 173.9625
 Ground Control USAF 173.5625
 Hospital Paging System USA
 173.4125/172.750
 Law Enforcement USA 165.1875
 Law Enforcement - Guard Net USA
 173.5125
 Law Enforcement - Provost Marshal USA
 163.5375 169.575
 Maintenance USA 413.150
 Medical Maintenance Net USA
 148.925 149.800
 Medical Net USA 150.600
 173.100 173.4625 173.7125
 Military Police USA 139.050
 139.200 139.300 165.0625
 Miscellaneous USA 139.2125
 139.3875 143.200
 Training Net USA 139.000
 142.375 142.425 142.475 142.875

142.975 143.000 143.100 143.125
 143.150 143.175 143.350 143.375
 148.575 148.650 150.450
 Transportation Net USA 143.075
 163.5625 173.6125

Note: Some of the frequencies assignments above may be now operational on the base trunk system and have been abandoned. Additional reports are requested.

AERONAUTICAL SERVICES:

Fort Leonard Wood/Waynesville Regional Airport (KTBN)37-44-29.872N / 092-08-26.650W
 DSN Prefix: 581
 ATIS FAA 118.700 237.500
 Cannon Range Control USA
 392.200
 Ground Controlled Approach FAA
 321.600
 Tower USA 110.000 125.400
 229.400 241.000

Many thanks to Mark Meece for checking in with us this month.

◆ **Military Monitoring in New Jersey**

A newcomer to this column's reporting ranks is Steve O'Connor in Forked River, New Jersey, who has been doing a lot of listening in the Garden State since 9/11 and wanted to share his intercepts with *MT* readers.

FM Mode

40.100 Mercer County, NJ Airport/National Guard
 46.750 Willow Grove PA Air National Guard

AM Mode

118.650 McGuire AFB Tower
 119.050 McGuire AFB Tower
 120.250 McGuire AFB Approach/Departure Control
 124.150 McGuire AFB Approach/Departure Control
 124.600 New Jersey Air National Guard 177FW/119FS <V-6> Atlantic City Approach/Departure Control
 127.775 Lakehurst Naval Air Engineering Station (Maxfield Field) Tower
 130.650 McGuire AFB 305AMW Command Post/Air-to-Air
 134.100 McGuire AFB 305AMW Command Post/Pilot-to-Dispatcher (PTD)
 Dover AFB, Delaware 436AW Command Post/Pilot-to-Dispatcher (PTD)
 135.725 FACSAC Vacapes: Check-in/Out W-107 "Giant Killer"
 138.050 Atlantic City International Airport

177FW/119FS Air-to-Air <V-18>
 138.100 Atlantic City International Airport
 177FW/119FS Air-to-Air <V-19>
 138.125 Atlantic City International Airport
 177FW/119FS Air-to-Air <V-15>
 138.200 Atlantic City International Airport
 177FW/119FS Air-to-Air
 138.250 Atlantic City International Airport
 177FW/119FS Air-to-Air <V-14>
 138.300 New Jersey ANG
 138.425 Atlantic City International Airport
 177FW/119FS Air-to-Air <V-16>
 138.525 New York Air National Guard Tactical
 138.625 Willow Grove, PA Air National Guard
 138.875 Atlantic City International Airport
 177FW/119FS Air-to-Air <V-17>/McGuire
 AFB 305 AMW KC-10 tanker aircraft air-to-
 air (Team c/s)
 139.300 McGuire AFB [Army Operations-LVH]
 139.625 McGuire AFB Tanker Interplane
 139.875 McGuire AFB 305 AMW KC-10/KC-
 135 tanker air-to-air
 139.900 District of Columbia Air National
 Guard Andrews AFB F-16's
 142.450 Atlantic City International Airport
 177FW/119FS Air-to-Air
 143.825 McGuire AFB 305 AMW KC-10
 tanker air-to-air
 143.850 McGuire AFB tanker/transport air-to-
 air
 143.875 McGuire AFB tanker/transport air-to-
 air
 225.150 US Air Force [Nationwide JStars Have
 Quick channel-LVH]
 225.725 JStars
 226.100 US Air Force Interplane
 226.200 US Air Force Interplane <Sierra 1>
 226.400 US Air Force Interplane <Sierra 2>
 228.000 McGuire AFB Tankers / Refueling
 Area - AR 777 [Don't show an aerial refuel-
 ing route, track or anchor on this one or
 named AR-777. Might be a local ops kind of
 operation-LVH]
 228.900 NORAD Northeast Air Defense
 SOCC "Huntress" [Combat Air Patrol (CAP)
 in SE Michigan and Middle Atlantic (DC
 area)-LVH]
 231.725 JStars
 231.750 JStars
 234.600 NORAD Northeast Air Defense
 SOCC "Huntress" [New York and Philly CAP-
 LVH]
 236.000 Pennsylvania Air National Guard
 238.900 Aerial Refueling - Track (AR 212 NE/
 SW)
 239.000 Atlantic City International Airport
 Tower <U-04>
 239.800 McGuire AFB Metro (Weather Info)
 251.800 NORAD Northeast Air Defense
 SOCC "Huntress"
 252.100 Tankers / Refueling [This is an Air
 Force/AFRES/ANG Command Post/Supervi-
 sor of Flying/Operations Common frequency
 nationwide-LVH]
 254.200 NORAD Northeast Air Defense
 SOCC AHuntress and Northern Lights@
 [Used in the DC CAP and by NATO AWACS
 after 9/11-LVH]
 255.600 McGuire AFB Tower
 259.300 McGuire AFB Approach/Departure
 Control
 261.000 Atlantic City International Airport
 177FW/119FS Operations <U-01>
 266.500 Pennsylvania Air National Guard
 271.000 NORAD Northeast Air Defense
 SOCC "Huntress" <Blue-15> [New York
 CAP-LVH]
 275.800 McGuire AFB Ground Control
 285.400 Washington ARTCC (NJ ANG) <U-
 07>

286.200 Warren Grove Range Range Control/
 Flight Safety
 288.000 NORAD Northeast Air Defense
 SOCC Tactical "Huntress"
 288.400 NORAD Northeast Air Defense
 SOCC <Blue-19> "Huntress" NATO/
 AWACS OPS
 303.000 McGuire AFB KC-135 Tanker Ops
 "Torch"
 309.500 NORAD Northeast Air Defense
 SOCC Tactical "Huntress"
 311.000 Seymour Johnson AFB 916 ARW
 Command Post "Lighthouse Control"
 312.300 FACSAC Virginia Capes "Giant
 Killer"
 318.400 NORAD Northeast Air Defense
 SOCC "Huntress" [DC CAP Aerial refueling-
 LVH]
 319.400 McGuire AFB 305AMW AMC Com-
 mand Post
 320.600 NORAD Northeast Air Defense
 SOCC <Blue-24> "Huntress"
 320.900 US Air Force Refueling Secondary
 321.000 US Air Force ACC Command Post
 Secondary
 321.300 FAA ARTCC High Altitude NORAD
 designators <Blue-60/Amber-06>
 324.000 NORAD/Huntress Ops [I don't show
 a listing for this one in my notes-LVH]
 327.125 Atlantic City Approach/Departure
 Control
 333.550 US Air Force "Fullhouse"/Interplane
 [Frequency in the Glide Slope allocation-
 LVH]
 335.800 McGuire AFB Clearance Delivery
 335.950 AWACS Voice Coordination
 338.100 FACSAC Virginia Capes "Giant
 Killer" Check-in/Out W-105 W-106
 339.800 McGuire AFB Metro/Weather Info [I
 think this was replaced by 239.800-LVH]
 340.200 Lakehurst / Willow Grove Pa. / Tower
 341.750 AWACS Control/Nationwide Have
 Quick
 342.500 DoD Metro
 344.600 DoD Metro
 349.400 McGuire AFB 305AMW Command
 Post
 349.400 Dover AF Base / Command Post
 360.600 NORAD [I show this as a FAA Ap-
 proach/Departure control assignment nation-
 wide-LVH]
 362.300 NORAD [This also appears to be a
 primarily FAA assignment]
 363.800 McGuire Approach/Departure
 364.200 NORAD AICC Nationwide
 364.800 NORAD AICC <BLUE-31> [I show
 this as a FAA Approach/Departure control as-
 signment nationwide-LVH]
 372.200 McGuire AFB, Dover AFB, Andrews
 AFB Pilot-to-Dispatcher (PTD) [Nationwide-
 LVH]
 378.100 Andrews AFB 89AW Command Post/
 Air-to-Air "SAM Command"
 381.300 US Air Force ACC Command Post
 Nationwide
 381.800 US Coast Guard Air
 385.500 Atlantic City Approach/Departure
 Control
 386.000 NORAD Northeast Air Defense
 SOCC Tactical "Huntress"
 387.800 NORAD Northeast Air Defense
 SOCC Tactical "Huntress"

Thanks, Steve, for sharing your intercepts
 with our *Milcom* listening family.

◆ Pilot-to-Dispatcher (PTD)

One of the more interesting frequencies to
 monitor at military bases across the country is
 the Pilot-to-Dispatcher or PTD frequencies. As

an aircraft approaches its destination, they will
 usually announce to the receiving base informa-
 tion concerning their pending arrival. In years
 past 372.200 MHz has been the primary work
 horse for PTD communications, but in recent
 years the PTD function is starting to evolve
 onto other frequency assignments, especially
 139.300 in the VHF spectrum.

Here is a list of frequencies on which to
 watch for PTD activity. An asterisk indicates a
 primary PTD frequency allocation nationwide.
 You will find these assignments especially on
 372.200 primarily at US Air Force installations.
 But there is spotty activity at bases from the
 other services.

34.100	38.700	41.300	119.350	121.950
122.700	122.850*	122.950	122.975	
123.050	125.050	126.200	126.200	
126.375	126.850	130.650	130.650	
134.100	134.800	134.850	138.900	
139.300*	139.600	139.850	139.900	
140.875	142.900	141.750	227.200	
230.100	231.000	245.700	246.700	
256.200	256.800	260.400	262.000	
285.575	288.900	298.300	301.300	
305.150	306.600	308.200	335.625	
351.200	367.200	371.950	372.200*	
376.000	376.100	376.200	376.700	
379.400	379.475			

◆ Recent Milair frequency changes

Regular *Milcom* reporter Jack NeSmith re-
 ports the following frequencies changes at the
 terminals indicated below.

Campbell AAF (KHOP)
 "Eagle Radio" change from 242.400 to
 285.625 MHz
 Dobbins Air Reserve Base (KMGE)
 Air/Ground facility frequency changed
 "Dapper Dan" to 379.525 MHz
 Fairchild AFB (KSKA)
 Tower frequency changed to 233.700
 MHz
 Holloman AFB (KHMN)
 Clearance Delivery 289.400 with an al-
 ternate frequency of 397.875 MHz
 Little Rock AFB (KLRF)
 378.800 MHz changed to 319.250 MHz
 approach flight level 040 local channel 12
 372.800 MHz changed to 257.625 MHz
 approach flight level 040 local channel 9
 125.350 MHz changed to 120.125 MHz
 approach flight level 100 channel 9
 284.000 MHz changed to 343.600 MHz
 approach flight level 060 channel 10
 369.200 MHz changed to 317.800 MHz
 approach flight level 040 channel 11
 124.450 MHz changed to 119.450 MHz
 approach flight level 100
 Muir AAF (KMUI)
 Flight operations frequency 49.950 MHz
 FM and tower frequency of 40.900 MHz
 Norfolk Naval Station (KNGU)
 New heliport ground frequency 298.950
 MHz
 USAF Academy Airstrip (KAFF)
 ATIS frequency changed to 121.250 MHz

And that does it for this month's *Milcom*
 column. As always we invite you to submit
 your milair intercepts, base profiles, frequency
 card list and callsigns. You can contact us at the
 email address in the masthead. Until next time,
 73 and good hunting.

TRACKING THE TRUNKS

TECHNOLOGY, EQUIPMENT, FREQUENCIES AND NEWS

Dan Veeneman

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http://www.signalharbor.com

Signs of Things to Come

From the early days of crystal-controlled VHF receivers to today's microprocessor-controlled radios, scanning has evolved in scope and complexity. Despite the changes in technology, two common themes have continued to play a central role in the effectiveness of a radio system: *interoperability* and *coverage*. This month we'll take a look at two systems that typify where public safety trunked radio systems seem to be headed.

Washington, D.C.

Within the 68 square miles of the District of Columbia reside the White House, Congress, innumerable Federal agencies and half a million residents. The primary law enforcement agency in the District is the Metropolitan Police Department (MPD), which operates a Motorola trunked radio system in the UHF band. The District of Columbia Fire Department, which includes Emergency Medical Services, operates a Motorola SmartNet trunked system in the 800 MHz band.

As reported in the June 2001 *Tracking the Trunks* column, the 800 MHz system has been suffering from a number of "dead zones" where firefighter radios could not be heard by the nearest repeater. These zones weren't just in basements and parking garages where poor signal quality might be expected, but communication at such major locations as Union Station and the MCI Center were also unreliable.

The Fire Department instituted some patchwork solutions, including the use of cellular telephones and a policy of dispatching an extra fire engine on every call. The extra engine was there to provide radio "relay teams" who used their portable radios as repeaters, rebroadcasting the signals from personnel actually fighting the fire.

Upgrades

The good news in this story is that in October the city completed a \$31 million upgrade



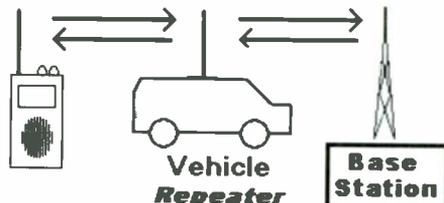
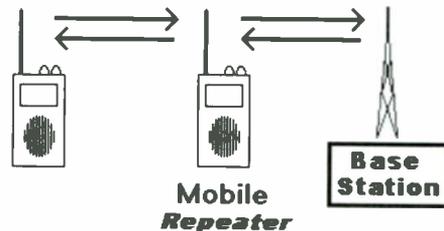
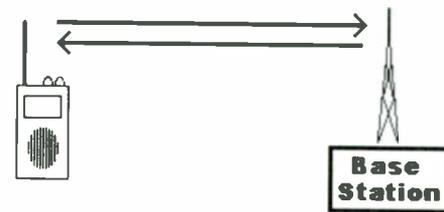
to the radio system, using money from a \$46 million Homeland Security grant received early last year.

The upgrade included six additional repeater sites and a new SmartNet network that interconnects the 800 MHz fire system with the UHF radios used by the MPD. The old UHF infrastructure was completely replaced as well as more than 1,000 old portable and mobile radios. During the upgrade, more than 60 vehicles were equipped with short-range repeaters that should greatly improve on-scene coverage.

The city now has a dual-band system with ten repeaters. Thirteen channels are available on the UHF system and sixteen on the 800 MHz system.

Interestingly, the city decided against using the APCO Project 25 standard. Their logic was that since most agencies in the metropolitan area use Motorola SmartNet systems, switching to P-25 would actually *reduce* interoperability with those agencies.

The city now claims that there are no longer any known dead zones, although additional work continues on the Metrorail tunnels and other underground structures.



Police

The Metropolitan Police Department frequencies are 460.0250, 460.1000, 460.1500, 460.2000, 460.2500, 460.2750, 460.3250, 460.3500, 460.4000, 460.4250, 460.4500, 460.4750 and 460.5000 MHz. For scanner programming, use a base frequency of 458.7750 MHz and an offset of 12.5 kHz.

Decimal	Hex	Description
16400	401	1st District
16432	403	2nd District
16464	405	3rd District
16496	407	4th District
16528	409	5th District
16560	40B	6th District
16592	40D	7th District
16624	40F	City Wide
16656	411	Command 2
16688	413	Command 1
16720	415	Command 3
16752	417	Command 4
17360	43D	Special Events 1
17392	43F	Special Events 1A
17424	441	Special Events 1B
17456	443	Special Events 2
17488	445	Special Events 2A
17520	447	Special Events 2B
17552	449	Special Events 3
17584	44B	Special Events 3A
17616	44D	Special Events 3B
17648	44F	Special Events 4
17680	451	Special Events 4A
17712	453	Special Events 4B
17744	455	Field Command
17840	45B	Mayor
17872	45D	Inter-Agency Operations 1
17904	45F	Inter-Agency Operations 1
18032	467	Emergency Communications Center A
18096	468	Emergency Communications Center 8
18160	46F	Emergency Communications Center C
18256	475	Fire Department 1
18288	477	Fire Department 2
18640	48D	Emergency Response Team 1
18672	48F	Emergency Response Team 2
18704	491	Emergency Response Team Command
18864	498	Harbor
18896	49D	Aviation
18928	49F	Field Operations
19728	4D1	Takoma Park (Maryland) Police
19760	4D3	Hyattsville (Maryland) Police
19824	4D7	Virginia State Police

19856	4D9	Maryland State Police
19952	4DF	Arlington (Virginia) Police
19984	4E1	Alexandria (Virginia) Police
21136	529	US Park Police 1
21168	52B	US Park Police 2
21200	52D	US Park Police 3
21232	52F	US Park Police 4

Fire

For those without a trunk-tracking scanner, Fire Dispatch is simulcast on 154.1900 MHz.

The Fire Department frequencies are 852.6125, 852.6375, 852.6625, 852.6875, 852.7125, 852.7375, 852.7625, 852.7875, 855.2125, 855.2375, 855.4625, 856.9875, 857.9875, 858.9875, 859.9875 and 860.9875 MHz.

Decimal	Hex	Description
1616	65	Dispatch
1632	66	Main
1648	67	Fireground 1
1664	68	Fireground 2
1680	69	Fireground 3
1904	77	Emergency Medical 1
1920	78	Emergency Medical 2
1936	79	Emergency Medical 3
1952	7A	Emergency Medical 4

1968	7B	Administration 1
2192	89	Administration 2
2208	8A	Administration 3

2032	7F	Training 1
2048	80	Training 2

2064	81	Investigations
2080	82	Inspectors

2320	91	Medstar
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2640	A5	Fire Boat Operations
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◆ State of Alaska

Across the continent from Washington, D.C., the state of Alaska is working on a joint program with the Department of Defense (DoD) called Alaska Land Mobile Radio (ALMR). What's unique about this project is that instead of the state building one network and the federal government building a second system, ALMR is designed to combine state and DoD resources. In particular, the radio frequencies from the state and the federal government are being combined into a single system.

