

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



Monitoring Times

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Red October

The fires still burn

Issues Left: 18
PERIODICALS W/RIDE ALONG ENCLOSED
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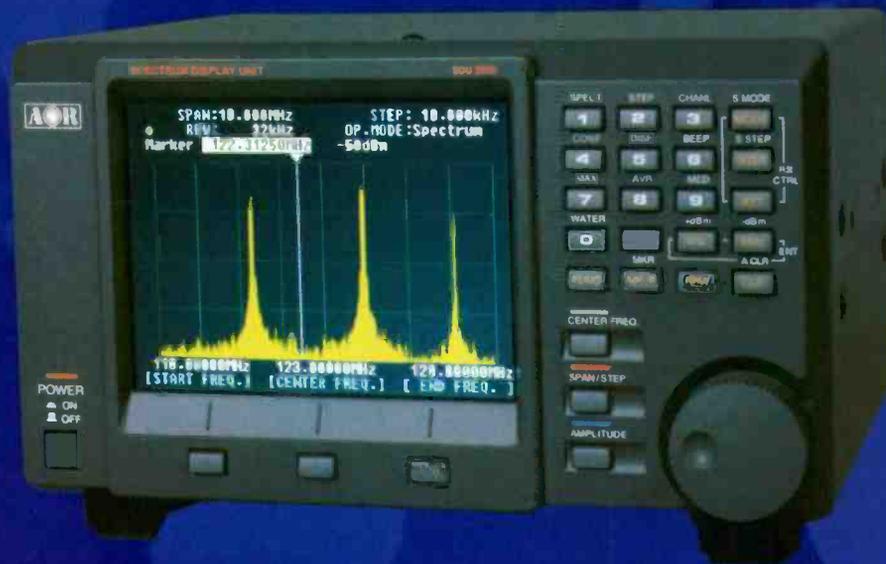
10

Also in this issue:

MT Reviews the Uniden BC898T Scanner
U.S. Navy Aircraft Carrier Communications
Maritime Emergency Communications
Propagation Outlook for Autumn

AOR SDU5600 Spectrum Display Unit

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- Menu driven operation
- Two RS-232C ports for receiver and computer control
- Easy to operate



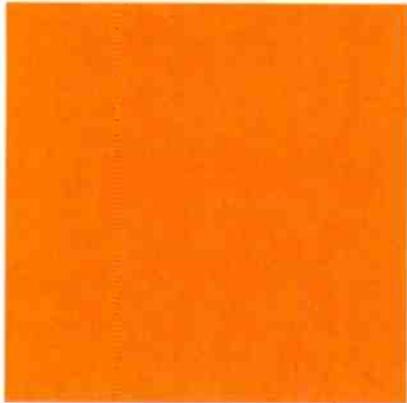
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AOR U.S.A., Inc.
20655 S. Western Ave., Suite 112, Torrance, CA 90501, USA
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"The G303i sets the new standard for PC-receivers ...Overall rating 5 stars"

World Radio Handbook

"The experience of being able to finely tune selectivity to suit a particular signal you are listening to is truly incredible"

Radio and Communications

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

ShortWave Magazine

Just when you thought you had seen everything in shortwave, here come WinRADIO software-defined receivers. Offering unparalleled performance, flexibility and richness of features, this 21st century technology is now available to any demanding shortwave listener. Long the domain of military users, these products are now available commercially and offering an incredible price/performance ratio.

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Monitoring Times

Vol. 23, No. 10

October 2004



Cover Story

Red October - the fires still burn

By Gary Webbenhurst

The season for wildland fires starts early and ends late. Many of the most devastating fires on record occurred in October.

To track wildland fire communications, you must first identify the players and know who is responsible for what. Then you'll have a better idea which frequencies are likely to be active. This article provides both frequencies and techniques for monitoring wildfires in the western states. Story starts on page 12. Cover photo by Gary Webbenhurst.

21st Century Radio Communications, III17

By John Catalano

The conclusion to our series on the future of radio communications takes you into realms you probably never dreamt of. Soon to come in our near future are ultra-wideband radios – already embroiled in a battle over technology standards. In another ten years, we should be seeing applications utilizing 60 GHz.

Think that's the limit? Not by a long shot – Still in the radio spectrum but very close to visible light come terahertz waves! Scientists are already intrigued ...

Propagation Outlook for Autumn22

By Tomas Hood

Get set for improving HF conditions, and even long-distance VHF. Plus we take a look back at some of the surprising conditions experienced in July 2004.

Deep Space Monitoring24

By Bob Grove

Recently rescued from demolition, a former NASA/NSA monitoring site located high in the Smoky Mountains has become the Pisgah Astronomical Research Institute. It's now an educational facility whose radio telescopes are available to high school and college students and teachers in North and South Carolina. Monitoring Times recently took a tour of this modernized relic of the Cold War, which now studies our much more distant neighbors – the stars!

Reviews:

The Uniden BC898T can be viewed as a significantly modernized BC895XLT. While it doesn't support text labels or APCO25 decoding, it is fast and flexible and supports all major trunked modes. See the review on page 78.

Looking to get into shortwave without spending big bucks? Check out the Kaito WRX911 review on page 84. The author compares the Kaito to the Grundig Mini World 100PE, and concludes they are both the cream of the crop in the \$30 price bracket.

Halloween always brings out a certain weirdness, and being techie types we're prone to experimenting with such things as creating special effects with

black light. Bob Grove explains the important difference between harmful and harmless ultraviolet waves, and reviews a new line of UV LEDs made by Nichia (see page 82).

To experience what one might call "non-radio DX," the Gadget Guy checks out C Crane's Bionic Ear; it really does have legitimate uses besides eavesdropping! (Page 83)

Here's a case of a high-tech solution for a low-tech problem: The tiny BioStik is a USB memory stick which cannot be accessed without your fingerprint. Our reviewer suggests you use it to store all those passwords you can't remember! (Page 80)

You could save over \$381⁰⁰ by only spending \$28⁹⁵!

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Address: 7540 Highway 64 West,
Brasstown, NC 28902-0098
Telephone: (828) 837-9200
Fax: (828) 837-2216 (24 hours)
Internet Address: www.grove-ent.com or
e-mail: mt@grove-ent.com
Editorial e-mail: editor@monitoringtimes.com
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Owners

Bob and Judy Grove
judy@grove-ent.com

Publisher

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

Managing Editor

Rachel Baughn, KE4OPD
editor@monitoringtimes.com

Assistant Editor

Larry Van Horn, N5FPW

Art Director

Bill Grove

Advertising Svcs.

Beth Leinbach
(828) 389-4007

bethleinbach@monitoringtimes.com

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EDITORIAL STAFF

Email firstname.lastname@monitoringtimes.com

TJ "Skip" Arey	On the Ham Bands	Jorge Rodriguez	Monitoring and the Law
Rachel Baughn	Communications	Idea Rogers	BOATS, PLANES, and Trains
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	What's New	Clem Small	Antenna Topics
Kevin Carey	Below 500 kHz	Robert Smathers	Satellite Services Guide
John Catalano	Computers & Radio	Doug Smith	American Bandscan
Mike Chace	Digital Digest	Hugh Stegman	Utility World
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John Figliozzi	Program Manager		Broadcast Logs
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YB 400PE AM/FM/Shortwave Radio

This high-performance PLL synthesized, dual-conversion YB 400PE receiver pulls in AM, FM-Stereo, Shortwave, and Longwave, including continuous coverage from 520-30,000 KHz. Even Ham radio two-way communications can be heard using the SSB circuitry. Its highly sensitive auto-tuning system stops even on weak stations within the international Shortwave broadcast bands. Its 40 programmable memory presets allow quick, easy access to your favorite stations. **Key features include:**

- Easy tuning with direct frequency entry, up/down buttons, and auto-scan
- Multifunction LCD displays time, frequency, band, alarm wake time, and sleep timer
- Sleep timer, dual clocks, and dual alarm modes wake you with beeper or radio play
- Built-in antennas for complete portability and socket for supplementary Shortwave antennas
- Includes AC adaptor, earphones, carrying pouch, supplementary Shortwave wire antenna, and batteries

\$149.95



YB 550PE AM/FM/Shortwave Radio

Unique features define the model YB 550PE, such as 200 randomly programmable memory presets with user-defined memory page customizing, digital fine-tuning control, and favorite station wake-up memory. Through its PLL synthesized digital tuner, receive AM, FM-Stereo, and Shortwave with excellent sensitivity and selectivity. Enjoy the entire Shortwave spectrum that includes all 14 international broadcast bands and continuous Shortwave coverage of 520-29,999 KHz. Its auto-tuning system stops even on weak stations within the international Shortwave spectrum, or with the direct frequency entry system, go instantly to any frequency in its tuning range. **Key features include:**

- Signal strength and battery power level indicators
- Digital clock with selectable 12/24 hour clock display format
- LCD with display light that shows simultaneous display of frequency and clock
- Alarm with snooze feature and 10-90 minute sleep timer
- Includes built-in antennas, sockets for supplementary Shortwave and FM antennas, earphones, and optional AC adaptor

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S350 AM/FM/Shortwave Radio

Incorporating a sensitive, high-performance analog tuner with digital frequency readout, the S350 receives AM, FM-Stereo, and continuous Shortwave coverage of 3,000 to 28,000 KHz, including all 14 international broadcast bands. Its classic analog tuning knob with superimposed fine-tuning control makes it a pleasure to operate, and the variable RF gain control, wide/narrow bandwidth selector and low pass filter give you complete control over incoming signals. Operates on 4 'D' batteries for long battery life. **Key features include:**

- Multifunction LCD shows digital frequency, clock, and more
- Alarm and 1-90 minute sleep timer
- Variable, independent bass and treble controls
- Left/right line-level outputs (stereo in FM)
- Includes built-in antennas, sockets for supplementary Shortwave and FM antennas, convertible nylon handle/carrying strap, earphones, and optional AC adaptor

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FR200 AM/FM/Shortwave Emergency Radio

Requiring no external power source, the FR200 is a versatile multi-purpose tool for keeping informed, entertained, and safe. Combining AM/FM/Shortwave radio and flashlight in one, the FR200 operates without batteries — powered by its built-in hand-crank generator — allowing you to listen to news, music, and international programming from anywhere, including places where power is a problem. **Key features include:**

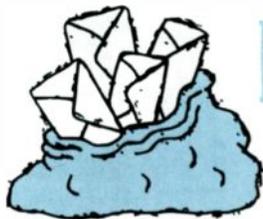
- AM/FM/Shortwave Tuning (SW1, 3.2-7.6MHz; SW2, 9.2-22MHz)
- Hand-crank power generator recharges internal Ni-MH battery
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- Splish-proof ABS cabinet withstands your adventures and abuse
- Can also operate on 3 AA batteries or optional AC adaptor

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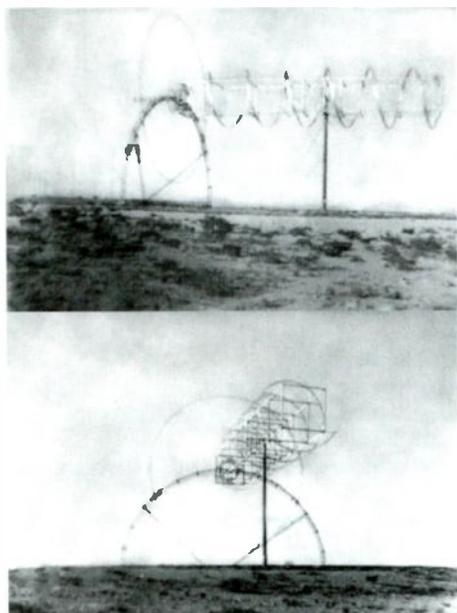


LETTERS TO THE EDITOR

Mystery Antenna

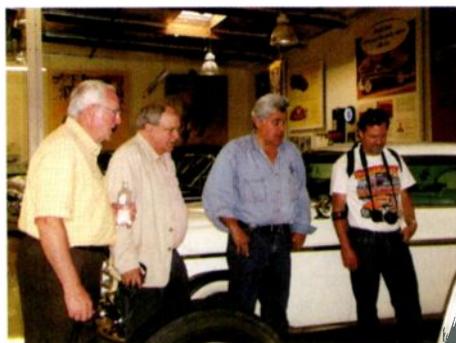
"I would like to know if anyone has any information on the antenna in the pictures. I took the photos back in 1968 about 12 miles east of Roswell, New Mexico. The antenna is impressive, the center pole is 55 feet tall, the antenna length is about 110 feet. The back end rotates in azimuth on a rail road track. Rough calculations from the size indicates it operates in the 28 MHz region. I would like to find some history on the antenna and what it was used for."

- Jesse Wadsworth, WA6CQE



Hobnobbing with the Famous

Ken Reitz's *Beginner's Corner* this month is about famous people who were amateur radio operators. But our only excuse for showing this picture is that an amateur radio operator (and *MT* reader) knows a famous person!



"It all started when I wrote Jay Leno a letter asking if he would like a 'Vincent Owner's Handbook' that had been in my stuff some 45 years. We telephoned back and forth a few times dis-

ussing common interests, i.e. Doble steam cars, Vincent motorcycles and various other automotive and motorcycle subjects. Eight of us from the Seattle area went down to Burbank, CA, on July 6th and attended the 'Tonight Show' as his guests and then he took us to his shop and show rooms. He has about 80 cars and 60 motorcycles.

"He took my niece, great nephew and me from the show to the shop in his Buick Roadmaster, the car he owned when he first came to California. It now has Corvette front and rear axles, oversize wheels and tires, disguised to look stock and 620 hp under the hood. He floor boarded it up for us on our jaunt to his shop and it really rips!

"Jay is really a great guy and was happy to answer any and all questions as he knows everything about anything he owns. He likes to work on stuff too."

The old brass pounder, Brownie (Elliott M Brown)

No Shipping to North America

John Musgrave of British Columbia, Canada, wrote to Lowe Electronics regarding problems he was having with his Lowe HF150. ("A slight out-of-sync between LSB-USB in independent sync modes.") He was surprised to get the following reply from Tony Mika, speaking for the company in Derbyshire, England.

"Sorry to hear you're having problems with your HF150. Also sorry to say we are no longer able to repair it for you. This is because the public liability insurance premium in respect of our dealings with North America is no longer worth paying compared with the amount of trade we do there. Of course, if you know someone outside that area they could deal with us on your behalf."

Tony went on to offer some parts prices if John wanted to try fixing it himself.

Down Memory Lane

"Here's a scan of the *FIRST International Listener's Shortwave Guide*, which eventually turned into *MT* from April 1984."

- Terry Palmersheim, KC7LDP, Helena, MT

Thanks, Terry; I think that is Larry Miller with his back to the camera. Larry became editor of *Monitoring Times* when the two magazines merged into a full-coverage magazine in 1984.

"I have just renewed my subscription; dam, missed the June issue! I'm a long time subscriber when I purchased my Pro 2004 and found your publication, and what a great source it is! Something for everyone.

"Times are changing fast for us monitors: am including clippings from the *Toledo Blade* regarding what is going on here in our area with the 800 MHz radio spectrum.

"My 'other' book reference is *Radio Infor-*

Sample copy



April 1984, Madsen, PA, Vol 1 No 1



HCJB's Clayton Howard to Retire this Summer

DX Party Line Host Ends 43 Year Service

"The Lord has been good to me at HCJB!" Clayton Howard, 77, of Denver, Colorado, announced that he will be retiring from his position as host of the DX Party Line on the radio. He has been with HCJB for 43 years. Clayton is a well-known figure in the amateur radio community and has hosted the DX Party Line for many years. He is also a member of the International Amateur Radio Union (IARU) and has been active in various radio-related organizations. Clayton's retirement is a significant loss to the radio community, but he will continue to be active in other ways. He is looking forward to spending more time with his family and pursuing his hobbies. Clayton's legacy will live on through the many people he has mentored and the many hours of entertainment he has provided. We wish Clayton all the best in his retirement and hope to see him again at some future radio event.

ation Systems scanner directory which is published for our area, and has a website. Kudos to Daryll Symington!

"I do not have a computer, so rely on what I read. By the way, Radio Info Systems' mailing address for readers in our area is: PO Box 2555, Whitehouse, Ohio 43571-0555.

"Hope this is of some benefit to your readers and monitors in my area."

- Bob Pomeroy, Toledo, Ohio

Survey

Things are indeed changing, Bob - on all fronts. And for that reason, we felt it was time we polled our readers about how we're doing and what we could be doing better. We evolved from a communications magazine to one inclusive of broadcasting and amateur radio. As we seek to further refine the magazine, we could use your input to help us focus our future direction.

You may tear the following page out or photocopy it to mail to *MT Survey*, 7540 Hwy 64 West, Brasstown, NC 28902; or you can email your answers to editor@monitoringtimes.com; or you can go to <http://www.monitoringtimes.com> and fill in the survey on line! All respondents who provide their name and address will be eligible for a November 15th drawing in which we'll give away a shortwave portable radio and several complimentary subscriptions.

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

Monitoring Times Reader Survey

Thanks for taking a moment to complete this questionnaire. As our hobby evolves, Monitoring Times evolves as well to meet the needs of our readers. Your feedback is important to us. We'll be giving away a shortwave portable receiver and several complimentary subscriptions; to be included in the Nov. 15 drawing please provide your name and address on a separate piece of paper.

With appreciation,
Bob Grove, Publisher; Rachel Baughn, Editor

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SW broadcasts Utilities Scanning Other _____

What is/are your least favorite MT column(s)? _____

Do you have access to the Internet or email? Yes No

If you would like to see a "subscribers only" area on the MT website, what would you like to see offered there?

Chat group Back issues Digital audio samples Frequency lists Other _____

As the radio hobby changes, I would like MT to help me ...

- understand new digital modes and technology.
- operate sophisticated new radios.
- find new frequencies and band plans.
- restore or repair analog radios.
- relive the excitement of early radio technology and history
- other _____

Please cut out or photocopy this survey and return it to:

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Remember, to be qualified for one of our many prizes, make sure to include your name and address on a separate piece of paper when you return your survey!

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Dumb Radio Laws

Two years ago, when Andy Powell and Jeff Koon, barely out of high school, published *You May Not Tie an Alligator to a Fire Hydrant: 101 Real Dumb Laws*, it may have never occurred to them that they could have filled an entire volume with real dumb radio laws. So, when we recently received in the mail the well-intentioned but complicated Chattanooga city code concerning interception of police radio signals, their book instantly came to mind.

Powell and Koon operate a web site (<http://www.dumbblaws.com>) where they collect and publish dumb laws from around the country and the world. We've also provided several links below for you to explore your own city or county's local ordinances and decide for yourself if it has a dumb radio law, too.

◆ Chattanooga's Dumb Radio Law

Under Article IV of the Chattanooga City Code, entitled Interception of Police Radio Signals, section 16-71, what struck us first was the broad definition of a police radio or scanner which the ordinance covers. Prohibited is any "high frequency police radio receiving set" which the city considered to be any radio receiving set capable of receiving any message sent out by any police radio station.

Unlike other state and local laws we've seen in this area, there is no requirement that the message be sent over assigned frequencies or even a Federal Communications Commission licensed station. Therefore, if the Chattanooga Police decided to use Citizen's Band radios, for example, to send messages from their police stations, a strict reading of this ordinance would mean every CB radio operated without a permit could be in violation of this law.

So how can you have a police scanner in Chattanooga? By Permit Only. The ordinance provides an application process to obtain a permit for the operation of a high frequency receiver. Otherwise, it is unlawful for any person to equip or operate inside the city a motor vehicle with a high frequency police radio receiving set. No definition of "equip" is provided in the code, so expect that even having a radio in the car, such as a handheld scanner, will be considered illegal. Exceptions are made in the law if the vehicle is being used by the federal, state, city or county government or a peace officer.

Applying for a permit to install and operate a mobile scanner is a rather involved process.

According to the code, an applicant must: (1) file an application with the police chief, in writing, stating the name of the applicant, the license number (the ordinance does not specify if this is the driver's license number or the vehicle's license plate or tag number), motor number or vehicle identification number, model and make of the motor vehicle in which you want to install such set, and you have to furnish a photograph of the applicant and a set of fingerprints. The applicant also has to give a reason why they desire to install the set.

Once that is done, the Chief of Police is supposed to investigate and determine if the applicant has shown a need for the radio set, that the radio set will be used for a lawful purpose and that the public interest will be served by the granting of the permit. If he does, he then sends a recommendation to the mayor.

Once the mayor approves the permit, the city treasurer shall issue to the applicant a permit for installation and use of the radio set after upon payment of a license fee of twenty-five dollars (\$25.00) per year.

And, what about next year? A new application must be filed and a new permit secured for each year a high frequency police radio receiving set is used.

You can forget about loaning your car to others if your radio is permanently installed. Any radio permit issued under the provisions of section 16-55 of the Chattanooga City Code cannot be transferred to any other person. Any high frequency police radio receiving set authorized to be installed and used by any such permit cannot be placed in any other motor vehicle other than the one described in the application for the permit without first obtaining a permit from the police chief for the removal of the set to the other motor vehicle. Fortunately, no additional fee is required for a removal permit.

If you change your license plate, "the owner of such vehicle shall notify the police chief of such change within five (5) days after the change is made." And doing something illegal with your high frequency police radio receiving set means your permit may be revoked. You get five (5) days notice to appear before the mayor to show cause why such permit should not be revoked.

In addition to this Chattanooga City Code, readers are reminded that several other cities in Tennessee also have laws on their books concerning police scanners.

If you would like a copy of the actual Chat-

tanooga City Code you can find it at <http://www.chattanooga.gov/citycode/code/Chapter16.pdf>.

◆ Finding Your Own City Code

How can you check to see if your local city or town has similar laws prohibiting scanners or requiring a permit? Here are five web sites that can get you started.

<http://www.municode.com>

Municipal Code Corporation has more than 50 years experience publishing Codes of Ordinances for local governments. Here you'll find more than 1,100 local governments.

<http://www.generalcode.com/Webcode.html>

General Code Publishers offers numerous municipal codes in folio infobases, especially for cities and counties in the northeastern United States; such as New York, New Jersey and Pennsylvania.

<http://municipalcodes.lexisnexis.com/>

The web library below includes links to Municipal Codes published through LexisNexis Municipal Codes Publishing and Ordlink Services.

<http://www.amlegal.com/index.htm>

American Legal Publishing Corporation began as the codification division of the Anderson Publishing Company of Cincinnati in 1934 and became a separate corporation in 1979. Their online links will take you to the Code sections of over 1,000 municipalities and counties nationwide, ranging from villages with fewer than 500 people to large cities with populations well over 1,000,000.

If you still haven't found your city or town listed, try going to their web site directly.

<http://www.statelocalgov.net/>

The State and Local Government on the Net Directory provides convenient one-stop access to the websites of thousands of state agencies and city and county governments. Here you'll only find web pages that are controlled and managed by state and local government agencies.

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.

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The Bearcat 895XLT is superb for intercepting trunked analog communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning pleasure, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; **PS002** DC power cord - enables permanent operation from your vehicle fuse box \$14.95; **MB001** Mobile mounting bracket \$14.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached \$19.95. **CAT895** Computer serial cable \$29.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.



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Mfg. suggested list price \$429.95/CEI price \$189.95

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Trunk Lockout • Trunk Delay • Cloning Capability
10 Priority Channels • Programmed Service Search
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Frequency Coverage:

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Bearcat BC125D APCO Project 25 digital software card.....	\$299.95
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Bearcat BC8XLT 50 channel handheld scanner.....	\$99.95
Bearcat 60XLT 30 channel handheld scanner.....	\$74.95
Bearcat BCT7 information mobile scanner.....	\$139.95
AOR AR160B Wide Band scanner with quick charger.....	\$199.95
Sangean ATS909 306 memory shortwave receiver.....	\$209.95
Sangean ATS818 45 memory shortwave receiver.....	\$139.95
Uniden WX500 Weather Alert with S A M E feature.....	\$39.95

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RADIO HONOR ROLL

Amateurs Respond to Wildfires

While Hurricane Charley ravaged Florida and the US Eastern Seaboard, wildfires raged throughout the Western US. In northern California Sacramento Valley Section Emergency Coordinator David Thorne, K6SOJ reported more than 20,000 acres burned and more than 100 homes destroyed as of August 16. Some 4000 firefighters were on the lines.

Thorne said the fire response marked "the first serious field test" in the Sacramento Valley Section of the Amateur Radio Communication Team (ARCT) concept he introduced in *QST*. ARCTs simplify the process of ordering needed resources within the Incident Command System.

"It worked flawlessly," he said. "It is flexible enough to work well, yet provide a standardized structure."

System resources range from a Type 1 ARCT – a 12-person Amateur Radio emergency communications field station – to a Type 5 ARCT – a single-operator supplementary resource with a vehicle. All configurations were used to respond to the August wildfires, aiding in evacuations, administration, tactical, and health and welfare communications for the Red Cross and other agencies.

Amateurs Respond to Hurricane

Amateur radio operators were very busy in the days and weeks following Hurricane Charley. Among other storm relief duties, hams handled emergency traffic, assisted the Federal Emergency Management Agency (FEMA) to set up HF communication to the state emergency operations center, helped provide communication for search-and-rescue teams, law enforcement agencies and area hospitals. They supported American Red Cross humanitarian relief efforts and handled outgoing health-and-welfare traffic from storm victims living in

shelters.

Several repeaters were up and active for emergency traffic; some regional repeaters were on 145.43 MHz and 442.950 MHz. The Salvation Army Team Emergency Radio Network (SATERN) was active on 14.265 MHz and also used their Echolink network to help families find each other.

"We've got about 2,500 volunteers," said Major Pat McPherson, national director of SATERN. "So many people want to help. It's great to see that spirit of altruism and 'can do.'"

Radio Rules

Following Hurricane Charlie there was no power, no phones, no water, but there was radio. Four hours after the storm was over, tiny Seaview-104.9 was back – its staff and volunteers keeping it on the air around the clock with needed information and encouragement.

"There's bottled water at the corner of Harbor and 41."

"Ice across from Taco Bell."

"Does anyone have a porta-potty?"

In spite of losing its own roof and windows, the small station on the edge of a mangrove bog became a center of communications in Punta Gorda. Listeners reciprocated by showing up with hammers and wood to build a new roof, when roof builders are almost impossible to find.

Ron Hall, a soft-spoken ham radio operator from St. Petersburg, showed up unannounced. In addition to guarding the front door and fielding messages from the community, Hall monitored messages from emergency operations center and got the information to the announcer's booth.

Federal authorities planned to distribute 50,000 radios to storm victims – a clear acknowledgement of the importance of local radio (from a *Washington Post* report).

"I wouldn't be surprised if one out of three, one out of four households have (a scanner)," said Ashby Police Chief Steven McLatchy.

Scanner usage is high enough that town officials may use scanner frequencies to broadcast town news. "We use it as a tool to get a quorum at town meeting," Townsend Police Chief Erving Marshall said. When there's a snow day for students, officials will announce it over their radio frequency, Townsend Ambulance Director Donald Girard said.

Another official said when there was a power outage in his town a few years ago, officials announced emergency phone numbers over the radio frequency.

Unlike most states, Massachusetts does not have a law making it illegal to use a scanner in commission of a crime. Officers say criminals do often listen to the scanner to figure out where the police officer is.

"It's unfortunate that a tool can be used either way," McLatchy said.

Media Rights at Stake in Australia

The Crime and Misconduct Commission (CMC) inquiry into the roll-out of an encrypted, digital police radio network in Queensland, Aus-

tralia, last October is being closely monitored by police across Australia. The inquiry is specifically examining the extent to which the media can access the network.

After four days of public hearings, CMC chairman Brendan Butler said in closing remarks the QPS had failed to adequately consider the issue of press freedom when it switched to a secure radio network.

"It seems to me regrettable that the police service migrated to the new secure digital system last October without giving adequate attention to the implications that course would have for media access to policing information," he said.

The police argue that privacy and security issues outweigh the right of the press to tap into police communications, and that the media was never meant to have access in the first place.

Frequency Recall in Rockland

Reclaiming unused frequencies for more efficient use of radio spectrum seemed an excellent move by the FCC. But not to Rockland, New York, which lost 10 emergency radio frequencies for which it had paid \$5,000 in filing fees in 1998. A five-year plan had been filed with the FCC in 1999, but after 9/11 funds dried up, the economy worsened, and progress slowed. Rockland has already invested in the new communications system, expected to cost at least \$27 million, but it may now have to spend thousands more to acquire new frequencies.

Is there a procedure to appeal the recall? Especially if, as Rockland believes, a mistake was made? Rockland is hoping there is.

Nextel Deal - Who Moves Next?

In early July, Federal Communications Commission officials finally approved a controversial deal that would move Nextel Communications Inc. out of the 800 MHz radio spectrum so their frequencies will no longer interfere with public safety communications systems using the same band. But is it a done deal?

First, Nextel was silent, awaiting the FCC's official order. When the 256-page order arrived in August, Nextel had 30 days to consider whether it would accept the terms. The total spectrum/cash value Nextel would be committing could add up to \$4.8 billion. As of presstime, Nextel still

AMATEUR RADIO

FCC Clarifies Emergency Communication Policy

The FCC has formalized its policy for communications on Amateur Radio Service frequencies during an emergency. Emergency communications declarations (ECDs) – which prohibit amateur communications not related to the emergency – will only be issued *after* a disaster disrupts normal communication systems instead of in anticipation of such emergency. ECDs will be applied first to VHF and UHF repeaters in the affected area and to simplex channels in the 60-meter band; HF communications will not be restricted unless necessary.

SCANNING

Massachusetts Scanning

An article in the *Sentinel and Enterprise* newspaper from Fitchburg, Massachusetts, carried an article on the role scanners play in surrounding towns. No one knows exactly how many people are listening, but the number of homes with scanners is substantial, said officials.



Oct 10: Wallingford, CT

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had not commented.

Even if Nextel accepts the plan, it's still not a shoe-in. Verizon Wireless and other competitors may carry out their threatened lawsuit, and Congress could also challenge the FCC's authority to bypass the auction process. (The General Accounting Office has already begun looking into this.) Most public safety groups support the solution, though a group which calls itself the First Response Coalition opposes it.

Some of the specifics of the deal are:

a. That the band reconfiguration be completed in phases within three years from the public notice announcing the start date of the reconfiguration.

b. Nextel gives up spectrum at 700 MHz and 800 MHz, but not 900 MHz, in exchange for nationwide authority to operate in 10 megahertz of spectrum at 1910-1915 MHz and 1990-1995 MHz. Nextel must reimburse incumbents for relocation costs within 30 months.

c. At the end of the 36 months, when the re-banding process is completed, Nextel would be given a \$1.607 billion credit for relinquishing rights in the 800 MHz band.

d. The commission will set technical specifications defining "unacceptable interference."

Fast Learner

Back when Nextel was putting together its network by accumulating 800 and 900 MHz frequencies from small or failed dispatch companies, Mobex abandoned its strategy of trying to compete with Nextel. Mobex sold its 800 MHz and 900 MHz licenses to Nextel and used the proceeds to purchase two of the nation's premier maritime communications firms, Regionet Wireless and Waterway Communications System L.L.C.

Mobex now has rights to the lion's share of spectrum in the 217-219 MHz band and license rights in major U.S. coastal cities, top metropolitan areas straddling the Great Lakes, the Mississippi, Illinois and Ohio rivers, and cities along the Gulf of Mexico.

Frequencies in the 217 MHz-219 MHz band were once restricted to ship-to-shore communications, but in the late 1990s, the FCC relaxed its rules to allow commercial mobile services. That means that Mobex has picked up clean, clear spectrum without having to pay top dollar at FCC auctions - just like Nextel did. Let's hope Mobex is paying attention, however, and also learns what can happen if a network becomes so successful it causes interference.

BROADCASTING

Canada Nixes CHOI

In July, the Canadian CRTC followed the lead of the USA FCC by closing down a licensed Canadian broadcaster, citing repeated "offensive comments" by the morning program hosts on CHOI-FM, the highest rated licensed broadcaster in Quebec. This was only the sixth nonrenewal of a broadcasting license in the history of Canada.

It was the first time that a broadcasting license has been terminated because of offensive language broadcast over a Canadian radio station.

Station owner Patrice Demers vowed to fight this decision in the Canadian courts. The CTRC maintains that the offensive comments on CHOI had to do with crude remarks about famous women's breasts, instructions for stealing satellite signals, and repeated offensive remarks. (George Zeller)

UK Urges Pirates to Go Legit

British Ofcom officers who make a raid on unlicensed broadcasters may also leave behind an application blank along with their citation. The initiative is part of a drive to encourage pirates to apply for dozens of small, cheap licenses that are to be made available under new legislation (similar to the new low power FM stations in the US).

NASB Report on HCJB

Beginning in August, the National Association of Shortwave Broadcasters will make a monthly report on HCJB's DX Party Line on the third Saturday of each month. The first program featured an interview NASB did with Abner Mir of Radio Free Asia at the recent DX meeting in Veracruz, Mexico. The DX Party Line can be heard in the Americas at 1230 UTC Saturday on 12005 kHz from HCJB-Ecuador, and at 0230 UTC Sunday on 6870 kHz via WRMI.

NEW TECHNOLOGY

Intel Announces Radio on a Chip

Intel has unveiled a chip designed to meet the demands of future radio sets by switching between different networks and frequencies based on availability or local government regulations. Intel's new chip features a 10GHz radio, with the synthesizer enabling it to tune down to lower frequencies in 30 kHz steps.

"They tune and tweak themselves," explained Krishnamurthy Soumyanath, director of Intel's communications circuits lab. "We are going to have four or five radios on a platform. You've got to make them cheaper, you've got to make them flexible and you've got to make them smart," he said, echoing statements made by John Catalano in this month's conclusion to "Radio in the 21st Century."

"Communications" is compiled by Rachel Baughn (editor@monitoringtimes.com) from newsclippings submitted by our readers. Many thanks to this month's reporters: Anonymous, NY; Norman Hill, VA; Rick Kissell; Brian McDermott; John Montgomery, NV; Jerry None; Ken Reitz; Brian Rogers, MI; Doug Robertson, CA; Tom Sundstrom; Larry Van Horn; Peter Vieth; Robert Wyman; Ed Yeary.

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Red October, the fires still burn



By Gary Webbenhurst
garywebbenhurst@monitoringtimes.com

Photos by Gary Webbenhurst

Like professional baseball, wildland fire season starts early and ends late. If you think the 2004 wildland fire season is over, think again. Last year, southern California was pummeled by a huge conflagration that started in late October and continued through the first week of November. The "Cedar Fire" burned 2,820 structures, 273,246 acres, and resulted in 15 lives lost. The "Old" fire burned in San Bernardino County in October 2003. It burned 91,281 acres, with 1,003 structures lost, and 6 deaths. For the year 2003, dollar damage in California was a staggering \$947,663,538.