In the United States, two agencies are responsible for allocating radio frequencies. Federal government allocations are done through the National Telecommunications and Information Administration (NTIA). The Federal Communications Commission (FCC) regulates all non-federal frequencies, including state and local public safety agencies. Rarely do the agencies overlap. However, the events of September 11, 2001, and the unique characteristics of Alaska prompted the FCC to grant ALMR an official waiver, allowing it to share Department of Defense frequencies.

As with many new radio systems, ALMR will be based on APCO Project 25 standards. The mantra here is interoperability — those in charge of an incident can



communicate directly with those involved, regardless of the agency they come from. Planners hope that ALMR will eventually replace more than 100 different radio systems currently in use around the state, allowing all of these users to be able to talk with each other when necessary.

ALMR will carry data as well as voice, allowing laptops and other computing devices to send and receive information from state databases. Voice will continue to have priority in emergency situations.

Alaska already has a network of microwave repeater sites, which are being modified to operate Project 25 compliant equipment. Build-out of the network will follow the Kenai Peninsula to Fairbanks, then to the North Slope and down to Canada along the Alaska Highway. Links from Juneau and Southeast Alaska are also in the works. ALMR will have a main control center in Anchorage. A duplicate, fully redundant center is under construction near Fairbanks.

Funding for the ALMR project comes largely from the federal government, totalling more than \$30 million through the next two years. The state expects to kick in about \$6 million, with the hope of a 90/10 cost-share with the federal government.

Security

With the Department of Defense and federal agencies expected to be heavy users of the system, security has taken on a larger role than in a typical public safety system. Much of the radio traffic from federal users is expected to be encrypted. ALMR plans to use the newer and (hopefully) stronger Advanced Encryption Standard (AES) algorithm for encryption, rather than the older Data Encryption Standard (DES).

DES is now three decades old and is showing its age — with the advances in computing power that have occurred since DES was originally designed it is possible to crack DES by “brute force,” where all possible decryption keys are tried in rapid succession. It is due in large measure to this weakness that the National Institute of Standards and Technology (NIST) is recommending the use of AES in place of DES. According to the ALMR documentation, AES is “highly advised most for homeland defense missions and roles.” It will be interesting to see if any of the public safety agencies touting encryption will follow Alaska's lead.

Future Development

Given Alaska's rugged terrain and harsh climate, some remote villages may end up being linked via satellite to a state-wide emergency broadcast system. There has also been interest from oil companies like Exxon-Mobil and Philips to join the system for their North Slope and marine operations.

ALMR has already demonstrated the ability to link up with other radio networks, including the existing Anchorage Airport 800 MHz system, the Federal Aviation Administration (FAA), and the Department of Transportation (including the Coast Guard and Highway communications systems).

The system is registered for more than a hundred frequencies between 154.6500 MHz and 156.2375 MHz, basically every 12.5 kHz

(you can see the exact frequencies and repeater locations on my web site at <http://www.signalharbor.com> under the APCO 25 Frequencies selection).

For instance, in the Anchorage area the following frequencies are in use from five repeaters:

154.7125, 154.8625, 155.1125,
155.4125, 155.5625, 155.9125,
156.1375 MHz
154.8000, 154.9500, 155.3500,
155.7625, 156.1500 MHz
154.6750, 154.8250, 155.3375,
155.5125, 155.7875, 155.9875,
156.1625 MHz
154.7375, 154.8875, 155.4875,
155.6875, 155.8500, 156.0875,
156.2375 MHz
154.6625, 154.8125, 155.5875,
155.8875, 156.0375, 156.1875 MHz

And in the Fairbanks area, six repeaters are licensed for these frequencies:

154.6750, 154.8250, 154.9875,
155.5125, 155.7875, 155.9875,
156.1625 MHz
154.8625, 155.1125, 155.4125,
155.5625, 155.7125, 155.9125,
156.1375 MHz
154.7000, 154.9000, 155.4500 MHz
154.8500, 155.0250, 156.1000 MHz
154.6625, 154.8125, 154.8875,
155.4875, 155.6875, 155.8875,
155.9250, 156.0875, 156.1875,
156.2375 MHz
154.6500, 154.6875, 154.8375,
154.8750, 155.4000, 155.4625,
155.6125, 155.9000, 156.0500,
156.1250 MHz

There are also a handful of standard Interoperability channels in use:

151.1375	Highway Maintenance
154.4525	Fire
155.7525	Any Public Safety (Calling Channel)
158.7375	Police
159.4725	Forestry/Conservation

◆ Trunking Goes Mainstream

That's all the room I have this month. This also marks the end of the *Tracking the Trunks* column, which started three years ago with the idea that scanner listeners might want more information about these increasingly common trunked radio systems. I'm happy to say that you and your fellow readers have responded positively to the information and explanations that have appeared here and I hope we've both learned a lot along the way.

As explained elsewhere in this issue, I will be taking over the *Scanning Report* column beginning in January. As more agencies and municipalities upgrade their radio systems it's clear that trunking is here to stay, and a comprehensive “scanning report” needs to reflect the real world mix of conventional and trunked systems. So, keep sending those e-mails to me at danveeneman@monitoringtimes.com. My web site at <http://www.signalharbor.com> will continue to be updated with radio- and trunking-related information.

Have a Merry Christmas and Happy New Year!

needs and financial viability as the published rates. "After all," points out Ayris, "we can't be of much use to less affluent broadcasters if our services are too rigidly priced."

So the key word here is flexibility. WRN will work with its content partners to fashion approaches that stay within their budget parameters and meet their unique needs. According to Ayris, WRN even has offered potential clients "free trials" to help them evaluate the service and sell the concept to their sponsors. Once concluded, contracts typically run annually on a rolling basis with a three month notice provision if either party chooses to end the relationship.

Clearly, this approach has met with success, as over 40 broadcasters and program providers worldwide have signed on as content partners (see Table 2).

WRN has also developed ad-hoc services tailored to the needs of distributors such as the SABC, the CBC and NPR that allows each to retain their own on-air identity (such as their own newscasts on the hour) and place the programming they prefer within their respective established broadcast schemes.

◆ WRN in North America

Ayris describes WRN's biggest challenges with two words – marketing and measuring.

First, WRN seeks to gain global recognition for its brand as a "one-stop shopping source" for stations interested in the unique programs and perspectives offered by international public broadcasters. Second, WRN needs to demonstrate both to its existing and prospective partners that listeners are interested in what they have to offer. This is not easy to do when one lacks a huge – or even substantial – budget for advertising campaigns and audience research. So, for now at least, much reliance is placed on developing and extending relationships and partnerships, word of mouth recommendations, and chronicling of anecdotal feedback (such as listener correspondence).

These challenges are compounded in the unique character of the huge North American broadcast marketplace – especially in the U.S. For example, WRN was able to secure nationwide coverage in Canada by teaming with CBC Radio, Canada's public broadcaster, to create the *CBC Overnight* service. However,



Readers may recognize Karl Miosga, one of the founders of WRN who attended the MT Convention in WRN's early days.

Receiving WRN in North America

Direct via satellite:

Telstar 5 at 97° West, Transponder 27, 12.177 GHz Vertical Polarisation, Symbol Rate 23,000 Msym/s, FEC 2/3, DVB MPEG2, Audio Channel: WRN1 (English) or WRN2 (Multilingual) or WRN Francais, Service-ID: 14.

Via satellite radio subscription:

Sirius Satellite Radio, stream 115.

Via SCOLA educational TV service:

Telstar 5, 97° West, Vertical polarity, Channel 3 audio subcarrier. (primarily used by colleges, universities, local school districts, libraries and some cable TV systems)

Via Cable:

1st Century Cable, Eastern Chicago, Illinois, Amherst, MassachusettsCo-Op, Palo Alto, California94.1 FM, Peterborough, OntarioCable Channel 66, PhiladelphiaTelecommunication NetworkCable Television, Yreka, California26, Northfield, MNElectric Cable TV, Sussex C., New JerseyTelevision, Lima, Ohio

Via local AM/FM Stations: (mostly confined to overnight)

CBC Radio One affiliates (in Canada)91.7FM, Orem, UT730AM, Concordia College, MN1280AM, Eugene, OR91.7FM, Houston, TX91.7FM, Clarksville/Montgomery City, TN89.1FM, Auburn, NY88.7FM, New Paltz, NY100.7FM, Atlanta, GA90.7FM, New Concord, OH88.3FM, Springfield, IL91.7 FM, Canonsburg, PA91.5FM, Evansville, IN95.1FM, Valparaiso, IN92.1FM, Hampden-Sydney, VA

Via the Internet:

<http://www.wrn.org>

the decentralized nature of American public radio meant that WRN had to market a similar service in the U.S. – *WRN on NPR* – to each individual NPR affiliate, a far more labor intensive and resource consuming task. At its peak, *WRN on NPR* had 68 affiliates; but the added burden of securing brand recognition and underwriting support affiliate by affiliate ultimately made the *WRN on NPR* approach impractical.

Nonetheless, WRN continues to market its "generic" *WRN English for North America* service to NPR affiliates with some success (see Table 3), while looking to develop a new NPR format. In addition, Ayris says that WRN is actively pursuing partnerships with the National Federation of Community Broadcasters, low power FM stations, collegiate broadcasters and major hotel chains.

Furthermore, WRN is available full time via its exclusive agreement with the growing subscription service, *Sirius Satellite Radio* (see companion article in this month's *MT*), which serves in excess of 100,000 subscribers and expects to reach 1 million by the end of 2004.

◆ The Internet

One of WRN's first distribution platforms was the internet. In 1992, it was new technology and gaining access to it was difficult and expensive for some broadcasters. WRN developed its internet platform both as a service to these providers and as an incu-

A New Platform

Mobile Broadcast Network is an innovative platform with the potential for making the programs of international broadcasters available to new audiences via an affordable portable wireless gadget that is not a radio!



MBN offers users of wireless appliances (cell phones, PDAs, wireless internet, etc.) access to live streaming and on-demand audio at no additional cost. Currently on offer only in the continental U.S., wireless users access MBN either through their wireless internet service or by dialing in from any standard wireless telephone. Upon accessing the MBN portal, users select their desired audio service and listen. Listeners get access to WRN's live streams and on-demand content. MBN even offers a simple audio preset feature for added convenience.

MBN is offered by XSVoice, a Tennessee based company developing new wireless applications and platforms. For more information and to register for the service, visit <http://www.myMBN.com>.

bator for the development of other platforms in pursuit of its objective to expand availability of their programming. Today, all of WRN's branded 24/7 services are streamed live over the Internet from the WRN web site <http://www.wrn.org>, and several broadcasters use WRN to archive their programming for on-demand availability.

◆ Coming Up

WRN isn't standing still. Ayris says that he sees potential in DRM and DAB (digital audio broadcasting) and in the budding partnership between the two for WRN to reach currently underserved and localized audiences, such as foreign worker and expatriate communities, with programming from home.

WRN also has recently partnered with *MBN* (see sidebar) to reach new listeners via emerging wireless communications technologies and devices. Voice of Nigeria, Voice of Turkey, All India Radio, Radio Jordan and Radio Romania International are in serious discussions to join the WRN line-up. WRN is even studying whether its model for distributing international radio can be successfully applied to distributing international television.

WRN does not seek to replace shortwave; nor does it work or hope for its demise. Its objective is purely to expand the audience for international public broadcasting beyond shortwave. Any true fan of international broadcasting cannot fail to see that this is the right strategy for the future.

Happy Holidays and good listening!



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Go West, Young Man

I've just returned from a two-week vacation in the American West. The land of cowboys, boiling geysers, dangerous grizzly bears, searing deserts, deep canyons, exotic Native American cultures, and wide open spaces. And (at least by comparison to the crowded East!) a wide open radio dial. Those of you lucky enough to live in the West should take full advantage of your location; those who live in the East should consider a radio vacation in the land west of Denver.

As you cross the Rocky Mountains, the nighttime contents of the AM dial change markedly. California stations like KFI-640, KNBR-680, and KNX-1070 can be routinely heard in the Midwest and even the East – but not very well and only with great effort. In Wyoming, these stations are easy, strong reception. Some stations in the mountains aren't really all that far from Eastern DXers, but use highly directional antennas to protect Eastern stations from interference. Stations like KKOBB-770 Albuquerque, KRVN-880 Lexington, Nebraska, and KTWO-1030 Casper, Wyoming, would be a DXer's dream east of the Mississippi, but are loud pests in Colorado.

Regional-channel stations seem to cover vast distances in the West. KTAR-620 (Phoenix) surprised me with their strong signal in central Wyoming. KLAC-570 (Los Angeles) was heard with good signals in Gallup in western New Mexico – the L.A. regionals on 980 (KFWB) and even 1480 (KVNR) were there, too.

Further east, on the Great Plains, the story is the daytime DX. Ground conductivity has an enormous effect on daytime AM reception. (Visit <http://www.fcc.gov/mb/audio/m3/index.html> for more information on ground conductivity and a map showing how it varies across North America.) KWMT-540 (Fort Dodge, Iowa) was blasting into Great Bend, Kansas, two hours before sunset, with the rest of the dial full of strong stations elsewhere in Kansas, Missouri, Nebraska, and Oklahoma. (Most of which seemed to be carrying the same Kansas City Royals baseball game...)

Westerners complain they don't get the VHF/UHF tropospheric openings we get in the East. They're probably right, but I've heard some rather interesting things on the car radio while traveling in the Rockies. On this trip, I had five car-radio FM loggings beyond 250 miles. Three were regular tropospheric propagation across Nebraska as a very strong cold front approached. The other two were across desert and mountain terrain. KKLT-98.7 Phoenix was heard in Leeds in southwest Utah; and KKOR-94.5 in west-

central New Mexico made the trip to Buena Vista in eastern Colorado.

Chasing meteor scatter can be fun in the West. In many areas, there are few local stations – there are plenty of open spots in the dial for meteor monitoring. Pick an empty frequency, as low in the dial as possible, and listen to the static. Occasionally, a strong signal will pop out of the noise. Sometimes it'll be there for only a fraction of a second, but some bursts can be as long as a minute (5-10 seconds is most common). In northwest New Mexico, on 100.7 I heard "...avenue, Fargo"; and in central Kansas on 97.5 I heard "...in LaCrosse 58." KDJZ Harwood, North Dakota; and KNXR Rochester, Minnesota. On a previous Western trip, I heard one of the Nashville stations back home while cruising across western Nebraska!

◆ Bits and Pieces

South American Loggings: Some lucky DXers in the South and East have succeeded in logging South American stations. The DX Clube do Brasil has released the second edition of a publication that should make it much easier to identify some of these stations. Best of all, it's free! Go to <http://www.ondascurtas.com>, click on "Brasil em ondas medias," and then on "Download." You'll need the Adobe PDF reader to open this list. Shortwave listeners may also

find useful material in this guide. They'll definitely find useful material elsewhere on the DXCB site!

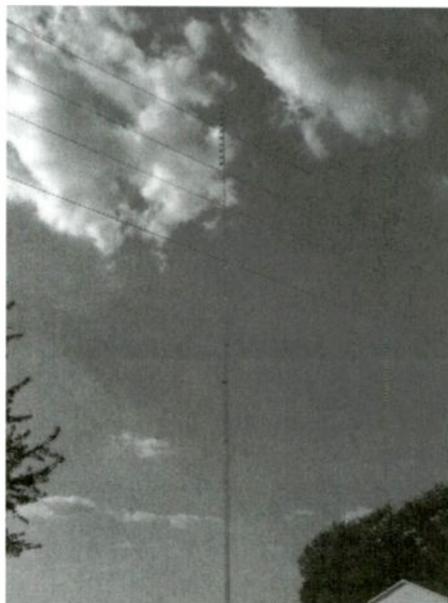
Permission to Move: Well, that didn't take very long... If you've been reading this column for a few months, you know the expanded-band permit for 1690kHz at West Frankfort, Illinois, has requested, and received, permission to move to the Chicago suburb of Berwyn. At deadline, the station is already testing on the air. They're sharing one of the towers in the four-tower array of co-owned WGC1-1390. Chicago media reports suggest the station will air a '50s and '60s oldies format, under the call WRLL. ("Real Radio") Legendary WLS DJ Larry Lujack is said to be involved in WRLL's operation. Regular operation of WRLL is expected to begin by the end of the year.

If 1690 isn't already being clobbered by WRLL at your location, you need to stake out the channel in search of something else. Another new expanded-band station is operating on this frequency, in Adel, Georgia. WSWK's FM sister WDDQ-92.1 has made news before, for their unique format. Wild Adventure Radio's entire schedule consists of a continuous ad for a nearby waterpark. WSWK-1690 is currently simulcasting the FM station.

Wants to Move: WSWK also plans a long-distance move. They want to go 190 miles from Adel to the Atlanta suburb of Avondale Estates. The proposed transmitter site is just inside the I-285 loop in Scottdale. I've not heard any word of a proposed permanent programming format. (I'm quite sure the waterpark ads are just temporary filler.)

Going Digital in Canada: Digital TV is now getting started in Canada. As of this fall, CITY-DT in Toronto was the only operating digital station in the country. At the end of September, applications were filed for seven more stations. CFTO (CTV), CKXT ("Toronto One"), and the two CBC stations (English and French) will operate digital transmitters on channels 40, 66, 20, and 24 respectively. CKXT will also operate a digital transmitter on channel 15 in Hamilton. Hamilton religious station CITS proposes a digital operation on channel 21. And finally, CIVT (CTV) proposes a digital transmitter on channel 33 in Vancouver.

Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to dougsmith@monitoringtimes.com. Good DX!



KWMT-540, heard throughout the Upper Midwest

DX Conditions Improving on Pirate Bands

Now that fall has arrived, the new DX season on the shortwave bands is rushing into high gear. Pirate radio broadcasters are taking advantage of the fact that summer static levels have vanished at the same time as nighttime hours are expanding. Thus, the available time when pirate radio signals will propagate over lengthy distances is better at this time of year than it is at any other time. As we have been reporting in recent months, a greater and greater percentage of the North American shortwave pirate broadcasters are moving down to frequencies near 6925 kHz.

A rumored drought of pirate broadcasters has turned out to be a myth. During all recent weekends, several pirate broadcasters have tuned up their transmitters to bounce novel programming off the ionosphere. Our readers heard dozens of them this month. With the always-active Thanksgiving and Christmas holidays coming up, DXers from all over North America are having increased levels of success in their pirate chasing. Given these excellent circumstances, now would also be a good time to give Santa a hint about the new receiver that you have been dreaming about.

◆ Talk Like a Pirate Day

It has been little known to most of us that a new pirate holiday has emerged. September 19 was suddenly christened as "Talk Like a Pirate Day" by Mark "Cap'n Slappy" Summers and John "Ol' Chumbucket" Baur. With a boost from humorist Dave Barry, this heretofore unknown event has probably entered the pirate radio world on a permanent basis. If you missed this one, you will want to check out the internet home of this novel occasion at the <http://www.talklikeapirate.com/piratehome.html> URL.

◆ What We Are Hearing

Our readers heard all of these North American pirate broadcasters this month. All pirates operate on a sporadic schedule, but shortwave pirate broadcasting increases noticeably on weekends, and during major holiday periods. You have to tune your dial up and down through the pirate radio band to find the stations, but the new main North American pirate frequency of 6925 kHz, plus or minus 30 or 40 kHz is the place to scan for the pirates.

Captain Morgan- Rock music and pirate discussions are the staple at the Captain's station. (None, asks for reports on the Free Radio Network web site)

KIPM- Alan Maxwell's existential dramas remain the most complex programming on shortwave radio today, whether from a licensed transmitter or a pirate one. The shows require a thinking cap to appreciate them, so this one is not light entertainment. (Elkhorn)

KRMI- Radio Michigan International continues to mix comedy and rock music. (Uses KRMI6955@yahoo.com even when their frequency is 6925 kHz)

KPSA- This new one has concentrated on public service announcements, allegedly from the Mojave desert. (None)

Partial India Radio- If you can't hear All India Radio from the Asian subcontinent, you may have to settle for its pirate radio parody. (Providence)

Possum Hunter Radio- The motive behind this new pirate is fairly evident in the station name. A good ole boy plays rock tunes on the station. (None known)

Radio Cochiguaz- The leading South American pirate has added 6950 kHz to its normal 14430 kHz frequency. They also are now using a Radio_Cochiguaz@yahoo.com e-mail address. Broadcasts remain irregular, but check for them on the weekends, often in upper sideband mode. (Santiago)

Ragnar Radio- Like many pirates, this one is dominated by rock music programming. (Uses ragnarradio@yahoo.com e-mail)

Sycko Radio- The rock music and professionally produced jingles make this one a standout in this particular pirate genre. (Still none, so spelling of station name still controversial)

Undercover Radio- Hard metal rock is starting to dominate their shows. The announcer sometimes is heard in QSO conversations with other pirates. (Merlin)

WHYP- The James Brown yard memorial station always features genuine programming from the old licensed WHYP in North East, PA. (Yes, there is a town by that name, ironically in northwestern PA.) It is among the most active pirates on the air today, and its parodies of DXing are becoming legendary. (Providence)

WJAM- This new pirate appeared during the fall with a punk rock music format and Jack Ryan as the announcer. Despite the "punk shortwave" slogan of the station, they have been playing a variety of rock. (None announced)

WMPR- Micropower Radio still cranks out its techno rock beat, in case you are in the mood for a "dance party." (Still none, but

occasionally QSLs loggings in *The ACE*)

WSDW- On most broadcasts this pirate rebroadcasts old time radio shows from "The Shadow" program. But, they have also been known to mix rock music into their shows. (Uses the_shadow6955@hotmail.com e-mail)

◆ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 28413, Providence, RI 02908; PO Box 69, Elkhorn, NE 68022; PO Box 293, Merlin, Ontario N0P 1W0; and Box 159, Santiago 14, Chile.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for sending loggings for possible QSL by pirates remain *The ACE* (\$2 US for sample copies via the Belfast address above) and the e-mailed *Free Radio Weekly* newsletter, still free to contributors via niel@ican.net. The *Free Radio Network* web site, another outstanding source of content about pirate radio, is found at <http://www.frn.net> on the internet.

◆ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: John T. Arthur, Belfast, NY; Dave Balint, Wooster, OH; Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; Richard Cuff, Allentown, PA; Cachito, Santiago, Chile; Jerry Coatsworth, Merlin, Ontario; Ross Comeau, Andover, MA; Rich D'Angelo, Wyomissing, PA; Gerry Dexter, Lake Geneva, WI; Brian Duddy, Nyack, NY; Harold Frogde, Midland, MI; William Hassig, Mount Prospect, IL; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Bill McClintock, Wellington, OH; Mark Morgan, Cincinnati, OH; Lee Reynolds, Lempster, NH; Fred Roberts, Hamburg, Germany; Robert Ross, London, Ontario; Martin Schoech, Merseburg, Germany; John Sedlacek, Omaha, NE; Bud Stacey, Setsuma, AL; Niel Wolfish, Toronto, Ontario; and Joe Wood, Gray, TN.

SATELLITE SERVICES

MT TRANSPONDER GUIDE www.monitoringtimes.com/mtssg.html
All Frequencies MHz

Robert Smathers

robertsmathers@monitoringtimes.com

Loral Skynet Telstar 5

C-Band - 97 degrees West longitude

1(M)	3720	ABC Network - East (LEITCH)
2(H)	3740	Nebraska Educational Television (digital)
3(V)	3760	TCT Ministries (digital) / Urban America Television Network (digital)
4(H)	3780	Nebraska Educational Television, Nebraska Educational Television HDTV (digital)
5(V)	3800	Occasional video
6(H)	3820	CBS Network feeds (digital)
7(V)	3840	Occasional video
8(H)	3860	Occasional video
9(V)	3880	Occasional video
10(H)	3900	FOX Network feeds (digital - acc) / 20th Century Fox syndication (analog - occ)
11(V)	3920	Bonneville Satellite feeds (digital) / BYU-TV, Latter Day Saints Radio Network, KSL-AM Salt Lake City (digital)
12(H)	3940	ABC network feeds (occ)
13(M)	3960	FOX Network feeds (digital - occ) / 20th Century Fox syndication (analog - occ)
14(H)	3980	Occasional video
15(V)	4000	Occasional video / ABC network feeds (occ)
16(H)	4020	Occasional video / ABC network feeds (occ)
17(V)	4040	Bonneville Satellite feeds (digital) / Latter Day Saints television (digital)
18(H)	4060	Armed Forces Radio and Television Service Satnet (digital)
19(V)	4080	Occasional video
20(H)	4100	Occasional video / ABC network feeds (occ)
21(V)	4120	ABC Network - West (LEITCH)
22(H)	4140	ABC Network - East (LEITCH)
23(V)	4160	Occasional video
24(H)	4180	Occasional video

Loral Skynet Telstar 5

Ku-Band - 97 degrees West longitude

1(V)	11728.5	Data Transmissions / Bob Jones University Homesat (digital)
2(H)	11735.0	Data Transmissions
3(V)	11789.5	Occasional video
4(H)	11796.0	Data Transmissions
5(V)	11836.0	Pittsburgh International Telecommunications (digital)
		IRIB2 (IRIB = Islamic Republic of Iran)
		Haiti Diaspo TV (HDTV)
		NTD (New Tang Dynasty) TV
		Rang-a-Rang Channel - DC
		Rang-a-Rang Channel - NY
		Arabic Radio
		World Service Radio
		Quran Radio
		Melli TV
		Life Radio 1
		Life Radio 2
		STAR Radio 1
		STAR Radio 2
		STAR Radio 4
		The Overcomer Ministries - Dr. Stair
		American Farsi Network (AFN) Iran Radio
6(H)	11842.5	Data Transmissions
7(V)	11867.0	Globecast World Television (digital)
		Assyria Sat TV USA
		TV Romania
		L.A. Home Shopping Entertainment (LAHSE)
		National Broadcasting Network - Lebanon
		Qatar TV
		Duna TV - Hungary
		AsiaNet USA
		PNN2 - Persian-language home shopping network
		TyC Sports USA - Argentina
		Pictures of Croatia

8(H)	11873.5	Voice of Croatia
		Harizan TV - Armenia
		Tamasha TV - Persian-language
		Kossuth Radio - Hungary
		Globecast World Television (digital)
		Arab Network of America (ANA) / MBC - Arabic
		Arab Network of America (ANA) Radio - Arabic
		Radio Dimensione Suono (RDS) - Italian
		SPT (SIC International) - Portuguese
		Al Jamahiriya Sat Channel - Arabic
		RTV-21 - Albanian
		Radio 21 - Albanian
		Futbol DP (Futbol de Primera)
		Yemen TV
		Radio Sanaa - Yemen
9(V)	11898.0	International services (digital)
		Nile TV International
		Palestine Satellite Channel
		Emirates Dubai Television
		Dubai Sports Channel
		Saudi Channel One
		Nile News
		Beste Van Nederland (Dubai Business Channel)
		Arabic radio
		Data Transmissions
		Globecast World Television (digital)
		Syria Satellite Channel
		Syria Radio
		Al Manar TV
		German TV
		DW Radio - German
		TV Polonia
		Palskie Radio 1
		Palskie Radio 3
		SBC (Hindi)
		Jordan TV
		TVP3 - Poland
		Mega Communications - WNUE-FM 98.1 Titusville, FL
		Asian FM Radio
12(H)	11935.5	Occasional video
13(M)	11960.0	Data Transmissions
14(H)	11966.5	Data Transmissions
15(V)	11991.0	Globecast World Television (digital)
		Globecast Business TV
		Setanta Sports
16(H)	11997.5	Data Transmissions
17(V)	12022.0	Data Transmissions
18(H)	12028.5	Data Transmissions
19(V)	12053.0	Globecast World Television (digital)
		BK TV - Serbia
		RSC-1 - Antena 1 and Prima TV - Romania
		RSC-2 - Realitatea TV and Etna - Romania
		MAC-TV
		Pro TV - Romania
		Euronews (languages: English, French, German, Italian, Spanish, Portuguese, Russian)
		Africa Independent TV (AIT)
		Ray Power 106.5 FM - Nigeria
20(H)	12059.5	Data Transmissions
21(M)	12084.0	Data Transmissions
22(H)	12090.5	ABS-CBN International (digital)
		The Filipino Channel - North America
		ABS-CBN News Channel
		Cinema Channel One
		DZMM Radio Patrol
		DWRR Radio Romance
		NITV (National Iranian TV)
		Zhong
		DA-I - Tzu Chi Da'I
		Pars TV Network
		Appadana International
		HZTV - Hwazan Satellite TV
		Channel One
		Pinoy Central TV
		PNN - Persian News Network
23(M)	12115.0	ETTV International (digital)
		ETTV Global
		ETTV Drama
		ETTV China
		ETTV News
		ETTV Yoyo TV

		BLTV - Buddhism Light TV
		SET International - Sanlih Entertainment TV - Taiwan
		Unique Satellite TV
		JET-TV - Japanese Entertainment TV
		Da-Ai TV - Tzu Chi Da'I
24(H)	12121.5	Globecast World Television (digital)
		Business TV 1: Globecast WTV promos (occ) / Globecast Business TV (acc)
		Business TV 2: HRT - Hrvatska Televizija - Croatia (shares with HIC)
		Business TV 2: HIC TV (Croatian Info Center Satellite TV - Hrvatski Informativni Centar)
		Business TV 3: Globecast Business TV
		HIC Radia (Croatian Info Center Satellite TV - Hrvatski Informativni Centar)
		Arya Persian TV
		DFH-1 - ATV and TBRT networks - Turkey
		DFH-2 - Star Network - Turkey
		DFH-3 - NTY, Kanal D, Teleon networks - Turkey
		KISB 1 - Korea International Satellite Broadcast channel 1
		KISB 2 - Korea International Satellite Broadcast channel 2
		KISB 3 - Korea International Satellite Broadcast channel 3
		DFH-FM 1 - Turkish radio channel 1
		DFH-FM 2 - Turkish radio channel 2
		JSTV - Jesus Satellite Ministry Channel 1 - Korean-language
		JSTV-2 - Jesus Satellite Ministry Channel 2 - Korean-language
		Hrvatski Narodna radio - Croatia
25(V)	12146.0	Occasional video
26(H)	12152.5	Globecast World Television
		Abu Dhabi TV - Arabic
		Emirate FM - Arabic radio
		Azadi Television
		IPN - International Programming Network
		Iran TV
		Tapesh TV - Iranian
		Ajara - Georgian
		Radio Sedaye Iran (KRSI Las Angeles area)
		Radio Seoul - live from L.A.
		Thai TV 5
		Armenian Public TV
		Jaam-e-Jam Shabaneh - Persian-language
		PNN - Persian News Network
		Radio Kol Hanesama - Israel
		Ma TV International - Persian-language
		KWKW-AM, Los Angeles Spanish-language radio
		Bahai Radio
		WVGN Radio, 107.3 FM Charlotte
		Amalie, Virgin Islands
27(V)	12177.0	Pittsburgh International Telecommunications
		KurdSat
		Kurd TV
		Maharishi Open University
		KIRN-AM 670 - Radio Iran
		VTVA (occ) / MRTV - Myanmar (occ)
		Samanyolu TV World
		World Radio Network 1 - English
		World Radio Network 2 - Multilingual
		World Radio Network 3 - French
		Kuwait Radio Network
		Kuwait Space Channel
		Back-to-Health TV
		Israeli TV
		Haitian Satellite TV
		TRT - Turkish Radio-TV Corp.
		World Jewish Radio
		Kairali USA
28(H)	12183.5	Spacecam Systems FM Squared / FM Cubed Services
		FM Squared Data Transmissions .11, .26, .33, .37, .55, .59, .68, .77, .80, .83, .86, .89, .92, .98, 1.03, 1.06, and 1.19 MHz

DXpedition Results

It has become a tradition. For the past three years, a US-Canadian team has converged on Miscou Island, New Brunswick, for a week of DXing and general radio camaraderie in early October. This location, in extreme North-eastern New Brunswick, boasts an open water-path to most of Europe and Africa, allowing us to log numerous signals that would not be audible from home.

I attended this year's event with Jacques d'Avignon (ON) and Ken Alexander (ON). The three of us made up the core team that stayed on the island for the full five days. Also joining the effort for at least part of the time were Brent Taylor (NB), Geoff Rivett (NB), Niel Wolfish (ON) and Miscou-area DXer, Roger Rousel. Our radio interests ranged from LF beacons to amateur satellite work, but we all shared a common interest in the wonders of wireless communication. Our membership in the Ontario DX Association (<http://www.odxa.on.ca>) was the thread that brought us together for this DXing event.

A key reason for selecting Miscou Island was the lack of man-made noise (QRM). There are relatively few residents on the island, and there are no industrial operations for miles around. When things are that quiet, however, you notice even the slightest increase in background noise, and we did encounter a few problems with static this year – mostly in the form of a 60 Hz buzz.

In trying to find the cause of the noise, almost every part of our station came under suspicion at one time or another. It was only after a methodical shutdown of each item that we were able to isolate the cause to two power supplies – one for our bank of multicouplers and another used to power a tabletop receiver. After some re-configuration of our setup, we were able to minimize the noise and continue monitoring. Next year, we plan to use batteries to power virtually everything, with solar power for recharging. With DC power, all noise coming from our own equipment should be eliminated.

◆ What We Heard

I can't say that this year's conditions were stellar. We heard fewer countries than in the past, and the distances were generally shorter. However, we did learn some interesting things about the behavior of our antenna systems, which included two Beverage wires, an active antenna, and a large aperture amplified loop.

The loop took the prize when it came to low noise reception. It didn't always give the strongest signal, but the signal-to-noise ratio was nearly always superior to the other antennas, and that

often makes the difference when you're trying to pull in a weak signal. Even when we were having trouble with 60 Hz noise, the loop shined with good performance on a wide range of frequencies.

The beverage wires also performed well, with the 500-ft East-West antenna favoring Europe as expected, and the 1000-ft North-South wire working well for North American signals. Our East-West wire was strung along the shore, so it became known as the "Beach Beverage." At one point we noticed strange behavior from this antenna with its directivity pattern becoming "blurred." A quick check revealed the probable cause – a large part of the antenna had been swept into the ocean by the high tide! Placing the wire back up on dry ground solved the problem.

The active antenna was hard to beat from the standpoint of simplicity. We mounted it to a pole with two plastic tie wraps, extended the 50-ft feedline into the cottage and it was ready to go. It also performed quite well on the air, in many cases giving the strongest signal of the bunch; however, it was also very sensitive to noise. During our noise problems, the active whip was the antenna most affected. Once the noise was eliminated, however, the whip became a very strong contender.

Table 1 shows a sampling of longwave signals received at Miscou. Countries are listed by their International Telecommunications Union (ITU) Code. A key to the codes is included at the end of the table.