A visit to the home webpage of the California Department of Forestry (CDF) and Fire Protection at <http://www.fire.ca.gov/> reveals the enormity of the destruction. Carefully read the tables from their website. Ten of the worst fires, including the top four, all occurred in October. Their website is a treasure trove of information. Take your time and carefully explore the many subchapters. Here is a sample:

Year	# of Fires	Acres burned	Dollar Damage
1999	7,562	285,272	134,258,534
2000	5,177	72,718	29,876,853
2001	6,223	90,985	87,295,001
2002	5,759	112,810	173,976,861
2003	5,684	527,753	947,663,538
Five year average	6,081	217,908	274,614,157

Rank	Fire Name	Date	County	Acres	Structures	Deaths
1	Tunnel	Oct 1991	Alameda	1,600	2,900	25
2	Cedar	Oct 2003	San Diego	273,246	2,820	15
3	Old	Oct 2003	San Bernardino	91,281	1,003	6
4	Jones	Oct 1999	Shasta	26,200	954	1

Tables and information taken from the official CDF website.

When I was a teenager, I spent hours listening to my old Realistic Patrolman™ tunable radio. In the 1990s, with new radios and a tall tower, I rediscovered the excitement of monitoring forest fires. Today, they are referred to as "wildland fires."

There is a new dimension to wildland fires, due to the forest-urban interface created by the population expansion into rural and forested areas. People have built new homes in the middle of the forest, and expect their home to be protected at all costs.

I lived in Sacramento, California, for many years. I remember the commute home on late afternoons. I would always look up east towards the Sierra Nevada mountains. Often there would be large cumulous thunderclouds. California is always dry in the summer. The clouds contained lots of lightning, but very little precipitation. On those days, I could count on several lightning strikes that would cause fires. Some days I actually spotted the smoke first, before I heard

the CDF fire dispatch call.

Or, perhaps it was a spark from a lawn mower, or a campfire, or an illegal backyard burning that got away. It seems there were always fire calls: CDF never had a slow day. I must point out that the 60-foot mast on my roof gave me a listening range of at least a hundred miles or more. The repeaters for the US Forest Service (USFS), and the California Department of Forest and Fire Protection were easily heard from my house.

So why my renewed interest in wildland fires? Well, at the time, I was the chair of Disaster Services for the Sacramento chapter of the American Red Cross. I wanted a heads-up on large forest fires. Hearing about it on the five o'clock news was not sufficient warning.

If you are a fire scanner listener or a ham operator, and belong to the local RACES/ARES group, you, too, can sit at home and relay important developments to your local Emergency Coordinator (EC) or Red Cross officials. Retired to Spokane, Washington, I am still active with the Red Cross disaster operations.

Sounds interesting, how do I monitor?

First you need to identify the players. Many federal agencies have lands they must protect: Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), the National Park Service (NP), Forest Service (USFS), and U.S. Fish and Wildlife Service. The National Weather Service provides technical services and special fire weather forecasts.

Many states have large areas of state pro-

tected lands. The most active wildland fires are in the west, from Minnesota down to Texas and over to the West Coast. There are smaller fires along the eastern seaboard. Florida, in particular, is active with lightning-caused wildland fires. Some monitoring enthusiasts take their vacation out west, in hopes of finding a big fire. I guess it is similar to severe storm chasing, which is growing in popularity.

You need to get out your maps to determine the nearby major agencies that contribute to the fire fighting efforts in your listening radius. The best map source is the Delorme™ Atlas and Gazetteer for your state. Great map, high price. In my situation, I had to buy one for Washington state and a second one for Idaho because of my proximity to Idaho.

However, any map is better than none. Clearly highlight all national forests, national parks, BIA, BLM, and Corps of Engineers recreation areas, as well as state forests, and state parks. I prefer a bright yellow highlighter pen.

On my Washington state map, I draw a circle of a 100 mile radius from my home station on Mt. Kit Carson in extreme eastern Washington. Within that area is the Colville National Forest (NF), Okanogan NF, Turnbull Game Refuge, the Colville and Spokane Indian reservations. Within that same 100 mile radius are several federal areas in Idaho: the Kanisku NF, Coeur D'Alene NF, Lolo NF, Kootenai NF, St. Joe NF, and the Clearwater NF. There are also the Coeur D'Alene and Nez Perce Indian Reservations. And yes, there are considerable BLM lands along the urban/rural interface – a mix of homes, businesses, and sparsely populated lands, mainly forested. There are also state forests, and state parks.

Now it's time to gather all the frequencies.

What are the Frequencies?

The best part of monitoring wildland fires is finding all the frequencies that are in use. Local fire departments will respond on their usual VHF frequencies as well as the county, and/or state mutual aid frequencies. As soon as state Department of Natural Resources (DNR) engines arrive, action will be on their frequencies.

When out-of-area federal engines, hand crews, and overhead management personnel arrive, they bring many radios and new frequencies with them. I love the challenge of finding these new frequencies. Federal agencies are usually found in the VHF 162-174 MHz range. The UHF range of 400-420 MHz is used for mountain top links and fire camp logistical repeaters.

U. S. Wildfire Fighting Aircraft Frequencies

AM mode	VHF-Victor 4	VHF-Victor 2 Air to air	VHF-Victor 1 Air to air	WA DNR	VHF-Victor 3 Air to air	VHF Helicopter air to air	VHF-Victor 6	VHF-Victor 5 Helicopter air to air	Colville NF-Kanisku NF	Panhandle NF	Air Tanker bases	Challis NF	Boise NF	Idaho Falls
122.850														
122.900														
122.925														
122.950														
122.975														
123.025														
123.050														
123.075														
123.100														
123.825														
123.975														
124.225														
124.425														
124.475														

124.225	Challis NF
124.425	Boise NF
124.475	Idaho Falls
125.075	Glendive/Billings
125.275	Glasgow/Billings
126.475	Dillon
126.925	Bozeman
127.175	Missoula
132.175	Kalispell
132.225	Marshall in SW MT
132.325	Billings
132.425	Colville NF air ops July 2003
132.575	Lewiston/Great Falls
132.625	Yellowstone/Bozeman
133.475	Clearwater/Nez NF
134.425	Butte/Helena
135.925	Used in Spokane area
135.950	VHF-7
135.975	VHF-8 (End of AM mode range)
164.675	U. S. government air frequencies on FM

166.675
168.225
168.650
169.175
170.000
170.275

The range of 72.000-77.000 MHz, is occasionally used as links for the sprawling deserts and forests. Almost all wildland fires are fought by agencies using VHF (150-174MHz). However, many are now on the new narrow band technology, which means channel separation of only 7.5 kHz. The old step was 15 kHz: i.e. 154.190, 154.205, 154.220 154.235. The establishment of the 7.5 splinters means that 154.1975, 154.2125, 154.2275, and 154.2425, etc. are now in use.

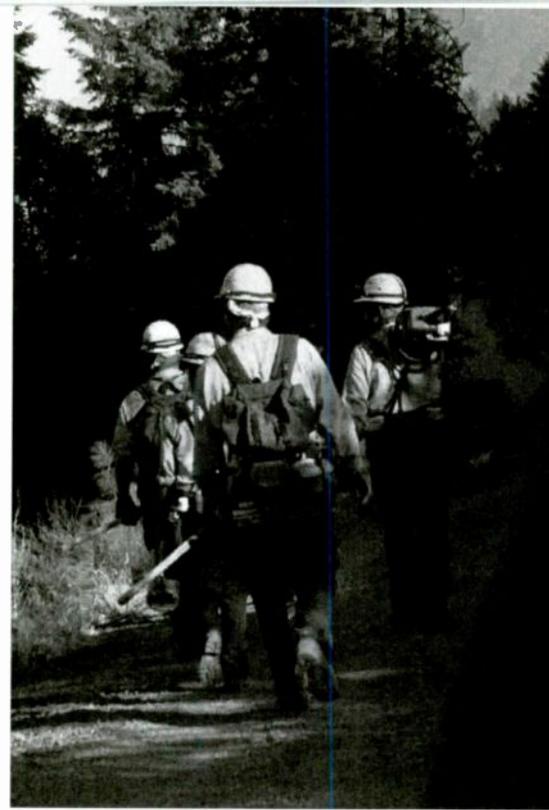
There are several VHF frequencies recently

USFS/BLM/BIA	Receive	PL	Transmit	PL Tone
	156.015	82.5	158.955	82.5
	164.525		163.025	114.8
	164.725		415.025	
	166.375	114.8	166.975	107.2
	168.225			
	168.425		173.8125	
	168.775		168.175	136.5
	169.700		164.550	123.0
	169.825		164.675	107.2
	169.875		171.550	146.2
	169.950		169.125	
	170.475			146.2
	170.550	146.2	169.575	West 103.5
	171.385		172.075	
	171.425	146.2	171.700	110.9
	171.975		171.475	146.2
	171.500			146.2
	172.250			146.2

Agency	Receive	PL	Transmit	PL
BIA Wellpinit	151.235			
BLM Coeur d'Alene alt is 164.725 (131.8)	151.310			
BLM strange but true, a spilt channel	151.340			
BLM Spokane District Coulee Dam	151.415			
BLM Lewiston	159.240	156.7	151.265	156.7
Temporary Command 11 Operations	159.270			
Panhandle ID NF Sandpoint dispatch	159.360	156.7	151.220	156.7
Keller BIA 114.8 "Bravo" aircraft	159.360	118.8	151.235	156.7
BIA Keller or 100.0 or 123.0	159.405	156.7	151.250	156.7
Okanogan WA NF Metaline Falls	159.420	103.5	151.295	103.5
Nez Perce ID NF	159.435	156.7	151.160	156.7
Okanogan NF	159.450	156.7	151.460	156.7
Colville NF Kalispell East TX 123.0	166.5625	156.7	168.150	156.7
Kootenai ID NF	172.375		170.575	
Colville Indian Reservation				
Colville NF Kalispell Blue				
Wenatchee NF CH 1				
Wenatchee NF CH 2				

New in July 2004: 170.475 & 171.575. These last channels are borrowed from the federal allocation for forestry operations.

Note: Arcadia 100 is the Chief Ranger on duty in the NE region. For the upper Columbia Basin, it is Columbia 100. Similar plans are used throughout Washington State.



liberated by the FCC for use by urban and rural fire departments. Plug these into your scanner: 150.775, 150.7825, 150.790, 150.7975, 150.805, 150.905, 150.920, and 150.995. The last five years has also witnessed several reallocated frequencies in the range of 159.465-161.565. Naturally, these were in areas where they were not in use by their originally allocated service.

The historical range for state and local for-

est conservation was the "C" class. The VHF high range was 151.145-151.475, and 159.225-159.465. Your scanner in search mode will serve you well in monitoring these ranges. These are primary channels to monitor. Remember the new steps of 7.5 kHz!

Below is my mandatory listening chart for northeastern Washington State.

For U.S. Government agencies, look in the back of *Police Call* under "National interagency Fire Center (NIFC). Then you can look up by each forest. A good website is <http://www.snowcrest.net/marnells/natradio.htm>.

Here are some frequencies heard on a road trip to a fire near Hope, Idaho, using my Scout™ Frequency Finder. This is a typical cross section of what you might hear on a fire fought by federal agencies.

159.3000	159.4050	162.6100	163.4125
163.9350	168.0500	168.1250	168.2000
168.3500	168.6000	168.7000	168.7625
168.7750	168.8500	169.1750	169.7500
170.5750	170.7750	171.1750	172.3250
172.3750	415.5000		

In major cities, firefighters quickly switch to fireground or tactical simplex channels. Wildland fires are usually in remote areas, and with larger areas affected. Use of mountaintop repeaters as well as aircraft flying high above means frequencies can be heard for a good distance. Standard VHF frequencies are active because that is what most "city" engines have.

You can see the problem experienced by fire agencies that went to 800 MHz trunked systems. They end up having to keep their old VHF/UHF radios, or at least some of the portables. A few states, like South Dakota, tried trunked VHF with limited success. South Dakota's unique idea was to change over every public safety agency, even schools and hospitals, to a VHF trunked system. The jury is still out on this one.

For statewide common, or mutual aid frequencies, consult your *Police Call* book, or their nationwide database CD. If you search *Police Call*, there is often a listing under your state for statewide use, usually with 1000 mobiles, or something similar. Sometimes it is licensed un-

der the state fire marshal or fire chief's association. Just run a statewide VHF search for "F" or "L" frequencies and look for 1000 users or more. In the back pages of *Police Call* are the listings by frequency. Check for any "F" or "C" listings between 159.465, and 453.000.

In Washington state, 153.830, red tactical, is used statewide for fire coordination. Both local fire apparatus and the State DNR vehicles have this frequency. Many also have the statewide OSCAR (On Scene Coordination) channel on 156.135. The OSCAR frequency is also used extensively by police for car to car, even surveillance. California has its CALCORD (California On Scene Coordination) channel on 156.075, and white fire frequencies on 154.265, 154.280, 154.295, and 153.830.

Good Internet Sources for Frequency Information:

<http://www.ffsl.utah.gov/>
http://www.sfr.cas.psu.edu/Employment/State_Agencies.htm (for all state DNRI)
<http://www.ut.blm.gov/ccifc/2003docs/sharedfiregroupfrequenciesouthzonepdf.pdf>
<http://www.bianifc.org/operations/hotshot.html>
http://www.fireground.com/faqs/faqs_imts.html Type teams
http://www.fs.fed.us/r2/fire/rma_int_home.htm Rocky Mtn teams
<http://www.fs.fed.us/news/fire/>
<http://www.nifc.gov/fireinfo/nfn.html#Washington>
<http://www.airtanker.com/>
<http://fire.ak.blm.gov/>
<http://www.fire.blm.gov/WhatWeDo/blmnifc.htm>
http://www.freqofnature.com/national_interagency_fire_cache.html
<http://www.nifc.gov/news/nicc.html>

Canadian Frequencies

For our Canadian listeners, Parks Canada and Natural Resources Canada have been very busy the last two summers, especially in British Columbia. I have pieced together what I believe are the correct radio channels. Some I have monitored and the rest are educated guesses. If any of our Canadian readers have updates or corrections. I would love to hear from you.

Canadian Forest Service

RX	Color	CH#	TX
163.890	Silver	F01	Simplex
163.935	Red	F02	163.065
163.965	Purple	F03	163.095
163.995	Green	F04	163.125
164.055	Tan	F05	163.185
164.085	Blue	F06	163.215
164.145	Orange	F07	163.275
164.175	Brown	F08	163.305
164.205	Yellow	F09	163.365
164.235	Gray	F10	164.025
164.265	Black	F11	163.395
163.830*	Gold	F12	Simplex
164.910	Copper	F13	Simplex
163.845	Pink	F14	Simplex
166.625	Bronze	F15	Simplex
163.080	Maroon	F16	Simplex

*used for coordinating with US agencies

What's going on here?

"Arcadia 100 - FIRE!" The emphasis is theirs, not mine. Those are the magic words and voice intonation used in eastern Washington.

Arcadia 100 is the chief ranger on duty for the Washington Department of Natural Resources (DNR). That phrase is used when the dispatcher alerts him about a new fire. Dispatch assigns the fire a number. It is really simple - the day of the month and the chronological order of the daily fires as reported. Thus, Fire 7-12 would be on the seventh day of the month, the twelfth reported fire that day.

For incident command purposes, every fire is also given a name that usually relates to a nearby road or physical feature, like a river, hill, or canyon, etc. These wildland fires can occur anywhere on private, state, or federal lands, even if it is all grass or brush. Metro or rural fire districts get the initial call, since it is in their district, and they can respond quickly.

If there are structures involved, these regular fire district engines will provide "Structure Protection." The federal wildfire crews are not trained nor equipped to fight structure fires.

There is a basic rule for responding to wildland fires. Send lots of resources, because if you don't get them out in the first 30 minutes, it might get away from you. First to arrive are district apparatus like Brush 44 and Attack 44. The DNR engines may be rolling from a great distance. They tell Arcadia 100 their ETA (estimated time of arrival). In Washington, these three-man engines have no red lights nor sirens. These seasonal hires are often college students. I guess they don't want them rolling code and risking an accident.

Often there is a call for a second alarm, or strike teams of engines, or brush rigs. It soon may race out of control and mutual aid is summoned, both from the rural and metro fire departments. Naturally, your state department of forestry or natural resources engines are rolling. A type III management (overhead) team is requested to plan a fire strategy and manage resources.

The fire might grow. We are now in day two or three. The management team knows they are in for a battle. Luckily, these officers have been on many similar fires. That is why they are appointed to management positions.

The Incident Command System has had a name change: It is now known as the National Incident Management System (NIMS). The organizational chart is still the same. Indeed, ICS was born in southern California more than 30 years



ago as a new and better method to manage the many agencies and resources at large forest fires. These folks are religious in their firm commitment to use NIMS at every incident. There are three levels of teams/equipment: Type I, II or III, with I being the highest for the really big events. Engines fall into a similar category.

The federal engines are usually four-wheel drive and use the rough back roads and logging trails. Same for the state engines. The strike team engines from large cities cannot go off road, and they fill the role of structure protection. These engines back into the driveway of every home. They do their best to save the home, but make a last-second escape if necessary.

Fire base camp is usually the same as the

staging area and Command Post, but not always. Someone needs to scout the area, find a site, and work out an agreement with local officials. The favorite sites are high schools, fairgrounds, and large public parks.

The cost of battling a large fire is high. Tent cities soon pop up, housing the hotshot and other hand crews. These hand crews are about 23 members strong. They dig lines, do the backfires and final mop-up of smoldering stumps, trees, and roots. Motels are booked for overhead management personnel. On rare occasion, the engine crews get a day off for laundry and sleeping in a motel.

Temporary radio equipment is set up. The Red Cross and Salvation Army might be supported on local ham repeaters, especially if there are evacuations during a fast moving fire.

Air traffic control is necessary. One of the exciting things about monitoring wildland fires is the heavy use of aircraft. There is usually a spotter plane (Air Attack or Recon One). They coordinate the tankers and helicopters, usually referred to as "rotors." There is often a helibase. Planes use local airports for fuel and retardant supplies. Thus, the local airport may have some short range frequencies to capture and some photo opportunities. One end of the airport may be used for helicopters, and the other for fixed wing tankers.

If this is your first time monitoring big fires, here is a good website to get you started: http://www.scancolorado.com/how_to_monitor_a_wildland_fire.htm

Radios

As I sit here writing this article, there is a fire of 1000+ acres just to the west of Spokane. The "Mill Canyon" fire got away from the local volunteer FDs, and now the state DNR has overhead management command. I just snagged a previously unlisted air-to-ground heli-base frequency of 170.275.

With those federal agencies, you just never know what frequency will pop up. I have my Pro 2052 fully loaded with 1,000 federal VHF frequencies. Its super fast scan rate allows me to catch even short conversations. With pen in hand, I spend hours monitoring my radios. I try to listen at different times of the day. Seven to nine o'clock in the morning is busy as engines and overhead supervisors go on duty and get their daily assignments.

Around nine o'clock, most agencies have the morning weather report. This takes about five minutes and is a good time to check for repeater inputs, linked systems, and PL tones. I enter the known frequencies into my Pro 92, and it does a very nice of running beside the other radios to detect the PL™ tones.

Part of the fun of monitoring is figuring out the various radio systems. What is the input? Is the PL tone the same for both the repeater input and output? Any new frequencies? On a busy day, I might hear a hundred frequencies. All this



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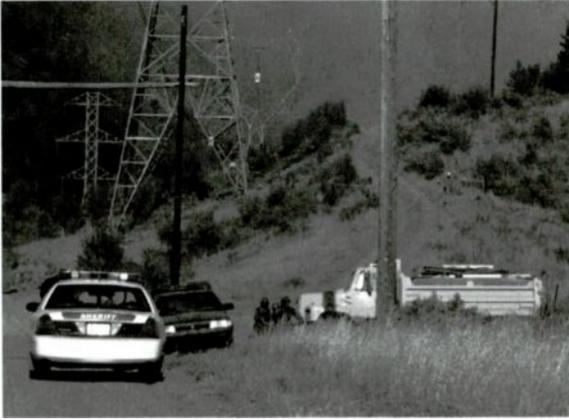
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knowledge allows to me concentrate on the most important frequencies, so I don't miss any new fire calls or other action.

Always keep paper and pen nearby. I am amazed at how often the dispatchers give out the exact frequencies, usually to in-bound, out-of-area aircraft. For example: She will advise tanker 52 that air to ground is 170.275 (FM, of course). Ground contact, or air attack (recon) is Fox 310.

Bottom line: You need at least two or three radios to keep up with the action. I like one for the air-to-air or air-to-ground coordination, another for main county fire dispatch, and a third one for the tactical repeaters or simplex channels. I must admit, on large fires you can easily use as many as five to seven radios, each dedicated to a specific channel. And then there is always the Pro 2052, scanning 1,000 channels at the speed of light.

So basically, you can monitor wildland fires with a regular scanner, but a trunk capable scanner with many channels and alphanumeric labels is sweet. Older scanner and ham transceivers can also be used, set to a single frequency.

Road Trip

I know this will generate some email, so let me clarify this idea for the umpteenth time on the record. It is *NOT OKAY* to respond the scene of a large police or fire response. However, in the case of these wildland fires, you can drive to the general area and sit in the Burger King lot, and catch most of the radio traffic. As you drive through the mountains, stop at "scenic overlooks."

The actual fire suppression work areas are always closed to civilian vehicle traffic. That means you! Watch your local TV stations on a small LCD TV and/or carry a scanner or ham transceiver that receives the audio of the local TV stations. GPS is also a fun and useful tool. GPS can guide you to a safe zone and give you all the little roads you never heard about, plus geographic (topographic) information. Watch out, though, for those slurry loads from overhead aircraft — they tend to dribble and can land on your car. Very nasty stuff!

Preparations:

I get up around 6 am. Like a storm chaser, you need to pick your chase days carefully, and that means extraordinary efforts. A quick breakfast and then online to check the morning wildfire summary from NIFC. Bring refreshments: it could be a long day.

Pre-program your radios. (This is why computer programs are so slick. You can download hundreds of fire frequencies in a matter of minutes. When you return home, you just download your newly discovered listening frequencies.)

Bring binoculars. Bring a camera, but realize it is hard to get good shots. It is *not* cool to take pictures of burned out homes if the owners are there. They have already been hit with a big blow and deem outsiders taking pictures as invading their privacy (true for all disaster scenes).

Your best bet for photos are at the fire camps. Watch along the road for a sign that says "Fire Camp or Base Camp." The signs are usually simply cardboard, often taped to an A frame barricade. With all their tents and vehicles, there is plenty to see and hear.

Note that vehicles are often marked on the windshield using orange lumber chalk. There could be several Engine 2's from various jurisdictions, so they become 602, 702, etc. In California, the CDF engines all have their four digit designators. City engines also have a four digit number assigned. Look carefully at the door or side of your local engines. You might see the four digit designator in small letters.

Strategies for listening:

Find a parking lot where no one will bother you. The summit of a mountain road will usually have a truck parking/brake check area. This gives you the high ground for searching for active frequencies. You must have patience. Some people listen for an hour and go home. You need to devote at least a full day (8am-8pm). Please note: If you have any breathing-related health problems, the field trip is not advised.

Half the fun of roads trips is to confirm or identify all the frequencies in use. Keep in mind that when out-of-area resources arrive,

they may well use their "home" radio frequencies. A Scout frequency finder is very helpful. The Pro 92 scanner is also handy because it has such quick decoding of PL and DCS.

Learn More

Wildland Firefighter magazine is a must-have for serious listeners. Equipment reviews, stories from the fire line, new products and services, vehicles, training, and really cool, large color action photos. From smokejumpers to foam-sprayers, this magazine has it all. You can contact the magazine at 888-456-5367 or <http://www.wildlandfirefighter.com>.

A basic book might help. Two sources for books: <http://www.wildfire.com>, and Oklahoma Fire Publications at <http://www.ifsta.org>. For our Canadian readers or vacationers, a British Columbia Frequency List is available through several small internet book dealers.

Wildland fires call for special gear, not the bunker gear normally used for structure fires. Here are some equipment catalogs: Forestry Suppliers Inc.

1-800-360-7788

<http://www.forestry-suppliers.com>

National Fire Fighter Corporation

1-800-423-8347

<http://www.nationalfirefighter.com>

The Supply Cache

1-800-839-0821

<http://www.firecache.com>

T-shirts (only)

1-530-926.6667

<http://www.fireteeshirts.com>

I have several t-shirts from these folks, and highly recommend their products.

You can also search the web for various management teams, smoke jumpers, and "hot shot" crews. With idle time in the winter, many have put up their own webpage.

At the top of the story, I listed the website for CDF. Explore this site carefully, as it is packed with information about wildland fire. There are also several good websites for "Hot Shot" hand crews, and ICS Level I, II, and III Management Teams.

In Closing

We will probably be voting for a new president before they put out the final embers. With two months of fire action left, there is still time to listen. Build up your database of wildland fire frequencies. If you are not yet knowledgeable about wildland

fires, be patient. You will pick up the nomenclature.

As much as I enjoy listening to the action, I never forget that many people lose their homes and sometimes their lives. Equally painful is the fact that thousands of acres of mother nature are destroyed by the fires. When I am in the forest, I am extra careful with campfires. Every year, I contribute money to the American Red Cross. I also plant a few more trees on my mountain. What will you do?



21st Century Radio Communications

Part 3: An Unimaginable Future

By Dr. John F. Catalano

The new semiconductor and electronic technologies of the 21st century will provide vastly expanded radio operating frequencies and methods. A business axiom says that applying new technologies to old applications and methods is not the thing to do. The logic goes that old applications do not fully utilize the capabilities of new technologies. Instead they impose artificial limits on the use of the new technology.

These limitations are no longer necessary, efficient or cost-effective, but they are inherited by trying to use the new technologies in the old manner. Simply put, 21st century radio will use communications methods that did not exist, or were not even considered in the 21st century.

The Radio-Computer Connection

Last time, in Part 2, we gazed into the future of the radio communications in the 21st century. In doing so we became pretty adroit with acronyms such as ADC, DAC, DSP, SDR, JTRS and a few others. The bottom line is that radios will become extensions of our computer-intensive society. We have seen it happen with home entertainment, where the VCR has been replaced by the DVD, which is little more than a purpose-built computer with digital optical input. The software definable radio, SDR, is the evolutionary jump to radio communications becoming a computer appliance.

Silicon Goes Higher and Higher

When silicon based semiconductor technology first replaced tubes (called *valves* in the UK) a 1 MHz silicon device was considered "hot." In the past, experts thought that silicon had been pushed to its maximum speed. This "limit" was reached at 50 MHz, 100 MHz, 500 MHz and again, most recently, 1 GHz. Each time, silicon has surprised the "experts" and provided higher speeds. In the 21st century 4 GHz processors are found in home PCs, and radio communication systems using a 7.5 GHz wide spectrum are being vigorously developed.

Ultra Wide Band – UWB

First worked on with vigor in the last years of the 20th century, ultra wide band communications, or UWB, is close to becoming an everyday reality for data. Surprisingly, the spark gap method, which started all this radio technology, was a type of UWB signal. A spark discharge is inherently rich in harmonics, which means it does not transmit on a single narrow frequency. Instead the spark produces a wide band of signals which stretched quite high up and down the radio spectrum. In the case of spark gap this "side" energy was lost. In contrast, UWB is very power efficient. Today, UWB methods are utilizing all of its energy (frequencies) for transmitting data in the 3 to 10 GHz frequency band with bandwidths of 500 MHz!

UWB's Initial Targets

In 2000, an explosion of new companies were formed in an attempt to meet the demand for PC wireless data communications. Interest in UWB took off as the market de-

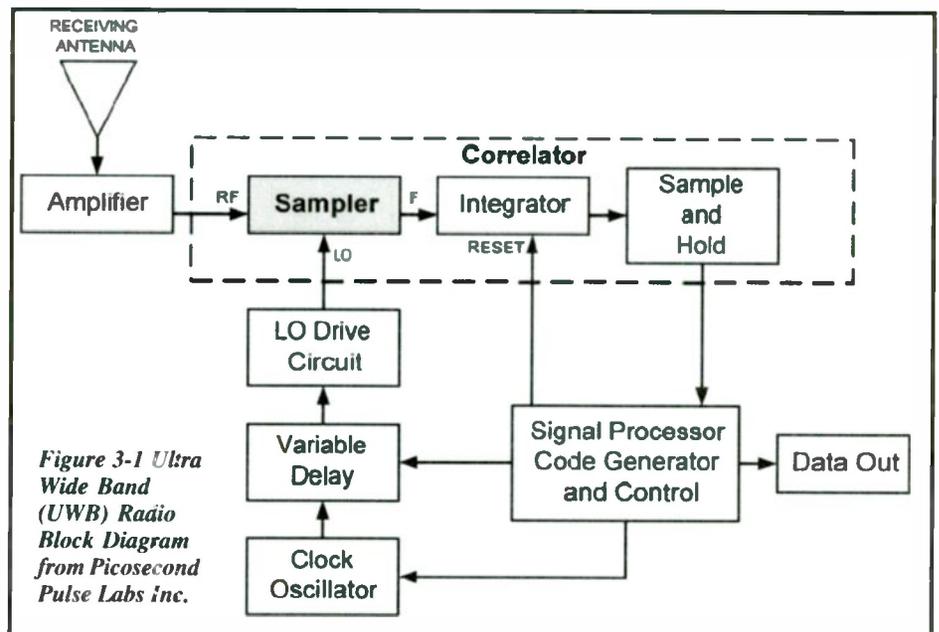
mand for wireless PC communications, local area networks (LAN), and wireless home entertainment distribution grew. The IEEE, Institute of Electronic and Electrical Engineers, formed committees to define wireless data communications standards.

In 2001, it seemed that every day a new startup company introduced a new wireless data method. Today, in 2004, many of these companies no longer exist because they could not keep pace with the costly, ever-changing technology developments and "standards." You may have heard of wireless standards such as 802.11, 802.15.3, 802.15.4 and 802.whatever.

A Moving Target

Currently these systems are designed for data transfer applications over relatively short ranges. No DX here yet. You can check the IEEE web site for various wireless standards details at <http://standards.ieee.org/wireless/>.

Summarizing, different standards are



being developed for different applications. Data rates range from 1 to 500 Mbits per second and distances from 1 to 50 meters. Clearly, equipment interconnects and LANs are the first target markets.

In one UWB method there is no carrier signal, no radio signal as we have become accustomed to in the 20th century. UWB uses a unique very short pulse "modulation" method. UWB pulse widths are on the order of 10 to 500 picoseconds. That's really short!

Instead, data encoding is performed utilizing three pulse parameters: amplitude, shape and timing. Decoding is performed by detecting these pulses of varying width across a spectrum of about 7.5 Ghz. The pulse signal *is* the data. Another UWB method being proposed cuts the 3 to 10 GHz band into 528 MHz sub-bands.

No Need For DSP

Although we have previously discussed how digital signal processing chips, DSP, are becoming the "heart" of digital mode radios, UWB technology is already looking to the day when digital data radio communications will not require a DSP! See Figure 3-1

The key to decoding one form of UWB is its pulse's three parameters, relative to each other. Hence, no traditional radio conversion stages are required. Gone is the whole down-conversion chain from RF stage to intermediate frequency (IF), and then to demodulation. This approach to UWB radio does not require digital processing, thereby eliminating the need for an expensive and power hungry DSP chip.

Huge Bandwidth, Tiny Power

Due to the pulse nature of UWB signals, power levels can be in the tens of *nano-watts*. The UWB signal, sounding like background noise, will have data rates projected to be as high as 1000 Mbits per second. Initial UWB designs call for 300 Mbits per second rates which will suit the initial local area data and multimedia home networks.

Providing video, audio and PC data throughout a home is UWB's first product goal. Be assured, however, that if UWB works

close to its theoretical plan, it will be expanded to long range communications. In late 2003 the 3.1 to 10.6 GHz band was designated for UWB applications. Recently, Wisair Ltd. working with Intel, produced a UWB transceiver chip, UB501, which requires just a crystal and some resistors and capacitors.

Standards Face-Off for a Fight

The standards battle took place when VCRs were being introduced: VHS vs Beta. Currently, DVDs are still trying to decide if its standard format is R+ or R-. It happens whenever an important new technology is emerging. A number of standard methods are proposed by "teaming" companies.

Many times the competing "sides" are not determined by the best technical capabilities. Instead, it comes down to what technology patents are held by which companies. Another consideration can be which new standard can be easily applied to a company's existing product lines. The UWB world is currently split between the Multiband OFDM Alliance (MBOA) and the CDMA team, now known as the UWB Forum.

The MBOA Team

MBOA members include some heavy hitters: Intel, TI, Microsoft and Philips to name a few. Smaller companies such as Wisair Ltd., with its first generation UB501 UWB chip, are also members. The foundation technology of this method is OFDM, Orthogonal Frequency Division Multiplexing. OFDM has been employed by cellphones, wired data transmission such as ADSL, Europe's Digital Audio Broadcast (DAB), and other communications system for the past 40 years.

MBOA's current UWB proposal utilizes a 528 MHz multi-sub-band method. This approach should provide data rates of near 1000 Mbits per second for links up to 2 meters apart. Although greater distances are possible, the reliable data rate decreases as the distance increases. For more information and additional proposed UWB standards you can check the MBOA website at <http://www.multibandofdm.org>.

The UWB Forum

Motorola and a Motorola backed startup XtremeSpectrum (<http://www.xtremespectrum.com>) led the DS-CDMA team, which included OKI semiconductor and others. Code Division Multiple Access (CDMA) had its origins in the early 1990s, tailored to the needs of the cellphone industry by its developer Qualcomm. DS stands for the latest twist, Direct Sequence (spread spectrum).

In contrast to the MBOA method, the XtremeSpectrum method uses only one frequency band. The CDMA-DS team is ahead on silicon development, with their third generation silicon chips about to be produced. Since the beginning of 2004, Motorola has used a second-generation chip set to produce customized UWB products. See http://www.motorola.com/files/wireless_comm/doc/fact_sheet/UWBFACT.pdf

Samsung, originally an MBOA member, recently jumped ship and used a Motorola UWB system to send multiple HDTV streams to their flat panel HDTV product at the 2004 Consumer Electronics Show. Freescale Semiconductor has recently joined the UWB Forum.

King Kong vs Godzilla

As of May 2004, after five voting attempts, no UWB standard has been decided upon. This is going to be a world-class battle which will not be decided for several more rounds.

Today, to say that UWB is in a state of flux is an understatement. As we have seen, the protocols being considered include TDMA, CDMA and OFDM. Further, a number of different combinations have been developed: TM-UWB (time-modulated UWB), MB-OFDM (multi-band OFDM), and DS-UWB (direct sequence UWB), to name a few. Each has its own strengths and weaknesses.

If you're feeling a bit confused you're not alone. There is a lot of market, money and ego riding on the choice of the UWB standard, so watch for a battle royal during the next twelve months. The standards war has taken a major casualty with XtremeSpectrum filing Chapter 11 bankruptcy in March 2004.

Overlooking the "situation" that exists in the UWB community today, and using a bit of positive thinking, we can expect to see a highly evolved UWB technology providing long range radio communications some time around 2012.

To 60 GHz and Beyond!

As we have just seen, the 3.1 to 10.6 GHz band has been defined for ultra wide band (UWB) communications systems. In 2003 the Federal Communications Commission (FCC) opened the 5 GHz U-NII band for new communications methods, including but not limited to Cognitive Radio (CR).

CR, which was covered in Part 2 of this series, is an intelligent software definable radio (SDR) which can learn on its own how to reconfigure itself to communicate with any

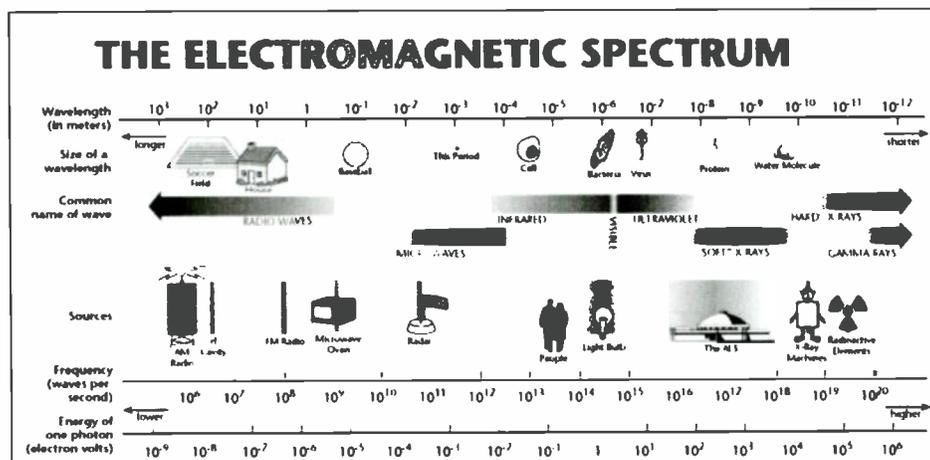


Figure 3-2 The Electromagnetic Spectrum Shows That Radio, Light, X-rays & Gamma Rays Are The Same Animal. (Courtesy of Lawrence Berkeley National Laboratory)

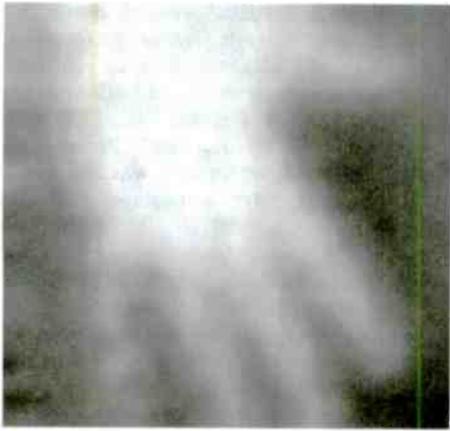


Figure 3-3 Passive Terahertz Image of a Hand

signal that it receives. In addition, after "listening" to band conditions – such as propagation, traffic density and interference level/type – it decides the optimum band for a given communications requirement at a given time. Artificial intelligence comes to radio communications and the 5 GHz band may be where it is first tried.

In 2004, the FCC opened the 60 to 90 GHz band to future broadband services. At these frequencies the whole concept of a radio transceiver changes paradigm yet again. At these high frequencies (high for the first decade of the 21st century, that is) the electrical characteristics of material properties, such as dielectric constants and magnetic perme-

ability, do not behave in a strictly Ohm's law manner.

At these frequencies electrical design methodologies and materials choices must be radically changed from today's. Interestingly, in theory these short wavelengths do allow total on-chip system integration, including adaptive antenna arrays. Now the question is, can these concepts be turned into low-cost manufacturable realities? A whole new family of semiconductor materials may need to be developed.

Interdisciplinary, International Challenges

Operating at frequencies of 60 GHz requires not just faster, but more accurately definable data pulses. By accuracy, we mean variations in pulse locations in time from where it is supposed to be to where it actually appears.

The position of data pulses in time is a function of many system factors including time base stability, delays introduced by going through transistors, chip interconnect metalization, and other process-related factors. As the frequency goes up, so must our understanding and control of each of these. Pulses must "behave" as expected in order to for a digital system to work at all.

Also, using traditional electronic design methods, as the frequency increases so does the power required. Not a happy thought at 90 GHz. Add to this, the fact that 21st cen-

tury portable equipment is still tied to 19th century battery technology, and a whole new set of problems loom.

Solving these problems will not be easy. It is almost like re-inventing solid state device technology and electronics. It will take a large team of dedicated innovative people with experience and knowledge in device physics, material science, mathematics, communications systems, digital design, analog design, chemistry and manufacturing. Equally important will be the group of dedicated, deep-pocketed companies needed to support the expensive commercialization effort.

As is usually the case for emerging technologies, much of the current work is being performed at universities around the world. Berkeley (CA) Wireless Research Center has recently shown that, using current 0.13 micron CMOS processes, 60 GHz operation is possible. National Taiwan University is investigating system on chip (SoC) for the 60 GHz band. In addition, all companies that produce ADC/DAC, a key component, are constantly working to make them faster.

This is only the beginning for 60 GHz communications. Just consider the amount of frequency spectrum that will be available to us. For most of the 20th century, over ninety percent of radio communications took place in three gigahertz of spectrum. When (not if) 60 GHz communications become a reality, it will increase our radio spectrum by 20 times.

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Waves of the Future

Watch for 60 GHz digital communications to become a widely used commercial reality by 2012 and then be extended to around 100 GHz. Also, keep an eye on developing SDR, CR and UWB technologies which will all be showing off their strengths in ways we cannot yet imagine.

With the seemingly ever-increasing maximum frequency that radio is pushed to, let's review the electromagnetic spectrum and see where radio waves fit. We may get an insight to the future of radio by considering what other types of electromagnetic waves border the radio spectrum of frequencies and what their properties are.

The Electromagnetic Spectrum

The full electromagnetic spectrum, shown in Figure 3-2 on page 18, shows that radio waves, light (infrared/visible/ultraviolet), X-rays, and gamma radiation are all the same animal. Their relative frequency ranges cause them to interact with us differently and therefore they have different properties, uses and effects. However, if we look at the boundaries where one category of electromagnetic wave ends and the next one begins, it is not a clean break.

Interfaces or boundaries between physical phenomena are oftentimes the most interesting regions to explore, due to their hybrid nature. Look at where 100 GHz communications systems lie on the spectrum in the figure. This corresponds to 10^{11} waves per second on the second line from the bottom (frequency) in Figure 3-2. We can also see from the figure that infrared light is centered at 10^{13} . In other words, the radio wave spectrum goes all the way up to the 1000 GHz range, or 1 terahertz (THz).

Properties of THz Waves

Since at the bottom end terahertz waves are relatively close in frequency to radar waves, it should come as no surprise that terahertz waves can be used for the same purposes. However, terahertz waves can produce enhancements over radar, such as much greater accuracy.

At terahertz frequencies, free ions in materials cannot react as quickly, or strongly, to the THz electromagnetic field. Material properties such as dielectric constant, which is a measure of ionic mobility and bonding, change dramatically at terahertz frequencies. Therefore, THz waves penetrate many materials, acting similar to x-rays, but without the depth of penetration or the damaging ionizing effects of x-rays.

Therefore, a THz transceiver could be used to image objects behind thin or low to medium density materials such as plastic, wood, paper, skin tissue or clothes. Clothes? Talk about violation of privacy!

Using software-sectioning methods currently in use with x-rays, three-dimensional

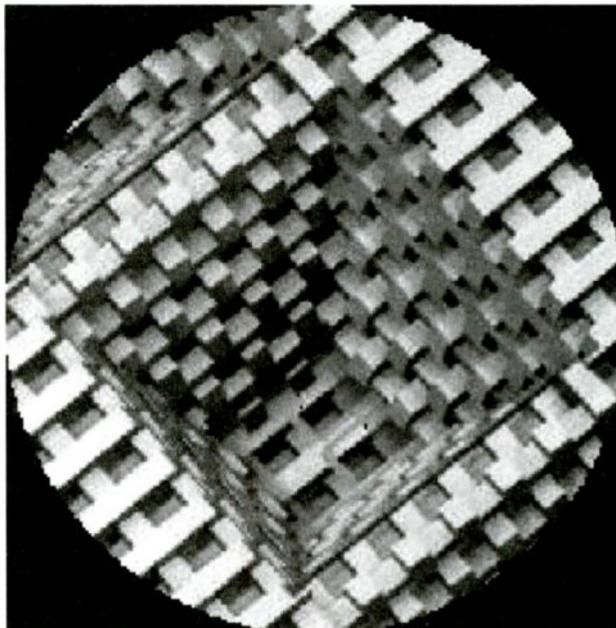


Figure 3-4 Artist's Conception of an Integrated Terahertz Receiver

imaging applications by the medical, security and fault inspection fields are limitless and without danger to humans.

In fact, it has been found that many materials naturally emit terahertz waves. This phenomenon enables imaging of materials without the need of an illuminating transmitter and is called passive imaging. Figure 3-3 shows a computer-enhanced terahertz passive image of a human hand. For a technology at such an early stage, this image shows the incredible potential of this technology.

Light on the Subject

Scientists have long used the wave properties of light to determine the composition of material. White light is composed of all wavelengths (colors) of light. Each element on the periodic table emits or absorbs specific wavelengths of light, not the entire spectrum of light. For example, by carefully analyzing the light that is emitted from a source we can determine of what elements the source is composed. Using this emission spectra method, astronomers can determine what elements are on distant stars.

When a chemical compound is illuminated by a source, it absorbs specific wavelengths depending on its composition and structure. This is called the absorption spectra of that compound.

Remembering and utilizing the fact that terahertz radio waves have light-like properties, allows for a whole new tool that can be used with the imaging. Using a two-frequency method, terahertz waves can perform compound composition analysis ...while imaging.

Not only will terahertz scans give medical personnel three-dimensional images of even the thinnest growth, but it will also give a chemical analysis of the image. In this manner medical technicians will be able to isolate cancerous tissue without the need for invasive biopsies. (Images of De Forest

Kelly's medical doctor character, Bones, on *Star Trek* come to mind. Waving a salt shaker-looking body analyzer over a wounded colleague he would say to Captain Kirk, "Damn it, Jim, I'm only a doctor!" Perhaps his salt shaker instrument was actually a terahertz imager and composition analyzer.)

Where is Terahertz Today?

Scientists in the Soviet Union began to investigate the properties of terahertz (THz) radio waves in the 1950s. They used vacuum tube technology to generate THz waves. Resurgence in terahertz studies worldwide occurred in 2000. Today, a collaboration that would have been unthinkable in the 1950s is working on solid state THz chips.

Russian and American scientists are combining their knowledge and creativity to develop THz chips based on a silicon-germanium semiconductor technology. Transmitters producing 8 THz emissions have been created.

Europe is also developing THz technology with an announcement from the European Space Agency's (ESA) Star Tiger Team that they had an operating terahertz imaging prototype. European universities are working on silicon-germanium THz emitters. Star Tiger's website has a wealth of Terahertz information for further study. Check it out at <http://www.startiger.org/index.htm>

Terahertz pulsed imaging work is being carried out by Tochigi Nikon of Japan. You can view a number of terahertz images, as well as watch a Venus Flytrap plant at work using THz imaging. Their website is <http://www.tochigi-nikon.co.jp/technologies/terahertz/eng/movies.html#03>

You Know It's Real When ...

Many technologies that are pursued at research establishments never become products. In fact, less than three out of ten make it to production. However, when a number of large companies start backing the technology by making it their own, you can be sure it has a reasonable chance of making it to a product.

In addition to the companies we have already mentioned, Intel is working hard on THz devices. The Toshiba company has been working on THz devices in the lab for a number of years and in 2001 created a company called TeraView <http://www.teraview.co.uk>. They now have a whole range of terahertz-based spectrometer products starting at \$450,000. So why is it that most people have not heard of Terahertz spectrum products?

Once again we have an example of a semiconductor technology (or lack of it) being the major limiting factor in the evolution of a new industry. A number of THz emission methods are being studied. Sometimes referred to as "quasi-optical," some use a combination of optical and radio methods. These include lasers, micro-electromechanical structures,

quantum transistors, carbon-nanotubes, and laser pumped crystals, to name a few.

Since 2000 the number of teams working on Terahertz components, methods and applications has been steadily growing. Today, Terahertz research, development and product development is being performed by organizations worldwide. The list includes many large international corporations, startup companies, government agencies and universities. If I compare Terahertz development to that of the home PC, which was introduced by IBM in 1983, I predict that Terahertz products will be a reality before the end of the next decade.

THz Communications

With all the possible uses for THz waves, we have yet to consider terahertz communications – the application of greatest interest to *MT* readers. Just think of the available spectrum. Going to 60 GHz band gives us a 20 times increase in available spectrum. Going to 6 THz will enable a 2000 fold increase!

Figure 3-5, from ESA's Star Tiger Team, is an artist's impression of a simple terahertz radio receiver. The pyramidal horn is made from stacked layers of etched silicon. This focuses the terahertz waves onto the T shaped aerial at the bottom that carries the signal to the detector. Again, this is only a drawing of a complex, futuristic receiver.

We are witnessing the birth of an entirely new communication technology. It's as if we have been transported back to 1900, watch-

ing a sparking gap being operated for the first time. Now try to make the mental jump from spark gap to cellular communications or Software Definable Radios.

There is no way this jump could have been made within the bounds of the 1900 human intellect.

In generations to come, terms such as coherent communications, CR, ambient intelligent networks and 100 THz operation will be everyday terms. Gone will be vocabulary such as co-signal interference, QRM, spectrum crowding, AM, FM, SSB and even perhaps some illnesses – all as a result of Terahertz technology.

As of 2004, a team of researchers at Germany's Technical University at Braunschweig hold the Terahertz DX record. They claim to have broadcast audio from a CD player over a THz link of one meter, approx. 3.3 feet. The audio that was transmitted was the song "We Didn't Start the Fire" by Billy Joel – a 21st century version of "Watson, come here I need you."

Use the Gifts Wisely

The constant, face-paced advances in electronics, personal computing, digital methods and semiconductor technologies have brought about today's revolution in radio and in all aspects of our life. As these technologies continue to develop and converge at a frenetic pace, they hold the promise of communications systems, applications and technologies unimaginable in the 20th century.

However, they will become commonplace technologies of the 21st century. It is truly exciting times.

Today we live in a world of self-powered radio transponders (RFID) sewn into articles of clothing, attached to our airline luggage and embedded into products that we purchase ... and the revolution is just beginning.

Imagine the explosion in the use of radio when all products and manufacturers use this RFID technology. Every factory, warehouse, distributor, trucking company, railroad, airline, cargo ship, and retail store will have a radio system to track products during their trip through their supply and retail chain.

Hopefully, the tracking will end when the product leaves the store. Revolutionary technological developments sometimes carry with them intrinsic moral issues. The technology is not at fault. Nor are the scientists who have created it. It is the moral responsibility of society to allow, reject or restrict a technology's uses.

History has shown that the problem is not centered around scientific issues. Instead, it comes down to a dilemma of morality versus economy. Let us all hope that the human race makes equally impressive advances in morality as well as technology, in the 21st century.

I hope this series of articles has been entertaining, stimulated your interests, and broadened your thinking about the use of radio waves. Welcome to the 21st Century!

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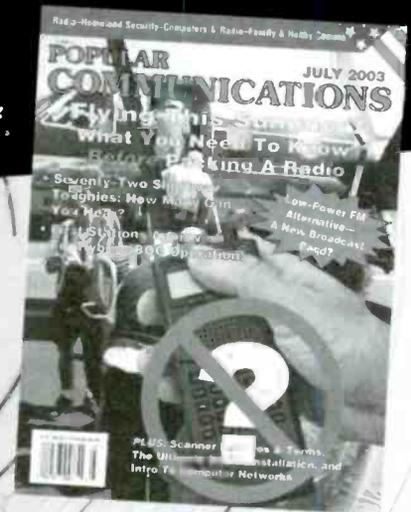
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Propagation Outlook for October, November, December 2004

By Tomas Hood NW7US

What an exciting year we've had so far in the world of radio propagation! We are far along the downward slope of Solar Cycle 23, yet short periods of high solar activity flare up out of quiet conditions, waking up the shortwave spectrum. And, the summer's sporadic-E (Es) season in North America was notably better in many respects when compared to the last few decades. Some records were broken in VHF/UHF Amateur Radio distance communications, and FM/TV DXing was hot.

As any Solar Cycle moves through the downward slope away from the years of maximum solar activity toward the year of solar minimum, it is normal to see flare-ups (pun intended) out of long quiet periods. This year has been moderately active, yet a bit more quiet than the previous year, with average monthly readings sometimes nearly half of what they were just a year ago. A sure sign of the approaching of this cycle's end is the increase of periods when we see no sunspots at all. For the first time in Cycle 23, this occurred on January 27, 2004. Along with the steady quieting down of solar activity we see longer periods, sometimes weeks, when the geomagnetic activity settles down and stays relatively quiet.

Yet, out of these gentle conditions, we see occasional and sensational geomagnetic storms and periods of very active sunspots and related X-ray flare activity. During one week in the middle of July 2004, we saw a series of flares explode in fairly rapid succession. These came from Sunspot 10649 (as numbered by NOAA).

The strongest of the flares measured over the level of X1. Five X-class flares erupted in a two-day period, with the largest being an X3.6. (Flares are classified by their intensity, the lowest category being A, followed by categories B, C, M, and finally X, with X being the highest level of intensity.) This, after there had been no significant sunspot or flare activity during previous weeks. With the increased activity, we saw the steep increase of the 10.7-cm solar flux read-

ing, reaching as high as 175, after a long period where it stayed below about 120, and often reaching down below 100.

The constant barrage of these strong flares caused a lot of degradation on the shortwave radio spectrum. X-ray flares are noticed within about eight minutes of their eruption, since the X-ray and Ultraviolet radiation from them travel at the speed of light. This causes a quick increase in the ionization of the sunlit portion of our Earth's ionosphere, including the D Layer. The more ionized the D Layer, the more it will absorb, and the higher the frequencies absorbed. This is called a "radio blackout" and it may last only minutes with a small flare, or for over an hour for strong flares. The flare activity in July caused waves of these radio blackouts.

In addition to these nearly immediate radio blackouts from the strong flares in July, we saw the global geomagnetic activity rise to storm levels. When a flare explodes, it can cause a huge section of the Sun's corona to burst out away from the Sun, to ride on the solar wind. This is known as a coronal mass ejection (CME). The plasma of the corona is blasted away, or ejected, out into space.

If a CME arrives and hits the Earth's magnetosphere (the magnetic force field or shield around the Earth), it may cause a high level of disturbance in the magnetic field lines running from pole to pole. The more disturbed the geomagnetic field, the greater the storm level reported.

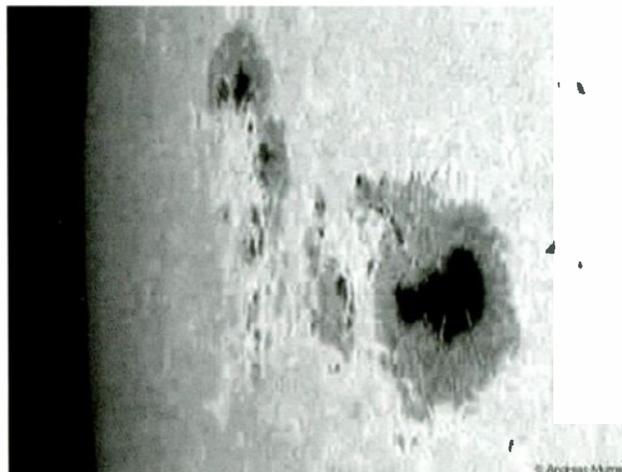
This geomagnetic activity has the affect of lowering the ionization of the various ionospheric layers. This will then bring down the maximum usable frequency over a given signal path. This lowering is much like what happens at night,

when the ultraviolet radiation of the sun is blocked, and the ionosphere settles down. The stronger and longer the geomagnetic storm, the more depressed the ionospheric propagation becomes. Aurora is also known to occur during these geomagnetic storms. Geomagnetic storms can last for days. Such was the case during July.

During July, as a result of the strong flaring activity and the associated coronal mass ejections, we experienced a major geomagnetic storm. The Planetary K index reached 9, the highest level. Visual aurora was reported as far south as Texas, and radio Aurora (AU) was very strong. DX clusters were showing AU as high as 222 MHz, not just in North America, but across Asia and Europe as well.

The result of all of this long-duration geomagnetic storminess at such high levels is to wipe out HF communications. Most of the HF band experienced severe depression of normal Maximum Usable Frequencies. Depressions of as high as 35 percent were observed. These degradations lasted for days.

As we moved into August, things became quieter. But, since it takes about 27 days for the



Sunspot 10652 courtesy of Andreas Murner

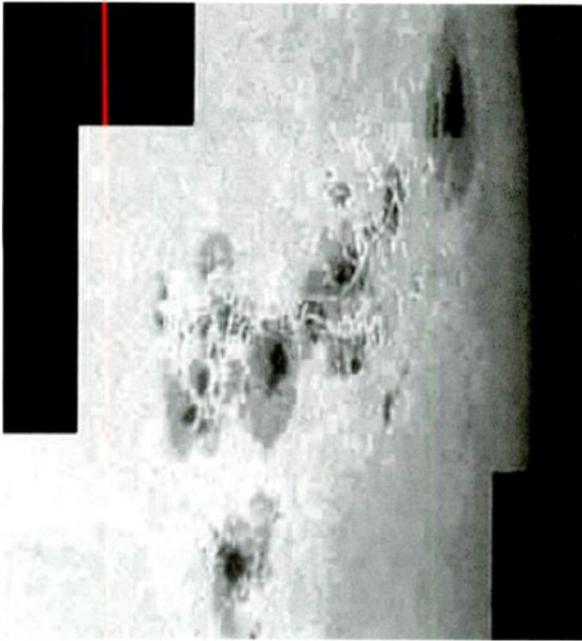


Photo courtesy of Eric Ng

Sun to make one rotation (while Earth takes 24 hours), the same sunspot group that caused all of the excitement in July came back, again with higher flux levels, and a significant number of strong flares. With those flares come the possible coronal mass ejections and the return of geomagnetic storms. It is typical then to see these flare-ups return, but usually with less intensity. It is also likely that new sunspot groups with new energy will again occur, though with less frequency, as we finally move into the bottom of the current solar cycle. The current cycle, 23, is expected to reach the lowest level of activity during 2006 and 2007.

Autumn HF Propagation

We are entering into the Northern Hemisphere's "DX" season on the high frequencies. Seasoned radio hobbyists on the high frequencies know that some of the sweetest DX catches can occur during the months between October and January. The lower HF bands tend to quiet down as a result of the seasonal decrease in thunder and tropical storms, as well as the changes in the ionosphere that take place during this season.

International Shortwave Broadcasters change their schedules and pick frequencies that are optimized for propagation during the longer hours of darkness in the Northern Hemisphere, and longer hours of daylight in the Southern Hemisphere. While many shortwave broadcasters make adjustments after a season change, most try to have their scheduled frequencies and times for the "winter" season in place and effective by October.

The "winter" season runs approximately from October through March, while the "summer" season runs approximately from April through October. (For the scoop on the United States' HF broadcasting by season, take a look at the FCC's page regarding Shortwave Broadcasting at http://www.fcc.gov/ib/sand/neg/hf_web/hf.html.) These changes provide the

shortwave radio listener with a wide choice of stations to hunt for during these better DXing months.

As you move from October through December, expect an increase in exciting DX openings on the MW and lower HF bands (MW, 160 through 75 meters) during the night and into the early hours of the morning. Static levels are considerably lower, and the D Layer, which absorbs lower frequencies, is not ionized as intensely or as long as during the summer months. These openings will often be weak during October, due to the relatively high signal absorption and higher levels of static, but they will improve with each day closer to the winter season. Look for openings toward Europe and towards the south from the eastern half of the US; and towards the south, the Far East, Australasia, and the South Pacific from the western half of the

country. Other DX openings might also be possible.

The hottest bands during the night will be the 41- and 31-meter bands, since they should be open first for DX toward Europe and the east during the late afternoon with signals increasing in intensity as darkness approaches. During the hours of darkness, signals should peak from an easterly direction at about midnight, and from a westerly direction, just after sunrise. Excellent openings toward the south should be possible throughout most of the night. Of course, it has been my experience that more International Shortwave Broadcasters use 31 meters as compared to 41 meters, due to the chaos of the 41 meter band.

The higher frequencies hold a lot of promise during this DX season. Openings should be possible on the 31, 25, 22, and even the 19 meter bands both day and night. Conditions should peak from about an hour or two after sunrise and again during the late afternoon and early evening hours. Expect signals from most areas of the world between sunrise and sunset, with some great openings well into the hours of darkness. Signal levels often are quite strong during October and November.

For those in low and middle latitude locations, the highest HF bands will yield occasional daytime signals with the opening up of paths both from the Southern Hemisphere, and from areas east or west of you. Openings from Europe and in a generally easterly direction should peak an hour or two before noon, while those from South America and Africa area are expected to peak during the early afternoon hours. Optimum conditions towards the Far East, Australia, southern Asia, and the South Pacific are forecast for the late afternoon and early evening hours, especially from stations in lower latitudes. However, don't expect these signals often, as the solar activity level is just not high enough to support propagation on these high frequencies. There might be, however, some sporadic-E activity during late De-

cember.

VHF in the Fall

Autumn is also a season of opportunity for long-distance VHF DX. Weather patterns can form great tropospheric ducting conditions, making it possible for VHF signals to span thousands of miles. A great resource to look at for this would be William Hepburn's website at http://www.iprimus.ca/~hepburnw/tropo_xxx.html.

Another interesting mode of propagation on VHF and UHF is via the Aurora. It is possible that aurora will occur during October and into November. Aurora conditions include the intensifying of the E Layer's ionization in such a way as to create highly dense ion clouds in the auroral zones around the Earth's North and South Poles. These ion clouds can have the ability to reflect radio waves up into the UHF range. During periods of very intense geomagnetic storms (when we see the planetary K index rise above 6), listen for distant stations on FM, TV, and other VHF bands. Amateurs in the Northern Hemisphere often point their VHF beams toward the north, and try to make contact with other amateur radio operators. Signals will tend to be fluttery and somewhat distorted via Aurora.

Meteor showers also provide unique opportunities for VHF long-distance signal propagation, though these reflections of radio signals tend to be very short (mere seconds). On the FM broadcast band, signals bounced off of meteors tend to be very quick "pings" or bursts of a far distant FM station's programming.

One of the largest yearly meteor showers occurs during November, and is known as the Leonids, which seems to radiate out of the constellation of Leo. In 2004, the Leonids are expected between November 14-21, with the peak on November 17. The Leonids are known to create intense meteor bursts. The best time to start tuning in for meteor scatter propagation off of the Leonids is around 11:30 pm, local time, in the Northern Hemisphere.

October does have the Draconids, active between October 6 and 10, and expected to peak on October 8. The shower could reach a very high rate of hourly meteors. Like with the Leonids, the best time to check for radio propagation would be from about midnight onward until dawn.

Write Me

Do you have questions about space weather and radio propagation? Do you have observations about Aurora, Sporadic-E, or Meteor Shower propagation that you would like to share? Please write me an e-mail message or a letter.

Check out my propagation resource center: Internet - <http://prop.hfradio.org> ; WAP version - <http://wap.hfradio.org> ; or <http://prop.hfradio.org/ealert/> to sign up for free propagation eAlert service. I wish you a happy radio-monitoring season!

73 de NW7US, Tomas Hood (AAA0WA)
P.O. Box 213, Brinnon, WA 98320-0213



Deep Space Monitoring – The Ultimate DX!

By Bob Grove W8JHD

Cradled in the lush Pisgah Forest, high in the Smoky Mountains near Brevard, North Carolina, lies a spectacular listening post aimed upward to space. It's called the Pisgah Astronomical Research Institute (PARI), a non-profit educational institution dedicated to pure science – the exploration of space.

Its location is not by accident. The ridges provide a clear, 360 degree view of the sky; the air is clean, and there are no lights or sources of electrical noise for miles in any direction. This site was originally acquired in the 1961-62 time frame from the US Forest Service to be used as a primary site for the National Aeronautical and Space Agency's (NASA) global communications network linking orbiting missions and even astronauts on the moon during projects Mercury, Gemini and Apollo.

By 1980, as the NASA man-in-space projects were winding down, the facility was turned over to the Department of Defense (reputedly the National Security Agency – NSA) and converted to a top-secret surveillance complex used to spy on Russian satellites during the cold war. Everything about the facility, from the giant dishes and intrusion-resistant buildings to the chain-link fencing and heavy-duty cabling, reflect the ultimate in technology and reliability.

Wideband noise generators embedded in the walls of the conference compound prevent electronic eavesdropping; thick, bullet-proof glass composes the windows; concrete floors several feet thick undergird the structures; redundant electrical generators and air conditioners back up the entire complex; double cipher locks prevent unauthorized office entry. A now-vacant pistol range reminds the staff of its former state of readiness.

By the 1990s, the normalization of East/West political relations rendered the complex obsolescent, and it was abandoned. Sitting fallow for years, it was finally scheduled for demolition. Fortunately, a last-minute intervention in 1998 by local scientists and others interested in preserving and using its facilities rescued the site and its contents, and a year later, PARI became its new owner.

So what's still there?

Since the complex once served 300 personnel, including 100 armed security guards, there's quite a bit! 30 buildings are scattered about the 200 acres. Two enormous, 85 foot radio telescopes – 400 tons each – tower in awesome majesty over the property, and are capable of listening throughout the 100 MHz to 22 GHz spectrum. Smaller dishes and other antennas are peppered throughout the complex.

A portable Hughes 40 foot dish offers 60 dB of gain at 30 GHz and is capable of receiving up to 60 GHz. Its protective radome cover introduces only 0.5 dB attenuation. This antenna package alone originally cost \$5 million.

30 buildings remain on the property, inviting a number of scientific specialties. An underground web of tunnels interconnects buildings and radio and optical telescopes with power, coax and fiber optics cables. Six miles of roads, mostly paved, wind through the area to allow vehicle access. Listening enthusiasts have a right to be impressed: PARI can monitor frequencies from 0.01 Hz (that's right – hertz) through 60 GHz (60,000 MHz)!

As serious as the former occupants were, the installation is not without its whimsy. One 15-foot dish, now used in the School of Galactic Radio Astronomy (SGRA) for high school instruction, is affectionately nicknamed "Smiley" for the face painted on it years ago when the government facility knew that Russian satellites were watching them!

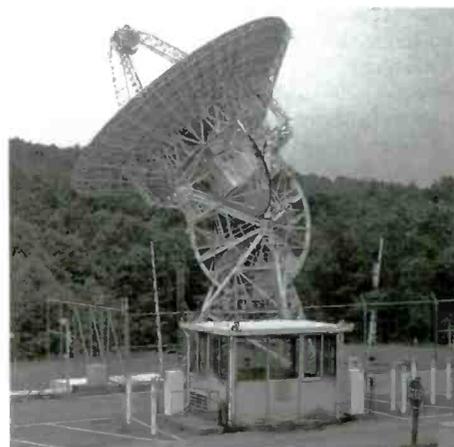
And who's there?

Currently, a full-time staff (16 personnel, including resident PhDs) conducts radio



astronomy experiments as well as hosting visiting scientists, amateur radio and optical astronomers, student groups and special public tours. Volunteers are also utilized to implement programs and engage the public.

Science Zone is one of their pet projects; it allows young students to conduct experiments remotely over the Internet by direct-



ing on-site robots to perform the operations. The young scientists can currently place lenses in various positions to make either a telescope or a microscope, watching the entire procedure on their computer screens, assisted by on-site web cams at PARI.

One building which serves as a media center also houses an extensive regional library for donated astronomical volumes and periodicals.

What do they do?

The specialists at PARI offer their services to North and South Carolina schools, even bringing a portable planetarium (StarLab) to schools for astronomy presentations. Four 10"-12" Meade reflecting telescopes are being used by amateur astronomy groups, and one of these can be remote-accessed over the web. The authorized user may open the dome, select an object and point the scope to view a high-resolution image on his computer from anywhere.

At the adult level, PARI administers the Pisgah Astronomical Research, Science and Education Center (PARSEC) for the 16-campus North Carolina university system. The program invites undergraduate and graduate research programs.

An ongoing listening experiment involves two co-phased beam antennas tracking the planet Jupiter, monitoring its historically-documented noise emissions in the 20 MHz spectrum.

Environmental monitoring is performed as well, not only for its scientific interest, but because the effectiveness of radio monitoring of the heavens is considerably impacted by the weather. And you wouldn't want to open the protective covers of the optical telescopes when it's raining!

Because accurate time measurement is crucial when such small arcs of the sky are being tracked by high-gain instruments, PARI has its own time base clock. Even at the speed



Pictured: Don Cline (left) and Bob Grove (right)



of light, the delay of time signals from WWV is far too large.

Since no equipment was left by the former occupants, PARI is always on the lookout for donated items. A storage facility brims with test equipment, preamps, spectrum analyzers, filters and other gear awaiting applications. When they can't find it, they have to buy it with funds from foundations, grants, and cash contributions from the public and other sources that they can locate.

When not performing scientific tasks, the dedicated staff may be holding teacher workshops or visiting schools and civic organizations. One enormous challenge awaiting their skills is the transfer of thousands of historic glass photographic plates held by observatories around the world into permanent digital files which can be shared over the web.

And finally...

We would like to thank Don Cline, President of PARI, and Bob Coley, KD4RR, for their kindness in providing a most enjoyable and informative tour of this amazing facility, and for making it possible for students as well as amateur and professional scientists to take part in this unusual opportunity to see and listen in on the universe.

We wish to remind our readers that this magnificent – and perhaps unique – installation is totally funded by grants, foundations and contributions. They are a 501 c(3) non-for-profit organization, and cash and equipment donations from the public are sought.

Don can be reached by email at dcline@pari.edu or by telephone at (336) 299-6717. PARI maintains an informative web site at <http://www.pari.edu>.

If you would like a copy of their newsletter, simply email newsletter@pari.edu.

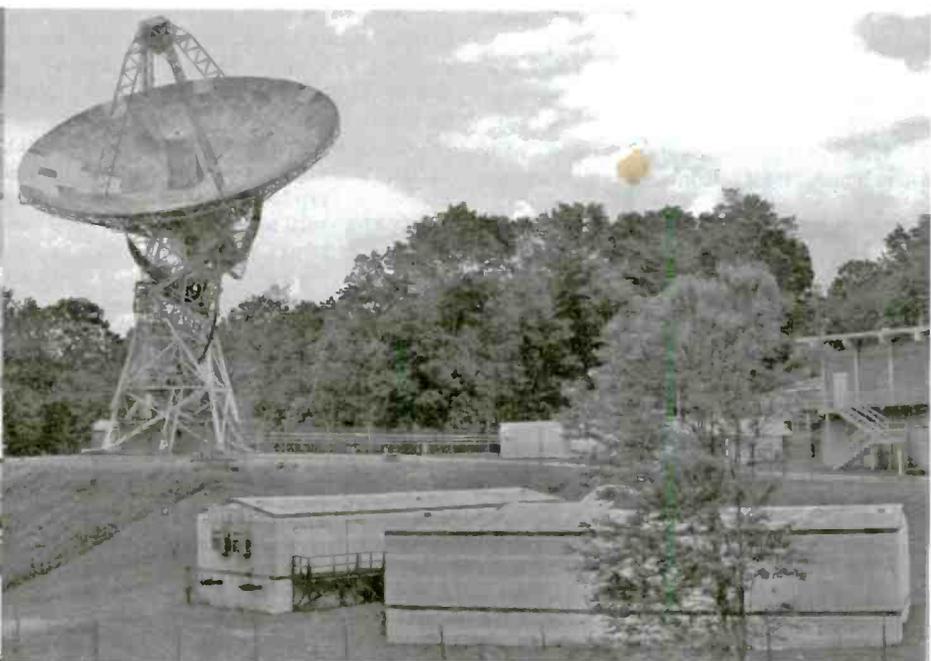


photo credit: Don Cline

Celebrity Hams and E-Logs Revisited

This month's seemingly disjointed column is actually connected. The connection is *MT* reader Paul Marcum, AC4OZ, of Tennessee. After reading July's *Beginner's Corner* on keeping a log for SWL and hams, he wrote with some suggestions of his own. To demonstrate what he had done he sent me some pages from his log.