Table 1. Selected LF Loggings – Miscou 2003

FREQ	ID	LOCATION / USER
162	—	LWBC, Allouis, F
171	—	LWBC, MRC
177	—	LWBC, Berlin
198	—	LWBC, London (BBC)
227	SZO	Fryeburg, ME
234	—	LWBC, LUX
242	3E	Galaxy Platform, NS
252	—	LWBC, ALG
257	FVE	Frenchville, ME
260	PYA	Penn Yan, NY
263	GGP	Logansport, IN
265	JH	Julianehaab, GRL
270	—	LWBC, CZE
270	FLO	Flores, AZR
272	OLD	Old Town, ME
278	BST	Belfast, ME
278	PQ	Presque Isle, ME
279	SI	Simiutaq, GRL
284	5N	Rowan Gorilla Platform, NS
298	KU	Kook Islands, GRL
323	SMA	Santa Maria, AZR
328	LC	Laconia, NH
330	CZM	Cozumel, MEX
330	FH	Frederikshaab, GRL

334	RM	Rockland, ME
336	BD8	Melva, VA
338	PST	Porto Santo, MDR
356	SUH	Rockland, ME
359	NA	Narsarsuaq, GRL
360	FMH	Falmouth, MA
360	ASN	Ascension Island, ASC
371	MGL	San Miguel, AZR
375	JRV	Morrisville, VT
380	FIL	Horta, AZR
382	LAR	Arruda, POR
386	CP	Constable Pt., GRL
397	OW	Norwood, MA
402	MQ	Miquelon, SPM
412	6C	H. Goodrich Platform, NL
421	PCW	Port Clinton, OH
421	GE	Madrid, E
444	—	CW Marine traffic
450	PPA	Puerta Plata, DOM
521.4	—	CW Marine traffic

Key to ITU Country Codes

ALG-Algeria
ASC-Ascension
AZR-Azores
CZE-Czech Republic
DOM-Dominican Republic
E-Spain
F-France
GRL-Greenland
LUX-Luxembourg
MDR-Madeira
MEX-Mexico
MRC-Morocco
POR-Portugal
SPM-St. Pierre & Miquelon

◆ BeaconFinder Fix

A small number of *BeaconFinder II* directories were shipped with the 3-hole punches cutting into station listings. This will be most apparent at the bottom of even-numbered pages. If you received a defective guide, simply drop me a note (e-mail or postal) and I will send you a replacement copy. I apologize for any inconvenience this may have caused.

◆ Beacon Updates

From Dave Tomasko via the *Lowdown* journal, come the following beacon updates: 352/NKX, Miramar, CA, is on the air; 215/UIZ, Detroit, MI, is off the air.

John Corby (ON) reports that all beacons for the Lester B. Pearson airport in Toronto have now converted to 3-letter IDs. The new IDs are as follows:

T/341 is now ZLP
X/385 is now ZDH
R/403 is now ZTO
L/368 is now ZYZ
J/236 is now ZLB

Merry Christmas, 73, and peace to all.

My Favorite Contest

You may have heard me say in past columns that I am not a particularly rabid contester. I'll poke around in most of the big shows playing hunt and pounce for states or countries. I make regular use of the various State QSO Parties to fill in the gaps on my quest for 5 Band Worked All States. But I am seldom one to ship the family and pets off to another grid square so I can give undivided attention to a bunch of like minded folks screaming CQ TEST at each other for 48 hours or so. It's just not my Cup-O-Joe.

With one notable exception...

For some reason I have never quite figured out, for quite a number of years, I get weak in the knees every December when the ARRL 10 Meter Contest comes around. I can sort of track it back to the bottom of the last cycle when the bands were really bad. The 10 Meter show that year had a bunch of neat openings that brought through some signals from relatively far away given the general shape of the bands at that time. It was like finding an oasis in the desert! I worked more DX and Stateside stuff in two days than I had in the previous 6 months or so.

Also, for some reason, every year, I get this notion that I am only a couple of states away from completing 10 meter WAS. The fact is that I have hovered at around 15 needed states probably since I was a Novice, but I still get this weird idea that "this is going to be the year" when I finish things up for that band.

Anyway, for these few but convoluted reasons (fitting to a person like me who is clearly "wired" a bit differently from the average), the annual 10 Meter event is the one contest I do more for than turning on the radios and checking out the exchange in the back of *World Radio*. And, for this reason, if no other, I thought it might be a good time to review some basic contest preparation and planning, along with a look at how to play the game on the big day.

◆ Contesting Contests

First of all, some general comments on the overall subject of amateur radio contesting. More than one person has pointed out over the years that it's odd that these radio events are called contests because the majority of folks involved don't really compete. At least, not in the sense of tallying up their score in hopes of winning whatever prize, plaque or certificate that is up for grabs. People may submit their

logs for the ability to see their callsign in the pages of *QST* or *CQ* but don't give it all that much thought beyond that. I would reckon that a good many folks are in the game for the same reasons as Old Uncle Skip often finds himself in the hunt. To take advantage of the contact rich environment to fill in the blanks in the log

drop a bunch of mega-bucks on building the ultimate contest station. But even a modest station and a bit of understanding or the rules and how to use them to your advantage can make it possible to post a score you can be proud of as well as fill in a lot of blanks in the log book.



leading to certain operating achievements not related to any particular contest. Awards such as DXCC, WAS, WAC, WPX and dozens of others.

Don't get me wrong, it can be a lot of fun to listen to a really well run, highly competitive contest station working the bands. You hear these folks and get to recognize their "Big Gun" signals and callsigns after you participate in a few contests. Multi-operator stations with separate rigs and towers for each band. Operations coordinated by network-linked logging computers. An entire team of hams working diligently just to put the biggest score up that they can. And then there are also extremely dedicated "Single-Op" stations using the most sophisticated equipment they can muster along with years of common sense contesting skills to work the bands to their best advantage. If you ever get an opportunity to visit or even participate at such a station, by all means go for it! It can be the experience of an amateur's lifetime.

Now it is fairly unlikely that anyone reading this column is going to run out and

◆ Is Your Station Contest Ready?

I am sure we all like to think that our current operating position is flawless in nature and ready for action at all times. Experienced hams, and especially contester types, know that the spirit of Captain Edward A. Murphy lurks around every corner. If there is a "iffy" piece of coax, a stale component about to buy the farm or even a chair that will pop a spring into your derriere, the problem is more likely to happen right in the middle of a contest, usually just as you about to complete an exchange with the rarest contact you will have during the whole contest weekend.

With this in mind, it never hurts to check out your radio system and your operating position from stem to stern and resolve any potential problems before the flag drops on contest day. Don't forget even the little factors. Did you ever need to go hunting around for a pen when the one you are using dries out? Of course, there is the classic story told at every Field Day gathering about the station that couldn't go on the air until somebody ran to the local Radio Shack to buy a coaxial cable barrel connector.

The rule on beating Murphy at his own game is put the thought into such matters before the contest so you won't need to worry about them during a contest.

◆ RTR = Read The Rules

Before playing in any contest, even as a casual participant, your experience will always be enhanced if you take a little time and read the rules before hand. The two tidbits of information everyone needs are: 1) The hours of operation for the contest 2) The rules and nature of the contest QSO exchange. Armed with just this information you can at least get on the air and not embarrass yourself too much. But a glance at the rules will almost always reveal some information to make you much more adept in your efforts.

Of course if you are intending to be a true "player" in the game and plan to submit your log for scoring and the awards and acco-

lades that may follow from such an effort, you cannot get very far without reading the rules.

Most contests have scoring multipliers that can help direct your efforts, turning a relatively small number of actual QSOs into a large points total. Let's say, for example, you worked 100 stations on phone in the upcoming 10 Meter Contest. Each of those stations count for 2 points for a total of 200. But reading the rules points out that you get a multiplier for each state, Canadian province, DXCC entity, or ITU region maritime mobile operation. So let's say in the course of working those hundred stations you nailed down 10 states and 5 DXCC countries. Now you're sitting on 3000 points instead of 200.

Many contests offer higher raw score points for CW or other mode contacts. Some contests offer additional multipliers for such things as portable operation or low power. A little bit of knowledge in the multiplier region will never fail to bring your score up to competitive levels. Rules for all ARRL sponsored contest can be found at their website <http://www.arrl.org>.

◆ Know The Conditions

With the advent of the Internet, accurate and up to date propagation prognostications are just a mouse click away. Or if you like to do things the *Old School* way, you can copy the CW bulletins off of WIAW. Any way you choose, knowing the band conditions going into a contest will help you tune to the right place at the right time. Now an interesting tactic I have used from time to time is paying attention to when bands are starting to go away. You can also monitor DX beacon stations during a contest to get the paths and their quality. This is usually not needed during big contests because you will hear the various entities coming in and going out by their callsigns.

Also, never forget the power of the "Greyline." Dawn and dusk both bring on interesting conditions that should aid your ability to work stations that normally give you trouble at other times of the day.

◆ Plan Your Time

Unless you are a truly dedicated contester, or operating from a multi-op station, it is not very likely you will run up against a contest time limits. Many contests set up rules such as only allowing 36 hours of operation within a 48 hour contest period. That being said, you would want to maximize your time so that you take maximum advantage of the bands and conditions as far as can be predicted.

But on a more practical level, most of us are fairly busy folks on weekends. We have chores to do, errands to run and business to take care of. Putting a little thought into when would be good times to operate and freeing up blocks of time during the day usually allows most of us to lead the dual life of Amateur Radio Operator (and Contester Extraordinaire) as well as Dutiful Spouse, Life Mate, Parent, Friend, etc.

When I play in contests, I seldom sit down

for more than an hour or two at a time. I find that, in that period of time, I have crawled across the band or bands I can hear and mined all the contacts of value to me. Getting away for another hour or so later in the day yields a whole new crop of potential contacts for me. It may not be all that scientific or efficient, but I've filled in a lot of logbooks this way.

◆ Become an Efficient Hunter and Pouncer

Hunting and Pouncing is my preferred method of contest operation. You sacrifice the process of "holding" a frequency (an unlikely prospect, anyway, if you are not running full gallon power into serious antennas) for the tactic of scouring the band for the signals you need. You can use this technique to build up multipliers if you are going for a high score. Or, if you are like me, you can use it to fill in the gaps for whatever challenges or awards you have set your sights on.

You can best accomplish either goal by having a couple of lists prepared at your operating station. Before any contest, I extract my "Wants and Needs" relevant to that particular operating event from my database. I am then able to refer to this list as I cruise the bands, prepared to jump out of the speaker of anyone who can give me the contact that will fill in the gaps shown on my list.

The key to making this work is to keep moving. If you hear someone you need, throw your call out a couple of times but do not become obsessed. If the station does not come back, after one or two calls, note his or her frequency and move on. After you have mined the bands for other signals you can drop back and try again. Very often conditions will have changed just enough to make the contact work.

Last year I took the techniques I described above and applied them to formally submitting a score for the ARRL 2002 10 Meter Contest. In addition to having a great deal of fun in a contest I always enjoy, I was awarded with a certificate for First Place, Single Operator, Phone. QRP for the South Jersey ARRL Section. I did this with a mere 4 hours of total operating time. I made 81 QSOs, but "worked the rules" to garner 32 multipliers giving me a total score of 5,056.

Have fun; I'll see you at the bottom end of 40 meters, or (at least one weekend this month) anywhere on 10 meters. Have a joyous and peaceful Holiday Season.

UNCLE SKIP'S CONTEST CORNER

QRP ARCI Holiday Spirits Sprint
Dec 7, 2000 UTC - 2400 UTC

ARRL 160-Meter Contest
Dec 5, 2200 UTC - Dec 7, 1600 UTC

ARRL 10-Meter Contest
Dec 13, 0000 UTC - Dec 14, 1000 UTC

Original QRP Contest (CW)
Dec 27, 1500 UTC - Dec 28, 1500 UTC

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Antennas for Medium-Wave DXing

We're approaching the time of year when we usually find the best conditions for DXing on the AM broadcast band, and the rest of the medium wave or medium frequency band. In the fall and winter there is less received electrical noise to mask over the weak DX stations you're trying to copy. But regardless of the season it's always nice to have an antenna that can help "pull in" those weak, far-away stations you want to snag. So let's discuss some antenna designs popular with the MF DXers, and consider ways to use them.

♦ Popular Medium-Frequency Antenna Types

It's important to realize that having an antenna that simply provides strong signals doesn't necessarily lead to excellent reception. On some of the HF band, the MF, and on lower frequencies received-atmospheric noise (also called "static" or "sferics") is usually of sufficient strength to cause considerable interference with reception. Changing from a 10 ft wire antenna to a 100 ft wire antenna will usually increase signal strength of most received signals, but it also increases the strength of the received noise.

Due to this simultaneous increase in noise along with the increase in signal we find that the signal-to-noise ratio (S/N) remains relatively constant. Thus, readability, or our quality of reception, remains about the same when using the longer antenna as when using the shorter one. It would be nice if we could select antennas that can significantly reduce the amount of received noise while increasing, or at least not significantly reducing, the strength of the desired signal. This sounds like a lot to ask of an

antenna, but, as you will see, some antennas are up to the task.

One good approach to the task just outlined is to use a highly-directional antenna, such as the Beverage.¹ This sort of antenna concentrates its reception in a specific direction, or two opposite directions for bi-directional types. With such beam antennas the antenna's reception pattern is concentrated in specific directions so that its response to both noise and interfering signals coming from other directions are reduced. Thus S/N is improved, and often this results in a worthwhile improvement in the quality of reception.

Another kind of directivity possessed by some antennas is the presence of nulls in the antenna's reception pattern. Nulls are directions of low antenna responsiveness in a particular direction. Loop antennas² in particular have deep, or pronounced nulls in certain directions. For this reason loop antennas such as open-frame loops, and ferrite rod loops are often quite useful to MF DXers for "nulling out" interference such as unwanted stations, or received noise. Of course the sources of interference must come from a direction other than that of the desired station.

Although a loop antenna's nulls are quite sharp, its major lobes are quite broad. Thus the signal strength of the desired station usually remains relatively unaffected as the antenna's orientation is adjusted to place the null in the direction of the interference.

To null out interference with a loop antenna, first tune to the station you want to hear. Then as you rotate the loop antenna, very slowly concentrate on listening to the interference. When you hear the interference level drop

in strength then very, very slowly move the loop back and forth, and also tilt it side to side, and back and forth. This allows you to find the position in which the loop's null rejects the interference most completely.

A yet different approach can be used with two antennas, some inductors (coils), potentiometers, and variable capacitors³. The signals from the two antennas are fed to a common circuit (fig. 1) where they are adjusted for phase such that the interfering signals are canceled, at least to some degree. This makes the desired signals more readable.

For reduction of some specific kinds of received noise, a few companies sell devices which utilize a short "noise antenna" which is separate from the receiver's main antenna. By adjusting the device, the phase of the noise from the noise antenna is varied, and then recombined with the main antenna's signal. By adjusting the phase of the received noise to cancel that from the main antenna the interference is reduced or cancelled.

The noise-antenna system just mentioned uses both an ordinary antenna and a relatively shorter noise antenna. In contrast, the phasing of two antennas, mentioned earlier, usually utilizes two relatively long antennas. The noise-antenna system utilizes active (transistors, ICs) devices in its circuitry, whereas the phased-antenna approach is just resistors, coils and capacitors; it is be relatively easily built by the radio enthusiast. The basic idea behind both systems – signal canceling by phase reversal of one signal – is essentially the same.

Active antennas are small, convenient, desk-top sized antennas. An active antenna is essentially a small antenna element which feeds a low-noise pre-amplifier. The pre-amplifier amplifies the signals from the antenna element, and feeds them to a receiver. After the amplification the signals captured by the small element will often be equal in strength to those captured by a much longer antenna.

If the antenna element used is a loop, then the active antenna has the desirable nulls mentioned above. On the other hand, most active antennas use short, whip antennas, and are located indoors where locally-generated electrical noise levels may be high. Active antennas are also subject to overload, intermod, and desensitization when there are very strong signals at their location. Nevertheless, in many locations they perform quite well, and are a convenient way to get long antenna performance from a short antenna.

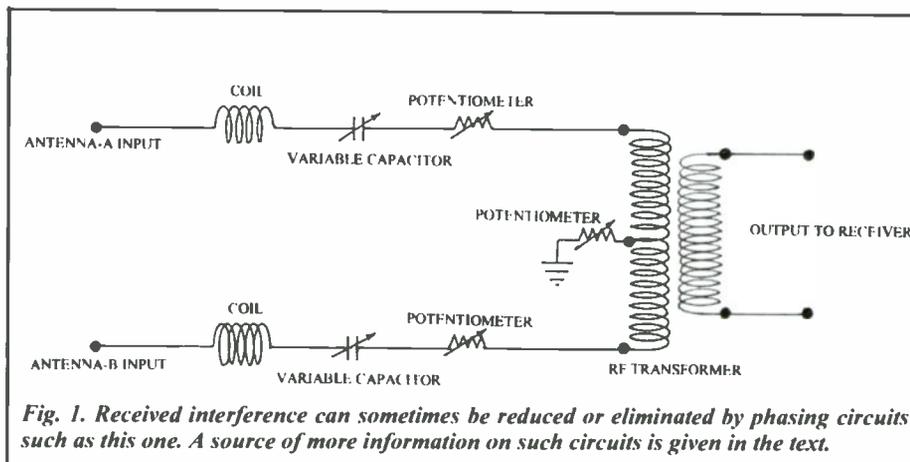


Fig. 1. Received interference can sometimes be reduced or eliminated by phasing circuits such as this one. A source of more information on such circuits is given in the text.

This Month's Interesting Antenna-Related Web site:

This site is a medium wave antenna handbook: <http://www.part15.org/mwa/skyhooks/chapter6.html>.

Here's a site that has loop-antenna design info, and lots of links to loop info: http://www.mindspring.com/~loop_antenna/.

And here's a site on building Beverages: <http://www.w8ji.com/beverages.htm>.

❖ Non-Antenna Approaches

The devices known as "noise limiters" and "noise blankers" are sometimes useful for reducing received-noise interference. Generally, however, these devices leave much to be desired when dealing with the simple, continual static background we find at MF and lower bands. Although there are plans available for home-brewing these devices, it is far more common to see them built-in as a part of the receiver as purchased.

The use of a squelch circuit may seem be a good way to reduce noise, but it merely turns off the receiver's audio when no usable signal is present. When a signal is strong enough to open the squelch and be heard, then the squelch has no effect on received noise.

❖ Now With All That Said...