After looking over the log I was inspired to do one myself. Actually, I was inspired to ask my wife (my computer guru) to do one for me. But, it was while I was looking over his log that I noticed a contact he had on a local 2 meter repeater with the call of a name that was very familiar: Rusty Wallace. Could this be the driver of the No. 2 Miller Lite race car on the NASCAR circuit? It turns out it wasn't. But, it sent me on a chase to hunt down famous hams with whom we would ordinarily have no opportunity to talk to but, thanks to a shared passion in radio, may sometimes meet.

❖ Celebrity Hams

It's the nature of amateur radio that it attracts people from all walks of life and stations of birth. Senators, kings, and other potentates are or have been hams. At least one President, Herbert Hoover (1929-33), was a ham. He was also the Secretary of Commerce in the early '20s when that department was in charge of assigning amateur radio calls. His grandson Herbert Hoover III holds the Extra class call sign W6ZH. The call W6FZZ belongs to the grandson of the originator of Morse Code (CW) none other than Samuel F. B. Morse III.

There is a peculiarity in ham radio which makes it possible for celebrities to remain anony-



Presidential hopeful and U.S. Senator Barry Goldwater was a very active ham. His call K7UGA is now a memorial station for the Central Arizona DX Association. (Courtesy CADX)

07/22/04	28.490	LW3DCE	SA	Argentina	BA	Keto	
07/22/04	28.475	PY2VA	SA	Brazil			
07/21/04	28.420	CX2FB	SA	Uruguay			
07/21/04	28.420	CX40C	SA	Uruguay		Hugo	
07/21/04	14.226.5	P29KPH	S Pac	Papua New Guinea		Peter	N5FTR
07/19/04	21.270	LU3OE	SA	Argentina	Salta		EA5KB
07/19/04	21.260	6Y5MN	Carib	Jamaica		Mark	QRZ

This is a typical page out of my "home brew" e-log. There's plenty of room for improvement, but it serves the purpose quite well and gave me a chance to learn more about working with spreadsheets. (Courtesy Author)

mous if they wish. That's the practice of using only first names during a contact. The advent of the call sign CD ROM and Internet call checking via QRZ.com, for instance, has made it possible to look up calls to find out who it is you're in contact with. But, would you know for sure? Not unless you can come up with some corroborating information. That's why, on the list below, some of the "hams" are only rumors.

Some people become celebrities because of their amateur radio related activities. K9EID may not be a familiar call to you, but if you're one of tens of thousands of hams speaking into one of the many makes of Heil microphones you should know the call of Bob Heil. Bob's friend Joe, WB6ACU, won't be familiar to you unless you're a rock music fan with albums of The James Gang or The Eagles and know the distinctive guitar work of Joe Walsh.

Musicians seem attracted to ham radio. Country music singer, songwriter and tireless performer Ronnie Millsap is known as WB4KCG, an Advanced Class licensee. Country singer Patty Lovelace, KD4WUJ, a novice call, is married to Emory L. Gordy, Jr., W4WRO, an Extra Class operator as well as a musician and producer of well known singers such as Vince Gill. The great guitarist Chet Atkins, WA4CZD, now a silent key (SK), was a long time active ham. That call is now held by Jill Dybka for whom Chet was an "Elmer," a term reserved for the main person who helped an individual into the ranks of amateur radio.

Academy award winning actor Marlon Brando, who passed away this past July, actually held two calls: KE6PZH and the FO5GJ French Polynesian call, under the name Martin Brandeux. He was 80 years old when he died. Journalistic icon Walter Cronkite still holds

his Novice call: KB2GSD. Current CNN newsman David French is N4KET, an Advanced Class licensee. And, if you're on the west coast don't be surprised if you hear very strange atmospheric noises on 3840 kHz. That's the frequency on which you'll likely hear W6OBB, known to America's insomniacs as Art Bell.

The late radio story teller Jean Sheperd was K2ORS, who entertained millions through his nightly tales of growing up in New York. The movie "A Christmas Story," which he wrote and narrated, has become a seasonal classic. That call now belongs to Warren Ziegler, Jr., who was a great fan of Jean Sheperd and took the call to honor the original holder. Similarly, when Barry Goldwater, K7UGA, Senator and Presidential candidate, became a silent key, the Central Arizona DX Association took his call and established a memorial station in his honor. The same happened with the original founder of the American Radio Relay League Hiram Percy Maxim, whose call was WIAW.

EA0JC, a Spanish call, happens to belong to a man named Juan Carlos. He's the King of Spain. VU2SON is Sonia Gandhi, daughter of Ragiv Gandhi VU2RG, the late Prime Minister of India. His call has also become a memorial station.

Getting a QSL card from a DX station that's also a celebrity makes it all the more interesting. It's a great opportunity for SWLers, too. But, as always, when you try to QSL an amateur station as a shortwave listener, always include a self-addressed envelope and add a stamp if it's an American station. If not, send along one or two IRCs.

Have you talked with a celebrity or received a QSL card from one? If so, share your brush with fame with other *MT* readers.

❖ Back to the Logs

Okay, now to the comments from Paul regarding making your own logs. He says, "...I



Amateur Radio Club

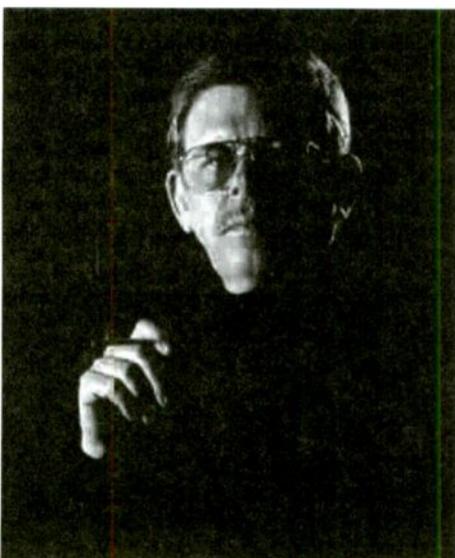
VU2 RG

Ragiv Gandhi, VU2RG is the late former Prime Minister of India. His call is now a memorial station in his honor. (Courtesy VU2RG Ragiv Gandhi Foundation)

prefer the Microsoft Works 6.0 database ... for its simplicity of set-up and use. If you want to sort or query the Works database, it is much easier (for me) than on a spreadsheet (such as Excel). I do recommend that anyone starting out with a database to create a log STAY AWAY from relational databases (such as Microsoft Access) due to their inherent complexity. Preparing the Works 6.0 database to create a radio log does require some patience, but ... a reasonably proficient PC user can create a nice, functional log for their ham or SWL shack use...."

I'm a reasonably proficient PC user but I wasn't taking any chances, so, as I said earlier, I asked my own personal computer guru for help. We chose the spreadsheet program which came with the software program I use from Sun Microsystems. Since I've been using the old-fashioned, hand operated, Fenway Park style ARRL log book for the last 16 years, we chose to set the columns exactly as they are in that log. It really helped to have someone who was very familiar with how spreadsheets work, and I really appreciated not having to create my own laborious learning curve.

I tried to simplify the general layout of the log by getting rid of the "power" and "mode" categories, since I operate mostly with 100 and in the Single Side Band (SSB) mode. Even so, I



Time for a smoke and some hot java with W6OBB, Art Bell.

was able to build in some frills. One thing I wanted to be able to do was sort by continent or region, country, province, or call sign. So we created "drop down" filters for those columns. Now, to call up a list of every contact with all South American stations I can do so. Or I can be more specific and call up every entry from Argentina. I can further call up every entry from each province of Argentina. That's an easy way to see what you're missing in various DX award categories.

There's a drop down filter on the call sign column so that I can see how many contacts I've had with a particular station and when. We added a light blue background behind every fifth entry so that it's easier to look across the page without losing one's place. We've even made a hyperlink in the "QSL Via" column to allow automatic call sign look-up on <http://www.QRZ.com>.

I like the simplicity of this log. It basically does what I need it to do and will do more as I learn more about manipulating the spreadsheet. It should be possible to export the data from this spreadsheet to a purchased or specifically designed amateur radio e-log should this one prove to be inadequate.

I have to echo Paul's comments about patience. As with anything else that's unfamiliar, it takes a while to feel comfortable navigating in the spreadsheet. What really takes a lot of time is transferring data from 16 years worth of paper logs to this one. The end result should be a much more useful log which will help me keep track of DXCC (DX countries worked) and any of the innumerable other awards offered in this hobby.

When you do the tedious work of data entry, do only a page at a time. Once you start to get weary you'll make all kinds of data entry errors and you'll end up proving the old computer adage "garbage in, garbage out."

This method is not intended to replace the commercially produced e-logs listed in my earlier column. It would be nearly worthless as a contest log, because for that purpose speed is of the essence and this method just wouldn't cut it. It's simply a way to have a record which can be searched.

One final word. No matter what software program you use to put together an e-log, you have to back up the data. Whether it's on 3-1/2" floppy disc, zip drive or memory stick, back it up. You simply don't want to have wasted hundreds of hours adding data only to lose it all in the event of a computer crash, glitch or lightning strike.

For More Information:

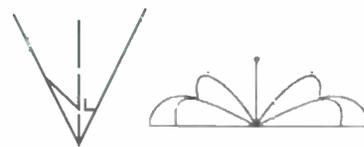
Joe Walsh: <http://www.joewalsh.com>
Dave Horsfall VK2KFU Celebrity Ham list: <http://www.geocities.com/SiliconValley/Campus/4400/famous.htm>
The amateur V.I.F list: <http://digilander.libero.it/i2mov/page17.htm>

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Q. *Would my shortwave portable and handy-talkie be in danger if I leave the batteries in them and power them up now and then? (Bill Black, Buford, GA)*

A. Generally speaking, the only thing that could blow up a battery would be high heat from excessive-current charging, or shorting it out (which is unlikely to occur in a battery compartment). If the battery never gets hot (warm is OK), this should not be a problem.

However, not all batteries are immune from chemical leakage of their electrolyte, especially when discharged, and NiCd batteries can "out-gas" as well. Caustic chemical electrolytes can damage a battery compartment and its contacts. It's always best to remove batteries (rechargeable as well as non-rechargeable) if the equipment is left unused over a prolonged period (nominally a month or so).

Q. *Merlin Communications operates powerful shortwave transmitters on Ascension Island. Author James Bamford, in his book Body of Secrets, Anatomy of the Ultra-Secret National Security Agency, says the British government has a listening post on that island as well. How can it receive without interference from a powerful broadcaster only about 9 miles away? (Ron Lindow, Pittsburgh, PA)*

A. Receivers with sharp-selectivity filtering and wide dynamic range can do it, and nine miles is actually quite a distance for initial signal attenuation. It's also quite possible that the receiving site has deeply-attenuating, sharply-tuned, cavity filters for the nearby transmitter's frequency(ies) to reduce the signals on the antenna line before they ever get to the receiver. Another possibility would be to phase their receiving antennas to cancel, or at least considerably reduce, signals from that direction.

Q. *What goes wrong with scanner antennas and coax cable that they have to be replaced? (James Ashe, Weymouth, MA)*

A. Any outdoor antenna is exposed to rain, wind and pollution that causes corrosion or even breaks

elements. This reduces the reception, especially on weak signals.

Similarly, coaxial cable dries out and develops cracks which allow moisture to penetrate, along with dissolved salts from atmospheric pollution. This is like a giant resistor between the center conductor and the shield, short-circuiting signal voltages before they reach the receiver. And, just like antennas, the connector hardware can become moisture-saturated and start to corrode, impeding the efficient transfer of received signal voltages.

And finally, some squirrels find coax delicious! Just two days ago, I had to replace a section of my coax that had been chewed in half! It's a good thing that I like squirrels.

Q. *I'm new at the outdoor antenna game; how many antennas can I run to a single ground rod? Or, does each antenna require its own ground rod? (Matt Stanley, email)*

A. It is recommended that only one common ground is established for all your equipment; you certainly don't need one for each antenna. On long and short wave, a ground may reduce electrical noise somewhat (you need to try it with and without the ground connection to see if there's any real difference), but a ground won't make signals stronger.

The only other benefits of an earth ground are to avoid electrical shocks from "hot" chassis, and to protect your equipment from nearby lightning strikes when combined with a lightning arrestor. The gas-discharge arrestors sold at Grove Enterprises work very well for this; I've had these same units on my antenna lines for more than a decade and I've never had equipment failure from lightning, even when a strike blew a tree apart in our front yard!

But keep in mind, no lightning arrestor provides total protection from a direct strike; antenna lines should be disconnected from equipment during severe electrical storms or long periods of disuse.

Q. *How well do "Phantom" antennas work compared to a full-size mobile whip? (Kenneth Pearson, Freehold, NJ)*

A. Phantom antennas are typically tuned helices (spiral coils) inside a plastic capsule (radome). Since they are smaller than a whip, they provide less capture area for the arriving wave front, so the received signal will be slightly weaker. The

lower the frequency, the weaker the received signal. In strong-signal areas, this is generally not debilitating, and their transmitted signal may be comparable to that from a full-size whip.

Q. *What causes the hum in my shortwave receiver I occasionally hear with certain antenna connections? (Bill Reuter, Hutchinson Is., FL)*

A. Common mode hum or ground loops are often experienced when using active antennas and indoor or outdoor antennas with unshielded transmission lines. It is usually heard as 120 Hz modulation of received signals. It can be caused by poor earth grounding, radiated diode-rectified AC voltages (such as produced by AC wall adaptors), or from power lines too close to the antenna or unshielded transmission line.

Such hum can usually be reduced or eliminated by using battery power, moving the antenna, using coax transmission line, and wrapping several turns of the coax or the power cord through a toroid as a filter.

Q. *Bob, why did you change your previous call sign (WA4PYQ) to the current W8JHD? Is there some symbolic meaning for the letters? (Several inquiries)*

A. My original call sign was WN8JHD which I received in Cleveland, Ohio, as a Novice Class license in 1951; when I upgraded, I was assigned W8JHD. Yes, I occasionally used whimsical phonetics ("Just Half Dead," "8 Juicy Hot Dogs," etc.). But when I moved to Florida, the FCC required a new call which they issued to me: WA4PYQ (Let your imagination provide phonetics for that one!). The call-district restrictions were eliminated a few years ago, and I was able to reacquire my original call sign under the new vanity gateway.

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>

Gary Webbenhurst

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

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October 5-11th is national fire awareness and prevention week. Most fire stations will have an open house. Call your local station at their listed non-emergency number for details.

Once there, you can check inside the engine cab and look for a radio frequency/channel list taped next to the radio. Their handheld radios might also have this information on the back.

Keep in mind that firefighters don't enter frequencies into their radios. Their 20 channel radios allow them to turn the knob and go to the "orange tactical" or "north primary." You get the fun part, figuring out what frequency goes with what coded name.

In Spokane, we recently opened a new state of the art Combined Communications Center (CCC). If you have never toured your local radio communications center, why not ask for a tour? Of course, a ScoutTM Frequency Finder discretely packed in your back pocket just might deliver some interesting numbers.

75

I think the electronics industry has made a leap forward in batteries. The new I-C3 AA batteries can be recharged in just 15 minutes. Available at most stores, I found the best price at Wal-Mart. This new charger *does not* condition or otherwise check the status of your batteries.

The new charger comes with a wall transformer that calls for 14.5 volts. I made up my own fused cigarette lighter cable. The 13.8 volts from the main car battery seems to do the job.

Final note, this new charger runs real hot, it even has an internal fan. The batteries themselves are quite pricey.

If you are sticking to Metal Hydride batteries, the newest 2200 mah batteries are available for cheap at: <http://www.batteriesamerica.com/>. They also have a new quick charger for less than \$20.

76

I have previously mentioned home brewed power cords and the importance of universal 12 volt DC power distribution in several earlier columns. Don't confuse this with standard 110 volt wires.

Well, reader Dave says he is still confused. He wants to know specifically how to make the change from a tangle of wall warts and cigarette plug cables. So here goes: Anderson Power PolesTM are red and black plastic housings. They hold a metal, mating coupler. They come in 15, 30, and 45 amp sizes. I find that the 30 amp size is best, unless you run some heavy duty HF rigs and amplifiers. Check these

websites for detailed information: <http://www.wavehunter.com/pwrpole.htm>, and <http://www.w7eca.org/connect.htm>

There are now three vendors who sell DC power distribution strips with Anderson Power PoleTM connectors: MFJ, Saratoga, and West Mountain Radio. Their websites, in alphabetical order:

<http://www.mfjenterprises.com/products.php?prodid=MFJ-1124>
<http://www.saratogaham.com/powerpanel/powerpanel4.html>

<http://www.westmountainradio.com/RIGrunner.htm>
Here is a source for wire, and the Anderson power poles, and other assorted cord connectors: <http://www.powerwerx.com/>

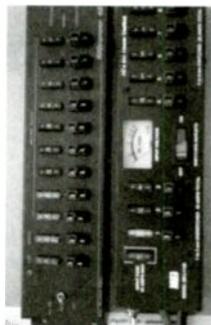
First step is to cut your power cord near the end toward the power source, not the radio/device. You want to leave yourself some length for versatility. It is important to get a clean cut, not the squashed bread type. This is important because the cut ends must fit smoothly into the metal connector. I find that the best cutter is actually a shrub trimmer I bought at Home Depot.



I then use a quality wire stripper to take off about 1/4 inch of the insulation. I give the bare wires a quick smooth right hand twist. I carefully insert the wire into the coupler with a right hand twist motion. I use the wire strippers as a holding vise and solder on the connectors. The red (positive) wire should be closest to you. Note how the connectors are "upside down" for the solder to flow properly.

When they cool, I can slide on the plastic housing. These have notched grooves on both sides of the plastic housing that make for a firm fit. If you wish, you can insert the optional small metal pin, and place a piece of black electrical tape over the housing to ensure they will *never* come apart. Make certain your finished product is identical to the pictures you see on the websites. If you reverse the order, you will damage, or destroy your equipment. See photo.

If you wish, you can repeat the process at



the end of the cord you cut off so the device can be reconnected via the power pole connectors to the power supply, or it can be plugged directly into one of the docking stations on the power strip. Note the power strip has a maximum of 40 amps input. Each docking slot has its own blade type fuse that is replaceable.

Remember, the power strip is for 12 (13.8) volts. For scanners and other devices that take *less than 12 volts* – well, that project is saved for next month. We will also tackle the problem of working with very small gauge wires. If you have an old MFJ strip using the screw-down binding poles, you can merely retrofit these, using short lengths of wire and a pair of Anderson connectors.

When your DC power-carrying wires are terminated in these connectors, they make the process of connecting electronic devices to a similar power source quick, easy, and foolproof. They are universal, and for that reason, they are used by many emergency groups such as ARES, RACES, and REACT. Your buddy can quickly recharge his HT by hooking up to your compatible power strip. The key word here is universally fitted – just like our standard phone jacks or our North American 110 volt outlet.

77

Loyal reader Robert, suggests marking all those cables with some self laminating cable markers from Radio Shack #278-1616. Also works well for labeling all those wall warts, and just about anything else!

78

As a loyal user and reader of *Police Call*, I have found some updates and new information for their next edition. I will be forwarding that information so it can be included in the 2005 edition. We are up against their deadline, so send your updates ASAP to rspolicecall@aol.com, or visit their webpage at <http://www.policecall.com/>. Please double-check your information to make sure it is accurate. Ask a fellow scanner buddy to confirm your findings.

79

Several months ago, a reader wanted a good source for the frequencies of the California Freeway Service Patrol (FSP) in the San Francisco bay area, and the Sacramento area. Well, I forgot your name, but I finally found a website. Here it is: <http://www.freqofnature.com>. On the left menu, go to frequencies, then California, then Caltrans. There is a sister page for you CHP buffs: <http://www.freqofnature.com/frequencies/ca/chp.html>. These two websites pages set the standard for excellence in radio related, personal websites. Check'em out.

One Type Does Not Fit All

There's a lot of complexity in the different types of public safety radio systems out there. This month we take a look at a couple of large radio networks and clear up some confusion on a few others.

◆ Southeastern Texas

Hi Dan,

I was trying to find sites that linked to the Harris County Motorola Type II SmartZone System 2381 and Montgomery County Ericsson EDACS system WPJY381. I recently obtained a Radio Shack PRO-92 trunking scanner and it seems to work fine, but I'm clueless!

The Harris County system has seven total sites including the central tower. I was wondering, with a SmartZone system do all the frequencies have to be programmed by site into separate banks or into the two banks that it would take to program ALL the frequencies?

The PRO-92 is able to track Motorola Type I, Type III Hybrid, and plain Type II like many other areas. Do they have just one site unlike the SmartZone and how do they all differ?

The Montgomery County EDACS system has a 3-site simulcast. I'm also lost as to what that means. I'm curious if that's similar to a SmartZone system would I have to program the frequencies into 4 separate banks even though it shows 15 frequencies in the LCN order or just leave the 15 frequencies in one bank?

And lastly... I hear Bexar County has gone to a "completely digital" EDACS digital trunking system. I am curious what that implies compared to Montgomery County's EDACS system.

Thanks!
Jason

Okay, let's start with simulcasting. Any repeater site has a limited geographic coverage area, so in order to provide service to an area that is larger than one site can reach, additional repeater sites are needed (these multi-site configurations are sometimes referred to as wide-area systems). The system designer must then decide which licensed frequencies should be used at each repeater site and what message traffic should be put on each frequency.

The whole idea of a radio system is to

move message traffic between the repeater site and the correct mobiles and portables. If there are multiple repeater sites, how do you know which site can reach a particular user? The simplest answer is to broadcast every message from every repeater site, and that way no matter where the user is located, as long as he or she is within range of at least one tower the message will be received. Simultaneously broadcasting the same message on the same radio frequency from two or more locations is called *simulcasting*.

For a scanner listener, entering all of the system frequencies just once is sufficient to follow simulcast systems.

Motorola's marketing term for a trunking system is *SmartNet*. It can have one or more repeater sites, and at least one pair of frequencies is reserved for a control channel.

SmartZone is another Motorola marketing term that describes two or more SmartNet systems connected together by a *Zone Controller*. This device keeps track of each mobile and portable radio, continuously determining which SmartNet system can reach it. When a talkgroup is in use, the controller instructs each SmartNet system with a participating radio to transmit the message traffic. If a SmartNet system doesn't have a radio in that talkgroup, the controller won't activate it and the message traffic will not be transmitted through it.

When programming your scanner for SmartZone systems, don't worry about which site has which frequency, just go head and enter the frequencies you have into a bank. The PRO-92 has ten banks of 50 channels each, so just choose a bank and program in the frequencies listed below. Be sure to set each frequency to Motorola mode.

The PRO-92 will also track analog traffic on EDACS. You only need to enter the frequencies once, but be sure to enter the frequencies

in Logical Channel Number (LCN) order. The "completely digital" EDACS system in Bexar County cannot be monitored by the PRO-92 or any other commercial scanner. Not only does the voice traffic on that system use a proprietary and secret method of encoding ("ProVoice digital"), but the control channel is encrypted as well.

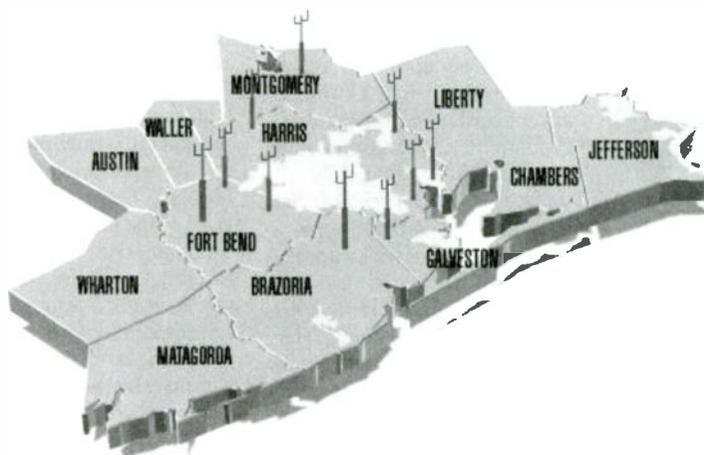
Harris County, Texas

Harris County is the largest county in Texas and the third largest in the country with nearly 1800 square miles of urban, suburban and rural areas. It is home to more than 3 million people and includes the city of Houston.

In 1989 the county built a six-channel system to consolidate more than a dozen different radio networks. They now have more than 130 radio channels across 17 repeater sites. The intention is to eventually cover 13 counties in the Houston and Galveston areas.

The Harris County Regional Radio System is a Motorola Type II network serving 60 law enforcement agencies and an additional 42 non-law enforcement agencies. It is a very large system, so in the interest of space I will list just the Houston area frequencies that are transmitted from the top of the Wells Fargo building downtown: 856.2125, 856.4875, 856.7125, 857.2125, 857.2375, 857.4875, 857.7125, 858.2125, 858.2375, 858.7125, 859.2125, 859.2375, 859.4625, 859.4875, 859.7125, 860.2125, 860.2375, 860.4875, 860.7125, 866.0750, 866.4250, 866.4625, 867.0625, 867.5375, 867.9125, 867.9375, 868.2375 and 868.4875 MHz.

Some talkgroups for the system:



Decimal	Hex	Description
5520	159	Harris County Sheriff Dispatch (District 1)
6512	197	Harris County Fire Marshal 1
6544	199	Houston Police (simulcast on 460.4250 MHz)
8496	213	Harris County Sheriff Dispatch (District 2)
8560	217	Mutual Aid 1
8592	219	Mutual Aid 2
8656	21D	Harris County Sheriff Motorist Assistance
8976	231	Harris County Sheriff Dispatch (District 3)
9008	233	Harris County Sheriff Dispatch (District 4)
9392	24B	Harris County Sheriff Emergency Response (Command)
9424	24D	Harris County Sheriff Emergency Response (Operations)
9712	25F	Harris County Sheriff Auto Theft
10960	2AD	Harris County Emergency Medical Services
10992	2AF	Harris County Fire
11728	2DD	Harris County Sheriff Traffic
12656	317	Harris County Sheriff Tactical 1
12688	319	Harris County Sheriff Tactical 2
12816	321	Harris County Sheriff Tactical 3
12848	323	Harris County Sheriff Tactical 4
14224	379	Mutual Aid 3
14768	39B	Harris County Sheriff Tactical (North)
14800	39D	Harris County Sheriff Tactical (East)
14832	39F	Harris County Sheriff Tactical (South)
14864	3A1	Harris County Sheriff Tactical (West)
14896	3A3	Harris County Sheriff Tactical (Central)
16656	411	Harris County Fire Marshal 2
18384	47D	Pursuit 1
18416	47F	Pursuit 2
18512	485	Harris County Sheriff Tactical 5
18544	487	Mutual Aid 4
18576	489	Mutual Aid 5
18608	48B	Mutual Aid 6
18832	499	Harris County Fire Marshal 3
18864	49B	Houston Police helicopter

Montgomery County, Texas

Montgomery County is located north of Houston and operates an EDACS radio network with the following frequencies:

LCN	Frequency
01	866.3250
02	866.7750
03	867.2500
04	867.7750
05	868.2750
06	868.8375
07	866.3500
08	866.8250
09	867.1000
10	867.3250
11	867.8000
12	868.3500
13	868.6875
14	867.3000
15	867.8500

Some Talkgroups:

265 02-011 Montgomery County EMS 1 (si-

266	02-012	mulcast to 155.325 MHz)
417	03-041	Montgomery County EMS 2
		The Woodlands Fire Dispatch (simulcast on 155.04 MHz)
521	04-011	Montgomery County Sheriff (North)
522	04-012	Montgomery County Sheriff (South and West)
523	04-013	Montgomery County Sheriff (East)
553	04-051	Montgomery County Constables, Precinct 1
554	04-052	Montgomery County Constables, Precinct 2
555	04-053	Montgomery County Constables, Precinct 3
556	04-054	Montgomery County Constables, Precinct 4
557	04-055	Montgomery County Constables, Precinct 5

For those of you with access to the world wide web, Myles Barkman has an excellent web site containing a wealth of Houston-area frequencies and talkgroups at <http://home.houston.rr.com/freqzone>

◆ Houston County, Georgia

Hi Dan,

I believe Houston County, Georgia, and the city of Warner Robins, Georgia, have gone to a digital system for their communications. I'm not sure, but they used to be analog, predominantly 154-155 MHz, and those frequencies have gone silent. My trunking scanner isn't APCO 25 compatible, and I have searched through the unblocked 800 MHz regions and found steady digital signals. I was searching your site trying to gather info before I shell out the \$500 for a new scanner!

Steve in Georgia

Sorry to break the news to you, Steve, but Houston County has transitioned to a "pure" APCO-25 system, meaning that all the traffic is digital and the control channel is running at 9600 baud. You'll need a Radio Shack PRO-96 or one of the newest Uniden scanners to follow the trunked activity.

The system has four repeater sites: one on Oakey Woods Road in Bonaire, another on Elberta Road in Warner Robins, and two in Perry, on Highway 41 and on Frank Satterfield Road. Frequencies on the system are 855.7375, 856.4625, 856.9375, 857.4375, 857.9375, 858.4875, 858.9375, 859.4875, 859.7375, 859.9625, 860.4875 and 860.9375 MHz. Some talkgroups in use:

Decimal	Hex	Description
1	001	Sheriff Dispatch
2	002	Sheriff Channel 2
9	009	Sheriff Supervisors
31	01F	Perry Medical (talkaround)
33	021	Perry Medical
46	02E	Warner Robins Police Dispatch
106	06A	Perry Police

◆ Nebraska

Dan,

Your frequency list is great for my PRO-92. Do you have any frequencies and talk groups

*for the Norfolk Police in Nebraska?
A Reader in Madison, Nebraska*

Norfolk is in the northeast corner of Nebraska, just over 100 miles from Omaha, and is home to about 23,000 people. The local police department uses radios on a commercially operated EDACS (Enhanced Digital Access Communication System) network run by a company called RACOM. RACOM is based in Iowa and serves about 10,000 users across the upper Midwest. A number of law enforcement agencies use the RACOM network, as well as commercial and business users.

In the Norfolk area you should be able to hear the following frequencies, which should be entered into your scanner in the given Logical Channel Number (LCN) order:

01	861.9625
02	862.9625
03	863.9625
04	864.9625
05	865.9625
06	866.9625
07	867.9625

Because the network is shared with other users you may hear non-police traffic, but here are the reported police talkgroups:

Decimal	AFS	Description
515	04-003	Police
516	04-004	Police
517	04-005	Police Car-to-Car
1905	14-141	Life Net Emergency Medical Airlift

It's been reported that some police activity is digital, which your PRO-92 will not decode.

The City of Norfolk dispatches fire and rescue crews on 854.9875 MHz.

Norfolk is also licensed for several other frequencies, including 39.94, 154.980, 155.085, 155.895 and 158.745 MHz. The Norfolk Airport Authority can be heard on 122.7 MHz.

◆ Fairfax County, Virginia

Hi Dan,

It's my impression that Fairfax County never went to APCO Project 25 like they planned. Do you know what went wrong?

Niles in Virginia

Nothing really went wrong, it's just taking a while to get everyone transferred over. Fairfax County is located just west of Washington, D.C. with a mixture of suburban homes, shopping malls and historic sites from the Revolutionary and Civil Wars. The four hundred square mile county contains nearly a million residents.

Fairfax County has a couple of systems operating concurrently. The older one is an LTR (Logic Trunked Radio) system that is now used for non-public safety agencies. Users on the LTR system are slowly being transitioned over to a new Motorola network that carries both analog and APCO-25 traffic.

The LTR system uses the following frequencies:

- 01 868.8250
- 02 868.5750
- 03 868.3125
- 04 868.1375
- 05 868.0875
- 06 867.9500
- 07 867.8125
- 08 867.6500
- 09 867.4125
- 10 867.3750
- 11 867.3000
- 12 867.2750
- 13 867.1625
- 14 867.1250
- 15 866.7500
- 16 866.4250
- 17 866.4000
- 18 866.3000
- 19 866.1500
- 20 866.1250

A recent report has frequencies 3, 9 and 12 showing activity as part of a separate Motorola system, although the FCC database doesn't reflect this. If any readers in Fairfax County can confirm this, please drop me a note!

The new APCO-25 system uses a 3600-baud control channel and carries both analog and digital traffic, meaning it can be monitored with any of the digital scanners on the market. Licensed frequencies are 852.9625, 853.1875, 853.3375, 853.4625, 853.4875, 853.6375, 853.7875, 853.9125, 853.9625, 854.1375, 854.2625, 854.2875, 854.4625, 855.9625, 855.9875, 856.2625, 857.2625, 858.2625, 859.2625 and 860.2625 MHz.

The following are some county talkgroups in operation on the system:

- 16016 3E9 Police Dispatch
- 16048 3EB Police Operations 1
- 16080 3ED Police Operations 2
- 16112 3EF Police Operations Support Bureau
- 16144 3F1 Police Operations Support Bureau 1
- 16176 3F3 Police Operations Support Bureau 2
- 17040 429 Police Dispatch (West Springfield)
- 17136 42F Police Dispatch (Annandale)
- 17232 435 Police Dispatch (McLean)
- 17328 43B Police Dispatch (Reston)
- 17424 441 Police Dispatch (Fair Oaks)
- 17616 44D Fire Dispatch
- 17648 44F Fire Response
- 17680 451 Fire Incident 1
- 17712 453 Fire Incident 2
- 17744 455 Fire Incident 3
- 17776 457 Fire Incident 4
- 17808 459 Fire Incident 5
- 17840 45B Fire Incident 6
- 17872 45D Fire Incident 7
- 17904 45F Fire Incident 8
- 17936 461 Fire Incident 9
- 17968 463 Fire Incident 10
- 19760 4D3 Sheriff Tactical 1
- 19792 4D5 Sheriff Tactical 2

The cities of Falls Church, Fairfax, Herndon, and Vienna are also transitioning to this new system.

State of Virginia

Meanwhile, the state of Virginia announced in July that Motorola will be designing and building a \$329 million radio system for the entire state. They're calling it STARS (State-

wide Agencies Radio System) and it will provide voice and data communication for twenty state agencies and, they hope, many municipalities. Initially it will replace the analog network used by the Virginia State Police since 1977, now operating in VHF from 47 repeater sites.

Motorola will install and upgrade about 130 repeater sites throughout the state, linked by microwave.

The new system will operate in the VHF 150 MHz band and will be fully digital and trunked. It will carry both voice and data traffic, allowing mobile computers to directly access dispatch and criminal databases. Vehicles will also be equipped with repeaters, allowing portable radios to extend their range through an in-car repeater.

The first of seven phases for the project is scheduled to be finished by the end of 2005, when it will begin providing coverage in the center of the state around Richmond. The last phase is expected to be complete by 2009.

◆ Tempe, Arizona

The Police Department in Tempe, Arizona, is hoping to get an \$11 million federal grant that will allow them to upgrade their old analog radio system and link up with the larger Phoenix Metro 800 MHz network (covered in last month's *Scanning Report* column). As it stands now, when a Tempe Police Officer needs to contact nearby local departments he or she needs to contact a dispatcher to relay the information.

Tempe Fire is already in the process of joining the Phoenix 800 MHz network, along with other fire departments in the valley.

The existing Tempe Police radio system was installed in 1988 and upgraded in 1996. It's a Motorola Type II SmartNet operating on the following frequencies: 855.7375, 856.4875, 856.7375, 857.4875, 857.7375, 858.4875, 858.7375, 859.4875, 859.7375, 860.7375

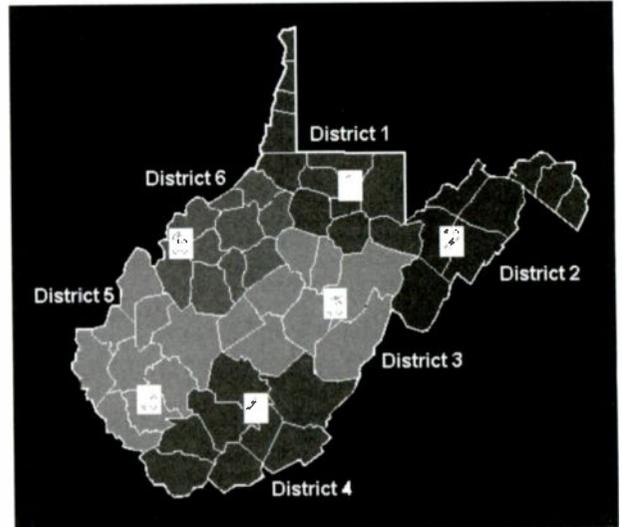
Decimal	Hex	Description
33616	835	Patrol (North)
33648	837	Information and Records
33680	839	Patrol (South)
33712	83B	Car to Car (North)
33744	83D	Patrol (Mill Avenue Detail)
33776	83F	Car to Car (South)
33808	841	Narcotics
33840	843	Traffic
33872	845	Criminal Investigations Division
33904	847	SWAT
33936	849	Not Reported
33968	84B	Tempe Fire
34000	84D	Arizona Mills (Traffic)
34032	84F	Gangs
34064	851	Not Reported

◆ West Virginia

Those fishing and hunting fees you pay have gone to good use, at least in West Virginia. The Division of Natural Resources there re-

cently finished the installation of a VHF APCO Project-25 radio system with 28 repeater sites tied to six district DNR dispatch centers. The system is operating in conventional (non-trunked) mode and is licensed for the following frequencies: 151.0925, 151.1600, 151.2350, 151.3250, 151.3550, 151.4075, 151.4675, 156.1125, 159.2925, 159.2400, 159.3525 and 172.2750 MHz. The frequency 159.2400 is also shared with the Division of Forestry.

Here's my list of repeater sites:



Nearest Town	County	District
Alderson	Greenbrier	4
Ansted	Fayette	4
Barracksville	Marion	1
Bolt	Raleigh	4
Caretta	McDowell	4
Craigsville	Nicholas	3
Elkins	Randolph	3
Flat Top	Mercer	4
Franklin	Pendleton	2
French Creek	Upshur	3
Gilbert	Mingo	5
Glennville	Gilmer	6
Great Cacapon	Morgan	2
Harrisville	Ritchie	6
Harts	Lincoln	5
Hernshaw	Kanawha	5
Kingwood	Preston	1
Moorefield	Hardy	2
Moundsville	Marshall	1
Mt. Alta	Mason	5
Ona	Cabell	5
Ripley	Jackson	6
Romney	Hampshire	2
Salem	Harrison	1
Volcano	Wood	6
Wallback	Clay	3
Webster Springs	Webster	3

That's all for this month. More information is available on my web site at <http://www.signalharbor.com>, including links and additional APCO-25 frequencies. Please continue to send your questions, comments and frequency lists to me at danveeneman@monitoringtimes.com

Until next time, happy scanning!

Burgers, Busy CD, and Boy Scouts

Robert Morden from London, Ontario, recently wrote to *MT* with the following comments:

"Hello John; I read your article, 'One Busy Megahertz' in the June issue of *Monitoring Times*. I took up the challenge and started listening from 30MHz to 30.580 MHz. I managed to hear the McDonalds fast food place near the corner of Bradley Ave. and Wellington Road, London, Ontario. The frequency they use is 30.840 FM, and the location is about one kilometer away in an easterly direction with a signal strength of S6. For receiving I am using a Kenwood TS-570-S and a Cushcraft A4S tri-band beam up 17 meters. I am told these stations run in the milliwatts and always less than a half a watt, so I am pleased to be able to hear such a low powered transmitter at that range.

"There is a Country Style Donut shop in a Sunoco station also about a kilometer to the South West of my location, (corner of Exeter Road and Wellington Road). I will keep an ear open for their transmitter. Thanks to your article an interest in listening to the 30 MHz range came about."

- 73 Bob, VE3EIM

Thanks for the feedback, Bob. While most readers would probably sit outside a restaurant with a handheld scanner and a rubber ducky antenna, Bob lined up his heavy artillery on the target and scored a direct hit.

For the benefit of other readers, Bob's antenna, the Cushcraft A4S, is a triband beam designed for the 10, 15 and 20 meter amateur radio bands. Since the amateur 10 meter band lies just below the "Busy Megahertz" where fast food restaurants operate their drive-thru radios, Bob's antenna will do a handy job of pulling in a great

signal from a kilometer away. Now, I wonder whether, if Bob could put out a high power signal at the top of 10 meters, the restaurant might just pick up his order? OK, just kidding folks.

News from Quebec

Gilles Thibodeau VE2KGF, writes: "It has been some time since I have sent frequencies for my area in the province of Quebec, so here are a few" (listed below)

Ontario Frequency Directory

Gilles also sent *MT* a copy of his new Ontario Frequency Directory CD to review. Like other similar products produced by Gilles and reviewed in *MT*, the CD contains a lot more than just frequency information.

The 14 sections of the CD cover:

"10 codes" (various communities in Ontario)
ACARS (Aircraft Communications Addressing and Reporting System) - includes popular shareware decoder titles

Amateur - the copy sent to *MT* includes a Quebec repeater list; possibly an oversight but useful information anyway. There is also a complete Canadian amateur call sign list and much more.

Antenna - designs for simple 800/900 MHz antennas that will boost signals from many trunked systems as well as, perhaps, find use as a cellular phone signal booster in poor reception areas. There are also shareware programs for antenna design and performance checking.

Decoder - A selection of information on descramblers and signal decoders.

DTMF - Information concerning Dual Tone Multi Frequency decoding

ECG (semiconductor catalog)

Electronic - A wide selection of electronic circuits and data for the home brew enthusiast.

I particularly liked the "Roach Transmitter" - a sub-miniature low power radio circuit using a very low component count.

Frequencies - This section is the "meat" of the directory. Gilles has provided a DBF formatted file with a simple to use search utility called "ONTSCAN". I checked a few of my own local areas and found the database to be accurate. Of course, frequencies and users can change and over time the file will need updates to remain accurate.

Modifications - always a popular topic among hobbyists eager to find new and hidden features in their radio equipment. Gilles provides sections for most major brands of equipment.
POCSAG (Post Office Code Standardization Advisory Group) - a section with instructions to build data slicers for decoding this popular paging protocol. Check the legality of decoding pager transmissions in your area before building any of this equipment.

Scanner - useful information on digital scanners and the APCO-25 standard.

Shareware - A selection of shareware titles useful to the scanner enthusiast. Includes a neat little utility called "Scan Recorder" that allows you to listen to your scanner while digitally recording reception on your computer.

Trunking - A selection of information on trunked radio systems. Contains a copy of "Trunk Manager" software which is a database program for storing, sorting, searching, and printing information on trunked radio systems. Data is organized into files representing radio talkgroups or channels. Also contains a copy of Trunker v3.8.2.

I spent several happy hours going through Gilles' CD. If you don't understand French you may have difficulty with some of the files but, hey, Canada is a bilingual country eh? The CD is available by mail order (\$30.00 postpaid in Canada. For shipping in the US add \$1.00). Contact Gilles by e-mail at ve2kgf1@hotmail.net, or write: Gilles Thibodeau, C.P. 193, Lac-Megantic, Quebec, G6B 2S6 Canada.

ScanCan and the Boy Scouts

ScanCan likes to get involved in promoting the radio hobby, especially with young people. This month's picture shows yours truly helping out at a local boy scout event with a demonstration of how radios work. Until November, happy scanning north of the border.



Quebec Scanning

Fire:	Freq	CTCSS	Notes
Town			
St-Gedeon, St-Ludger, St-Robert	463.3375	141.3	
Audet	410.1625		
Lac-Megantic	411.6000	103.5	
	413.4375		
		411.6	simplex F. 2
			simplex F. 3
Nantes, Woburn, Lac-Megantic,	St-Ludger, St-Gedeon, St-Robert		
	451.9625	100.0	common with simulcast transmission on 463.3375 and 460.03750
St-Ludger	411.4875	141.3	
Lambton	410.4875	100.0	
La Patrie, Scotstown, Hampden	422.2250		
Ambulance:			
Lac-Megantic, Lambton	422.7750	127.3	
St-Gedeon	463.3375		
Police:			

The Surete du Quebec (Quebec Provincial Police) is covering all the above area on 166.5000, 166.6800, 166.8000 CTCSS 192.8 including 454.4750, 454.5500 and 454.6250 UHF mobile repeaters.

Single Letters Fill the Sky

The summer brought out an unusual number of those Russian single-letter HF markers and beacons. These have mystified people for many years, and the new "ENIGMA codes" for these might seem equally mystifying.

ENIGMA 2000, the newer, online incarnation of the still extant ENIGMA, or European Numbers Information Gathering and Monitoring Association, has recently changed these. See this column's web site for the entire updated Control List, version 20. Here are the new designations.

MX: M stands for Morse code and X stands for an oddity. This is the umbrella category for all single-letter Morse code stations. It breaks down further as follows:

MXI: These are the Russian cluster beacons that have mystified listeners for many years. The I in this case is first of four Roman numeral classes. Roman numerals cause a potential for confusion in this series of codes, since letters "V," "M," and "X" can go either way. Even so, it's still an improvement.

MXI beacons, formerly **MXC**, seem to come suddenly on-air when Russian naval activity is high, then vanish just as abruptly. Emission is usually on-off keyed, continuous-wave (CW), in Morse code. Eight beacon clusters have been found based on eight HF frequencies. (One of the clusters is in the 40-meter amateur band.) The seven known stations in the system are widely separated geographically, and each location will always identify with the same letter and transmit with the same offset from the base frequency (see table). A broad filter might hear them all at once, which makes them good propagation indicators when they're transmitting.

Cluster Beacon List

Base frequencies (CW, in kHz):

4557	5153	7038	8494
10871	13527	16331	20047

Stations, with positions in clusters: +kHz Letter Location

0.7	D	Odessa
0.8	P	Kaliningrad
0.9	S	Arkhangelsk
1.0	C	Moscow
1.1	?	Nothing heard
1.2	F	Vladivostok
1.3	K	Petropavlovsk-Kamchatskiy
1.4	M	Magadan

MXII: This is a special, rather rare, case of a single letter beacon using frequency-shift keying (FSK) instead of straight CW. Frequency-shifted Morse sounds like CW if tuned with a narrow filter that rejects the other tone, but tuning to the wrong side can be a rather dizzying experience.

MXIII: These are the long-term, solitary channel markers. We know they're markers, because they sometimes stop for messages in various modes. They appear to be operated by the military in Russia and former Soviet republics, although there's also one in Albania. A lot of different ones have been heard over the years. Some, like "R," Izhevsk, have relatively frequent voice contacts in plain Russian, using military procedures.

MXIV: These are the solitary, short term markers. They are like MXIII, but come and go faster.

MXP: This is held over from the old scheme. It's a special, CW "P" marker which is frequently interrupted by broadcasts from several different Russian stations. Again, it's probably the navy, possibly in Kaliningrad. This one went crazy during the summer, with several different modes coming in rapid succession. There were 5-figure code groups in fast, MCW (modulated CW) Morse, plus online-encrypted radio teletype (RTTY) and also another teleprinting mode called 36-50. Some relayed traffic had originated from RDL, a station listed as in Smolensk.

Frequencies for this one are quite stable at 4605, parallel 5111 kHz (day); and 4031, parallel 4476 kHz (night). Sometimes these overlap, and sometimes 3772 kHz is also used.

There's another "P," which is found in the clusters, and therefore is classified MXI.

MXV: This is also held over. The "V" in this case is not the Roman numeral five, but the identifier. This is an irregularly heard "V" marker, thought to be in Khiva. It was recently logged on 3658 kHz CW. It's also been bagged on 3175, and it has been known to pop up, most conspicuously, in the extreme low end of the 40-meter amateur band.

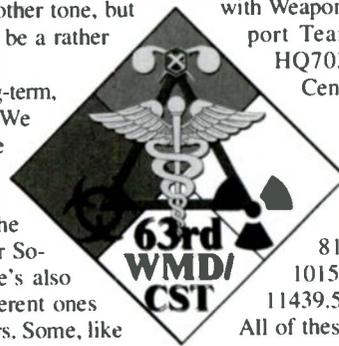
◆ National Guard ALE

Recently, a number of dedicated ALE chasers found a whole new system of US National Guard ALE callsigns. It splits up the 2-letter state postal abbreviation with 0, the National

Guard region, 0, and finally "N." For example C010TN is Connecticut.

More recently, some calls have ended in "NG" or "NGB." These seem to correspond with Weapon of Mass Destruction Civil Support Teams (WMD-CSTs). Control is HQ703N, apparently the Readiness Center in Virginia

Those who want to join the hunt can get a good start by programming in the upper-side-band ALE frequencies of 6911.5, 7650.0, 8037.0, 8047.0, 8171.5, 8181.5, 9081.5, 9295.0, 10151.5, 10670.5, 10816.5, 10818.0, 11439.5, 12087.0, 14483.5, and 16338.5. All of these are in kilohertz (kHz).



◆ Is HF Going Digital?

Recent descriptions of new military radio contracts seem to indicate a convergence of radio systems between services. The next generation of HF military radios will integrate ALE, digital data, text e-mail, file transfers, and analog or digital voice. There's some indication that digital voice transmission, probably with encryption, is considered the future for new military voice radios, just as in public safety communication on higher frequencies.

Another article describes the successful use of HF e-mail by E-3 Airborne Warning And Control System (AWACS) aircraft in the Iraq war. Pilots and ground personnel were very happy with the system, suggesting possible wider deployment.

Another recent article describes a similar success using autoconnection devices, controlled by ALE or other forms of in-band signaling, for civilian HF voice and data phone calls in remote parts of Africa. In addition, a corporate web site describes the outsourcing of radio and information system maintenance on the island of Guam, which will greatly integrate Navy and Air Force radio systems, including the High-Frequency Global Communication System (HF-GCS) and Scope Command radios.

Last but not least, a letter writer suggests the Joint Inter Agency Task Force-South, in Florida, as another possible location for what was once Blue Star on 8971 kHz (see last month's column). He adds that this voice callsign does not seem to be in use at the moment. Indeed, reports have dropped off to zero in recent months.

ABBREVIATIONS USED IN THIS COLUMN

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
CAMSPAC	.....	Communication Area Master Station, Pacific
CW	.....	Morse code telegraphy ("Continuous Wave")
DEA	.....	US Drug Enforcement Administration
DSC	.....	Digital Selective Calling
EAM	.....	Emergency Action Message
FAX	.....	Radiofacsimile
FBI	.....	US Federal Bureau of Investigation
FEC	.....	Forward Error Correction teleprinting system
FM46	.....	Field Meteorological reporting code 46
HF-GCS	.....	High-Frequency Global Communications System
HFDL	.....	High-Frequency Data Link
ICE	.....	Immigration and Customs Enforcement
JSTARS	.....	Joint Surveillance Target Attack Radar System
LDOC	.....	Long-Distance Operational Control
LSB	.....	Lower Sideband
M8	.....	Cuban Morse code, using letters for numbers
M22	.....	Israeli Navy 4XZ, weather and "numbers"
Meteo	.....	Meteorological
MFA	.....	Ministry of Foreign Affairs
MXI	.....	Russian Navy single-letter cluster beacon
MXIV	.....	Russian single-letter short-term solitary marker
MXP	.....	Russian single-letter marker with traffic
MXV	.....	Russian irregular "V" marker
PACTOR	.....	Packet Teleprinting Over Radio
PR	.....	Puerto Rico
RSA	.....	Republic of South Africa
RTTY	.....	Radio Teletype
SITOR-A	.....	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	.....	Simplex Teleprinting Over Radio, FEC mode
UK	.....	United Kingdom
Unid	.....	Unidentified
US	.....	United States
V2	.....	Cuban Spanish female "numbers," all formats
VFT	.....	Voice Frequency Telegraphy
VOLMET	.....	Flying Weather (loosely from French)

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

2187.5	LYCD-Lithuanian vessel <i>Kapitonas Simkis</i> , using identifier 277016000 to call Lyngby Radio, Denmark, in DSC at 2102. (Patrice Privat-France)
2808.5	CL1-US joint task force, calling OM2, in ALE at 0546. (Mark Cleary-SC)
3202.8	"L"-Russian CW single-letter channel marker, St. Petersburg, new frequency, at 1929. (Ary Boender-Netherlands) [New ENIGMA designator for this one is MXIV, IV being a Roman numeral. -Hugh]
3658.0	"V"-Russian single-letter CW channel marker, at 1913. (Boender-Netherlands) [New ENIGMA designator for this one is MXV, where V is the identifier, not a Roman numeral. -Hugh]
3772.0	"P"-Russian CW channel marker, parallel on 4031 and 4476, at 1929. (Boender-Netherlands) [This station, which runs traffic in several modes, has the new ENIGMA designator MXP. Probably Russian Navy. -Hugh]
3855.0	DDH3-Hamburg Meteo, Germany, with FAX weather charts at 0635. (Day Watson-UK)
4031.0	"P"-Russian CW channel marker (MXP), parallel on 4476, came from 5111, at 2055. (Boender-Netherlands)
4292.0	IAR-Rome Radio, CW weather forecast at 1853. (Watson-UK)
4605.0	"P"-Russian CW channel marker (MXP), parallel on 5111, at 0542. (Boender-Netherlands)
4795.0	F236AA-US Army Medical Center, Landstuhl, Germany, ALE sounding at 0202 and 0603. (Watson-UK)
4996.0	RWM-Russian time station, Moscow, CW pips at 1851. (Watson-UK)
5058.5	SL1-FBI, calling HQ1 in ALE, also on 5388.5, 7778.5, 7903.5, and 9183.5, all at 0400. (Cleary-SC)
5111.0	"P"-Russian CW channel marker (MXP), interrupted by RTTY and CW traffic from RDL (Smolensk, Russia) and others, at 1816. (Boender-Netherlands)
5153.9	"S"-Russian CW single-letter cluster beacon, Arkhangelsk, parallel on 7038.9, 8494.9, 10871.9, 13527.9, and 16331.9, at 1913. (Boender-Netherlands) [Cluster beacons are now ENIGMA designator MXI, where I is a Roman numeral. -Hugh]
5154.0	"C"-Russian CW single-letter cluster beacon (MXI), Moscow, parallel on 7039.0, 8495.0, 10872.0, 13528.0, and 16332.0, at 1913. (Boender-Netherlands)
5465.8	"R"-Russian Navy CW single-letter marker (MXP), Izhevsk, at 1913. (Boender-Netherlands)
5680.0	Rescue 122-UK Royal Air Force, on a rescue operation with Kinloss Rescue, Scotland, at 0322. (Rick Baker-OH)
5696.0	CAMSLANT-US Coast Guard, CA, setting radio guard with "Kilo-0-Echo," at 1245. (Cleary-SC)
5717.0	Halifax Military-Canadian Forces, working Rescue 311 with relay to Gander, at 2026. (Baker-OH)
5732.0	CAMSLANT-US Coast Guard, VA, getting position from Juliet 37 at 0043. (Cleary-SC)
6312.0	EBZV-Spanish vessel <i>Inigo Tapias</i> , DSC test to US Coast Guard Miami, at 0615. (Watson-UK)
6319.5	UCE-Arkhangelsk Radio, Russia, identifying with CW marker "KY," at 1954. (Watson-UK)
6330.5	OSY-Sailmail, Bruges, Belgium, message in PACTOR-II and III, at 2118. (Watson-UK)
6348.0	FUE-French Navy, Brest, working warship 'FC' in RTTY, at 1050. (Watson-UK)
6360.3	GYA-UK Royal Navy, London, 4-channel VFT at 2149. (Watson-UK)
6370.9	GYU-UK Royal Navy, Gibraltar, RTTY channel availability, at 2201. (Watson-UK)
6379.0	4XZ-Israeli Navy, Haifa (M22), traffic in 5-letter CW groups at 2237. (Watson-UK)
6418.1	VTP5-Indian Navy, Vishakhapatnam, 4-figure CW groups at 2238. (Watson-UK)
6697.0	Pupil Eye-US military, with a 28-character EAM, simulcast on 8992 and 11244 at 1525, and a different EAM simulcast on these frequencies and 13155, at 1555. (Jeff Haverlah-TX)
6761.0	Echo 43-US Air Force, air refueling coordination with Reach 3601, Air Mobility Command, at 2331. Echo 61, working a Reach aircraft at 2336. (Baker-OH)
7527.0	CAMSPAC-US Coast Guard, CA, setting radio guard with Foxtrot 41, at 1322. (Cleary-SC) J25-US Coast Guard, calling PAC in ALE, then voice call to CAMSPAC as 25C, no joy at 2150. (Cleary-SC) [PAC=CAMSPAC; nice one. -Hugh]
07602.0	04JMERCAP-US Civil Air Patrol, Middle Eastern US Region, calling 022NHQCAP, National Operations Center, AL, in ALE at 2209. (Ron Perron-MD)
7646.0	DDH7-Hamburg Meteo, RTTY weather in German, at 1200. (Watson-UK)
07650.0	T22238-2/238th Aviation, Indiana National Guard, Shelbyville, ALE sounding at 1543. (Perron-MD)
7739.0	OHT30P-Sonatrach Gas and Oil, Ohanet, Algeria, ALE sounding at 2158. (Watson-UK)
7849.0	CGGN-Venezuelan National Guard headquarters, calling CUFAN1, Unified Command of Armed Forces, in ALE at 0908. (Perron-MD)
8037.0	CP5NY-US National Guard Bureau, Cooperstown, NY, ALE sounding, also on 11439.5, at 1347. (Perron-MD)
8047.0	HQ703N-US National Guard, VA, calling M010EN, Maine National Guard, in ALE at 0935. Also calling M010AN, MA, at 1008; V010TN, VT, at 1022; R010IN, RI, at 1034; H090IN, HI, at 1628; and A100KN, AK, at 1724. (Perron-MD)
08171.5	T22238-2/238th Aviation, IN National Guard, ALE sounding at 0132. (Perron-MD)
8386.0	UCVK-Norwegian vessel <i>Us Krusenqtern</i> , working UIW, Kaliningrad, in 3-shift Cyrillic SITOR-A, at 2012. (Watson-UK)
8424.0	SVO4-Olympia Radio, Greece, SITOR-B maritime news in Greek, at 1321. (Watson-UK)

- 8430.0 RRR34-Moscow Radio, SITOR-B traffic list, then CW marker, at 141B. (Watson-UK)
- 8431.0 TAH-Istanbul Radio, receiving SITOR-A traffic from unknown vessel at 1425. (Watson-UK)
- 8444.1 Unid-Murmansk Meteo, Russia, with a skewed FAX weather chart at 1903. (Watson-UK)
- 8453.0 FUG-French Navy Toulon, RTTY loop from Naviter France Sud to Batiments (all ships), at 1521. (Watson-UK)
- 8467.5 JJC-Tokyo Radio, Japan, with a 60 lines/minute Kyodo News FAX in Japanese, at 1B27. (Watson-UK)
- 8500.0 BNA-Venezuelan Navy Base "Amario," calling BNF, Base "Falcon," in ALE at 225B. (Perron-MD)
- 8503.9 NMG-US Coast Guard, New Orleans, LA, weather FAX at 0635. (Watson-UK)
- 8549.0 UCE-Arkhangelsk Radio, Russia, SITOR-A marker "KY," at 2147. (Watson-UK)
- 8582.0 PWZ33-Brazilian Navy, Rio De Janeiro, with RTTY navigation warnings in Portuguese, at 2204. (Watson-UK)
- 8600.0 XSV-Tianjin Radio, China, with a CW calling marker at 1852. (Watson-UK)
- 8625.9 GYU-UK Royal Navy, Gibraltar, RTTY marker in a VFT channel, at 1425. (Watson-UK)
- 8638.5 DAO8B-Kiel Radio, Germany, CW marker every 3 minutes, at 1433. (Watson-UK)
- 8640.3 GYA-UK Royal Navy, London, 4-channel VFT at 1437. (Watson-UK)
- 8646.0 VTP6-Indian Navy, Vishakhapatnam, rough-sounding CW navigation warnings, at 1856. (Watson-UK)
- 8677.1 CBV-Valparaiso Radio, Chile, Antarctic ice FAX at 2216. (Watson-UK)
- 8825.0 BNA-Venezuelan Navy, calling 64B (landing ship Los Llanos), in ALE at 0020. (Perron-MD)
- 8894.0 N'djamena-Africa/Indian Ocean air route control, Chad, working Air France 995 in French, at 0005. (Perron-MD)
- 8912.0 19C-US joint task force, position for Panther, (DEA, Bahamas), at 2330. (Cleary-SC)
- 8983.0 CAMSLANT-US Coast Guard, VA, working Rescue 1706, Rescue 2118, and Rescue 2135, at 2305. (Allan Stern-FL)
- 8992.0 Corn Meal-US military, broadcasting a 28-character EAM simulcast on 11244, at 0240. Razor 22-US Air Force E-8C JSTARS aircraft, patch via McClellan HF-GCS, CA, to Peach Tree, at 0543. Axe Knife, calling Mainsail ("Any ground station this net"), raised Andrews HF-GCS, MD, who moved the aircraft to 11175, at 1541. Newsroom-US military, possibly an airborne command post, with a 28-character EAM simulcast on 11244, at 2033. (Haverlah-TX)
- 9007.0 Trenton Military-Canadian Forces, handling a patch for Racer 324, at 0001. (Perron-MD)
- 9025.0 Sentry 31-US Air Force E-3B AWACS, passing formatted traffic to Raymond 24, Tinker AFB, OK, at 0343. E30008, another AWACS, working Offutt AFB, NE, in ALE at 0344. (Perron-MD)
- 9052.0 RABAT-French Embassy, Morocco, calling CER11, French MFA, Paris, in ALE at 2107. CRC2M-Venezuelan Army, calling CLC23M, also on 7849, 8060, 9052, and 10272, in ALE at 2257. (Perron-MD)
- 09081.5 T1Z137-1/137th Aviation, OH National Guard, sounding at 1623. (Perron-MD)
- 9183.5 SJ1-Probably FBI, calling CO1 in ALE, also on 11073.5, 14458.5, and 14493.5, all at 0340. (Cleary-SC)
- 9295.0 RVHNY-US National Guard Bureau, Riverhead, NY, ALE sounding at 1623. RCHNY, Rochester, NY, sounding at 1746. (Perron-MD)
- 10126.0 Cuban "Atencion" station (V2), started too early at 1954 with AM female voice "numbers," quickly caught the mistake and went back to carrier, then started a normal callup at 2002. (Chris Smolinski-MD)
- 10242.0 17C-US joint task force patrol aircraft, working Panther (DEA, Bahamas), at 1207. (Cleary-SC)
- 10600.0 CORE7- Venezuelan Army, calling CUFAN3, Unified Command of National Armed Forces, in ALE at 2305. (Perron-MD)
- 10670.5 CGOOPS-Probably National Guard, ALE sounding at 0124. (Perron-MD)
- 10913.5 ME1-FBI, calling QT2, Quantico, VA, in ALE at 0857. (Cleary-SC)
- 10914.5 ERMBEL-Brazilian Navy Radio Station, Belem, calling FRADEM, Brazilian Navy Frigate Rademaker, in ALE at 2302. (Perron-MD)
- 11090.0 KVM70-US government, Honolulu, HI, weather FAX at 0630. (Bob Hall-RSA)
- 11175.0 Axe Knife-US military, came from 8992, patch via Andrews HF-GCS to White Ash, at 1543. (Haverlah-TX)
- 11232.0 Trenton Military-Canadian Forces, passing weather to Canforce 4333, at 1750. (Perron-MD)
- 11494.0 51A-US DEA aircraft, working Panther, Bahamas, at 0202. (Cleary-SC)
- 11574.0 T1Z159-1/159th Aviation, Ft Bragg, NC, ALE sounding at 1234. (Perron-MD)
- 12136.7 RFFTD-French Air Force, Villacoublay, ARQ idler at 1550. (Hall-RSA)
- 12577.0 LAPF2-Norwegian vessel Bow Lady, maritime identifier 257504000, calling unknown station in DSC, at 1830. (Privat-France)
- 12745.5 JJC-Tokyo Radio, Japan, 60 lines/minute Kyodo News FAX at 1554. (Watson-UK)
- 12763.5 DAO12A-Kiel Radio, Germany, CW marker every 3 minutes, at 1806. (Watson-UK)
- 12789.9 NMG-US Coast Guard, New Orleans, LA, weather FAX at 0629. (Watson-UK)
- 12983.0 4XZ-Israeli Navy, Haifa, CW marker (M22), at 0130. (Jeff Seale-KY)
- 12984.0 4XZ-Israeli Navy, Haifa (M22), with FM46 weather codes, markers, then encrypted traffic, in CW at 1507. (Watson-UK)
- 13042.5 FUV-French Navy, Djibouti, RTTY test loop "voyez le brik," at 1600. (Hall-RSA)
- 13050.0 UDK2-Murmansk Radio, Russia, receiving CW traffic from an unheard station at 1825. (Watson-UK)
- 13155.0 Obedient-US military, broadcasting a 28-character EAM, simulcast on 6697, 8992, and 11244, at 1343, and again with the 25/55 broadcast at 1355. (Haverlah-TX)
- 13200.0 170041-US Air Force C-5, calling HIK, Hickam AFB, HI, in ALE at 1330, and ADW, Andrews AFB, MD, ALE at 1332. (Watson-UK)
- 13221.0 NOJ-US Coast Guard, Kodiak, AK, ALE sounding at 0259. (Perron-MD)
- 13242.0 190013-US Air Force aircraft, calling ADWNPR, Non-classified Internet Protocol Router Network gateway, Andrews AFB, MD, in ALE at 1425. (Perron-MD)
- 13510.0 CFH-Canadian Forces, Halifax, NS, weather FAX at 1537, and RTTY at 1939. (Watson-UK)
- 13538.0 ZSJ-South African Navy, Silvermine, weather FAX at 1550. (Hall-RSA)
- 13886.2 Unid-Moscow Meteo, weather FAX at 1555. (Hall-RSA)
- 13942.0 RJ1-Brazilian Army, Rio de Janeiro, calling BR1, Army headquarters, Brasilia, in ALE at 2228. (Perron-MD)
- 14585.7 RFFTC-French Forces, N'djamena, Chad, ARQ-E3 idler at 1849. (Watson-UK)
- 14670.7 1903-French Forces, ARQ-E3 idler at 1903. (Watson-UK)
- 14780.0 NDCMM-Brazilian Navy landing ship Mattoso Maia, working ERMBEL, Belem, also on 17010, at 0052. (Perron-MD)
- 14996.0 RWM-Russian time station, Moscow, CW pips at 1357. (Watson-UK)
- 15025.0 Wolf 02-US Navy E-2C, working Smasher, joint task force in Key West, FL, at 2311. (Cleary-SC)
- 15867.0 502-US ICE, calling LNT in ALE, at 2018. (Privat-France) D49-US Customs Service, calling OPB (Operations, Bahamas and Tortugas), in ALE at 2019. (Cleary-SC)
- 16338.5 F040LN-National Guard, FL, calling HQ703N, ALE at 1254. (Perron-MD)
- 16345.0 RS1-Brazilian Army, Rio Grande do Sul, calling BR1, Brasilia, in ALE at 2018. (Perron-MD)
- 16927.0 UIW-Kaliningrad Radio, working vessels in CW, at 0858. (Watson-UK)
- 17069.6 JJC-Tokyo Radio, Japan, 60 lines/minute Kyodo News FAX, in Japanese at 0817. (Watson-UK)
- 17147.0 URL-Sevastopol Radio, Ukraine, CW markers and traffic, at 1714. (Watson-UK)
- 17230.1 CWA-Cerrito Radio, Uruguay, CW marker at 1752. (Watson-UK)
- 18444.5 RFFXL-French Forces Naqoura, Lebanon, ARQ traffic to RFXCCS on circuit XZL (Versailles), at 1542. (Watson-UK)
- 19216.7 RFLI-French Forces, Fort De France, Martinique, ARQ-E3 idler at 1300. (Watson-UK)
- 20535.0 PA1-Unknown Brazilian Navy, calling BR1, Brasilia, in ALE at 2234. (Perron-MD)

Getting Going with ALE

Readers Arthur T emails *Digital Digest* to ask, "I see a lot of references to ALE when reading up on digital utility listening on the web. I also see a lot of interesting stations mentioned and would like to know how to get going with this mode. Can you help?" 73, *Art in Florida*

Well, it's been some time since we updated readers on this rapidly-growing digital technology, so Art's letter couldn't have come at a better time. So let's start at the beginning...

❖ ALE Redux

ALE, short for Automatic Link Establishment, is a generic acronym used to describe many different types of completely automated networks that are capable of monitoring prevailing link quality between stations and selecting the best channel to use from a pool of many when a connection is required from one station in the network to another.

By far and away the most popular ALE systems are the open MIL-STD-188-141 standards A and B, but these are not the only ALE systems in use and audible today. Those from Rohde & Schwarz (ALIS), Codan, ARCOTEL and Tadiran, in addition to many other proprietary systems, are also in use by many different organizations around the world.

So what exactly can we hear on these networks? Well, for the most part, it is the activity among stations that either announces the presence of a station, tests the quality of a connection or that makes and breaks a connection between stations when communication is required. According to the particular configuration, short text or data messages may also be sent, much like SMS messages on mobile phones, by which the operators can chitchat or by which remote equipment can be configured. And of course, once connections between stations are made or "triggered," communication takes place, which can be plain speech, encrypted or scrambled speech, or some sort of data modem traffic.