It's true that the technology discussed above often be a big help in pulling in those hard-to-get DX stations. On the other hand, it is also true that you can receive a lot of not-so-hard-to-get DX with only an ordinary antenna, and ordinary receiver. So don't overlook the fact that, when the band is open, many DX stations are present at good strength, and reasonably in the clear. Of course, when the band is really down nobody hears anything. Or if you want to get a bit more involved try putting up a wire antenna as high and long as is practical for you. Then you'll have even more of the DX world pouring out of your radio's speaker for your listening enjoyment.

RADIO RIDDLES

Last Month

I said: "What is the "HCL antenna?" Want a not very-helpful hint? OK, it's also called the "hydrochloric acid antenna."

Well, I admit that the hint which I offered then was not only less than helpful; it was also a bit misleading. The HCL antenna has nothing to do with hydrochloric acid. "HCL" just happens to be the acronym for both hydrochloric acid, and for the description of the HCL antenna which is: "high, clear, and long."

This antenna was a favorite of old-time radio operators long before beams were popular. And it can give a good account of itself on all bands. Sited outdoors as high, in the clear, and long as is practical for your situation this antenna can support a lot of great radio re-

ception, including the MF DXing we just discussed above.

This Month

In the discussion above I suggested that directionality was a valuable asset for eliminating interference, and improving reception for MF DXing. But did you notice that I didn't suggest using the very popular directional beam antennas like the Yagi-Uda, cubical quad, the phased arrays, or long wire beams like the rhombic and V antennas? Also missing were the highly directional dish and corner-reflector antennas. Why were all these directional antennas left out?

You'll find 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.

The two articles cited below are available from: *Monitoring Times*, 7540 Highway 64 West, Brasstown, NC, 28902-0098. Email order@grove-ent.com to discover price and availability of back issues or reprints.

- 1 "Don't Try Drinking this Beverage!", *Monitoring Times*, January, 2001
- 2 "A Survey of Various Loop Antennas", *Monitoring Times*, December, 1995
- 3 Information on phased antennas for MF is available in *NRC Antenna Reference Manual, Volume Two*, available from National Radio Club, Inc., P.O. Box 164, Dept W, Mannsville NY 13661-0164 USA, <http://www.nrcdxas.org/catalog/books/>. They offer for sale four booklets on MF antennas.

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DJ-X10T Wide Range Receiver
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Are you ready for extreme operations?
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The S-40A – Still a Restorer's Challenge

I've been writing a radio restoration column every month for almost exactly seventeen years. But I've never run across a set that's thrown me as many curves as this one has! The other side of the coin, of course, is that I don't think I've ever learned more from a single restoration project.

You may recall that last month, after recapping the set completely, changing out the power transformer, and removing a lot of senseless owner mods, I plugged in the radio for the first time. I was gratified to find that I could hear signals all over the broadcast band, though short wave seemed to be dead. Still, considering the mess the radio had been in, I felt lucky to hear anything at all.

◆ An A.V.C. Problem?

Because of all the other atrocities visited upon this set, I guessed that I might be dealing with a lack of sensitivity caused by an amateurishly-aligned i.f. channel. So I began this month's session by getting out my test instruments and going to work on the i.f. I was surprised to find that I could improve very little on the alignment. All of the existing adjustments seemed to be in the right places. However, I did note that meter swings on passing through resonance weren't as vigorous as I am used to.

As I was doing this work, I noticed that while I was hearing those strong signals all over the broadcast band, there was something odd about the audio. For one thing, the sound didn't come in smoothly as the set warmed up while tuned to a station. It would cut on suddenly – sometimes not starting at all until the volume or tuning control was moved a little. For another, the sound would distort when switching over to a.v.c. with the sensi-

tivity control up full (as recommended in the owner's manual for broadcast listening).

I began trouble-shooting with the obvious: checking the voltages observed at the pins of all the tubes against the values shown on the voltage chart published in my service notes. I did find some discrepancies, but nothing glaring enough to suggest a serious failure anywhere in the set.

Since the audio symptoms could reflect insufficient a.v.c. voltage, I began checking resistances and other components associated with the a.v.c. and first audio circuits. Unfortunately I had no reference figure for the grid voltages to be expected on the tubes controlled by the a.v.c. line. The manufacturer's voltage charts were compiled with a 20,000-ohms-per-volt VOM (apparently this was before the VTVM came into widespread use) and the voltages for the tube pins in question were marked "N.R." (Not readable with meter used.)

◆ How A.V.C. Works

I had better mention here that a.v.c., or *automatic volume control*, is a circuit that evens out the audio of strong and weak signals so that the listener doesn't get blasted by tuning to a strong signal while the volume is still turned up for a weak one. In the usual a.v.c. circuit, some of the signal at the radio's detector stage is rectified and the resulting negative d.c. voltage is applied to the control grids of several of the receiver's stages: in this case, the r.f. stage and the first and second i.f.s.

For weak signals, the resulting negative voltage is relatively small and does not much affect the gain of the stages being controlled. Stronger signals develop proportionally larger negative voltages, proportionally reducing the gain of the stages being controlled. The effect is that all signals appear to the listener to be about the same volume.

Virtually all superheterodyne radios are equipped with a.v.c., but communication receivers such as the S-40A have a means of shutting off the a.v.c. when using the internal beat frequency oscillator (b.f.o.) to listen to c.w. signals. The reason is simple; the b.f.o.

injects such a strong signal into the receiver that if the a.v.c. were on it would reduce the sensitivity of the receiver to a minimum.

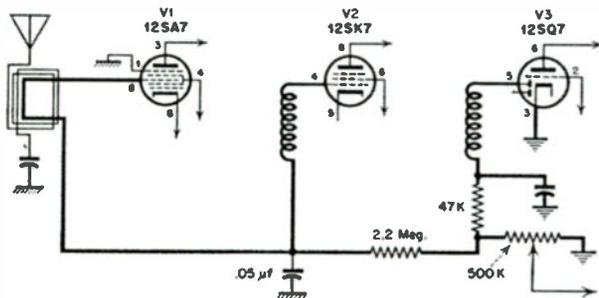
◆ Rider's Manuals Save the Day

The resistance values in the a.v.c. and first audio circuits, for the most part, were within tolerance, though I did change a few that seemed a little high. This did little to improve the audio. Another problem I was running into was that the wiring around the stages I was checking didn't exactly match either the wiring on my S-40A schematic or the wiring on my parts set (an early model S-40). Normally one doesn't get into component-by-component checking of a set's wiring when doing a restoration. But the maniac who had messed up the set before seemed to have spent a lot of time doing things to the very stages I was interested in, and I just couldn't trust what was there.

I was beginning to get very frustrated with the discrepancies, and finally decided to look up the radio in *Rider's Manuals* (I'm fortunate enough to have a complete set). Normally I never go to *Rider's* if I have a copy of the actual manufacturer's service data. While my invaluable *Rider's* set has pulled me out of many a jam, usually the data on any one radio is a fairly brief excerpt from the manufacturer's data. There are normally two or three pages at most, including the schematic, voltage readings, and alignment instructions.

Not so in this case! There were no less than 20 pages (counting a double-width fold-out schematic as four), containing a wealth of data not in my seven-page service bulletin. The material included expanded versions of alignment and maintenance instructions from the service bulletin, point to point resistance readings for test purposes, a detailed stage-by-stage description of the functioning of the circuit, many full-page pictures with detailed callouts identifying virtually every part by schematic symbol, and "Clarified Schematics" showing the actual circuit of the r.f. and oscillator stages for each position of the bandswitch.

I'm puzzled about where this material originally appeared, since I doubt that it was developed especially for *Rider's*. Perhaps Hallicrafters had published a more complete and now rare version of the service notes. At any rate, I'm delighted to have the additional material at my disposal and, just for starters, it has helped me verify that the wiring around the first audio and a.v.c. stages of my set is correct.



Simplified a.v.c. circuit for a 5-tube broadcast receiver. In this case, the a.v.c. voltage is developed across the 2.2 meg resistor and controls the sensitivity of the 12SA7 first detector and 12SK7 i.f. amplifier stages.

Radio Shack PRO-96 Scanner

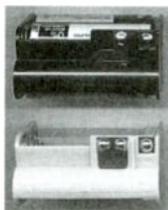
The Radio Shack PRO-96 is a portable, 5500 channel scanner, built in China by GRE for Radio Shack. It can receive AM and FM signals and track conversations in Motorola, APCO-25, and EDACS trunked systems.

The PRO-96 is a newer, more sophisticated version of the 1000 channel trunk-tracking PRO-95. The most important enhancements include the ability to demodulate APCO-25 C4FM digital signals and track conversations in APCO-25 digital trunked systems, CTCSS ("PL") and DCS ("DPL") decoding and display, and the ability to choose among several configurations.

At time of writing, most APCO-25 digital systems use C4FM modulation. A few APCO-25 systems are starting to employ a new CQPSK digital modulation scheme. Our early PRO-96 (s/n C012993) is designed to demodulate C4FM but not CQPSK signals.

The PRO-96 runs on four simple AA batteries (not included). The scanner is furnished with two battery trays, a black colored tray for alkaline cells and a yellow tray for rechargeable cells.

You may power the scanner and charge the batteries (in the yellow tray) using an optional 9 VDC 300 mA wall wart.



◆ Frequency Coverage

The PRO-96 receives AM and FM signals on the most popular scanner bands plus Citizens Band, 216 - 225, and 1240 - 1300 MHz. The 225 - 400 MHz military air band is not included.

Like the PRO-2053 (see May 2002 *MT*) and PRO-95, the new PRO-96 tunes the 137 - 174 MHz band using factory-selected steps of 5, 6.25, or 7.5 kHz, and the user cannot change the step size. The PRO-96 coerces VHF-high frequencies to fit a preset FCC bandplan which doesn't account for federal government assignments. For instance, the PRO-96 rounds off the 165.2375 MHz US Customs frequency to 165.2400 MHz.

◆ Memory and Modes

We need to explain our earlier comment that the PRO-96 has 5500 memory channels. You can select from among 11 different configurations. There are 500 memory channels which you can scan at one time in a given configuration, but a total of 5500 memory channels across

the 11 configurations.

Each configuration supports 10 banks of 50 memory channels apiece, a set of six preprogrammed service search banks, one user programmable limit search bank, talk groups, text labels, and other settings.

Radio Shack terms the PRO-96 a "virtual scanner" due to the multiple configuration scheme and calls a configuration a "folder." The folders are preprogrammed at the factory with trunked system frequencies and talk groups for several major metropolitan areas, though the user may override these settings.

The scanner alerts you when programming a channel with a frequency which is already programmed into another channel within the same bank.

Each channel has a mode: AM, FM, CT (CTCSS), DC (DCS), MO (Motorola trunked), or ED (EDACS trunked). The PRO-96 does not support LTR trunking.

For trunking purposes, both Motorola 3600 bps (bits per second) and APCO-25 9600 bps control channels are supported.

You would normally dedicate a separate 50 channel bank for each trunked system. Each bank supports a total of 150 talk group IDs, organized in up to five sub-banks of up to 30 IDs each.

You can program a 12-character label for each memory bank, memory channel, and talk group. Both the channel label and frequency are displayed simultaneously when stopped on a conventional channel.

The PRO-96's attenuator can be enabled on a per-channel, per-search bank basis or globally.

◆ Scanning and Searching

The PRO-96 scans a mixture of both conventional and trunked systems very well, with no perceptible hesitation when switching between banks.

Memory banks may be scanned in open or closed mode, a distinction which makes sense only for trunked systems. When scanning



trunked systems in the closed mode, the talk group lists are used as filters to tell the PRO-96 which talk groups to ignore and which to monitor. In open mode, the PRO-96 will stop for conversations in any talk group.

There is only one pair of user programmable search limits. There are preprogrammed service search banks for VHF-marine, citizens band, police/fire, civil aviation, GMRS/MURS/FRS, and ham radio. CB, FRS, and marine channel designations are displayed as well as frequency. The police/fire and ham banks are further divided into sub-banks by frequency. Therefore, you can choose to limit your search to preprogrammed VHF-low band police/fire, 2 meter hams, etc. Up to 50 frequencies may be locked out.

A single priority frequency may be sampled approximately every two seconds, though the PRO-96 will not

interrupt a trunked transmission to sample the priority channel.

◆ Manual

The PRO-96 user manual prose is easier understand than earlier manuals, but that is offset by a lack of display diagrams. The manual is only 3-3/4 inches wide and difficult to hold open while reading.

You can download a copy of the user manual from the <http://support.radioshack.com> web site and print it out so you won't have to fight with the binding.

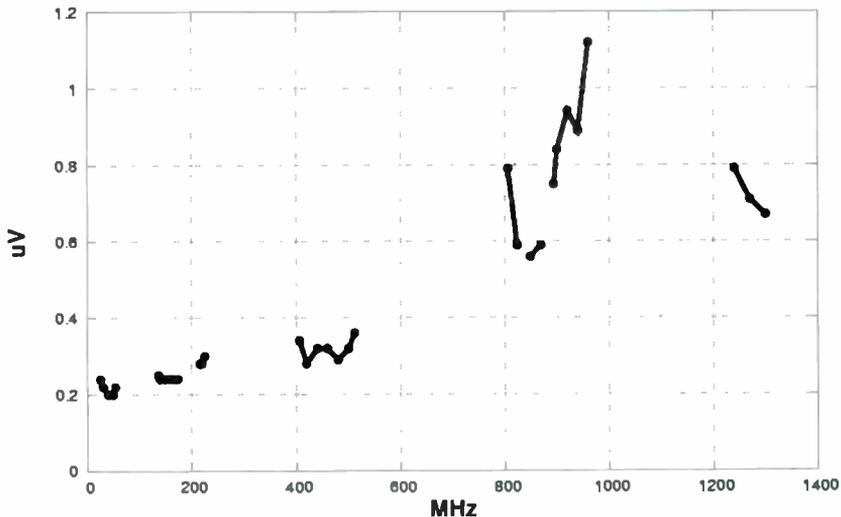
A separate 23 page booklet lists the frequencies preprogrammed into the virtual folders.

◆ Performance

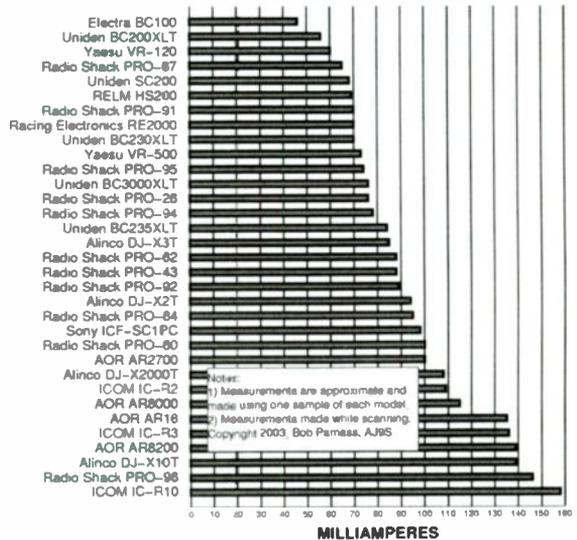
We do not have any APCO-25 digital systems within reception range and were only able to test the PRO-96 on analog trunked and conventional systems.

Like the PRO-95, the PRO-96's speaker audio is good and loud. We measured 138 mW of power at the earphone jack. Audio at this jack is purposely attenuated for use with an earphone.

Radio Shack PRO-96 NFM 12 dB SINAD Sensitivity, s/n C012993



CURRENT CONSUMPTION



The squelch control has a moderate amount of hysteresis. We measured a brief 6 ms squelch tail, or noise burst as the squelch closed at the end of each conventional transmission. We couldn't hear any squelch tail while monitoring many land mobile transmissions using the CTCSS squelch.

The PRO-96's IF is more selective than the PRO-95. PRO-96 selectivity above 28 MHz is specified as 8/14 kHz vs. 10/18 kHz for the PRO-95 at 6 and 50 dB points. We measured the PRO-96 modulation acceptance at only 8 kHz vs. 12 kHz for the PRO-95.

When connected to an outdoor antenna, our PRO-96 experienced some intermodulation in the VHF aero and VHF-high bands from both television and 162 MHz NWR transmitters.

so much easier.

The PRO-96 is fitted with a serial interface jack and commercial Windows-only software is just now becoming available at the time this review is being written. There is no native cloning software for Linux and Mac computer users yet.

Measurements

Radio Shack PRO-96 Scanner Catalog #20-526, S/N C012993

List price: approx. \$500
Radio Shack Corp.
Fort Worth, TX 76102
<http://www.radioshack.com>

Frequency coverage (MHz):
25 - 54 (5 kHz step)
108 - 136.9875 (12.5 kHz step)
137 - 174 (5, 6.25, 7.5 kHz steps)
216.0025 - 221.9975 (5 kHz step)
222 - 225 (5 kHz step)
406 - 512 (6.25 kHz step)
806 - 823.9875 (6.25 kHz step)
849 - 868.9875 (6.25 kHz step)
894 - 960 (6.25 kHz step)
1240 - 1300 (6.25 kHz step)

Modes: AM, NFM, user selectable
NFM modulation acceptance: 8 kHz

Attenuator:
19.5 dB @ 40 MHz
18.5 dB @ 155 MHz
19.0 dB @ 220 MHz
19.5 dB @ 460 MHz
18.0 dB @ 860 MHz
13.0 dB @ 1270 MHz

Intermediate Frequencies (MHz):
380.8 (approx), 21.4, 0.455

Audio output power, measured at earphone jack:
138 mW @ 10% distortion

Squelch tail near threshold (1 uV @ 155.1 MHz): 6 ms.

Current Consumption (mA):
0.3 uA, off
147 mA, manual, squelch closed
146 mA, scanning
228 mA, squelch open, max volume
Practical memory scan speed: 38 channels/sec. (non-trunked)

Other Observations

Unlike earlier GRE models, both the keys and display are recessed to keep them out of harm's way.

The PRO-96 keys are translucent. Both the keypad and display amber color backlighting are brilliant, making nighttime operation much easier. The green display backlighting in earlier models was dim and the keys were not lit at all.