In all cases, however, some sort of station or link identifier is sent as part of the signal that makes or tests the connections between stations or that triggers modem activity. And this, for many listeners, is where the fun in ALE lies: determining the users behind the identifiers. Sometimes they are relatively easy to determine, because they

indicate place names, ship names, or units of army forces. Sometimes the identifiers are much more cryptic or just plain tactical: 1001, 000000660011, ABC, XYZ etc.

Careful and patient listening of the traffic carried by a network after triggering of voice or modem communications is essential if one is to have fun investigating the users behind the ALE. Check Utility Monitoring Central's database of ALE IDs if you want to see if the station has been logged before (see Resources).

❖ Decoding ALE

One can have plenty of fun decoding and investigating MIL-188-141A transmissions on just about any computer system. Among the best are Charles Brain's free *PC-ALE* for Windows systems, Chris Smolinski's *MultiMode* for the Mac and a host of others (see Resources). Both PC-ALE and Multi-mode require nothing more than connecting your receiver's audio output (preferably the fixed level or "line out" connection) to the computer's soundcard input.

Another beauty of ALE is that no expensive radio is required, either, as long as it is capable of demodulating Single Sideband (SSB) transmissions. We've even had success decoding ALE with an old Grundig Yacht Boy 400 broadcast receiver in SSB mode. Most transmissions take place on a whole kHz point in USB mode, but some networks utilize LSB.

❖ What's Out There on ALE?

So, where can you find this stuff and who's out there?

Probably the best place to start is the venerable US Air Force network, because it has a large number of well-known and constantly used channels and can be heard just about anywhere in the world at any time. Just hook up your favorite decoder to your radio, tune your receiver to the following frequencies and wait for the characteristic few seconds of gurgling ALE sound and you should see the identifiers appear on screen something like (using PC-ALE):

```
[13:45:20][FRQ 9025000][SND][HAW ][TWS][
][ALO] BER 32 SM 11
[RX][CH 25][TWS HAW][TWS HAW][R]
```

USAF ALE Network (kHz)

```
2805.0 3059.0 3068.0 3137.0 4490.0 4721.0
4724.0 5684.0 5708.0 6685.0 6715.0 6721.0
6761.0 7632.0 7840.0 8965.0 8992.0 9019.0
```

```
9025.0 9026.0 9027.0 9057.0 11175.0 11226.0
11250.0 13209.0 13215.0 15016.0 15043.0 18000.0
18003.0 20031.0 20631.0 23337.0 27870.0
```

In a short while you will probably see ALE from various US Air Force bases in addition to that from overflying aircraft. The ground stations carry identifiers that are relatively easy to place, and the aircraft use their "tail" numbers, made up of five digits. Here are the most commonly heard bases:

ADW	Andrews AFB, MD
AED	Elmendorf AFB, AK
CRO	RAF Croughton, UK
ELM	Elmendorf AFB, AK
GUA	Andersen AFB, Guam
HAW	Ascension Island
HIK	Hickam AFB, HI
ICZ	Sigonella Naval Air Station, Italy
JDG	Diego Garcia, Indonesia
JNR	Roosevelt Roads, PR
JTY	Yokota AB, Japan
MCC	McClellan AFB, CA
OFF	Offutt AFB, NE
PLA	Lajes AB, Azores
RIC	Richmond, VA

Brazilian Navy

Looking a little further afield, the Brazilian Navy has been slowly building up ALE on its large fleet of ships (kHz):

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10914.5 11486.0 12437.0 13101.0 14780.0 15932.0
17010.0 19709.0
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ERMBEL	Naval Base Belem
ERMNAT	Naval Base Natal
ERMRIO	Naval Base Rio de Janeiro
FDEFEN	Frigate "Defensora"
FRADEM	Frigate "Rademaker"
NTGMTA	Oiler "Almirante Gastao Motta"
NAESPO	Naval Airbase São Paulo
NDDCEA	Landing Ship "Ceara"
NEBRSL	Training Ship "Brasil"
NDCCMM	Landing ship, "Mattoso Maia"

French Diplomatic Service

The French have also been transitioning to ALE to connect their various embassies around the world. Traffic carried is for both regular diplomats and military attaches located in their consulates and embassies (kHz):

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6900.0 7740.0 9052.0 10187.0 10825.0 12170.0
12200.0 14671.0 15921.0 16320.0 17477.0 18307.0
18396.0 19233.0 19636.0 25301.0
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ABUDHABI	Embassy Abu Dhabi, UAE
BEYROUTH	Embassy Beirut, Lebanon
CER11	MFA Paris
CER41	MFA Paris
ISLAMABAD	Embassy Islamabad, Pakistan
KHARTOUM	Embassy Khartoum, Sudan
KIGALI	Embassy Kigali, Rwanda

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An American Shortwave Broadcaster's Perspective

Jeff White of Radio Miami International writes:

FCC regulations do not say that US-licensed SW stations cannot broadcast to a domestic audience, but that they cannot broadcast a program service that is designed "exclusively" for an audience in the continental US. So we can broadcast to Canada, Mexico, or even Hawaii or Puerto Rico. They don't permit us to register purely US ITU zones as target areas. But everything else is fair game. And as we read the rules, we can broadcast to the U.S., but just not "exclusively."

I don't think anyone can prove that there are "dwindling audience numbers" for shortwave. There never have been any reliable audience figures for the medium, which is why it has never become commercialized. Many stations have been cutting back SW transmissions. But these are mainly government-owned, whose raison d'être was to counter communist propaganda during the Cold War. Since the fall of the Berlin Wall, many of these stations have experienced significant budget cuts from their governments and have therefore been forced to reduce sched-

ules, languages, etc. – and in some cases cease transmissions altogether.

Click on "SW Audience" at our website <http://www.wrmi.net> – Within that explanation, you will see a link to "more information about the shortwave audience" which is a very interesting article about shortwave audience research by an ex-BBC researcher. There is also a link to "FAQ's about shortwave," where point #10 is labeled "How many people listen to shortwave?" The HFCC tells us they are not seeing any reduction in overall amount of frequencies registered each season. So shortwave being a "dying medium" is just a myth, so far at least.

More stations want relays within single-hop range of the target area. Broadcasters requesting more spectrum space have always felt the HFBC bands were too crowded and have always needed more spectrum. The in-band segments are still extremely crowded, and in order to be heard without interference it has been necessary for most FCC-licensed stations to use out-of-band frequencies. And many SW stations are looking forward to DRM transmissions, also requiring more spectrum.

AFGHANISTAN [non] Internews' SW broadcasts on 17700 and 11795 as Salaam Watandar were expected to continue through Sept. 15, according to David Trilling, who verified my report [so now may be gone]. The network of AM and FM stations within the country was expected to expand from 19 to 40 by yearend (Jorge Garcia Rangel, Venezuela, DX Listening Digest)

ALBANIA In early August, all R. Tirana transmissions via our Cerrik station were transferred to Shijak, where the Chinese installed two new HF Transmitters, each 100 kW. New reception reports are appreciated. Cerrik site is totally rented by CRI for 15 years, where they will soon install 6 new HF transmitters, each 150 kW (Drita Cico, R. Tirana, via Rudolf Krumm, Germany, BC-DX)

ANTARCTICA LRA36, usually broadcasts 1800-2100 [weekdays] on 15476, with the program "63° Latitud Sur." Some days it cannot go on the air due to inclement weather, winds up to 90 knots. Correct reception reports via P-mail only with one IRC will be QSLed by letter along with a souvenir card of the base if sent to: LRA36, Radio Nacional Arcángel San Gabriel, Base Esperanza, Antártida Argentina 9411, República Argentina (Manuel Méndez, Spain, DXLD)

BANGLADESH Betar has ordered a new 100 kW shortwave transmitter and auxiliaries for its station in Savar near Dhaka. The Thales 100 kW transmitter type TSW 2100 is fully capable of digital DRM operation. With the PSM part built into the transmitter, this model is a very cost effective solution for near distance shortwave broadcasting; scheduled to go on air early 2005. Transmitter and site material will be delivered by end of this year (THALES Radio News via Wolfgang Büschel, DXLD)

BOLIVIA I have been in contact with Padre Estanislao de Radio Virgen de Remedios, Tupiza, testing on 5500 and 5945.2. In mid-July he wrote that they were not on the air as antennas were not ready, but their authorized frequency would be 3330, to be used only at 0000-0200 to cover their large, mountainous parish bordering Chile and Argentina. FM on 89.5 runs 24 hours, with relay of EWTN. The station is run by two Bolivian and two Polish fathers. Address is Parroquia Nuestra Señora de Candelaria, Casilla 198, Tupiza. Listen to the ID at <http://www.dxing.info/news/> and <http://www.malm-ecuador.com/> (via Rogildo Aragão, Bolivia, DXLD)

On 4763.31, Radio Chicha, 1053-1103, sign-on with typical Andean music. 1100 complete ID as: "Ésta es Radio Chicha, desde Tocla, provincia Norchichas, en el departamento de Potosí, transmitiendo en 4760 kilociclos", then same in Aymara (Arnaldo Slaen, Argentina, BCLNews.it)

BRAZIL Another station has returned to SW, Rádio A Voz do Coração Imaculado, from Anápolis, Goiás. Heard in Minas Gerais by Cáo Lopes, around 2200, on 4885, but no ID as the Catholic programming was uninterrupted; several days later, Samuel Cássio Martins, in São Paulo caught an ID at 2020 (Célio Romais, Panorama, @atividade DX)

CHINA Jon Kennedy, the well-known Aus-

tralian voice on CRI's English Service, died in Beijing of a heart attack. He was 34. According to TerraNet, his death occurred on July 15. He had previously worked for radio stations across Australia, and for Radio Mount Lebanon in the Middle East. In a tribute dated July 24, TerraNet said Kennedy had "lived for adventure and travel. He enthused charm and people warmed to his gentle nature." Kennedy joined CRI in 2003, where he hosted a number of feature programs, including *Realtime Beijing*. A recording of his resonant Australian voice can still be heard introducing *News and Reports* at the top of the hour on CRI's English Service (Roger Tidy, UK, DXLD)

COLOMBIA Voz de la Resistencia, The FARC clandestine, was heard on June 10 but active just a few days, back August 3-4 with strong but distorted signal at 2230-2320* on 6239.82, no jammer this time (Björn Malm, Ecuador, DXLD) Per his recording, they say they broadcast from the mountains in western Colombia. Nine soldiers were killed in an ambush the other day in this region (Henrik Klemetz, <http://www.malm-ecuador.com>) It has been regularly active although not every day, also putting a spur varying 6120-6130. They open with music and announcements around 2220; curiously, the announcer has a strong Cuban accent like the early days of R. Rebelde. Resistencia tends to be most active around significant patriotic days such as July 20, August 7. They say it's run by the Comando Conjunto de Occidente, which operates in the departments of Cauca, Valle del Cauca and Nariño; other FARC fronts operate more FM stations, and it has been some time since I heard 6260 from the Bloque Oriental (Rafael Rodriguez, Colombia, Conexión Digital)

CZECH REPUBLIC [and non] Prague Post reports that Radio Free Europe/Radio Liberty is planning to ask the US Congress for an additional \$13 million to construct a new HQ outside the centre of Prague. Despite reports in the Czech press that the US government had already agreed to fund the project, negotiations were still underway. US isn't expected to make a final decision until the start of FY 2006, Oct. 1, 2005. Don Jensen, director of communications for RFE/RL, says they want to make the move as soon as possible, potentially even by 2006, although 2007 is probably a more realistic target (Media Network blog) If there is a change at the top in DC, all bets are off (Lou Josephs, *ibid.*)

ECUADOR 4899.8, La Voz de Saquisilí was heard at the end of July, 1220-1300. Not sure if a reactivation, but I had not heard it for several months. Folk music, also mentions AM side, Radio El Libertador (Rafael Rodriguez, Bogotá, Colombia, Conexión Digital)

4960, R. Federación, Sucúa at 2300-2316 relaying FM station 107.3 La Voz de Ruta(?) (Rafael Rodriguez, Bogotá, Colombia, Conexión Digital) on 4959.97 at 0338 with "107.3 MHz" ID, the next day as La Voz de La Ruta (Adán González, Venezuela, WORLD OF RADIO)

FINLAND YLE says it is not about to close down R. Finland. SW transmissions will continue in the present form until the end of 2006, when the current transmission contract expires and YLE "needs to consider various options." (DXing.info)

GREECE Although most of its programs are

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

in Greek, VOG has a page linking to zip files of its entire program schedule presented in English: <http://www.ert.gr/radio/channel.asp?id=19-41k> Times are local UT+3 summer/+2 winter (John Babbis, Silver Spring, MD, DXLD)

KUWAIT The ITU added a new SW site here at the end of June: 29N31, 047E41. At least three new 250 kW IBB SW transmitters had been planned since 2001. The coordinates put the new site NW of Kuwait City, at same location as the MW 1548 transmitter (Olle Alm, Sweden, DXLD)

A March 2004 Inspector General Report for the State Department and the Broadcasting Board of Governors <http://oig.state.gov/documents/organization/30847.pdf> said the project to begin SW broadcasts to Afghanistan from here in February had been delayed by the contractor. To save the cost of purchasing new units, IBB programmed three 250-kW SW transmitters from the closed Gloria Transmitting Station in Portugal (via Bernd Trutenau, Lithuania, DXLD)

Tests were heard as early as July 11 on 5955, 12005, 13650 (Anker Petersen, Denmark, DSWCI DX Window) in the 1500-0300 period also tested 6095, 7245, 9535, and 21815 (Wolfgang Büschel, Stuttgart, Germany, BC-DX) Regular broadcasts with only one transmitter began July 19 and by July 31 the schedule was:

1330-1430 17605 R. Free Afghanistan Dari
1430-1530 13690 VOA Dari
1530-1630 13690 VOA Pashto
1630-1730 11760 VOA Dari
1730-1800 11730 VOA Pashto
1800-1830 11730 VOA Dari
1830-1930 11750 VOA Pashto
1930-2230 11835 VOA English
2230-0030 11935 VOA English
0030-0230 11995 VOA Pashto
0230-0330 11945 R. Free Afghanistan Pashto
(Bernd Trutenau, Lithuania, DXLD)

All transmissions are at 55 degrees, \ to MW 1296 Kabul, and mostly 12140 IBB Iranawila, Sri Lanka, but Kuwait is about one second ahead of 12140, since it is fed via Atlantic satellite, while feed to Sri Lanka comes around via Pacific and Indian Ocean satellite (Wolfgang Büschel, Stuttgart, Germany, BC-DX)

MALDIVES [non] We've heard from Dave Hardingham, who is with Friends of Maldives, about setting up an independent radio station for the Islands, where the current government does not allow a free press. Just people keen to initiate democracy and free speech in the Maldives. Based in London, they have Maldivians ready to produce programs. Check <http://www.friendsofmaldives.co.uk> for details as soon as SW transmission arrangements have been finalized (Glenn Hauser, WORLD OF RADIO)

MÉXICO Here's the real reason IMER closed down XERMX, Radio México Internacional: a US firm, Mercer Management Consulting, was paid 7.5 megapagos for four weeks of work last December. Mercer concluded that XERMX and two MW stations in Campeche and Colima had no future and lacked the funds to sustain them, so IMER's steady growth since 1983 has been reversed (Fernando Mejia Barquera, <http://www.etcetera.com.mx/pag19ne45.asp> via Conexión Digital)

NEW ZEALAND RNZI issued a revised schedule at the end of July, effective September through end of October. Although there may have been further changes by now, especially with the end of DST in early Oct, it showed: 1300-1750 6095, 1751-1850 9845, 1851-2050 11725, 2051-2245 15720, 2245-0458 17675, 0459-0705 11820, 0706-1059 9885, 1100-1259 9885. Primarily for All Pacific, except 1100-1259 for the NW Pacific, Bougainville, Timor, Asia. Also, Paul Ormandy's DX news was leaving Mailbox at the end of August (via Adrian Sainsbury, RNZI via Mark Nicholls, NZ DX Times) Wonder if he also quit all the other stations airing his same DX reports? (gh)

PAPUA NEW GUINEA R. Bougainville, 3325, sent a very nice textured tan colored full-data QSL card and personal letter from v/s Mark Nikis ("acting Director Provincial Radio") in about 2 months for English report, CD, and \$2. Mr. Nikis says "Some of the National Broadcasting Corporation stations have not disappeared on air waves, but due to government funding these have put these stations to go off air [sic]. Here at Radio Bougainville we have encountered similar problems, but with the help of the NGO's and the help of the AusAid (Australian Aid Programme) we have been on air, and also our provincial government have help us with some funding to produce peace process programmes and awareness programmes as our people were at war with the government for ten years or so. At the moment we are at peace. Radio Bougainville has a bright future since we are at peace and we will continue to serve our local listeners and also overseas friends." (Dave Valko, PA, Cumbredx)

PARAGUAY Adán Mur of R. América advises that the guys at the Colegio Técnico Municipal Santa Rosa de Lima, in Nembey, are testing irregularly, up to 24 hours a day on 3220 with only 12 watts, and a quarter wave antenna, with very good local coverage. If you hear it, report to radioamerica@lycos.com (Arnaldo Slaen, Argentina, bclnews.it and Samuel Cassio, radioescutas)

PERÚ Reception reports to R. Municipal de Panao, 3173, Huánuco, have been answered [in Spanish] by Pablo Alfredo Albornoz Rojas, who wants to learn more about DXing, preferably by airmail, to him at Jr. Tacna 385, Panao, Provincia de Pachitea, Huánuco, Perú, but his E-mail is dalsmop@hotmail.com (via Björn Malm; Arnaldo Slaen, Noticias DX) He says programming from 2200 to 0300 and 0900 to 1100

includes greetings and interviews; actually heard on 3172.69 at 1050 (via Björn Malm, DXLD)

An UNID on 5062.35 is another spur from Radio La Hora, 4855v (Björn Malm, Quito, Ecuador, WORLD OF RADIO)

UNID on 4751.7 at 0951-1027 is presumably R. Huanta Dos Mil, ex-4747 which was missing; seemed to slowly drift up 20 Hz and back down (Dave Valko, PA, Cumbre DX) Presumed the same on 4751.82, at 2248-2302, in Quechua or Aymara and Spanish, also at 1025 onwards (Arnaldo Slaen, Argentina) It's definitely Huanta 2000 on 4751.45 ex-4747 (Björn Malm, Ecuador, DXLD)

Another unID on 5119.51, recorded at 0220 mentioning three frequencies (Björn Malm, Ecuador, DXLD) On 5119.4 at 2345-0105* it's R. Ondas del Suroriente, Quillabamba, reactivated? Mentioning 1400, 5060, 96.5 (Rafael Rodriguez, Colombia, Conexión Digital)

SCOTLAND [non] R. Six International, which began in 1963, now webcasts, and since 2003 via IRRS Milan, added daily broadcasts August 1 via WBCQ, The Planet, in Maine, 5105 at 2300-2400.

The station's unique programming is centred on unsigned and unpublished performers from around the world - rock bands from the USA, a classical guitarist from Japan, multi-instrumentalists from Russia, jazz outfits from England, singers from Denmark, percussion bands from Africa, even a symphony orchestra from Iraq, all with music that's never been heard on the radio before.

The nightly programmes will include pop, jazz, country, pipers, lounge music, live sessions, world and Scottish news, new CDs and documentaries. And that's just the start, for Radio Six International aims to expand as soon as possible from just sixty minutes a day. There will be programmes for listeners of Scottish descent; and for those who simply want to hear new music. Broadcast live from modern studios in Scotland's biggest city, the Glasgow-based station intends to be a positive voice in the crowded short wave bands. Details at <http://www.radiosix.com> (Tony Currie, Radio Six International, PO Box 600, Glasgow, Scotland, G41 5SH, DX LISTENING DIGEST)

SLOVAKIA Radio Slovakia International announced July 25 it will be on shortwave to the end of 2004 and then will try for more funding. Hope that funding is found! (Bill Bergadano, KA2EMZ, DXLD) Says support from listeners has been a significant factor in the decision not to close down on 1 July as had been threatened (Andy Sennitt, Media Network blog)

SUDAN News about Voice of New Sudan - On 2 Aug I got a brief e-mail from the engineer contracted to set up the SW transmitter in Southern Sudan. He was in Nairobi on his way back home to US. There were more technical problems; had managed to do some testing on 9310 with modulation during three days with about 7 kW before they got hit by lightning, then down awaiting some capacitors. The engineer would return to Sudan "in a few weeks." The frequency will possibly be shifted higher, to 9485, as most receivers in the region will not tune below 9400 (Jari Savolainen, Finland, WORLD OF RADIO)

SURINAME R. Apintie reactivated July 30, heard on 4989.97 at 0314, clear and stable, sounds like more power than before. Included music in English, ID as "Radio Apintie, The Happy Station." Still audible at 0626. Never answered my report with IRC last December (Adán González, Venezuela, DXLD) Also in Dutch at 0930 (Chuck Bolland, Clewiston, FL, DXLD) And as late as 1005 in Dutch (Bob Wilkner, Pompano Beach, FL, WORLD OF RADIO)

SWITZERLAND Swiss Radio International is to cease all radio broadcasts at the end of October, and will thereafter concentrate exclusively on its Internet platform, <http://www.swissinfo.org>

Starting 1 August, a special series of radio programs look back at key events that have shaped SRI and Switzerland over the past seven decades. During our last 12 weeks on air, we are broadcasting a special half-hour program each week to recall highlights since SRI first hit the airwaves in 1935. Other programs in the "Assignment Switzerland" series will profile personalities who shaped the country, the four Swiss cultures and the Swiss living abroad. You can also listen to the programs online each week by clicking on "In Focus" in our multimedia section (via Artie Bigley, DXLD)

Best reception in NAM at 2330 on 11905 via French Guiana; also try the other GUF relay, 15220 at 1930-2030. Rest of remaining English schedule via Germany or Switzerland: 0730-0800 13650 15445 21770; 0830-0900 21770; 1730-1800 13750 15515 17870, 1930-2030 11815 13645 13795; 2330-0000 9885 (Mike Barraclough, World DX Club Contact) Instead of recorded music. Apparently changed each week on Saturday and then played for the rest of the week (Alan Pennington, Caversham, UK, BDXC-UK)

SYRIA [non] Radio Free Syria, 13650, 120 degrees, 100 kW via Jülich, Germany, Sundays in Arabic, planned an end-of-DST shift Oct 3 to one hour later, 1900-2000 UT (Observer, Bulgaria)

TAIWAN Star Star Broadcasting Station [numbers in Chinese] seems inactive due to cases of Mainland spying. Frequencies to check, designated channels 1 thru 5 in this order: 11430, 15388, 9725, 8300, 13750 (Miller Liu, Taiwan, dxing.info)

TURKMENISTAN English from Turkmen Radio, Asgabat scheduled: Radio 1, 5030, 1500-1510; Radio 2, 4930, 1630-1645 (Shukhrat Rakhmatullaev, Tashkent, Uzbekistan, DSWCI DX Window)

UGANDA [non] Radio Rhino International, which went on hiatus in April or May, resumed July 12, 17870 via Germany M-F at 1500-1530 (Observer, Bulgaria) Still opening as the voice of Freedom and Democracy, Trini López' "If I Had a Hammer", then news in English including investigations into war crimes by government forces in Northern Uganda (Mike Barraclough, England, World DX Club Contact) May be

Shortwave Broadcasting

a full hour on some days, heard at 1552 (Richard Thurlow, Ipswich, Suffolk, BDXC-UK Communication)

UK Richard Sambrook is to leave his job as the BBC's head of news to take up a new post as director of the World Service. Sambrook had been the BBC's news chief for four years and was at the centre of the row with the Government over the Dr. David Kelly Affair. He will be replaced as director of BBC news by Helen Boaden, currently controller of Radio 4 and BBC7 (ITV teletext, via Mike Barraclough, DXLD) Sambrook was head of news last year when the BBC ran a report accusing the government of "sexing up" a vital intelligence dossier used by Prime Minister Tony Blair as a basis for Britain's involvement in the war in Iraq. Sambrook conceded then that "the BBC made mistakes and we have to face up to that." Sambrook and Boaden take up their new appointments in September (AP via Mike Cooper) BBC also confirmed the appointment of Nigel Chapman as Director of the World Service, reporting to Richard Sambrook on all WS activities (Media Network blog) Boaden began her journalistic career in 1979 on New York Pacifica station WBAL (Independent Digital via Mike Cooper)

USA [and non] The Broadcasting Board of Governors is busy setting up deals to get its output on FM stations and networks in key target areas, such as Pakistan. But this hides a significant fact: there is great pressure from the BBG for elements of US international broadcasting to increase audiences. This usually requires FM access, but often requires compromises on content. For example, the FM relays of Aap Ki Dunya in Pakistan include no hard news - especially no news about Pakistan or India-Pakistan relations. That news does continue, but on mediumwave from transmitters outside of Pakistan, shortwave, and satellite outlets (Andy Sennitt, Media Network)

Self-destruction is an inexplicable phenomenon. "What is doing well, is best left alone," may be a sound adage but it is quite amazing how often the contrary gets done, no less by organizations than by individuals. The latest instance of such self-demolition is the venerable Voice of America.

Under the utterly mistaken notion that its worldwide listening audience is more interested in pop, bee bop and hip hop than in good, old-fashioned news, current affairs, discussions and magazine programs, it has begun to dismantle itself. The current VOA philosophy is simple: if you are below 15 and over 39, get lost. We are not interested in you. Some jokers have sold its governors the utterly ridiculous idea - insofar as the Islamic world goes - that the way to a potential suicide bomber's heart is through pop music, interspersed with snappy sound bites packaged as news and information.

It took VOA more than 60 years to win universal recognition and admiration for its call signal and it has taken it just months to assume several new and ridiculous identities. Its Persian service is now called Radio Farda, its Arabic service Radio Sawa and its Pakistan service, Radio Aap ki Dunya, if you please. A more irrelevant name could not have been invented. I suggest that the genius who thought it up should be put on a donkey, back to front and paraded through the streets of Washington and Islamabad.

Radio Aap ki Dunya is aimed at age group 15 to 39. God alone knows on what research the decision to launch this pop-goes-the-weasel service is based, but who told these worthies that people in this age group remain awake from 7 pm to 7 am, the hours Dunya is on the air? It is Pakistani pop and Indian pop and itsy bitsy news in between. How many times can even the admirers of her looks and voice listen to Hadiqa Kiyani for instance? And how will Miss Kiyani's music help the "war on terrorism" and fight radical Islam? Will it get the Americans Osama bin Laden?

On July 9 at a special ceremony here, the Board signed a deal with Clarity Communications (Pakistan), known to one and all as a proxy much favoured by the indestructible Federal Information Secretary. Clarity will broadcast Dunya programmes during the day on FM101 on leased time segments. FM101 is owned by Radio Pakistan. The honest and logical thing would have been to sign the deal direct with Radio Pakistan. That the Information Ministry did not favour. It was discreetly suggested to the VOA Board that business could only be done with Clarity. The strangest part of this entire charade is that neither the Board nor Clarity is willing to disclose what the financial basis of the deal is.

The buzz in Washington is that Clarity is going to be paid two million dollars. For what? For broadcasting its and bits of Dunya from FM101's eight city stations, none of which has a range of more than 12-15 miles. Eighty-five percent of Pakistan's population that lives in rural areas will not be able to listen to these programmes. Even in large cities like Lahore and Karachi, there will be areas where the FM101 signal will not reach. If ever there was a "sweetheart deal", this is it. (Khalid Hasan, Washington, Pakistan Daily Times)

Let The Voice Of America Speak Arabic Once Again - Middle East scholar Juan Cole noted that the "Arabic service used to be among the best and most extensive providers of news and discussion programs in the Arab world. Since the US can broadcast FM signals in Iraq (today), it could now be beamed to Iraqis if it still existed. It doesn't. So in the wake of Sept. 11, 2001, and the US occupation of Iraq, the big media move of the Bush administration was to abolish the Arabic Service of the Voice of America. It boggles the mind."

The BBG has responded that a more recent alternative, Radio Sawa, was created to appeal to Arab youth and to new audiences, through programs dominated by a lively combination of news head-

lines and Arabic as well as Western pop music. However, a nagging question has persisted ever since Radio Sawa replaced VOA Arabic: Who's listening and why?

Norman Pattiz, who heads the BBG, says that Sawa has had an audience as high as 80 percent of adults in Jordan and in some Gulf states, where it is on FM. A recent BBG-commissioned study by Oxford Research International reported that in Iraq, Al-Hurra attracted 61 percent of adult viewers per week.

Independent surveys, however, have indicated lower figures. Middle East scholar Shibley Telhami of the University of Maryland claims that Al-Hurra is regarded as a favored news source by relatively few viewers. None of the more than 3,000 people his survey team questioned in six Arab countries last spring rated it as their first source of news. Only 3.8 percent rated it as even a second choice.

One of the ironies of US international broadcasting is that the Bush administration and Congress have endowed it, in each of the past several years, with relatively generous budget enhancements. Yet because the BBG and Pattiz want to invest heavily in the new Arabic-language networks, services to most other areas of the world have either been abolished or severely cut back: 10 languages to Eastern and Central Europe were silenced by the BBG last February. The BBG has also relegated VOA's English-language service to a secondary position and cut English frequencies by one-third since 1999 to save money. Those cuts are scheduled to continue right up until the November presidential election. (Alan L. Heil, former deputy director of VOA and author of "Voice of America: A History", Columbia University Press, 2003. He wrote this commentary for The Daily Star, Beirut, via Mike Terry, MWDX yahoo group)

On page 377 of its report, the 9/11 Commission made this recommendation: "Recognizing that Arab and Muslim audiences rely on satellite television and radio, the government has begun some promising initiatives in television and radio broadcasting to the Arab world, Iran, and Afghanistan. These efforts are beginning to reach large audiences." The report said the BBG has asked for more money, and should get it (BBG press release)

VOA Management Stifles Comprehensive News And Reveals Drastic Cuts In English - At several meetings Aug. 4, the person VOA Director David Jackson, installed as the Director of Central News, Ted Liff, announced that all news produced by the VOA newswriters would be no longer than 40 seconds in length even if more optional material was requested. Employees complained that by not providing longer news items the VOA was in violation of its Charter. When one employee complained that this action would turn the VOA into "CNN Headline News," Mr. Liff visibly bristled. Employees were also stunned to learn that despite the ongoing war on terrorism] and the upcoming presidential election, Mr. Liff was eliminating the VOA Middle East News Desk and the VOA National News Desk.