The PRO-96 usually powers up in the same condition it was when last powered down. For example, if the radio was last listening on channel 104 in Manual mode when you turned the power off, the PRO-96 will power up in Manual mode tuned to channel 104. One exception is that the radio will not remember on power up if you used the Pause key previously to monitor a single talk group in a trunked system.

In contrast to the earlier PRO-92 and PRO-2067, the PRO-96's CTCSS/DCS squelch is effective even when the radio is in Manual mode, monitoring one channel.

Our PRO-96 consumes 147 mA at 6 VDC while scanning and that's more current than most of the other portables we've measured (see chart).

Software

Programming the PRO-96's channels, text tags, and trunk IDs entirely through the radio's keyboard could require days of tire-some effort. A computer equipped with the proper cloning software would make the task

Overall

We were impressed with the PRO-96's performance when scanning a mixture of trunked and conventional signals. The audio is very good and the text labels are great. We appreciate the CTCSS and DCS squelch and instant display. The AA battery arrangement is superior to a monolithic, proprietary pack.

Radio Shack should publish on their web site the information required to write cloning software for their scanners. It would make the scanners more attractive if buyers had more software choices.

For \$500, we would like to have military air band coverage, LTR trunking, and selectable step sizes. This is the first Radio Shack (GRE) scanner which can demodulate digital voice signals, a feature which is probably responsible for a good portion of the price tag.

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Digital Radio Mondiale Overview - Part 2 Digging Deeper into DRM

Last time, in Part One, we began looking into the latest radio modulation method, Digital Radio Mondiale (DRM). We started with an overview of the concept of digital modes. Then we took a quick glimpse at the group of companies that make up the DRM consortium. Finally, we jumped into the alphabet soup of the technology.

This time, as promised, we'll look at a bit more DRM data detail and then see how it's all put together in a DRM transmission.

Don't be scared off. We will just skip the surface of the DRM digital format, taking liberties every place possible to make it easier, even if we don't strictly adhere to the science. For me and the other techo-junkies in the crowd, I've included data format information for each channel.

A Quick Review

The DRM channel structure is composed of three major elements: Main Service Channel (MSC), Fast Access Channel (FAC), and the Service Description Channel (SDC). Each plays a different role in bringing the listener all the features that DRM can provide.

Previously, we saw that the MSC is where the audio or data for transmission resides and it may contain may up to four different "broadcasts" or services.

Just the FACs

The next channel in the DRM system is the FAC (Fast Access Channel). DRM signal configuration varies depending on the specific broadcast mix. The FAC provides data in a fixed format concerning signal configuration such as MDC and SDC modes, channel width and number and types of services being transmitted.

If the decoder at the receiver end can "read" the DRM signal configuration in the FAC it can do its decoding job a lot quicker, without taking the time to analyze the signal. One FAC data block is required for each service, carried by the DRM signal.

The FAC's application identifier field also allows listeners to automatically find a desired data service broadcast. I'm sure that the FAC functions will be expanded in the future to encompass many customized listening features.

FAC Data Format

- Base/Enhancement flag 1 bit
- Identity 2 bits
- Spectrum occupancy 4 bits
- Interleaver depth flag 1 bit
- MSC mode 2 bits
- SDC mode 1 bit
- Number of services 4 bits
- Reconfiguration index 3 bits
- Rfu 2 bits

Service Description

OK. One more and we're home! I conceptually consider the Service Description Channel (SDC) as the digital equivalent of the AGC (automatic gain control) circuit of an analog receiver. In a basic sense both are concerned with signal fading. If the AGC of a receiver detects a lower signal intensity it boosts its gain to compensate.

The SDC takes it one step further. If the decoder is having a difficult time receiving the DRM signal, the SDC is capable of checking alternative frequencies for the service. Pretty slick.

The SDC also supplements the FAC in providing additional information to the receiver decoder on the MSC configuration. Audio specific configuration information is also transmitted in the SDC.

SDC Data Format

The total amount of data to be sent may require more than a single SDC block. The SDC block is made up as follows:

- AFS index 4 bits
- data field *n* bytes
- CRC 16 bits

So Much More

For further details (and there are lots more), check out the DRM technical paper, ETSI DRM Specification TS 101 980 V1.1.1 (2001-09). This is available on the website of the European Telecommunications Standards Institute at <http://www.etsi.org>. I believe you will have to register to get access to the site, but it is free.

Creating a DRM Signal

Figure 1 is the block diagram of a DRM transmission system as described in the ETSI filed DRM paper. On the left side are the inputs. These inputs include: digitized audio, a digital data stream, FAC data and SDC data. Their entry point is at an encoder device. The "broadcasts" (audio and data streams) are combined in a multiplexer and then put into the MSC channel data format.

Keep following the flow and processing of the audio data stream starting at the top left side of Figure 1 and moving right. The next large processing block, the multiplexer, combines digital data with the audio. This gives DRM the capability of transmitting digital messages and audio content simultaneously.

After the Multiplexer come three blocks of some fancy signal processing: Energy Dispersal, Channel Encoder and Cell Interleaver.

Considering the Frequency

Some of the processing signal blocks' operations are dependent upon the radio frequency on which the DRM signal is to be transmitted. For example, propagation for long and medium wave (AM broadcast band) are usually via ground wave. The behavior of the radio signal, which delivers the digital data to the receiver, is very different under fading, multi-path and other ionospheric factors than when associated with shortwave sky wave propagation. These factors become very important when we consider the accurate timing required in decoding complex digital data such as DRM signals. These processing blocks take many, many of these factors into consideration, including the radio transmission frequency.

In a simplistic sense just consider these functional blocks as essentially maximizing and formatting the audio and data. The result is the Main Service Channel (MSC).

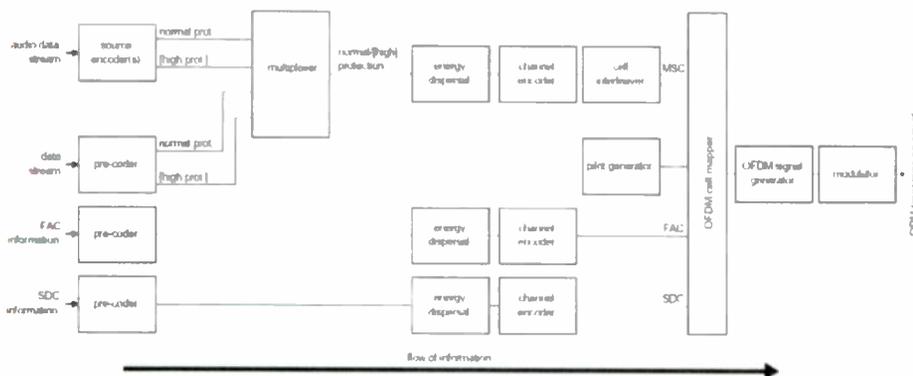


Figure 1: Conceptual DRM transmission block diagram

Figure 1 – DRM Channel Processing Overview

Looking at the two processing flows below the MSC we can see that the Fast Access Channel (FAC) and the Service Description Channel (SDC) are similar to the MSC processing chain. However, the FAC and SDC are not as complicated as the MSC since they do not require two complex functional operations: Multiplexer and Cell Interleaver. Finally, the three channels MSC, FAC and SDC, come together in the Cell Mapper.

Modulation - More Alphabet Soup

If you have come this far, hang on ...we're almost out of the acronym maze!

DRM uses amplitude modulation (AM). But how does this mass of digital data ride on the back of a radio signal? The answer is ... not simply.

OFDM, orthogonal frequency division multiplexing (a mouthful!), was first developed in the 1970s and was used in Digital Audio Broadcasting (DAB), Digital Terrestrial Television Broadcasting (DTTB) and wireless Local Area Networks (W-LAN).

Wikipedia.com defines OFDM as "an FDM (frequency division multiplexing) modulation technique for transmitting large amounts of digital data over a radio wave. OFDM works by splitting the radio signal into multiple smaller sub-signals that are then transmitted simultaneously at different frequencies to the receiver."

The benefits of OFDM are high data transmission rates with minimal waveform distortion ... and that's just what DRM signals need.

Don't sweat the tech details! As the saying goes, "It's not important to know how a watch works in order to tell the accurate time." The detailed operation and theory of these circuits are beyond the scope of this column. However, an in-depth technical discussion of each functional block is available in the ETSI DRM specification TS 101 980 V1.1.1 (2001-09) downloadable in Acrobat PDF format.

So What IS a DRM Transmission? Well, as we have seen above, the OFDM method results in many signals sent simultaneously. Again, very simplistically (would-be technocrats do not need to write me with specifics), if we look at a DRM transmission it will look like lots of separate modulated carriers.

Each carrier "signal" has a common digital structure consisting of Pilot information for timing synchronization, Control information consisting of the FAC and SDC, and Data to be ultimately listen to or displayed.

What's Needed for DRM Decoding?

Finally! After navigating all the technology it comes down to what we monitors are really interested in, "How do I receive the darn DRM?!" Remember that DRM is a digital modulation method that is transmitted on frequencies from medium wave (AM) through shortwave up to 30 MHz.

A stable receiver is the first requirement. However, due to the signal bandwidth of the DRM signal, the receiver must have an intermediate frequency (IF) output at 12 kHz. Now most receivers use an intermediate frequency of 455

kHz, or 10.7 MHz for a multi-conversion radio. But keep in mind that these radios are designed to decode amplitude modulated (AM) audio. But for DRM we are trying to decode a relatively complex digital data stream(s).

Not Here, Not Now

If you wish to delve into the electronics of intermediate frequency theory and circuits, check the ARRL *Amateur Radio Handbook*, any edition, for that topic. Ten-Tec and WiNRADiO (G3 series) radios may be used for DRM reception, and several other receivers may be modified or used with a converter. The 12 kHz IF output is available on the back panel of TenTec's DX-320D.

Ten-Tec will modify any RX-320 to give it the required DRM 12 kHz output for \$47 including return shipping in the continental USA. See their website for more information at <http://www.tentec.com/TT320.htm>

We need to send the DRM signal to the computer's soundcard before it goes through our receiver's normal audio demodulation. The only hardware connection is made between receiver and computer's soundcard using a standard audio cable. That's all the connection required!

Once we pick the signal off at 12 kHz from the receiver, we then can input it into a computer's sound card input for decoding. Currently it takes the power of a PC and dedicated DRM software to decode DRM signals into audio and data.

Now for the Software

The first DRM software we will try comes from VT Merlin Communications Ltd., an official software supplier of the DRM Group. It will cost you 60 Euros (about \$74 US) and is available as a download from the <http://www.drmtx.org> website. It is a 12 MB file and takes some time to download at 56kbs dial-up service. The Merlin DRM software's minimum computer system requirements are:

- Windows 2000, XP or 98
- 500 MHz Intel Pentium. But an 800 MHz Pentium is recommended
- 64 MB RAM
- 50 MB Hard Drive Space
- 16-bit SoundBlaster (or compatible) sound Card - MUCH More on this later!
- Receiver with 12 kHz IF output and output level suitable for soundcard input

Self-contained DRM receivers are being readied for release as we speak. These will not require an external computer for decoding, but instead will rely on internal dedicated processors to do all the work that the PC is currently performing. Watch

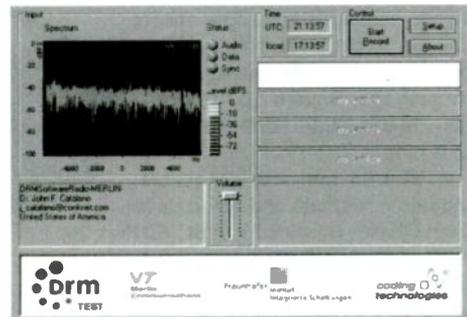


Figure 2 - DRM Software Trying to Work

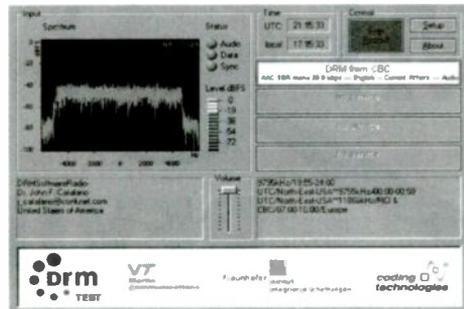


Figure 3 - Yes! Sweet Digital Audio! Radio Canada International DRM Broadcast Screen

for a review in MT in the near future.

Running the Software

I first tried the DRM software on my trusty 500 MHz Pentium II laptop. It seemed to load and run flawlessly. Figure 2 is the "business" screen of the DRM software. On the top left is a graph of the input signal indicating the signal to noise level. The right side is where the signal data is displayed such as Station ID, program content, etc.

Following the schedule provided on the DRM website, I tuned my receiver for the RC1 Sackville, Canada, broadcast and waited with great anticipation. And waited with great anticipation.

And waited with great anticipation

As you can see, from Figure 2, not much was happening. Worst still, no audio was to be heard from my speakers!

Over the next few days I tried everything! I knew the 12 kHz signal was getting to the sound card by watching the graph as I varied the output level of the RX-320D receiver. But no matter how I adjusted the output, from the lowest to the highest, no DRM decoding

A Change of Computer

Finally, in desperation and in a cold sweat (I had promised our MT Editor this DRM column), I set up my homebrew Pentium III flight simulation computer next to the receiver. I ran the DRM decoding software on the Pentium III and the RX-320D control software on the Laptop.

As the seconds ticked down to the time for the DRM transmission I thought, "What if doesn't work? What are you going to tell MT and the readers?!"

Just then the computer speakers came to life and so did the display, as you can see in Figure 3. "Thank you Great Wireless Spirit!" Watching the data scroll by while listening to the beautifully clear audio was a pleasure.

Next Time - Actually Receiving DRM

Next time we will look at DRM decoded screen information in more detail. Then we'll see what I (and a few people that I enlisted around the USA) encountered trying to monitor DRM. Also we'll get some insight in why my laptop, and possibly your computer, would not decode DRM. Stay tuned for the next chapter in the saga of Digital Radio Mondiale. Meanwhile, what in the "World" is a mondiale?

MT



REVIEW

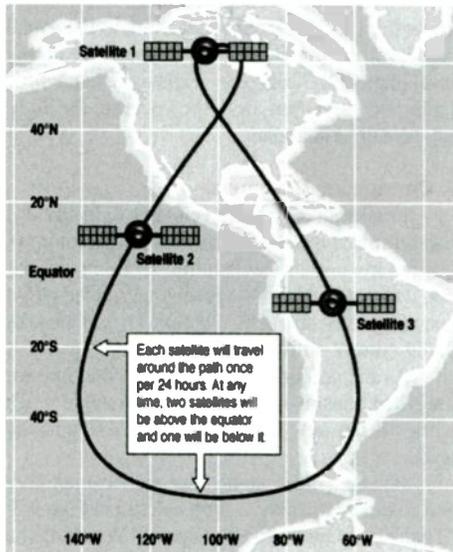
Kenwood's "Here2Anywhere" Portable Sirius Kit

by John Figliozi

Sirius Satellite Radio is one of two active satellite digital radio subscription services (licensed by the FCC as Digital Audio Radio Services) available in the continental U.S. XM is the other and was extensively reviewed in March's *MT*, along with Delphi's SKYFi system. Neither service has been licensed in Canada by the CRTC, so service is not "officially" available there though reception appears fine.

◆ The Sirius System

XM uses geostationary satellites arrayed along the equator, 22,300 miles in space. Sirius takes a different approach. Its three Space Systems/Loral satellites form a geosynchronous inclined elliptical constellation staggered in orbits separated by eight hours (see Figure 1). This ensures that each satellite spends about 16 hours



a day over the continental U.S., with at least one satellite over the country at all times. The satellites are 29,200 miles in space at apogee over Manitoba and 14,900 miles up at their low point. [Those interested in further technical information about the Sirius satellites may consult <http://www.ssloral.com/html/products/prodsvr.html#1300>.]

Programs are beamed from the uplink site

(Sirius studios in New York City - see Figure 2) to the satellites, which in turn transmit the signal to the ground, where a Sirius radio receiver decodes its 100+ channels.

This is a "line of sight" reception path. So, like XM, Sirius uses ground repeaters in areas where the signal from the satellite is likely to be interrupted by obstructions. However, Sirius can employ far fewer repeaters because its system places a satellite almost directly overhead at an angle of elevation always greater than 60 degrees, as opposed to a 30 degree maximum for XM's equatorial system. Sirius' signal, therefore, is far less likely to be obstructed.

There are two parts to the Sirius receiver: the antenna module and the tuner module. The antenna receives the signal, amplifies it, filters out interference and passes it on to the tuner. The tuner module is an Agere chipset consisting of eight chips, which converts the signal from 2.3 GHz to a lower intermediate frequency or is adapted to allow conventional car radios to receive and play the signal. [A more extensive description of the technology and how it works can be found at <http://www.elecdesign.com/Articles/Index.cfm?ArticleID=5603>.]

◆ The Sirius Service

Sirius offers 104 program "streams" clustered into twelve broad "categories." They are: Pop (9 streams), Rock (13), Country (5), Hip-Hop (5), R&B (4), Dance (6), Jazz/Standards (6), Classical (3), Variety (9), News (16), Sports (8) and Entertainment (20).

The 60 music streams, all programmed by and originating from Sirius in New York City, carry no advertising. Just about every music angle is covered, including today's top hits and pop music classified by decades, easy listening and adult contemporary; classic, alternative, modern, indie and Christian rock; blues to bluegrass; rap, soul, electronica, disco; swing, standards and show music; country to classical; folk to gospel; reggae to world music; latin to new age. Stream 100 offers daily live in-studio performances at 6 p.m.

The 44 non-music streams include news, talk and information from CNBC, Bloomberg, ABC, CNN, NPR, PRI and Fox; international perspectives from the BBC and the World Radio Network (see *Programming Spotlight* in this issue); regional weather services; streams for kids,

truckers, the gay and lesbian community; a comedy channel and classic radio shows. Prominent brands including C-SPAN, Disney, WSM, E!, A&E, Discovery, ESPN, Speed Channel, Sports By-Line and Court TV program their own streams. Sirius also has concluded contracts with the NBA and the NHL providing live play-by-play coverage of up to 40 games a week from each league.

There are five Spanish language channels, including BBC Mundo and Radio Deportivo and two channels offering Mexican and Latin music.

The variety is breathtaking, to say the least.

◆ Kenwood's Here2Anywhere Kit

The Kenwood "Here2Anywhere" KTC-H2A1 Tuner, KPA-H2C Car Docking Kit and KPA-H2H Home Docking Kit combine to form a shuttle system that allows the listener to transport the tuner between the car and the home and have access to the service in both locations, under a single subscription. (It can also be used with a marine audio system or a personal computer.)

The plug and play tuner is somewhat oddly shaped (like a pita pocket), but not unappealing. Its front face (see Figure 3) is dominated by a display, which shows the stream (number and name), category, artist, song and set-up information. To the right are buttons marked "DISP" (for display) and "MEM" (for memory). To the left are similar buttons arranged in a square each with a vector signifying up, down, left and right. Another button in the center of these four is marked "SEL" (for select). Beneath all this are six pre-set number





buttons flanked by a "PWR" (power) button and a "PRE" (preset) button.

A remote is included with the tuner and includes all these functions plus a button marked "DIRECT" that allows the user to enter a stream number and move "directly" to that program.

The up and down vectors select streams sequentially. The right and left vectors select categories sequentially, serving as a means of moving more quickly across the spectrum. There are many sophisticated functions, too numerous to describe fully here. However, the listener can select music (or other programming) by stream, artist and song (or program), set up 24 presets (especially handy – if not essential – for use in the car), save and recall informa-

tion for up to 24 songs for later reference. The display can be set for brightness, for normal and large fonts, or to show information by stream or by category.

The rear of the tuner has a recessed plug and the underside of the tuner has a push button release for removing the tuner from a docking unit.

◆ **Home and Car Versatility**

The tuner must be mated to a docking unit. Two units are offered: one for home and one for the car. The car unit works with your existing OEM receiver. Each includes a cradle (see Figure 4) into which the tuner is plugged, an adjustable base, a weatherproof antenna module (with magnetic base on the car unit) and an audio cable. The car unit also includes a carry bag, a cassette adapter and a cigarette lighter power adapter. The home unit includes an AC power adapter.

The rear of each cradle has connections for the antenna, power and audio cables. With the car unit, there's an option to use the OEM receiver's auxiliary input (if available) or the cassette adapter. With the home unit, the audio cable connects to an auxiliary input on the home stereo system.

In car installations, Sirius and Kenwood recommend that the antenna (see Figure 5) be located on the roof (or the trunk lid on convertibles) on a metal surface at least 12"x12", and at least 6 inches from a window. With home installations, the antenna can be placed outdoors or near a window facing roughly the north central portion of the country. The tuner includes an antenna signal strength display option that assists in proper placement.

◆ **How Well Does It Work?**

This is line of sight reception, so anytime the antenna loses contact with the satellite for any significant period, there will be silence. Having said that, silent running is infrequent and fleeting – occurring only in tunnels and unusually long underpasses, where high structures obstruct access to the satellites and under very heavy tree foliage. Cloud cover, fog and rain have no effect on reception.

Antenna placement also appears to be far more forgiving than the impression given by printed instructions. In the car, I experimented with the antenna on the front dashboard (not recommended for safety reasons) and on the inside deck under the rear window. In my wood frame house, the antenna is in the middle of the room nowhere near a window. In both cases, reception has been fine. However, because the satellites are in motion, reception strength at a given location varies somewhat from time to time. The home antenna sometimes required slight repositioning within the room.

The acoustic experience is pleasing, though it appears to have slightly less depth than that of a CD to these 50 year old ears (admittedly battered by nearly 40 years of shortwave listening and DXing). However, satisfaction with the audio also depends a great deal on the caliber of the car or home stereo system to which it is connected.

◆ **The Costs**

MSRP for the tuner unit is \$99; for the docking units – \$69 each. However, Sirius and Kenwood offer a \$50 rebate for those purchasing the tuner and both docking units – making the final equipment cost for both home and car access \$149.

Activation charge is \$15 by phone; only \$5 via online. The subscription charge is \$12.95 per month, with up to three additional subscriptions \$6.99 a month each. A one year pre-payment yields 1 month free; two years, three months free. There are other cost-saving options as well.

Kenwood, Audiovox, Clarion, Blix and Panasonic offer several other equipment options. Vendors include Circuit City, Sears, Best Buy, Good Guys, Tweeter, Ultimate Electronics, Crutchfield and other retailers and specialized consumer electronics distributors. Sirius also has arrangements with car makers placing Sirius-ready OEM receivers in many new cars. [<http://www.siriusradio.com> has all the details.]

◆ **Recommendations**

There is no doubt that satellite radio offers a listening experience far superior to that of AM and FM radio. In essence, XM and Sirius offer services of similar quality; therefore, personal preferences will guide consumer choice. For me, the added availability of three U.S. public radio streams and the World Radio Network (with access to over 25 international broadcasters), along with the non-commercial nature of the music streams and the availability of free on-line access anywhere, brought me to Sirius despite its slightly higher monthly subscription cost. Your mileage, as they say, may vary.

The plug and play system is the least expensive and most versatile option. Access at home and on the road requires only one subscription and installation does not require costly professional help. Kenwood's equipment appears to be well made and durable, although the tuner does generate considerable heat (which is effectively dissipated through an aluminum heatsink).

In sum, you can't go wrong in my estimation. The car is an ideal radio listening environment. The Kenwood Here2Anywhere Satellite Radio plug and play system is affordably priced and presents another option for quality radio listening, not only in the car but also in the home – for the price of a lunch per month. For international radio aficionados, Sirius offers – through the BBC and the World Radio Network – many of the benefits of shortwave radio with better signal dependability and high quality audio.

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Debriefing Isabel: What Worked - What Didn't

By Ken Reitz KS4ZR

It wasn't as if we weren't prepared for a tropical storm. The National Hurricane Center in Miami had done a terrific job of data mining during the week before landfall: input from satellites, ocean buoys, and recon flights were filtered through the very latest meteorological software to get a prediction which had Isabel's path down cold. Those of us in the predicted path grimly set about our own preparations and hoped, somehow, the Center had gotten it wrong.

I did what I could at my own location: removing the TV/FM array, the 13 element 2 meter beam, and lowering the large 3-element HF tri-bander to just above roof level. I decided to let the wire, all-band dipole ride and hoped for the best. The 10-foot satellite TV dish would have to fend for itself and I felt good about the chances for the DBS dishes.

I went through the check list: plenty of batteries for the scanner, AM/FM/TV band radio, flashlights and 4-inch TV set; plenty of candles and matches; an impressive line-up of 5 gallon buckets filled with water (we're on well water so there would be no water for the duration of any power outage). At the last minute we decided to fill the bath tub and the washing machine, a decision for which we were later grateful.

Isabel struck the Carolina coast a few hundred miles away on the morning of September 18. By then it was raining at my location in Central Virginia and the winds gradually picked up. While we still had power I continued to monitor the Weather Channel on satellite TV, watching the growing, menacing green blob on the screen and plotting, as I had done for the past week, Isabel's progress on my own hurricane tracking chart. By noon we were experiencing heavy bands of wind driven rain. It seemed like a summer storm that just wouldn't quit.

I checked my electronic weather station which showed sustained winds out of the NNE at 10-15 miles per hour with gusts to 25 mph. The barometer which I had calibrated prior to the storm was at 30.02 inches and falling. I checked the local police frequencies and things were getting rougher. Units were responding to auto accidents, branches of trees in the roads and false alarms from residential alarm systems. Traffic on the 2 meter repeaters was normal and programming on over-the-air TV was as dreary as ever.

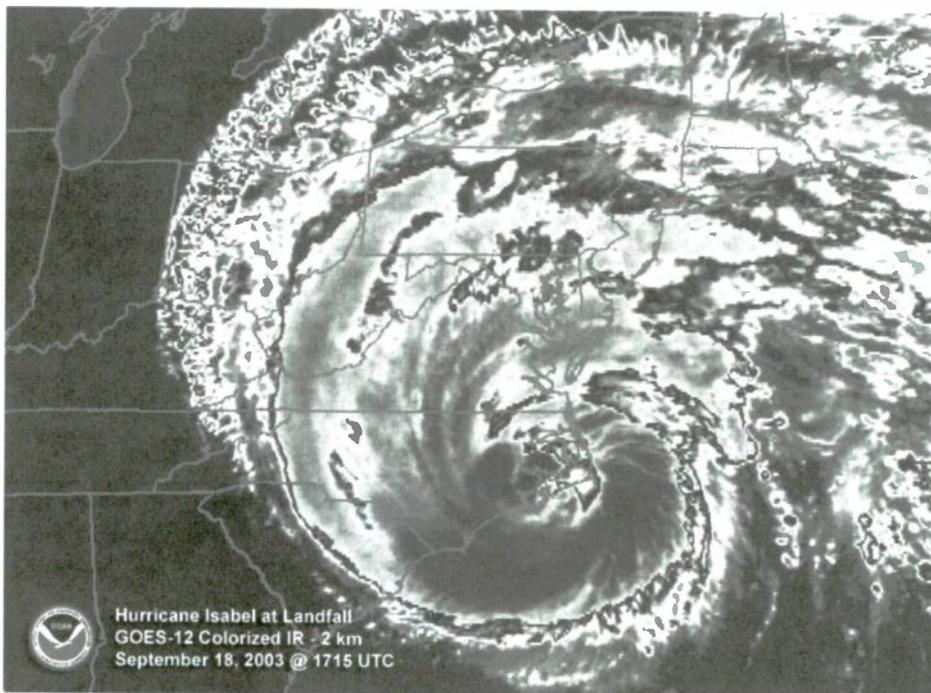
By 5 pm the winds had dramatically picked up, the rain was horizontal, the temperature was 65 degrees, about 15 degrees below nor-

mal. By 5:30 pm the power failed. I knew the batteries in the electronic weather station would hold only for 2 hours and there wouldn't be enough batteries in the county to keep it running for the duration of the outage. By 7 pm the barometer had fallen to 29.55 inches and the winds were sustained at 20 mph with gusts from 40 to 50 mph. I decided to check the rain gauge before it got dark: 2.5 inches in about 8 hours.

I was trying to plot the hurricane but the local NOAA weather radio was still giving coordinates from 6 hours before. I thought this was ironic because during outbreaks of frequent severe summer storms they announce the location of various bad weather cells by the minute and within 5 miles of the action. By 10 pm the phones were out. Tuning into local TV channels on the TV band radio showed the Virginia/Carolina coast had taken the brunt of the force with Richmond hard hit as well. Our local FM broadcaster finally lost power and went silent. Not that they were a great source of information: they spent the last two hours playing uninterrupted bluegrass music until the end.

By 11 pm the pressure had dropped to 29.38 inches and winds were estimated to be much the same as they were at 7 pm. In the darkness the driving bands of rain and winds ripping at the 80 foot tall, 100 year old oaks in the front yard had my imagination running wild. By 2 am there was a brief lull in the storm and shortly afterward I could tell that the winds had switched and were now coming out of the southwest. What was left of the eye of the storm had just passed over us.

I tuned around the FM band. A handful of stations were still on the air. Some were re-broadcasting their AM affiliates or the audio from some of the local TV stations. Since most people in the region were without power the stations realized there were few watching TV but many were doing as I was: turning to the FM band for information. The main topic was which gas stations were open and still pumping gas. The next day there would be lines around the block at the ones that were open.



Hurricane Isabel on September 18. As the eye crosses the North Carolina coast at least eight states are simultaneously affected. (Courtesy: National Weather Service)

This is your equipment page. Monitoring Times pays for projects, reviews, radio theory and hardware topics. Contact Rachel Baughn, 7540 Hwy 64 West, Brasstown, NC 28902; email editor@monitoringtimes.com.

Even at the peak of the storm one nearby radio station owned by Clear Channel Communications was still belting out the top hits with a peppy computer controlled announcer cheerfully carrying on as if the entire region weren't under a state of emergency, as if millions weren't without power, as if thousands weren't driven from their homes inundated by floods and as if 34 weren't dead.

❖ The Morning After

By 8:30 am, Friday the 19th. I checked the rain gauge: another 2.5 inches of rain had fallen; the barometer was at 29.85" and rising; the temperature was 64 degrees. I was glad I still had the old analog barometer, the cheap Radio Shack remote reading thermometers and wished I still had the home-brew analog anemometer which had cratered last year after years of service, the DC motor which drove the system having rusted out from the weather.

That morning, using the tractor battery, I powered up the 2 meter base unit attached to an attic mounted VHF/UHF ground plane antenna. First, I checked the local NOAA weather radio frequency. It was dead, mercifully no longer transmitting outdated information.

Traffic on the local repeaters was nil. I called on a popular repeater and was told it was operating, as was everything else, on batteries and they were trying to conserve power. I learned that all the traffic lights were out in nearby cities, banks, shops, and many gas stations were closed. Ice couldn't be bought at any price, though I later learned scalpers were

getting as much as \$10 per bag for what ice there was. All the cell phone towers were out of use as well. The only private communications in or out of the affected area was through ham radio. Local police and public service repeaters had been well served by their own local generators which kicked in when the power went out and stayed on for the duration of the outage.

The only casualty at our house was the all-band wire antenna. A ceramic insulator at one end of the antenna broke causing one leg of the antenna to drop to the ground. After I got the antenna back up I returned to the radio shack and switched the battery to the HF rig. I cranked the power down to 10 watts output to save the battery. I checked into SouthCars, a 40 meter traffic net, to relay health and welfare information to various family members who had been trying for days to find out how we had fared in the storm. I also checked into the 20 meter InterContinental net to reach further flung relations. The traffic nets worked well with hams outside the affected area eager to help once they became aware that I was operating under emergency power and needing to pass general health and welfare traffic.

Isabel, it turned out, was the strongest tropical storm to hit the mid-Atlantic states since the 1930s, before storms were named. Damage was extensive; many throughout the region were without power for a week. It made the earlier brief power outage in the northeast look like a well run emergency operations test. But, Isabel exposed region-wide vulnerabilities

in our power and communications systems and has given us one more chance to work on getting it better. For those not affected by the storm it provides an opportunity to learn from our fiascos.

What would you do if you lost power for three days or a week? How would you communicate with family members away from the affected area? Where would you get news, information and how would you keep it powered? What would you do for drinking water, bathroom facilities, bathing, storing food and cooking?

Not worried because the tropical storm season is over? Guess what: it's winter!

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Rokenbok Rules!

It uses eight radio frequencies and combines the best elements of an electric train, a video game system, a construction set, and robotic vehicles. It's called the Rokenbok System, and since it arrived in the Elliott household as a Christmas present two years ago, father and son have had a great time with it.

The Rokenbok System is a play set. The basic start set consists of a radio control center, a hand-held control pad (which looks for all the world like a video game controller), a precision radio-controlled loader, a motorized conveyor, 152 large-scale snap-fit building pieces and a plan sheet.

The building pieces are part of a plastic construction system a bit like Legos. There are plastic beams, sheets and connectors that you snap together to form ramps, buildings, and other structures that resemble a factory or a construction site. Since the system is modular, you can add to it, and eventually you can build all kinds of things, including a monorail track.

The motorized conveyor has a bin at the bottom where you drop in red and blue plastic balls. The conveyor automatically starts, lifting the balls to the top, where they are shunted off, through various pipes and ramps, to places where they collect. Sometimes the balls are automatically sorted with all the red balls going to one destination and all the blue going to another.

Now, here's the really cool part. The radio control center has eight different radio receiver modules, numbered 1 through 8. Pop any of these into the receptacle – number 1, for example – on the radio-controlled loader, and you're ready to play. Grab the control pad, select the corresponding channel number – 1 – on the control pad, and you can use it to control the battery-powered loader. You can motor, tether-free, over to one of the loading ports, pick up some of the plastic balls, drive across the layout to

the bin at the bottom of the conveyor, and drop in some balls to start it up.

What gets really interesting is that since there are eight different radio receiver modules, one control pad can operate as many as eight different radio control vehicles, although not at the same time, simply by selecting the appropriate channel number. (Any of the vehicles can be equipped with any of the receiver modules, so you can mix and match to your heart's delight.) In addition, the radio control center has the capacity to accept four different control pads. That means, ultimately, that four different people can share control of eight different radio control vehicles.

◆ Really Rokin'

On the Rokenbok setup that my son and I share, we have the radio control loader, a radio control skip track (like a front-end loader), and a monorail freighter. So while I am operating the loader (on channel 1) to gather red and blue balls from a dumping station, my son is collecting balls from overhead dispensers with the skip track (on channel 2) and dropping them into the trailer car on the monorail (on channel 3). He presses a couple

of buttons, takes control of the monorail freighter, and then drives to the dumping station at the foot of the automatic conveyor. He presses another button, the bed of the monorail trailer slides sideways, and the balls roll off into the conveyor bin.

In the meantime, I've used the bucket on the loader to fill its dump box with red and blue balls, and now I've motored to the top of a ramp near the monorail track. My son drives the monorail freighter to my location; I dump a load of balls into the monorail trailer, and he's off again. I take control of the skip track and use its blade to tidy up the balls at another dumping station.

The skip track and loader are both amazingly agile, can turn in their own length and climb fairly steep ramps and obstacles. Sometimes we inadvertently run them off ramps or elevated platforms with no damage to the vehicles, and other times we miss when we are trying to drop the balls. When that happens, we caution each other: "Hey, the foreman is gonna dock your pay for that!"

The most fun is to create a closed-loop system – one in which the balls can be recycled endlessly from one place to another using a combination of radio controlled ve-

hicles. You can literally spend hours with the Rokenboks, and the radio control vehicles seem remarkably frugal with battery usage. (The radio control center plugs into the house current with a wall wart transformer.) And when you get bored with one Rokenbok setup, it's easy to snap it apart and create another one!