In a handout, it was revealed that VOA Worldwide English radio broadcasts would be reduced to 13 hours a day on weekdays and 10 hours a day on weekends. Two years ago, VOA Worldwide English radio broadcasts were 24 hours a day, 7 days a week. The VOA Worldwide English radio broadcasts were considered one of the premier international radio broadcasting services. Since the 9/11 terrorist attacks and despite the increased need for broadcasting to the rest of the world, the BBG has steadily cut VOA English language radio broadcasts (AFGE Local 1812)

Christian Media Network reduced its time on WRMI, which was filled by more relays of World Radio Network, amounting to 72.5 hours per week as of early August, giving lots and lots of stations a free ride into NAM on a SW relay; consult the Listeners section at <http://www.wrmi.org> for specific schedule once you choose UTC:

Mon-Fri	1200-1600 15725
Tue-Sat	0400-0900 6870
Sat	1200-2200 15725
Sun-Mon	0330-0900 6870
Sun	1330-2000 15725

6870? Yes, the continuous utility interference on 7385 caused WRMI to change to 6870 by mid-August, from 2300 on weekdays, 0230 weekends. WRMI also resumed broadcasting WORLD OF RADIO, UT Mondays 0230, along with other media programs: Sun 0230 Viva Miami or Voice of NASB, 0300 DX Partyline; Mon 0300 AWR Wavescan. These shows would also alternate filling time as available, subject to change, such as M-F 0900-0930, Thu 0930-1000 on 9955; Sun 1200-1300, 2130-2200 on 15725. Current schedule is at <http://www.wrmi.net/pages/714011/index.htm> WRMI and many other schedules shift one UT hour later from the last Sunday in October as DST ends; the B-04 season begins at the same time, entailing many frequency changes, but probably none further at WRMI (gh)

Our prophecy has come true! Brother Stair began broadcasting from his home state, South Carolina, in August, not by purchasing WHSB, but by buying time on it now that LeSEA is running it: 0200-0300 & 0400-09900 7535, 0900-1000 9850, as scheduled on his website (gh)

[non] WYFR's move inband from 6300 to 6155 via Taiwan did not work out; by July 19 it moved again to 7250, in Chinese at 1100-1600, 2100-2400. CBS had used this frequency years ago for broadcasts to the Mainland, and it was heavily jammed (gh)

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

0000 UTC 7415

USA: Radio Six International via WBCQ. Special broadcast to North America from this Scottish station. Interesting mix of music from the Tony Currie Wireless Show. News at 0100 followed by reading a few emails, including mine! Excellent signal. (Rich D'Angelo, PA/NASWA Flash Sheet)

0100 UTC on 6240

PIRATES: Radio Free Speech. Fair signal quality during IDs and Belfast QSL maildrop address. Comedy routine and parody, followed by additional IDs. Fair signal quality. (G. Van Horn, NC) **Captain Morgan** 6950, 0244-0308*. (D'Angelo, PA) Euro's **Mystery Radio** 6220 // 6280 from 2350. Canned station ID between songs. (Jerry Berg, MA/NASWA Flash Sheet) **Grasscutters Radio** 6925, 0015. (Tom Banks, Dallas, TX)

0130 UTC on 6536.1

PERU: Radio Dif La Ponderosa. Spanish identification into huaynos/criollos style music. Local time check as "8:35" into local items and 0200*. Additional Peruvians monitored: **Radio Melodia** 6042.5, 0300; **Radio Union** 6115, 0830; **Radio del Pacifico** 4975, 0830; **La Voz de las Huarinas** 6819.7, 1000; **Radio Cultural Amata** 4955.1, 1100; **La Voz del Campesino** 6955, 1100; **La Voz de Andahuayla** 6249.2, 2245 with criollos by Diana Pucar. Ads for Cerveza Cristal and Restaurant Carbonazo. (Fernando Garcia, Baltimore, MD) **Radio Oriente** 6188, 1103-1110; **Radio Tacna** 9504.76, 1035-1101. (Arnaldo Slaen, Buenos Aires, Argentina)

0138 UTC on 11700

BULGARIA: Radio. French service of current affairs wrap-up. (David W. Weronka, Benson, NC) 11500, 1749-1759. Bulgarian national news to ID. (Harold Frodge, Midland, MI)

0210 UTC on 6025

BOLIVIA: Radio Illimani. Spanish. Fair signal during futbol sports commentary. Pauses for station jingles, "canned" ads and station IDs. Closing station info and identification at 0250. (Van Horn, NC)

0305 UTC on 15120

PHILIPPINES: Radio Pilipinas. Tagalog/English. Pop music and talk to full English identification and freq at 0310. Fair-poor signal quality. (Banks, TX) Philippines' **Radio Blagovest** 11795, 1544. Excellent reception in Russian with Protestant programming. Organ music then ID as, "Vy sluyshayte Radio Blagovest," followed by Moscow address and finally "Radio Blag." (Walter Salmaniw, Victoria, BC Canada/HCDX)

0415 UTC on 4910

ZAMBIA: ZNBC. Fair signal of male announcer's African vernacular and mentions of various African countries. Signal faded after Lusaka sunrise. (Guy Atkins, Puyallup, WA/HCDX)

0425 UTC on 12060

MADAGASCAR: Voice of Hope relay. ID into African vocals and news from Iraq and Uganda to 0447. Choral music and more on Uganda to 0456*, // 15320. (Garcia, MD) **AWR** relay 3215, 0239-0302. (Scott Barbour, Intervale, NH)

0510 UTC on 4960

SAO TOME: VOA relay. Presumed Hausa language. Male/female mentions of West African countries and "VOA Africa" at 0512. Fair-good signal. (Atkins, WA) **VOA Morocco** relay 11720, 2045. (Sam Wright, Biloxi, MS)

0800 UTC on 6035

COLOMBIA: La Voz del Guaviare. Colombian identification to local Spanish news. Sports calendar roundup to identification. (Garcia, MD) Logged 1020-1030. (Slaen, ARG)

0858 UTC on 17490

RUSSIA: Radio Ezra. Test tones until 0900 sign-on. Station ID and mention of "Life of Israel" radio broadcast," followed by vernacular recitations. Hebrew scriptures and Karaism. Poor reception with deep fades and co-channel China Radio Intl interference. (Barbour, NH)

0900 UTC on 17590

RUSSIA: Radio Ezra. Tone to 0900, then voice of John Hill. Signal fair, slightly improving while the postal address was given. Indian style music to 0930*. (Berg, MA) 0922-0930* including mention of

"Palestinian Arabs" to identification at 0927. Off with instrumental music amid very poor signal. (D'Angelo, PA) 17490, 0858-0900+ (Barbour, NH) **Voice of Russia** English service 12070, 2025 *This is Russia*, // 15455. (Fraser, ME)

1033 UTC on 4779.68

GUATEMALA: Radio Cultural. Spanish sign-on to national anthem and complete ID. Marimba music tunes of fair quality. (Slaen, ARG) Guatemala's **Radio Amistad** 4698.7, 1040. Spanish religious programming to ID and Christian pops. (Garcia, MD) **Radio Verdad** 4052.5, 0340-0357 with Spanish text and ballads. (Barbour, NH)

1105 UTC on 7260

THAILAND: Radio Thailand. Vietnamese/English/Khmer. News of Bangkok to ID and contact info. Full English ID and Khmer service announced at 1113, followed by news. (Barbour, NH)

1330 UTC on 15295

UZBEKISTAN: Radio Tashkent. Best frequency with interval signal and English programming. Only at poor signal level and // 17775. (Salmaniw, CAN)

1330 UTC on 17860

FRENCH GUIANA: Radio France Intl relay. French service news-cast on national items. (David W. Weronka, Benson, NC) **Radio France's Japan relay** 17710, 2335 in French. **Radio Jamahiriya** via France 1715-1735, 17695 // 17635 (Banks, TX)

1357 UTC on 21605

UAE: Emirates Radio. Arabic text to traditional music to 1400 signal pause. (Weronka, NC) Tentative station during Middle Eastern music 15395, 2003-2026*. (D'Angelo, PA)

1450 UTC on 15190

ANTIGUA: BBC relay. Current affairs talk and interviews to BBC identification and UTC time. (Banks, TX) Antigua relay monitored 12095 at 2150. (Fraser, ME)

1508 UTC on 11660

AUSTRALIA: Radio. Pop tunes to poetry readings. SIO 3_42. (Frodge, MI) **HCJB**-Australia 15435, 1230-1255 with International Friendship Program with fair signal quality. (Banks, TX) 13630, 0010 on 17715 with commentaries. (Wright, MS)

2032 UTC on 9600

TURKEY: Voice of Turkish. Scanning for African Union BC via Radio Ethiopia, but found VO Turkey. Music to 2100 time pips and ID. Newscast signal improving over Radio Marti on 9605, // 9460. (Barbour, NH) 9830, 2200-2206. Program and news. (Frodge, MI)

2207 UTC on 6249.4

EQUATORIAL GUINEA: Radio Nacional. Spanish/English. Afro pops at tune-in. *More Than Words* by Extreme with Spanish talk-over and mentions of Malabo and Radio Nacional. Signal abruptly cut-off at 2228 without sign-off. Subsequent logging 6249.8, 2227-2307*. Nice clear signal 2254-2304 and sign-off ID as "Radio Malabo." (Barbour, NH)

2212 UTC on 11775

ANGUILLA: Caribbean Beacon. "Dr. Billy" Gene Scott explains the story of Noah. SIO 444 // 13815. Parallel programming noted on 9725 Costa Rica's **University Network**. (Frodge, MI)

2237 UTC on 4760

LIBERIA: ELWA Radio. Religious program hosted by Charles White regarding Psalm 22. Contact info amid weak audio and sign-off announcements. Fair signal during anthem. (Barbour, NH)

2342 UTC on 4635

TAJIKISTAN: Tajik Radia. (Tent.) Tajik/Russian. Vocal music at tune-in alternating talks and Arabic/Central Asian style musical bridges. Presumed identification into news and classical/choral music bits. Weak signal, but steady under constant static. (Barbour, NH)

2353 UTC on 9550

CUBA: Radio Habana. English feature on Haiti. SIO 544. (Frodge, MI)

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

Location, location, location!

You've heard it before, but location means everything – even when it comes to DXing and collecting verifications.

While a station may identify as "Radio Korea International," it may in fact be transmitting from the Sackville, Canada, relay site. Radio Taiwan International relays to the Americas via Okeechobee, Florida. Two of Voice of America's relays are via Sao Tome and Ascension Islands, and Radio Netherlands relays via Netherlands Antilles and Madagascar.

The list of transmitting relays continues to expand, while broadcasters in the United States and abroad trade relays from multiple locations. For country-collectors this is an added boost, and in some instances, may be the only opportunity to verify a particular country.

Each transmitter location may count as a separate country. This means you may be able to verify several countries from one station.

Next time you bandscan, look up the frequency in *World Radio Handbook*, *Passport to Word Band Radio*, or the station's website. You may be surprised at its transmitting location. Most stations, if requested, will put the transmitter site on your QSL. Normally, reports should be directed to the station's main office, rather than trying to go through personnel at the site. But, if you decide to go the direct route, a prepared card is usually advisable.

Confirming sites could be an easy way to add to your totals. Don't forget...location means everything!

AMATEUR RADIO

Rodriguez Island, 20 meters SSB. Full data color folder card. Received in two months for a Euro nested airmail envelope and \$2.00. QSL Manager: FSDXA, P.O. Box 73, Church Stretton, SY6 6WF. DXCC # 172. (Larry Van Horn N5FPW, NC)

ASCENSION ISLAND

WYFR relay, 21680 kHz. Full data 30 Years card unsigned, plus religious literature. Received in 22 days for an English report and mint stamps (not used). Station address: P.O. Box 2140, Oakland, CA 94621-9985. (Scott Barbour, Intervale, NH)

AUSTRIA

Radio Austria International, 6155 kHz. Full data verification on station letterhead, signed as Listeners' Relations Dept. Received in 16 days for an English report. Station address: Argentinierstrasse 30a, A-1040 Vienna, Austria. Website: <http://roi.orf.at>. (Arnaldo Slaen, Buenos Aires, Argentina).



CLANDESTINE

Norway-Denge Mezopotamya. Full data card with illegible signature. Received in 477 days after follow up English report and one IRC. QSL address: c/o Ludo Maes, P.O. Box 1, 2310 Rijkevorsel, Belgium. (Nicholas Eramo, Argentina/HCDX)

ECUADOR

HCJB, 6010 kHz. Full data Volcano Guagua Pichincha card, plus station info sheets. Received in 106 days for one IRC to HCJB's German Service. Report was forwarded to Dieter K. Reibold in Germany, and received a separate DX Topics card and personal note in 114 days. Station address: Casilla 17-17-691, Quito, Ecuador. (Barbour, NH)



GHANA

Ghana Broadcasting Corp., 4915 kHz. Full data station logo card unsigned. Received in 28 days for an English report and mint stamps (used on reply), plus souvenir post card. Station address: P.O. Box 1633, accra, Ghana. (Tom Banks, Dallas, Texas)



MEDIUM WAVE

Australia, 2AD, 1134 kHz AM. Blue QSL card and Verification letter signed by Andrew Kollosche-Senior Technician. Received in 22 days for an AM report and Aussie stamp. Station address: P.O. Box 270, Armidale, NSW 2350 Australia. (David Onley, Myrtleford, Victoria, Australia/HCDX)

Australia, 2GL, 819 kHz AM. Verification letter signed by Gavin Tapp-Communications Officer, ABC Audience. Received in 14 days for an AM report and Aussie stamp (returned). Station address: GPO Box 9994, Sydney, NSW 2001 Australia. (Onley, AST)

KKOL, 1300 kHz AM. Received my third verification signed by Dick Harris-Corp. Engineer, plus coverage map. Noted station operates from a ship with a pole antenna. Wish some of the toughies were this easy to hear from! Received in 180 days for an AM report. QSL address: Salem Radio Seattle, 2815 Second Avenue, Suite 550, Seattle, WA 98121. (Patrick Martin, Seaside, OR)

KSKO, 870 kHz AM. Verified form letter signed by Dustin Parker-News Director. Received in 370 days after second follow up report. KSKO is part of Community Radio of Alaska. Station address: P.O. Box 70, Mc Grath, AK 99627-0070. (Martin, OR)

Paraguay, ZP20 Radio America, 1480 kHz AM. Full data Paraguayan scenery card signed by Adan Mur. Received in 14 days via regular mail, for a Spanish email report to Radioamerica@lycos.com Station address: Casilla de Correo 2220, Asuncion, Paraguay. (Slaen, ARG)

SERBIA & MONTENEGRO

Intl Radio, 7220 kHz. Full data card unsigned.

Received in 35 days via regular mail for an email report to radiouy@bitsyu.net. Station address: Hilendarska 2/IV, P.O. Box 200, 11000 Beograd, Serbia & Montenegro. (Frank Hillton, Charleston, SC)

SINGAPORE

Radio Netherlands relay, 6120 kHz. Full data scenery card unsigned, but noted via Singapore, plus On Target newsletter. Received in 43 days regular mail for email letter to letters@rw.nl. Station address: P.O. Box 222, 1200 JG Hilversum, The Netherlands. (Brian Bagwell, St. Louis, MO)

UNITED ARAB EMIRATES

Adventist World Radio relay, 15320 kHz. Full data Philippians 4: 6&7 card, signed by Adrian Peterson. Magazine, calendar, and bookmark enclosed. Received in nine months for an English report. Station address: 12501 Old Columbia Pike, Silver Spring, MD 20904. (Joe Talbot VA6JWT, Red Deer, Alberta, Canada/HCDX)

Radio Japan relay, 17720 kHz. Full data Japan scenery card signed by J. Tada, plus pennant, sticker and program schedule. Received in 68 days for English email report to info@intl.nhk.or.jp. Station address: Nippon Hoso Kyokai, Tokyo 150-8001 Japan. (Sam Wright, Biloxi, MS)

October Holiday DXing

China Founding Day of PRC, Oct. 1
Cyprus Independence Day, Oct. 1
Hong Kong National Day, Oct. 1
Macau National Day, Oct. 1
Nigeria National Day, Oct. 1
Guinea Independence Day, Oct. 2
Germany Unity Day, Oct. 3
Lesotho Independence Day, Oct. 4
Uganda Independence Day, Oct. 9
Fiji Independence Day, Oct. 11
Taiwan Republic Day, Oct. 10
Eq. Guinea Independence Day, Oct. 12
Spain Hispanic Day, Oct. 12
Vatican, Pope John II Coronation Day, Oct. 22
Zambia Independence Day, Oct. 24
Kazakhstan Republic Day, Oct. 25
Austria National Day, Oct. 26
Turkmenistan Independence Day, Oct. 27
Czech Rep. Founding Day, Oct. 28
Turkey Independence Day, Oct. 29

The Medium versus the Message

If you're a regular reader of this column, your interests must lie – at least somewhat – with the pursuit of quality radio, perhaps in addition to the chase of that elusive signal and the other wonderful pastimes of shortwave radio.

So, here's the question: Should our quest for first rate programming extend beyond that which is available to us via shortwave?

I have to confess to feeling a bit guilty about this. One revelation upon first discovering shortwave was the existence of a whole different class of radio there, much of which was more informative, stimulating and better crafted than that originating here at home. It's this experience over many years that fueled my passion for the medium and spurred me to enthusiastically promote it. In this vein, it seems almost "disloyal" to embrace the new technologies.

But a more sober perspective clearly conveys that improvements in technology and the greater accessibility this affords are actually benefits, not threats. And being narrowminded about modes of delivery appears antithetical to the embrace of broad perspectives singularly encouraged over these many years by shortwave radio.

Indeed, the emergence of more sources and more ways to access them should be seen as a culmination of that effort and a signal of shortwave's ultimate success. Shortwave radio can – and does – exist side by side with internet streaming and archiving, personal digital players, direct satellite, and wireless telephony.

So, what's the problem?

❖ So Much Product; So Little Time/Space

The once clear lines between "international" and "domestic" are blurring. In addition, as far flung and seemingly chaotic as shortwave has been over the years, the phrase "you ain't seen nothin' yet" aptly applies today. Any effort to logically organize in some relevant way the vast program content available across all these platforms begins to resemble the experience of herding cats.

However, such an effort is necessary – even noble perhaps; and having available but one page provides a welcome built-in excuse for being incomplete. So, we fearlessly press on! But let's start simply with an approach that, of necessity, must be termed an occasional but continuing series.

The National Public Networks

There are (at least) five highly reputable English language public service national radio networks worldwide. They are: the *Australian Broad-*

casting Corporation (ABC), the *British Broadcasting Corporation (BBC)*, the *Canadian Broadcasting Corporation (CBC)*, *Radio New Zealand (RNZ)* and *RTE Radio One* in Ireland. All five are using new media technology to expand access to their services, even though most of these are prepared with a domestic audience in mind. Their easy availability today across borders, however, illustrates the blurring of the lines mentioned earlier. Listeners increasingly possess or can easily obtain the necessary background to understand most of the local references used in broadcasts that are ostensibly national.

The ABC <abc.net.au/radio>

If you listen to *Radio Australia*, you're already hearing a sizeable portion of the ABC's domestic content. RA gets the majority of its programming from *Radio National*, the ABC's arts and ideas network. "The Margaret Throsby Interview" and "Keys to Music" originate at the *Classic FM* (arts, classical music and jazz) network. "Australia All Over", "Sunday Profile" and "Speaking Out" are *ABC Local Radio* programs. "Australia Wide" is a compilation of national news stories produced for RA by *ABC NewsRadio* (continuous news).

In addition to *Radio Australia*, *Radio National* and *ABC NewsRadio* are streamed "live" on the internet. One ABC Local Radio service, *Coast FM*, which serves the beach areas around Brisbane with a diverse, adult-oriented mix of popular music and talk radio is also streamed 24/7; as is Triple J, the nationwide youth culture and rock music network.

Classic FM is not yet streamed "live" due to copyright issues. However, several of its programs can be streamed to the listener on-demand. My personal favorite from this service is "Breakfast with Clive."

Clive Alexander Robertson, an accomplished veteran Australian broadcaster, brings an inimitable style to *Classic FM* five mornings a week with a delightful mix of music expertly programmed, as it has been for many years, by Felix Hayman. I say "expertly" because so much of classical music radio seems both haphazard in its preparation and stuffy in its presentation. On "Breakfast with Clive," the pieces all seem to fit together beautifully and Robertson's commentary is always friendly and conversational – perfect for a workday morning. In fact, on many mornings, this is the program I have streaming on my computer at work. It may have been broadcast half a day earlier or more in Australia, but it always sounds fresh to me. And you and I can hear it only via the internet.

On balance, my favorite radio network bar none is *Radio National*. Apart from the stunning diversity of topics covered, RN (perhaps inevitably) holds up a mirror to American society, almost as much as it does to Australia. It challenges its listeners; it refuses to pander to them. I really like that.

RN broadcasts over sixty programs, many of which are not carried on RA. All are available "live", and most on-demand, via the internet. Among them are:

- "Big Ideas" - lectures, conversations, features and special series from Australia and around the world.
- "Book Reading" and "First Person" - every weekday, the first offers readings of the best of classic and contemporary fiction by Australian and world writers and the second offers the best in autobiographical writing.
- "The Comfort Zone" - a truly unique program which debates and celebrates the cultural significance of architecture and design, landscape and gardens, and food.
- "Counterpoint" - a new commentary program that in some respects serves as an ideological counterweight to Philip Adams' *Late Night Live*.
- "The Deep End" - a weeknight arts and new music program with what's new in Australian and overseas cultural events.
- "The Night Air" - an eclectic, experimental, ever-changing, free form composition of music, sounds, ideas and stories.
- "PoeticA" - performances of poetry (in itself a unique offering on radio).

Radio National also offers documentaries, music, comedy (including British classics like "The Goons"), topical magazines and features, drama and lectures.

Dig

A new experimental ABC network, *Dig* (for digital), is available only via the internet and offers diverse and continuous music "with depth." It's a new form of radio in which the audio content is entirely devoid of speech and closely integrated with the network's web page. It's definitely a work in progress and further experimentation and development is a certainty.

Keep in mind that all of the times given at <http://abc.net.au/radio> are in Australian Eastern Time. New York is 14 hours behind AET (Los Angeles, 17) until the seasonal clock changes when it falls 16 hours behind (Los Angeles, 19).

Next month, we'll continue this series with the CBC. Until then, good listening – wherever you find it!

HOW TO USE THE SHORTWAVE GUIDE

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

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Time) 4, 5, 6 or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each 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, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

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

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

Day Codes

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

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

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

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

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

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

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

Target Areas

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

Choose a program or station you want to hear.

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

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

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

MT MONITORING TEAM

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

Daniel Sampson
 danielsampson@monitoringtimes.com

Program Highlights

John Figliozzi

WRN via WRMI

WRMI Miami carries substantial portions of the World Radio Network for North America schedule. Here is a rundown of what can be heard during the segments carried: (*same programs as in SW broadcast)

0330	S/M	R. Budapest*
0400	D	R. Netherlands*
0500	D	Israel Radio (news magazine)
0530	S	Banns R. Int. (Copenhagen Calling)
	M-A	Channel Africa (Dateline Africa)
0600	D	China R. Int. (Realtime China)
0630	D	R. Sweden*
0700	S	R. Australia (Smart Societies & Verbatim)
	M-F	R. Australia (PM)
	A	R. Australia (Asia Pacific & Innovations)
0800	D	Voice of Russia (news & features)
0830	S	Wales R. Int. (Celtic Notes)
	M-F	R. Canada Int. (Canada Today)
	A	UN Radio
0845	A	R. Guangdong
1200	M-F	R. Netherlands*
1300	M-F	RTE Ireland (Marian Finucane)
	A	RTE Ireland (Playback)
1330	S	RTE Ireland (This Week in progress)
1400	S	Eco-Zone
	M-F	Deutsche Welle (Newslink)
	A	Wales R. Int. (Celtic Notes)
1430	D	RVi (Flanders, Belgium)*
1500	D	R. Romania Int.* (as 2130 sw broadcast)
1530	D	R. Korea Int.* (first half hour)
1600	S	UN Radio
	A	R. Guangdong
1615	S/A	Vatican R. (News)
1630	S/A	R. Slovakia Int.*
1700	S/A	R. Polonia (Insight Central Europe & Europe East)
1730	S	Banns R. Int. (Copenhagen Calling)
	A	Eco Zone
1800	S/A	RTE Ireland (sports results)
1830	S/A	RVi (Flanders, Belgium)*
1900	S/A	R. Sweden*
1930	S/A	R. Australia (All in the Mind & Pacific Review)
2000	A	China R. Int. (Realtime China)
2030	A	R. Budapest*
2100	A	RTE Ireland (sports results)
2130	A	R. Romania Int.* (as 2130 sw broadcast)

0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

0000	0007	vi	Sierra Leone, SLBS	3316do		
0000	0015	vi	Cambodia, National Radio	11940as		
0000	0027		Czech Rep, Radio Prague Intl	7345na	9440na	
0000	0030	vi	Croatia, Croatian Radio	9925ca		
0000	0030		Egypt, Radio Cairo	11725na		
0000	0030		Japan, Radio	13650as	17810as	
0000	0030		Serbia & Montenegro, Intl Radio	9580na		
0000	0030		Thailand, Radio	5890va	9570va	
0000	0030		UK, BBC World Service	3915as	5970as	
			6195as 9410as	9740as	11945as	11995as
			15280as	15360as	17655va	17790as
0000	0030		USA, Voice of America	7215va	15185va	
			17820va			
0000	0045		India, All India Radio	9705as	9950as	
			11620as	11645as	13605as	
0000	0057		Canada, Radio Canada Intl	9640as	15205as	
0000	0059		Germany, Deutsche Welle	7130as	9505as	
			9825as			
0000	0059		Spain, Radio Exterior Espana	15385na		
0000	0100		Anguilla, Caribbean Beacon	6090am		
0000	0100		Australia, ABC NT Alice Springs	2310irr	4835do	
0000	0100		Australia, ABC NT Katherine	5025do		
0000	0100		Australia, ABC NT Tennant Creek	4910do		
0000	0100		Australia, HCJB	15525as		
0000	0100		Australia, Radio	9660pa	12080va	13630pa
			15240pa	17750pa	17755as	17795as
			21725as			
0000	0100		Canada, CBC Northern Service	9625do		
0000	0100		Canada, CFRX Toronto ON	6070do		
0000	0100		Canada, CFVP Calgary AB	6030do		
0000	0100		Canada, CKZN St John's NF	6160do		
0000	0100		Canada, CKZU Vancouver BC	6160do		
0000	0100		China, China Radio Intl	6145va		
0000	0100		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa		
0000	0100	mtwhf	Germany, Bible Voice Broadcasting		6010as	
0000	0100		Guyana, Voice of	3290do		
0000	0100		Japan, Radio	6145ca		
0000	0100		Malaysia, Radio Malaysia	7295do		
0000	0100		Namibia, Namibian BC Corp	3270af	3290af	
			6060af			
0000	0100		Netherlands, Radio	9845na		
0000	0100		New Zealand, Radio NZ Intl	17675pa		
0000	0100		Sierra Leone, Radio UNAMSIL	6137af		
0000	0100		Singapore, Mediacorp Radio	6150do		
0000	0100	vi	Solomon Islands, SIBC	5020do	9545do	
0000	0100		UK, BBC World Service	5975ca	7545af	
			9825ca	11835ca	12095ca	
0000	0100		Ukraine, Radio Ukraine Intl	7545na		
0000	0100		USA, AFRTS	4319usb	5765usb	
			6350usb	7507usb	10320usb	12133usb
			13362usb	13855usb		
0000	0100		USA, KAIJ Dallas TX	13815va		
0000	0100		USA, KTBN Salt Lake City UT	7505na	15590na	
0000	0100		USA, KWHR Naalehu HI	17510as		
0000	0100		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
0000	0100		USA, WBOH Newport NC	5920am		
0000	0100		USA, WEWN Birmingham AL	5825na	7425na	
			13615va			
0000	0100		USA, WHRA Greenbush ME	7580va		
0000	0100		USA, WHRI Noblesville IN	7315am	7535am	
0000	0100		USA, WINB Red Lion PA	9320am		
0000	0100		USA, WJIE Louisville KY	13595am		
0000	0100	as	USA, WRMI Miami FL	9955am		
0000	0100	mtwhf	USA, WRMI Miami FL	6870na		
0000	0100		USA, WTJC Newport NC	9370na		
0000	0100		USA, WWCR Nashville TN	5070na	9475na	
			13845na			
0000	0100		USA, WWRB Manchester TN	5050na	5085na	
			5745na	6890na		
0000	0100		USA, WYFR Okeechobee FL	6065na	9505na	
			15130sa	15195as		
0000	0100		Zambia, Radio Christian Voice	4965af		
0005	0030	twhfa	Austria, Radio Austria Intl	9870sa		
0030	0100		Australia, Radio	9660pa	12080va	13630pa
			15240pa	15415as	17750pa	17775as
			17795as	21725as		
0030	0100		Canada, Radio Canada Intl	9755am	11990am	
			13710am			
0030	0100	s	Germany, Pan American BC	9740eu		
0030	0100		Iran, Voice of the Islamic Rep	9905sa		
0030	0100		Lithuania, Radio Vilnius	11690na		
0030	0100		Sri Lanka, SLBC	6005as	11905as	15745as

0030	0100		Thailand, Radio	5890na	15395na	
0030	0100		UK, BBC World Service	6195as	9410as	
			9740as 11955as	15280as	15310as	15360as
			17655as	17790as		
0030	0100		USA, Voice of America	7215va	11760va	
			15185va	15290va	17740va	17820va
0035	0100	sm	Austria, Radio Austria Intl	9870ca		
0045	0100		Pakistan, Radio	9340as	11565as	
0055	0100		Italy, RAI Intl	11800na		

0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

0100	0115		Italy, RAI Intl	11800na		
0100	0115		Pakistan, Radio	9340as	11565as	
0100	0127		Czech Rep, Radio Prague Intl	6200na	7345na	
0100	0128		Vietnam, Voice of	6175na		
0100	0130	vi	Croatia, Croatian Radio	9925na		
0100	0130	mtwhf	Germany, Bible Voice Broadcasting		5925me	
0100	0130	s	Germany, Universal Life	9485as		
0100	0130	mtwhfa	Hungary, Radio Budapest	9590na		
0100	0130	mtwhfa	Serbia & Montenegro, Intl Radio	9580na		
0100	0130		Slovakia, Radio Slovakia Intl	5930am	9440am	
0100	0130		Uzbekistan, Radio Tashkent Intl	7190as	6165as	
			9715as			
0100	0156		Romania, Radio Romania Intl	9690na	11940na	
			15430nc	17760na		
0100	0157	DRM	Netherlands, Radio	15525na		
0100	0159		Canada, Radio Canada Intl	9755am	11990am	
			13710am			
0100	0200		Anguilla, Caribbean Beacon	6090am		
0100	0200		Australia, ABC NT Katherine	5025do		
0100	0200		Australia, ABC NT Tennant Creek	4910do		
0100	0200		Australia, HCJB	15560as		
0100	0200		Canada, CBC Northern Service	9625do		
0100	0200		Canada, CFRX Toronto ON	6070do		
0100	0200		Canada, CFVP Calgary AB	6030do		
0100	0200		Canada, CKZN St John's NF	6160do		
0100	0200		Canada, CKZU Vancouver BC	6160do		
0100	0200		China, China Radio Intl	9580am	9790ca	
0100	0200		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa		
0100	0200		Cuba, Radio Havana	6000na	9820na	
0100	0200		Guyana, Voice of	3290do		
0100	0200		Indonesia, Voice of	9525as	11785as	15150af
0100	0200		Iran, Voice of the Islamic Rep	9905as		
0100	0200		Japan, Radio	6025va	11860as	15325cs
			17560va	17685pa	17810as	17835am
			17845sa			
0100	0200		Malaysia, Radio Malaysia	7295do		
0100	0200		Namibia, Namibian BC Corp	3270af	3290af	
			6060af			
0100	0200		Netherlands, Radio	9845na		
0100	0200		New Zealand, Radio NZ Intl	17675po		
0100	0200		North Korea, Voice of	3560as	7140as	
			9345am	9720as	11735am	13760as
			15180as			
0100	0200		Russia, Voice of	5945me	9665na	15595na
			17660na			
0100	0200		Sierra Leone, Radio UNAMSIL	6137af		
0100	0200		Singapore, Mediacorp Radio	6150do		
0100	0200	vi	Solomon Islands, SIBC	5020do	9545do	
0100	0200		Sri Lanka, SLBC	6005as	11905as	15745as
0100	0200		UK, BBC World Service	5975ca	6195as	
			9410as 9525ca	9825ca	11835ca	12095ca
			15280as	15310as	15360as	17790as
0100	0200		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
0100	0200		USA, KAIJ Dallas TX	13815va		
0100	0200		USA, KJES Vado NM	7555na		
0100	0200		USA, KTBN Salt Lake City UT	7505na		
0100	0200		USA, KWHR Naalehu HI	17510as		
0100	0200	mtwhf	USA, Voice of America	7115va	9885va	
			11705va	11725va		
0100	0200		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
0100	0200		USA, WBOH Newport NC	5920am		
0100	0200		USA, WEWN Birmingham AL	5825na	7425na	
			13615va			
0100	0200		USA, WHRA Greenbush ME	7580va		
0100	0200		USA, WHRI Noblesville IN	7315am	7535am	
0100	0200		USA, WINB Red Lion PA	9320am		
0100	0200		USA, WJIE Louisville KY	13595am		
0100	0200		USA, WRMI Miami FL	6870na		
0100	0200		USA, WTJC Newport NC	9370na		
0100	0200		USA, WWCR Nashville TN	5070na		

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0100	0200		7465na	13845na		
			USA, WWRB Manchester TN	5050na	5085na	
			5745na	6890na		
0100	0200		USA, WYFR Okeechobee FL	6065na	9505na	
			15060va	15195as		
0100	0200		Zambia, Radio Christian Voice	4965af		
0105	0130	sm	Austria, Radio Austria Intl	9870na		
0115	0120	mtwhf	Kyrgyzstan, Radio Kyrgyz	4010irr	4795irr	
0115	0130	twhfa	Austria, Radio Austria Intl	9870am		
0130	0145	s	Germany, Pan American BC	9495eu		
0130	0200		Australia, Radio	9660pa	12080va	13630pa
			15240pa	15415as	17750as	17775as
			17795as	21725as		
0130	0200		Sweden, Radio	6010na	9435va	
0130	0200		USA, Voice of America	9775am	13740am	
0135	0150	sm	Austria, Radio Austria Intl	9870am		
0140	0200		Vatican City, Vatican Radio	9650as	12055as	
0145	0200		Albania, Radio Tirana Intl	6115eu	7160eu	
0145	0200		Austria, Radio Austria Intl	9870am		

0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

0200	0230		Australia, HCJB	15560as		
0200	0230		Austria, AWR Europe	9820as		
0200	0230	fmw	Belarus, Radio Belarus Intl	5970eu	7210eu	
0200	0230	vl	Croatia, Croatian Radio	9925na		
0200	0230		Iran, Voice of the Islamic Rep	9905sa		
0200	0230	a	UK, Wales Radio Intl	9795na		
0200	0230		USA, KJES Vado NM	7555na		
0200	0230	o	USA, WRMI Miami FL	9955am		
0200	0257		Canada, Radio Canada Intl	15510as	17860as	
0200	0300		Anguilla, Caribbean Beacon	6090am		
0200	0300	twhfa	Argentina, RAE	11710na		
0200	0300		Australia, ABC NT Alice Springs	2310irr	4835do	
0200	0300		Australia, ABC NT Katherine	5025do		
0200	0300		Australia, ABC NT Tennant Creek	4910do		
0200	0300		Australia, Radio	9660pa	12080va	13630pa
			15240pa	15415as	17750as	21725as
0200	0300		Bulgaria, Radio	9700na	11700na	
0200	0300		Canada, CBC Northern Service	9625do		
0200	0300		Canada, CFRX Toronto ON	6070do		
0200	0300		Canada, CFVP Calgary AB	6030do		
0200	0300		Canada, CKZN St John's NF	6160do		
0200	0300		Canada, CKZU Vancouver BC	6160do		
0200	0300		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa		
0200	0300		Cuba, Radio Havana	6000na	9820na	
0200	0300		Egypt, Radio Cairo	11855na		
0200	0300		Guyana, Voice of	3290do		
0200	0300		Malaysia, Radio Malaysia	7295do		
0200	0300		Myanmar, Radio	7185do		
0200	0300		Namibia, Namibian BC Corp	6090af	3290af	
0200	0300		New Zealand, Radio NZ Intl	17675pa		
0200	0300		North Korea, Voice of	4405as	11845as	
			15230as			
0200	0300	as	Philippines, Radio Pilipinas	11885me	15120me	
			15270me			
0200	0300		Russia, Voice of	5945me	9665na	9860na
			15595na	17660na		
0200	0300		Sierra Leone, Radio UNAMSIL	6137af		
0200	0300		Singapore, Mediacoop Radio	6150do		
0200	0300	vl	Solomon Islands, SIBC	5020do	9545do	
0200	0300		South Korea, Radio Korea Intl	9560na	11810na	
			15575na			
0200	0300		Sri Lanka, SLBC	6005as	11905as	15745as
0200	0300		Taiwan, Radio Taiwan Intl	5950na	9680na	
			11875as	15320as	15465as	
			UK, BBC World Service	5975ca	6195me	
			9410va	9750af	9825ca	11760me
			11835ca	11955as	12095ca	15280as
			15310as	15360as	17790as	
0200	0300		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
0200	0300		USA, KAIJ Dallas TX	5755va		
0200	0300		USA, KTBN Salt Lake City UT		7505na	
0200	0300		USA, KWHR Naalehu HI		17510as	
0200	0300	mtwhf	USA, Voice of America	7115va	9885va	
			11705va	11725va		
0200	0300		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
0200	0300		USA, WBOH Newport NC	5920am		
0200	0300		USA, WEWN Birmingham AL	5825na	7425na	
			13615va			
0200	0300		USA, WHRA Greenbush ME	7580va		
0200	0300		USA, WHRI Noblesville IN	7315am	7535am	
0200	0300		USA, WINB Red Lion PA	9320am		
0200	0300		USA, WJIE Louisville KY	13595am		

0200	0300		USA, WRMI Miami FL	6870na		
0200	0300		USA, WTJC Newport NC	9370na		
0200	0300		USA, WWCR Nashville TN	3210na	5070na	
			5770na	5935na		
0200	0300		USA, WWRB Manchester TN	5050na	5085na	
			5745na	6890na		
0200	0300		USA, WYFR Okeechobee FL	5985na	6065na	
			9505na	11855ca		
0200	0300		Zambia, Radio Christian Voice	4965af		
0215	0230		Nepal, Radio	3230as	5005as	6100as
			7165as			
0230	0258		Vietnam, Voice of	6175na		
0230	0300		Albania, Radio Tirana Intl		6115eu	7160eu
0230	0300	mtwhfa	Hungary, Radio Budapest		9790na	
0230	0300		Sweden, Radio	6010na		
0250	0300		Vatican City, Vatican Radio		7305am	9605am
0250	0300		Zambia, Radio	4910do		