I give Rokenboks my heartiest recommendation as a neat, creative toy for kids from 8 to 88. The Starter Set costs about \$80.00, but we spent about \$200 for the starter set, extra control pad, monorail freighter, and skip track. For more information, including where to find Rokenboks, visit <http://www.rokenbok.com> or call 1-888-4ROKBOK (888-476-5265).



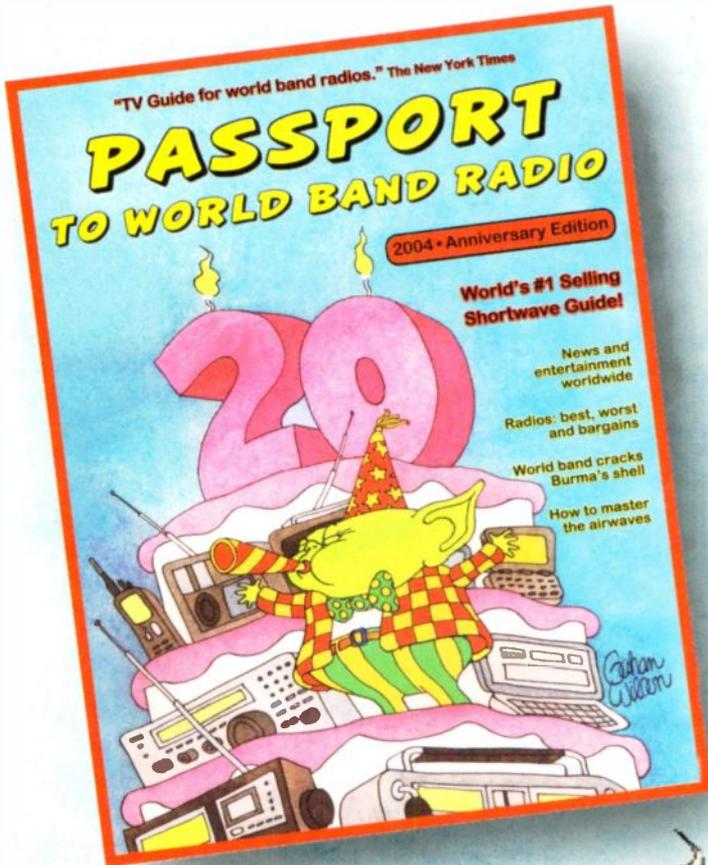
In the foreground, the Rokenbok monorail freighter takes on cargo from the skip track while the loader prepares to activate the overhead dispensers.

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What's NEW

Tell them you saw it in *Monitoring Times*

PRO-99 Race Scanner

The new PRO-99 handheld scanner being released by Radio Shack in November is a triple conversion receiver which promises to be a versatile and relatively sophisticated receiver, even without trunking capability. The PRO-99's primary selling feature is a band dedicated to auto races, but it is much more than that. Service bands also include marine, FRS/GMRS/MURS, police/fire, civilian aircraft, and ham radio bands (29-54, 108-136.9875, 137-174, 406-512, 806-823.9875, 849-868.9875, and 894-960 MHz).

The radio is especially designed to make auto race scanning easy and versatile. You can store a car number and frequency in each of the scanner's channels, associate one or more frequencies stored in channels with a car number, and recall any frequencies associated with that car number by simply entering the number. You can store one car number and frequency, or one frequency by itself, in each channel. On air programming is also possible at some tracks.

The PRO-99 can store 10 banks containing up to 20 channels entered by the user. Text tags up to 16 characters can be added for easier identification. Up to 500 channels can be selected to scan. Scan rate is up to 25 channels per second, with scan resume on a two-second delay if desired.

CTCSS digital tone code entry allows selective listening by group. One hobbyist has expressed the concern that the DCS digital code being used by many drivers is not mentioned and hopes it is only an oversight in the manual.

When performing a search, the PRO-99 can temporarily store up to 20 active frequencies for later storage. The scanner will notify you of duplicates. Six preprogrammed and one user-configured search ranges are available. The radio also scans

weather frequencies and can monitor for National Weather Service weather alerts.

The PRO-99 can be powered by internal batteries (three AA batteries, not supplied) which may be non-rechargeable batteries, rechargeable Ni-MH (nickel-metal hydride) or regular or high capacity Ni-Cd (nickel-cadmium) batteries. It will also operate using optional AC or DC (vehicle) power adapters.

Two antennas are supplied: a stub antenna for use at auto race events and a flexible antenna for stronger reception of local signals. A 1/8-inch (3.5 mm) plug is provided for earphones, headset, or external speaker.

Look for the PRO-99 in Radio Shack stores in November and an upcoming review in *MT*.

Sangean WR-1 Radio

A new AM/FM radio coming out in November from Sangean received its first preview on the internet by Chris Justice of Radiolabs. His rave review of Sangean's WR-1 wooden radio said, "In a nut-shell, the WR-1, Wooden Radio, is an eye-pleasing, small, hi-fi radio with tons of quality audio and simple functions."

The radio competes with widely-advertised high-end AM/FM sets. It's an analog set with only three controls - tuning knob, volume control, and band switch, but Justice found them all to be tight and accurate.

On AM reception, the WR-1 was the hands down winner among its competitors, picking up more stations with its 4-1/2-inch, 1/2 inch diameter ferrite rod. The WR-1 has external jacks on the back for power, headphone connection, line output, line input, external AM and FM antenna connections. It also comes with a small wire FM antenna, which you plug in the back of the radio for improved FM sensitivity.



Primary selling points, however, are audio quality and price. Perhaps due to the wooden cabinet, the reviewer found the audio to be superb, with great bass and mid-frequency audio response. The price is \$119 retail; check with your local retailer or visit <http://www.radiolabs.com> for more info on price and availability. The UK version will offer an optional longwave band. The wooden cabinet comes in cherry or walnut veneer.

Yacht Boy 550PE

The Yacht Boy 550PE portable AM/FM/Shortwave world receiver combines performance and an updated modern design in a lightweight, compact unit, perfect for travel. It receives all 14 international shortwave bands plus citizen's band (1.711 to 29.999 MHz) and allows five tuning methods including 200 programmable memories and shortwave autoscans.

Other features include:

- Power failure backup feature and auto power off;
- 200 programmable station memory presets - create memory pages in four configurations from 4 pages of 50 memories to 20 pages of 10;
- A keypad for direct entry of all AM/FM and Shortwave stations, or tune via a scroll wheel;
- Alarm with snooze feature and ability to wake up to a preset station or the last one tuned, and 5-120 minute sleep timer;
- Built-in telescopic antenna for shortwave and FM, and internal ferrite bar antenna for AM;
- and a complete product kit that includes: earbuds, snap-on stand, carrying case, owners manual, Shortwave Listening Guide, and 3AA batteries.

At 4-1/2"W x 6-1/2"H x 1-1/2"D and only 10 ounces, the Yacht Boy 550PE is available at select national retailers for \$99.95. For additional information about the Yacht Boy 550PE and other Eton products, call 1-800-872-2228, or visit the website at <http://www.etoncorp.com>

or wait for the review in *MT*.

Antennas for Radio Communications

Grove's long-awaited second edition CD combining Clem Small's comprehensive *Antenna Handbook* with Bob Grove's concise *Antenna Factbook* has been released, and it's a valuable resource for anyone in the radio hobby. Both books are well-illustrated and contain practical applications throughout.

MT's antenna columnist for nearly 20 years, Clem Small has compiled antenna designs for every facet of radio - shortwave, scanning, amateur radio, citizen's band, and much more. New to this edition are four chapters which cover antenna modeling, frequency of operation vs antenna choice, unplanned signals, and time domain reflectometry.

The 209-page *Handbook* is organized into three sections: an introduction to antennas with an overview of types and applications, popular antennas and how to build them, and the technical side of antennas (signal-to-noise, signal propagation, design considerations, etc). Several useful appendices are provided at the end for quick reference to formulas, frequency bands, suppliers, glossary, etc.

Though only 36 pages in length, Bob Grove's *Antenna Factbook* is refreshing and practical as a quick reference to what one needs to know when choosing and installing an antenna. Chapters cover Radio Waves, Antenna Location, Construction and Size, Matching the System, Types of Antennas, Accessories, Biohazards, and Facts not Fiction. The latter chapter is particularly interesting as it outlines a number of general principles about antennas, some of which may surprise you.

The *Antennas for Radio Communications* CD is available for \$19.95 from Grove Enterprises (1-800-438-8155 or <http://www.grove-ent.com>)



The NRC AM Radio Log

This 24th annual edition of the National Radio Club's AM Radio Log contains 296 pages in 8-1/2" by 11" size, 3-hole punched, loose leaf format so you can put it into a three ring notebook. AM band radio station by frequency listings from the United States and Canada include listing for the new expanded (X-band) stations from 1610-1700 kHz.

Each station listing consists of its operating frequency, callsign, location (city and state of license), time zone, antenna and transmission power, mailing address and daytime telephone number, hours of operation, broadcast format/networks, and much more. There are also cross reference listings by city and callsign, as well as a list of stations conducting AM stereo operations.

The NRC AM Radio Log is available from several radio dealers and directly from the club website at <http://www.nrcdxas.org/>. This publication list for \$25.95 (non-NRC members) and \$19.95 (for members). New York residents will have to add sales tax. Be sure to check the website for current pricing on this publica-



tion. You can also get addition information or send orders via mail to: National Radio Club Publications, Box 164, Dept W, Mannsville, NY 13661-0164.

Inside the Shadow Government

By Harry Helms

Monitoring Times readers have heard of Harry Helms, who was given the Don Jensen Award as DXer of the year by the Association of North American Radio Clubs last year. Helms' name is familiar from his many DX books and for his work as immediate past publisher of *The ACE*. Harry still is one of the editors for the medium wave National Radio Club hobby bulletin.

Helms recently made an appearance on the nationally syndicated Art Bell program in October, plugging his new book, *Inside the Shadow Government: National Emergencies and the Cult of Secrecy*.

Harry Helms' book is a tremendous resource work that will have enormous appeal both to clandestine DXers and the general public. As Harry says on the cover of his book, he finds that the "Shadow Government" is "one of the most closely-held secrets of the U.S. Gov-

ernment." Harry reveals the location of many secret facilities operated by the government, originally designed for the operation of the government in the event of a nuclear attack. The now-famous Area 51 in Nevada which often makes its way into pirate radio broadcasts is one of many such locations that Harry discusses in surprising detail.

He meticulously outlines the procedures by which the government could morph into a dictatorship, where civilians could be rounded up and detained while normal constitutional protections could be suspended by executive orders. A helpful 73 page reference Appendix lists a variety of executive orders that permit numerous federal government departments to operate the federal government on a secret and clandestine basis.

Helms' book traces the evolution of this problem all the way from Roosevelt to Clinton and even the current Washington administration. Harry's well researched book could once have been written off as a paranoid collection of anti-government propaganda. But, given recent turns in world events and the political responses of the US government, this



book is now essential reading for everybody in the United States, whether they be radio hobbyists or not. But, pirate and clandestine DXers, as well as radio hobbyists who monitor the military, will find the book to be unusually helpful.

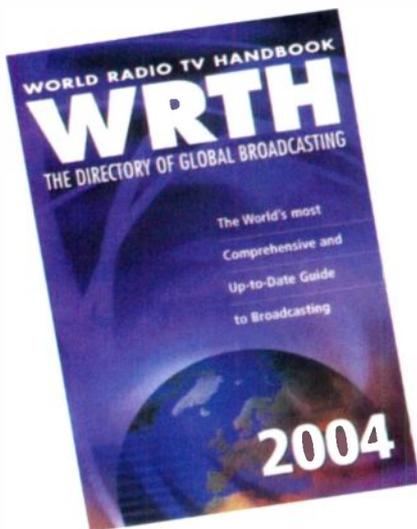
The fact that Helms' book can be published at all in the United States is a measure of the healthy state of democracy and freedom in the USA. It is listed at a price of \$12.95 from Feral House in Los Angeles. It is available from them at their <http://www.feralhouse.com> web site, and will also be available from many *MT* advertisers. A book of this importance will also be found in bookstores on a nationwide basis. You should go buy one at once, while you still have the chance.

Reviewed by George Zeller

Books and equipment for announcement or review should be sent to "What's New?" c/o *Monitoring Times*, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to Rachel Baughn, editor@monitoringtimes.com

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Bang, Crash!

I worked in the satellite industry for nearly two decades as a satellite controller (amongst other roles), and became familiar with the procedures used for the development and construction of satellites and the associated hardware and software used to control them. Consequently, I was amazed to hear that the NOAA-N Prime satellite had been severely damaged due to an apparent oversight.

The official announcement read: "A spacecraft being built for the U.S. National Oceanic and Atmospheric Administration (NOAA) was damaged (on) September 6 in a factory floor accident at Lockheed Martin Space Systems in Sunnyvale, California. The NOAA-N Prime satellite was being rotated from vertical to horizontal on a device known as the 'turn over cart' when it slipped off the cart, 'causing severe damage,' according to an anomaly report sent to NASA and NOAA officials.

According to this report, the initial assessment of the cause of the accident is that 24 bolts were missing from the cart when technicians went to move the satellite to the horizontal position. Engineers working on another satellite program that uses a similar cart, removed the bolts from the NOAA-N Prime cart on September 4 without documenting their actions, according to the report. "At this point in the investigation, we are looking into whether procedures were followed as written."

NOAA-N Prime is scheduled for a 2008 launch. "It's clear there is some damage, but we have to determine what kind and the kind of rework that will be needed to bring spacecraft back into a situation which would make it fit to fly," said a spokesperson.

The current launch schedule shows NOAA-N, the next NOAA WXSAT, is due to be launched in June 2004.

◆ NOAA-16 has problems

September was not a brilliant month for WXSATs! First reports of a loss of image synchronization on the HRPT from NOAA-16 were received following reception on September 19. This type of fault has been seen previously on earlier satellites, so NOAA has acquired some experience in limiting the effects of the problem. On September 26, the following statement was issued:

"The NOAA-16 AVHRR/MIRP resynchronization commands are now incorporated into the stored command table and are executed at 0430UTC daily. On September 23, TCE24 (AVHRR Heater/Louver) was turned off

in an attempt to raise the temperature of the local area around the AVHRR in an attempt to recover additional lubricant for the scan motor. The AVHRR scan motor has stabilized at a new temperature less than five degrees higher than the previous steady state. Over the last 24 hours, the AVHRR performance appears nominal, although it continues to be carefully monitored."

Within a few days, NOAA-16's HRPT was once more nominal – much to the relief of amateurs and professionals around the world – see figure 1.

Fig 1: NOAA-16 image from Carlos Farena of Argentina



◆ LRIT - Low Rate Information Transmission

GOES-East (currently GOES-12) is now providing – as from October 7 – regular test transmissions of LRIT imagery. Positioned at 75° west longitude, there are two data streams: GVAR (digital) on 1685.7 MHz and WEFAX (analog)/LRIT (digital) on 1691 MHz.

The LRIT slots are hourly: 0045UTC (29 minutes), and all slots at 45 minutes past the hour until 2345UTC, all lasting 29 minutes. The LRIT/WEFAX time share is therefore now active on GOES East.

The formal announcement stated: At 0000Z 7 October 2003, NOAA began full time share operations of Weather Facsimile (WEFAX) and Low Rate Information Transmission (LRIT) on the WEFAX transponder of GOES East. Every hour there will be 31 minutes of WEFAX, starting at xx:14, and 29 minutes of LRIT, starting at xx:45. This transition phase will last approximately 12 months, at which point WEFAX will be eliminated from the GOES East and LRIT will operate continuously.

Contact point for enquiries: Charlie.Vance@noaa.gov or lrit@noaa.gov

Hurricane Kate is seen in figure 2, located over the Atlantic Ocean near 36°N 55.2°W at 1500UTC on October 6. Kate has been moving north-northeastward at 19 knots with maximum sustained winds estimated at 75 knots, with gusts to 90 knots. Much of North America is under clear skies in this image, and storm systems can be seen in the tropical regions off the West Coast. If



Fig 2: GOES-12 visible-light (enhanced color) October 6, 2003 at 1800UTC

you have a WEFAX station you can monitor the tropical storms and produce animated sequences. Now is the time to consider enhancing your station to receive the new LRIT data.

◆ Imaging Satellites?

There is a constellation of satellites to which the following description applies: Each of the satellites has a 101 minute, sun-synchronous near-polar orbit at an altitude of 830km above the surface of the earth. They carry visible and infrared sensors that collect images across a 3000km swath, and provide global coverage twice per day. The combination of day/night and dawn/dusk satellites allows monitoring of global information such as clouds every six hours. The microwave imager and sounders cover one half the width of the visible and infrared swath. These instruments cover polar regions at least twice and the equatorial region once per day. They also carry space environment sensors to record data along the track.

These satellites form the Defense Meteorological Satellite Program, and next month I am looking at plans for their future.

Frequencies

NOAA-12 and -15 transmit APT on 137.50 MHz
NOAA-17 transmits APT on 137.62 MHz
GOES-10 (135°W) provides GVAR (digital) on 1685.7 MHz and WEFAX (analog) on 1691 MHz
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INDEX OF ADVERTISERS

Alinco Japan	75
Antenna Warehouse	91
Antique Radio	77
Antique Wireless	77
AOR	Cover 2
B&D Enterprises	83
C Crane	73
Carey, Kevin	73
CIDX	91
Communications Electronics	31
Computer Aided Technology	7
Cumbre DX	91
Fineware	41
Hauser, Glenn	79
Grove Enterprises	13, 21, 83, Cover 3
Hallins Radio	23
ICOM	Cover 4
Monitoring Times	67, 91
ODXA	91
Palomar Engineers	85
Passport	87
Popular Communications	85
Radios4You	91
Radio Showcase	79
Radioworld	29
RC Distributing	25
Scrambling News	25
Skyvision	25
Small Planet Systems	25
SWL-remotes.com	73
Talon Creative	9
Ten-Tec	15
Universal Radio	29, 91
WINRADIO	1
WRTH	5

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