0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0315		Vatican City, Vatican Radio	17590va		
0300	0327		Czech Rep, Radio Prague Intl	7345na	9870na	
0300	0330		Egypt, Radio Cairo	11855na		
0300	0330	as	Philippines, Radio Pilipinas	11885me	15120me	
			15270me			
0300	0330		Thailand, Radio	15395na		
0300	0330		Vatican City, Vatican Radio	9660af		
0300	0350		Turkey, Voice of	6020va	6140va	7270me
0300	0355		South Africa, Channel Africa	9770af	3345af	6160af
0300	0400		Anguilla, Caribbean Beacon	6090am		
0300	0400		Australia, ABC NT Alice Springs	2310irr	4835do	
0300	0400		Australia, ABC NT Katherine	5025do		
0300	0400		Australia, ABC NT Tennant Creek	4910do		
0300	0400		Australia, Radio	9660pa	12080va	13630pa
			15240pa	15415as	17750as	21725as
0300	0400		Canada, CBC Northern Service	9625do		
0300	0400		Canada, CFRX Toronto ON	6070do		
0300	0400		Canada, CFVP Calgary AB	6030do		
0300	0400		Canada, CKZN St John's NF	6160do		
0300	0400		Canada, CKZU Vancouver BC	6160do		
0300	0400		China, China Radio Intl	9690am	9790ca	
0300	0400		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa		
0300	0400		Cuba, Radio Havana	6000na	9820na	
0300	0400	vl	Guatemala, Radio Cultural	3300am		
0300	0400		Guyana, Voice of	3290do		
0300	0400		Japan, Radio	21610pa		
0300	0400		Malaysia, Radio Malaysia	7295do		
0300	0400		Malaysia, Voice of	6175as	9750as	15295as
0300	0400		Namibia, Namibian BC Corp	6090af	3270af	3290af
0300	0400		New Zealand, Radio NZ Intl	17675pa		
0300	0400		North Korea, Voice of	9345as	9720as	7140as
0300	0400		Oman, Radio	15355af		
0300	0400		Russia, Voice of	7300na	9665na	9860na
			15595na	17660na		
0300	0400		Sierra Leone, Radio UNAMSIL	6137af		
0300	0400		Singapore, Mediacoop Radio	6150do		
0300	0400	vl	Solomon Islands, SIBC	5020do	9545do	
0300	0400		Sri Lanka, SLBC	6005as	11905as	15745as
0300	0400		Taiwan, Radio Taiwan Intl	5950na	15215na	
			15320as			
0300	0400	vl	Uganda, Radio	4976do	5026do	7196do
0300	0400		UK, BBC World Service	9410va	9750af	9825ca
			11835ca	11955as	12095ca	15280as
			15280as	15310as	15360as	17790as
			17760as	17790as		
0300	0400		Ukraine, Radio Ukraine Intl	7545na		
0300	0400		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
0300	0400		USA, KAIJ Dallas TX	5755va		
0300	0400		USA, KTBN Salt Lake City UT		7505na	
0300	0400		USA, KWHR Naalehu HI		17510as	
0300	0400	mtwhf	USA, Voice of America	7290af	7340af	9885af
			11705va	11725va		
0300	0400		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
0300	0400		USA, WBOH Newport NC	5920am		
0300	0400		USA, WEWN Birmingham AL	5825na	7425na	
			13615va			
0300	0400		USA, WHRA Greenbush ME	7580va		
0300	0400		USA, WHRI Noblesville IN	7315am	7535am	
0300	0400		USA, WINB Red Lion PA	9320am		
0300	0400		USA, WJIE Louisville KY	13595am		
0300	0400		USA, WMLK Bethel PA	9465eu		

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0300	0400	smtwhf	USA, WRMI Miami FL	6870na	
0300	0400		USA, WTJC Newport NC	9370na	
0300	0400		USA, WWCR Nashville TN	3210na	5070na
			5770na 5935na		
0300	0400		USA, WWRB Manchester TN	5050na	5085na
			5745na 6890na		
0300	0400		USA, WYFR Okeechobee FL	6065na	9505va
			11740na		
0300	0400		Zambia, Radio 4910do		
0300	0400		Zambia, Radio Christian Voice	4965af	
0300	0400	vl	Zimbabwe, ZBC Corp	5975do	
0330	0357		Czech Rep, Radio Prague Intl	11600va	15600va
0330	0358		Vietnam, Voice of 6175ca		
0330	0400		UK, BBC World Service	3255af	6005af
			6190af 7120af 7160af	12035af	15420af
0345	0400		Tajikistan, Radio 7245sirr		

0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400	0415		Israel, Kol Israel 9435va	11590va	17600va
0400	0430		Belgium, Radio Vlaanderen Intl	11635na	
0400	0430	vl	Croatia, Croatian Radio	9480na	12105va
			12110va		
0400	0430		France, Radio France Intl	9550af	9805af
			11955af 13610af		
0400	0430		Sri Lanka, SLBC 6005as	11905as	15745as
0400	0430	mtwhf	USA, Voice of America	4960af	6080af
			7290af 9575af 9885af	12080af	17895af
0400	0455		Romania, Radio Romania Intl	11820na	15140na
			15235na 17860na		
0400	0457	DRM/as	Netherlands, Radio 15400au		
0400	0453		New Zealand, Radio NZ Intl	17675pa	
0400	0459		Germany, Deutsche Welle	7225af	9630a:
			9710af 11945af		
0400	0500		Anguilla, Caribbean Beacon	6090am	
0400	0500		Australia, ABC NT Alice Springs	2310sirr	4835do
0400	0500		Australia, ABC NT Katherine	5025do	
0400	0500		Australia, ABC NT Tennant Creek	4910do	
0400	0500		Australia, Radio 9660pa	12080va	13630pa
			15240pa 15515va	17750as	21725as
0400	0500		Canada, CBC Northern Service	9625do	
0400	0500		Canada, CFRX Toronto ON	6070do	
0400	0500		Canada, CKZN St John's NF	6160do	
0400	0500		Canada, CKZU Vancouver BC	6160do	
0400	0500		China, China Radio Intl	6190am	9560am
			9755am 17490am	17650am	
0400	0500		Costa Rica, University Network	5030am	6150am
			7375am 9725sa		
0400	0500		Cuba, Radio Havana	6000na	9820na
0400	0500		Guyana, Voice of 3290do		
0400	0500		Malaysia, Radio Malaysia	7295do	
0400	0500		Malaysia, Voice of 6175as	9750as	15295cs
0400	0500		Namibia, Namibian BC Corp	3270af	3290af
			6090af		
0400	0500		Netherlands, Radio 6165na	9590na	
0400	0500		Russia, Voice of 7300na	9665na	15595ra
			17660na		
0400	0500		Sierra Leone, Radio UNAMSIL	6137af	
0400	0500		Singapore, Mediacorp Radio	6150do	
0400	0500	vl	Solomon Islands, SIBC	5020do	9545do
0400	0500	vl	Uganda, Radio 4976do	5026do	7196do
0400	0500		UK, BBC World Service	3255af	5975ca
			6005af 6190af 6195eu	7120af	7160af
			9410va 11760me	11835ca	12035af
			12095va 15280as	15310as	15360as
			15420af 15575me	17760as	17790as
			21660as		
0400	0500		USA, AFRTS 4319usb	5446usb	5765usb
			6350usb 7507usb	10320usb	12133usb
			13362usb		
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	9620va	11695va
0400	0500		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
0400	0500		USA, WBOH Newport NC	5920am	
0400	0500		USA, WEWN Birmingham AL	5825na	7425na
			13615va		
0400	0500		USA, WHRA Greenbush ME	7580va	
0400	0500		USA, WHRI Noblesville IN	7315am	7535am
0400	0500		USA, WJIE Louisville KY	7490am	13595am
0400	0500		USA, WRMI Miami FL	6870na	
0400	0500		USA, WTJC Newport NC	9370na	
0400	0500		USA, WWCR Nashville TN	3210na	5070na
			5770na 5935na		
0400	0500		USA, WWRB Manchester TN	5050na	5085na
			5745na 6890na		
0400	0500		USA, WYFR Okeechobee FL	6855va	7355va
			9715na		

0400	0500		Zambia, Radio 4910do		
0400	0500		Zambia, Radio Christian Voice	4965af	
0400	0500	vl	Zimbabwe, ZBC Corp	5975do	
0415	0420	mtwhf	Kyrgyzstan, Radio Kyrgyz	4010sirr	4795sirr
0430	0500		Nigeria, Radio/Enugu	6025do	
0430	0500		Nigeria, Radio/Ibadan	6050do	
0430	0500		Nigeria, Radio/Kaduna	4770do	6090do
0430	0500		Nigeria, Radio/Lagos	3326dc	4990do
0430	0500		Serbia & Montenegro, Intl Radio	9580va	
0430	0500		Swaziland, TWR 4775af	6120af	
0430	0500	mtwhf	USA, Voice of America	4960af	6080af
			7290af 9575af 11835af	12080af	17895af
0445	0500		Italy, RAI Intl	6110af	7235af
0459	0500		New Zealand, Radio NZ Intl	11820pa	

0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500	0530		France, Radio France Intl	11850a:	13610af
			15155af		
0500	0530		UK, BBC World Service	6005af	6190af
			7160af 11765af 11940af	11955as	15280as
			15310as 15360as	15420af	17640af
			17760me 17790as	17885a-	21660as
0500	0530		Vatican City, Vatican Radio	9660af	11625af
			13765af		
0500	0559		Germany, Deutsche Welle	9630af	9700af
			12045af 15410af	17860am	
0500	0600		Anguilla, Caribbean Beacon	6090am	
0500	0600		Australia, ABC NT Alice Springs	2310sirr	4835do
0500	0600		Australia, ABC NT Katherine	5025do	
0500	0600		Australia, ABC NT Tennant Creek	4910do	
0500	0600		Australia, Radio 9660pa	12080va	13630pa
			15160pa 15240as	15415va	15515as
			17750as 21725as		
0500	0600		Canada, CBC Northern Service	9625do	
0500	0600		Canada, CFRX Toronto ON	6070do	
0500	0600		Canada, CKZN St John's NF	6160do	
0500	0600		Canada, CKZU Vancouver BC	6160do	
0500	0600		China, China Radio Intl	9560am	9755na
			11760am 17490am	17650am	
0500	0600		Costa Rica, University Network	5030am	6150am
			7375am 9725sa		
0500	0600		Cuba, Radio Havana	9820pa	9550ca
0500	0600		Guyana, Voice of 3290do		
0500	0600		Japan, Radio 5975va	6110na	7230va
			15195va 17810va	21755va	
0500	0600		Malaysia, Radio Malaysia	7295do	
0500	0600		Malaysia, Voice of 6175as	9750as	15295as
0500	0600		Namibia, Namibian BC Corp	6060af	6175af
0500	0600		New Zealand, Radio NZ Intl	11820pa	
0500	0600		Nigeria, Radio/Enugu	6025do	
0500	0600		Nigeria, Radio/Ibadan	6050do	
0500	0600		Nigeria, Radio/Kaduna	4770do	6090do
0500	0600		Nigeria, Radio/Lagos	3326do	4990do
0500	0600		Nigeria, Voice of 7255af	15120af	
0500	0600		Russia, Voice of 21790pa		
0500	0600		Sierra Leone, Radio UNAMSIL	6137af	
0500	0600		Singapore, Mediacorp Radio	6150do	
0500	0600	vl	Solomon Islands, SIBC	5020do	9545do
0500	0600		South Africa, Channel Africa	7210af	9770af
0500	0600		Swaziland, TWR 6120af	7205af	9500af
0500	0600	vl	Uganda, Radio 4976do	5026do	7196do
0500	0600		UK, BBC World Service	9410me	11760me
			15565me 15575me		
0500	0600		USA, AFRTS 4319usb	5446usb	5765usb
			6350usb 7507usb	10320usb	12133usb
			13362usb		
0500	0600		USA, KAIJ Dallas TX 5755va		
0500	0600		USA, KTBN Salt Lake City UT	7505na	
0500	0600		USA, KWHR Naalehu HI	11565as	17780as
0500	0600	mtwhf	USA, Voice of America	6035af	6080af
			6180af 7290af 12080af		
0500	0600		USA, WBCQ Kennebunk ME	5105na	7415na
0500	0600		USA, WBOH Newport NC	5920am	
0500	0600		USA, WEWN Birmingham AL	5825na	7425na
			13615va		
0500	0600		USA, WHRA Greenbush ME	11730na	
0500	0600		USA, WHRI Noblesville IN	7315am	7535am
0500	0600		USA, WJIE Louisville KY	7490am	13595am
0500	0600		USA, WMLK Bethel PA	9465eu	
0500	0600	smtwhf	USA, WRMI Miami FL	6870na	
0500	0600		USA, WTJC Newport NC	9370na	
0500	0600		USA, WWCR Nashville TN	3210na	5070na
			5770na 5935na		
0500	0600		USA, WYFR Okeechobee FL	6855va	9355eu
0500	0600		Zambia, Radio Christian Voice	9865af	
0500	0600	vl	Zimbabwe, ZBC Corp	5975do	
0505	0530	s	Austria, Radio Austria Intl	17870me	

Shortwave Guide



0515	0525		Rwanda, Radio	6005do		
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915do	
0530	0600		Serbia & Montenegro, Intl Radio	9580va		
0530	0600		Thailand, Radio	21795eu		
0530	0600		UAE, Radio Dubai	15435va	17830va	21700va
0530	0600		UK, BBC World Service	6005af	6190af	
			7160af 11765af	11940af	11955as	15310as
			15360as	15420af	17640af	17760as
			17790as	21660as		
0535	0600	s	Austria, Radio Austria Intl	17870me		

0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600	0620		Vatican City, Vatican Radio	4005eu	5890eu	
			7250eu			
0600	0630	vl	Croatia, Croatian Radio	9480na	12105va	
			12110va			
0600	0630		France, Radio France Intl	11665as	11725as	
			15155as	17800as	21620as	
0600	0630		Swaziland, TWR	6120af	7205af	9500af
0600	0630	mtwhf	USA, Voice of America	6035af	6180af	
			12080af			
0600	0659		Germany, Deutsche Welle	7170af	15275af	
			17860af	21675af		
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	11880pa	12080va
			13605pa	13630pa	15160pa	15240as
			15415va	15515va	17750as	
0600	0700		Canada, CFRX Toronto ON	6070do		
0600	0700		Canada, CFVP Calgary AB	6030do		
0600	0700		Canada, CKZN St John's NF	6160do		
0600	0700		Canada, CKZU Vancouver BC	6160do		
0600	0700		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870sa	
0600	0700		Cuba, Radio Havana	9550ca	9655pa	
			9820pa			
0600	0700		Germany, Deutsche Welle	6140eu		
0600	0700		Germany, Overcomer Ministries	6110eu		
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do	
0600	0700		Guyana, Voice of	3290do		
0600	0700		Japan, Radio	7230va	11715va	11740va
			11690va	11760va	13630va	15195va
			17870va	21755va		
0600	0700		Liberia, ELWA	4760do		
0600	0700		Malaysia, Radio Malaysia	7295do		
0600	0700		Malaysia, Voice of	6175as		
0600	0700		Namibia, Namibian BC Corp	6060af	6175al	
0600	0700		New Zealand, Radio NZ Intl	11820pa		
0600	0700		Nigeria, Radio/Enugu	6025do		
0600	0700		Nigeria, Radio/Ibadan	6050do		
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do	
0600	0700		Nigeria, Radio/Lagos	3326do	4990do	
0600	0700		Nigeria, Voice of	7255af	15120af	
0600	0700		Papua New Guinea, NBC	4890do		
0600	0700		Russia, Voice of	21790pa		
0600	0700		Sierra Leone, Radio UNAMSIL	6137af		
0600	0700	vl	Singapore, Mediacorp Radio	6150do		
0600	0700		Solomon Islands, SIBC	5020do	9545do	
0600	0700		South Africa, Channel Africa	7210af	15215af	
0600	0700		UK, BBC World Service	6005af	6190af	
			7160af 9410eu	11760af	11940af	12095eu
			15485eu	15545af	15565me	15575me
			17640af			
0600	0700	as	UK, BBC World Service	17885af		
0600	0700		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
0600	0700		USA, KAIJ Dallas TX	5755va		
0600	0700		USA, KTBN Salt Lake City UT	7505na		
0600	0700		USA, KWHR Naalehu HI	11565as	17780as	
0600	0700		USA, Voice of America	6080af	7290af	
0600	0700		USA, WBCQ Kennebunk ME	5105na	7415na	
0600	0700		USA, WBOH Newport NC	5920am		
0600	0700		USA, WEWN Birmingham AL	5825na	7425na	
			7580va	13615na		
0600	0700		USA, WHRA Greenbush ME	11730na		
0600	0700		USA, WHRI Noblesville IN	7315am	7535am	
0600	0700		USA, WJIE Louisville KY	7490am	13595am	
0600	0700		USA, WMLK Bethel PA	9465eu		
0600	0700	smtwhf	USA, WRMI Miami FL	6870na		
0600	0700		USA, WTJC Newport NC	9370na		
0600	0700		USA, WWCR Nashville TN	3210na	5070na	
			5770na	5935na		
0600	0700		USA, WYFR Okeechobee FL	7355eu	11530eu	
			11580eu			
0600	0700	vl	Vanuatu, Radio	4960do	7260do	

0600	0700		Yemen, Rep of Yemen Radio	9780me		
0600	0700		Zambia, Radio Christian Voice	9865af		
0600	0700	vl	Zimbabwe, ZBC Corp	5975do		
0630	0700		Bulgaria, Radio	11600eu	13600eu	
0630	0700	vl	Georgia, Radio Georgia	11805eu		
0630	0700		Swaziland, TWR	7205af	9500af	
0630	0700		Vatican City, Vatican Radio	5890va	11625af	
			13765af	13795af	15570af	15595af
0645	0700	as	Albania, TWR	11865eu		
0645	0700	as	Monaco, TWR	9870eu		

0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700	0705		New Zealand, Radio NZ Intl	11820pa		
0700	0715		Israel, Kol Israel	11590va	11620va	17600va
0700	0720		UK, BBC World Service	6190af	11765af	
			11940af	15400af		
0700	0720	as	UK, BBC World Service	17885af		
0700	0726		Romania, Radio Romania Intl	11830na	15150na	
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu	
0700	0730		Belgium, Radio Vlaanderen Intl	5985eu		
0700	0730		Slovakia, Radio Slovakia Intl	9440	oc	15460
			oc			
0700	0730	a	Tibet, Xizang PBS	6110as	9490as	9580as
0700	0730		UK, BBC World Service	15565me	15575me	
0700	0750	as	Albania, TWR	11865eu		
0700	0750	as	Monaco, TWR	9870eu		
0700	0800		Anguilla, Caribbean Beacon	6090am		
0700	0800		Australia, ABC NT Alice Springs	2310irr	4835do	
0700	0800		Australia, ABC NT Katherine	5025do		
0700	0800		Australia, ABC NT Tennant Creek	4910do		
0700	0800		Australia, HCJB	11750pa		
0700	0800		Australia, Radio	9580pa	9660pa	11880pa
			12080va	13630pa	15160pa	15240as
			15415va	15515as	17750as	
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, University Network	5030am	6150am	
			7375am	9725sa	11870sa	
0700	0800		Eq Guinea, Radio Africa	15184af		
0700	0800		France, Radio France Intl	15605af		
0700	0800		Germany, Deutsche Welle	6140eu	21675af	
0700	0800	DRM	Germany, Deutsche Welle	21675eu		
0700	0800		Germany, Overcomer Ministries	6110eu		
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do	
0700	0800		Guyana, Voice of	3290do	5950do	
0700	0800	vl/as	Italy, IRRS	13840va		
0700	0800		Liberia, ELWA	4760do		
0700	0800		Malaysia, Radio Malaysia	7295do		
0700	0800		Malaysia, Voice of	6175as	9750as	
0700	0800		Myanmar, Radio	9730do		
0700	0800		Nigeria, Radio Enugu	6025do		
0700	0800		Nigeria, Radio/Ibadan	6050do		
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do	
0700	0800		Nigeria, Radio/Lagos	3326do	4990do	
0700	0800		Nigeria, Voice of	7255af	15120af	
0700	0800		Papua New Guinea, NBC	4890do		
0700	0800		Russia, Voice of	17495pa	17525pa	17635pa
			21790pa			
0700	0800		Sierra Leone, Radio UNAMSIL	6137af		
0700	0800		Singapore, Mediacorp Radio	6150do		
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do	
0700	0800		South Africa, Channel Africa	11825af		
0700	0800		Swaziland, TWR	7205af	9500af	
0700	0800		Taiwan, Radio Taiwan Intl	5950na		
0700	0800		UK, BBC World Service	11955as	15310as	
			15360as	15545af	17760as	17790as
			21660as			
0700	0800		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
0700	0800		USA, KAIJ Dallas TX	5755va		
0700	0800		USA, KTBN Salt Lake City UT	7505na		
0700	0800		USA, KWHR Naalehu HI	11565as	17780as	
0700	0800		USA, WBCQ Kennebunk ME	5105na	7415na	
0700	0800		USA, WBOH Newport NC	5920am		
0700	0800		USA, WEWN Birmingham AL	5825na	7425na	
			7580na	11875va		
0700	0800		USA, WHRA Greenbush ME	11730na		
0700	0800		USA, WHRI Noblesville IN	7315am	7535am	
0700	0800		USA, WMLK Bethel PA	9465eu		
0700	0800		USA, WRMI Miami FL	6870na		
0700	0800	mtwhf	USA, WTJC Newport NC	9370na		
0700	0800		USA, WWCR Nashville TN	3210na	5070na	
			5770na	5935na		
0700	0800		USA, WYFR Okeechobee FL	7355eu	11530eu	
			11580eu			
0700	0800	vl	Vanuatu, Radio	4960do	7260do	

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0700	0800		Zambia, Radio Christian Voice	9865af		
0706	0800		New Zealand, Radio NZ Intl	9885pa		
0715	0800	mtwhf	Albania, TWR	11865eu		
0715	0800	mtwhf	Monaco, TWR	9870eu		
0720	0800		UK, BBC World Service	6190af	11765af	
			11940af	15400af		
0730	0745		Vatican City, Vatican Radio	4005va	5890va	
			6185va	7250va	9645va	11740va
			15595va			
0730	0800		Georgia, Radio Georgia		11910eu	
0730	0800	as	Guam, TWR/KTWR	15205as		
0730	0800	as	UK, BBC World Service	15575me	17885af	
0730	0800	mtwhf	UK, BBC World Service	11760me	15665me	
0740	0800	mtwhf	Guam, TWR/KTWR	11840as	15205as	
0755	0800	s	Monaco, TWR	9870eu		

0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0820	srmtwhf	Albania, TWR	11865eu		
0800	0820	mtwhfs	Monaco, TWR	9870eu		
0800	0830		Australia, ABC NT Katherine	5025do		
0800	0830		Australia, ABC NT Tennant Creek	4910do		
0800	0830		Malaysia, Voice of	6175as	9750as	
0800	0830		Myanmar, Radio	9730do		
0800	0900		Anguilla, Caribbean Beacon	6090am		
0800	0900		Australia, ABC NT Alice Springs	2310irr	4835do	
0800	0900		Australia, HCJB	11750pa		
0800	0900		Australia, Radio	5995pa	9580va	9590as
			9710pa	12080va	13630pa	15415as
			15515va	17750as		
0800	0900		Canada, CFRX Toronto ON	6070do		
0800	0900		Canada, CFVP Calgary AB	6030do		
0800	0900		Canada, CKZN St John's NF	6160do		
0800	0900		Canada, CKZU Vancouver BC	6160do		
0800	0900		Costa Rica, University Network	5030am	6150am	
			7375am	9725sc	11870sa	
0800	0900		Eqt Guinea, Radio Africa	15184af		
0800	0900		Germany, Deutsche Welle	6140eu	21675af	
0800	0900	DRM	Germany, Deutsche Welle	21675af		
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do	
0800	0900	as	Guam, TWR/KTWR	15205as	15330as	
0800	0900	mtwhf	Guam, TWR/KTWR	11840as		
0800	0900		Guyana, Voice of	3290do	5950do	
0800	0900		Indonesia, Voice of	9525as	11785as	15150al
0800	0900	vl/as	Italy, IRRS	13840va		
0800	0900		Liberia, ELWA	4760do		
0800	0900		Malaysia, Radio Malaysia	7295do		
0800	0900		New Zealand, Radio NZ Intl	9885pa		
0800	0900		Nigeria, Radio Enugu	6025do		
0800	0900		Nigeria, Radio/Ibadan	6050do		
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do	
0800	0900		Nigeria, Radio/Lagos	3326do	4990dc	
0800	0900		Nigeria, Voice of	7255af	15120af	
0800	0900	vl	Pakistan, Radio	15100eu	17835eu	
0800	0900		Papua New Guinea, Cath Radio	Network	4960va	
0800	0900		Papua New Guinea, NBC	4890do		
0800	0900		Russia, Voice of	17495pa	17635pa	
			21790pa			
0800	0900		Sierra Leone, Radio UNAMSIL	6137af		
0800	0900		Singapore, Mediacorp Radio	6150do		
0800	0900	vl	Salomon Islands, SIBC	5020do	9545do	
0800	0900		South Korea, Radio Korea Intl	13670eu		
0800	0900		Swaziland, TWR	7205af	9500af	
0800	0900		Taiwan, Radio Taiwan Intl	9610au		
0800	0900		UK, BBC World Service	6190af	11760me	
			11955as	12095eu	15310as	15360as
			15400af	15485eu	15565me	15575me
			17760as	17790as	17830af	21470af
			21660as			
0800	0900		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
0800	0900		USA, KAIJ Dallas TX	5755va		
0800	0900		USA, KNLS Anchor Point AK	11765as		
0800	0900		USA, KTBN Salt Lake City UT	7505na		
0800	0900		USA, KWHR Naalehu HI	11565as	17780as	
0800	0900		USA, WBCQ Kennebunk ME	5105na	7415na	
0800	0900		USA, WBOH Newport NC	5920am		
0800	0900		USA, WEWN Birmingham AL	5825na	7425na	
			7580na	11875va		
0800	0900		USA, WHRI Noblesville IN	7315am	7535am	
0800	0900		USA, WJIE Louisville KY	7490am	13595am	
0800	0900		USA, WMLK Bethel PA	9465eu		
0800	0900	smtwhf	USA, WRMI Miami FL	6870na		
0800	0900		USA, WTJC Newport NC	9370na		
0800	0900		USA, WWCR Nashville TN	3210na	5070na	
			5770na	5935na		
0800	0900		USA, WYFR Okeechobee FL	5950af	9930cf	
0800	0900	vl	Vanuatu, Radio	4960do	7260do	

0800	0900		Zambia, Radio Christian Voice	9865af		
0830	0850		Bangladesh, Bangla Belar	7185as	9550as	
0830	0900		Australia, ABC NT Katherine	2485do		
0830	0900		Australia, ABC NT Tennant Creek	2325do		
0830	0900		Georgia, Radio Georgia	11910eu		
0830	0900		Lithuania, Radio Vilnius	9710eu		

0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do	
0900	0929		Czech Rep, Radio Prague Intl	21745va		
0900	0930		Guam, TWR/KTWR	11840as		
0900	0930		Russia, Radio Ezra	17590va		
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	9590as	11880as
			12080va	13630pa	15415as	
0900	1000		Australia, Voice Intl	11955as	13685as	
0900	1000		Canada, CFRX Toronto ON	6070do		
0900	1000		Canada, CFVP Calgary AB	6030do		
0900	1000		Canada, CKZN St John's NF	6160do		
0900	1000		Canada, CKZU Vancouver BC	6160do		
0900	1000		China, China Radio Intl	15210pa	17490va	
			17690va			
0900	1000		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
0900	1000		Eqt Guinea, Radio Africa	15184af		
0900	1000	DRM/ m-f	Germany, Deutsche Welle	15440af	17700af	
0900	1000		Germany, Deutsche Welle	6140eu	21675af	
0900	1000		Guyana, Voice of	3290do	5950do	
0900	1000	vl/as	Italy, IRRS	13840va		
0900	1000		Malaysia, Radio Malaysia	7295do		
0900	1000		Malaysia, Voice of	15295as		
0900	1000	DRM	Netherlands, Radio	9815eu		
0900	1000		New Zealand, Radio NZ Intl	9885pa		
0900	1000		Nigeria, Radio Enugu	6025do		
0900	1000		Nigeria, Radio/Ibadan	6050do		
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do	
0900	1000		Nigeria, Radio/Lagos	3326do	4990do	
0900	1000		Nigeria, Voice of	7255af	15120af	
0900	1000	vl	Pakistan, Radio	15100eu	17835eu	
0900	1000		Palau, KHBN	15725as		
0900	1000		Papua New Guinea, Cath Radio	Network	4960va	
0900	1000		Papua New Guinea, NBC	4890do		
0900	1000		Singapore, Mediacorp Radio	6150do		
0900	1000	vl	Solomon Islands, SIBC	5020do	9545do	
0900	1000	s	UAE, Radio UNMEE	21460af		
0900	1000		UK, BBC World Service	6195as	9605as	
			9740as	11760me	12095eu	15190ca
			15360as	15485eu	15575me	17640me
			17760as	17790as	21660as	
0900	1000		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
0900	1000		USA, KAIJ Dallas TX	5755va		
0900	1000		USA, KTBN Salt Lake City UT	7505na		
0900	1000		USA, KWHR Naalehu HI	11565as	17780as	
0900	1000		USA, WBCQ Kennebunk ME	5105na	7415na	
0900	1000		USA, WBOH Newport NC	5920am		
0900	1000		USA, WEWN Birmingham AL	5825na	7425na	
			7580na	11875va		
0900	1000		USA, WHRA Greenbush ME	11730na		
0900	1000		USA, WHRI Noblesville IN	7315am	7535am	
0900	1000		USA, WJIE Louisville KY	7490am	13595am	
0900	1000		USA, WRMI Miami FL	6870na		
0900	1000		USA, WTJC Newport NC	9370na		
0900	1000		USA, WWCR Nashville TN	3210na	5070na	
			5770na	5935na		
0900	1000		USA, WYFR Okeechobee FL	5950na	9930cf	
0900	1000	vl	Vanuatu, Radio	4960do	7260do	
0910	0930	s	Zambia, Radio Christian Voice	9865af		
0930	1000		Armenia, Voice of	4810eu	15270as	
0930	1000		Georgia, Radio Georgia	11910me		
0930	1000	smwhfa	Greece, Voice of	9420eu	15630eu	15650af

1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1029		Germany, Deutsche Welle	15190as	15350as	
			17820as			
1000	1030		Guam, AWR/KSDA	11560as	11930as	
1000	1030		Mongolia, Voice of	12085as		
1000	1030		UK, BBC World Service	6195as	9605as	
			9740as	15310as	15360as	15360as
			17790as	21660as	15360as	17760as
1000	1059		New Zealand, Radio NZ Intl	9885pa		

Shortwave Guide

1000	1100		Anguilla, Caribbean Beacon	11775am		1100	1200		Anguilla, Caribbean Beacon	11775am		
1000	1100		Australia, ABC NT Alice Springs	2310da	4835irr	1100	1200		Australia, ABC NT Alice Springs	2310da	4835irr	
1000	1100		Australia, ABC NT Katherine	2485do		1100	1200		Australia, ABC NT Katherine	2485do		
1000	1100		Australia, ABC NT Tennant Creek	2325do		1100	1200		Australia, ABC NT Tennant Creek	2325do		
1000	1100		Australia, HCJB	11750pa		1100	1200		Australia, HCJB	15425as		
1000	1100		Australia, Radio	5995pa	6020pa	6035va	1100	1200	Australia, Radio	5995pa	6020pa	6035va
			9475as	9560as	9580va	9590as	1100	1200	9475as	9560as	9580va	9590as
			12080as	13630pa					12080as			
1000	1100		Australia, Voice Intl	11955as	13685as		1100	1200	Australia, Voice Intl	13685as		
1000	1100		Canada, CFRX Toronto ON	6070do		1100	1200		Canada, CFRX Toronto ON	6070do		
1000	1100		Canada, CFVP Calgary AB	6030do		1100	1200		Canada, CFVP Calgary AB	6030do		
1000	1100		Canada, CKZN St John's NF	6160do		1100	1200		Canada, CKZN St John's NF	6160do		
1000	1100		Canada, CKZU Vancouver BC	6160do		1100	1200		Canada, CKZU Vancouver BC	6160do		
1000	1100		China, China Radio Intl	6040na	17490va	1100	1200		China, China Radio Intl	6040am	11750ca	
			17690va						17490am	17650am		
1000	1100		Costa Rica, University Network	5030am	6150am	1100	1200		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na			7375am	9725sa	11870am	
1000	1100		Eqt Guinea, Radio Africa	15184af		1100	1200		Ecuador, HCJB	12005va	21455am	
1000	1100	DRM/ m-f	Germany, Deutsche Welle	15440eu	17700eu	1100	1200		Germany, Deutsche Welle	15105as	17820as	
1000	1100		Guyana, Voice of	3290do	5950do				Germany, Deutsche Welle	21650as	21820as	
1000	1100		India, All India Radio	13695as	15020as	1100	1200	DRM	India, All India Radio	15260as	15410as	17510au
			15260as	15410as	17510au	17800as			Italy, IRRS	13840va		
			17895as						Italy, IRRS	15665af		
1000	1100	vl/as	Italy, IRRS	13840va		1100	1200	f	Japan, Radio	6120ca	9695as	11730as
1000	1100		Japan, Radio	6120ca	9695as	11730as			17585eu	17720va		
			17585eu	17720va					Libya, Voice of Africa	21695af	15610af	17695af
1000	1100	vl	Libya, Voice of Africa	21695af		1100	1200	vl	Malaysia, Radio Malaysia	7295do		
1000	1100		Malaysia, Radio Malaysia	7295do		1100	1200		Malaysia, Voice of	15295as		
1000	1100		Malaysia, Voice of	15295as		1100	1200		Netherlands, Radio	9815eu		
1000	1100	DRM	Netherlands, Radio	9815eu		1100	1200		Netherlands, Radio	11675na		
1000	1100		Netherlands, Radio	9785au	12065as	13710as			New Zealand, Radio NZ Intl	9885pa		
			13820as						Papua New Guinea, Cath Radio	4960va		
1000	1100		Nigeria, Voice of	7255af	15120af		1100	1200	Papua New Guinea, NBC	4890do		
1000	1100		North Korea, Voice of	11735na	13650as	15180as	1100	1200	Singapore, Radio Singapore Intl	6080as	6150as	
			11735na	13650as	15180as				South Africa, Channel Africa	11825af		
1000	1100		Palau, KHBN	15725as		1100	1200		Taiwan, Radio Taiwan Intl	7445as		
1000	1100		Papua New Guinea, Cath Radio	4960va		1100	1200		UK, BBC World Service	6195va	9740as	
1000	1100		Papua New Guinea, NBC	4890do		1100	1200		12095eu	15310as	15485eu	
1000	1100		Singapore, Mediacorp Radio	6150do		1100	1200		17790as			
1000	1100	vl	Solomon Islands, SIBC	5020do	9545do		1100	1200	Ukraine, Radio Ukraine Intl	15415eu		
1000	1100		South Africa, Channel Africa	11825af		1100	1200		USA, AFRTS	4319usb	5446usb	5765usb
1000	1100		UK, BBC World Service	6190af	11940af				6350usb	7507usb	10320usb	12133usb
			12095eu	15485eu	17885af	21470af			13362usb			
1000	1100	as	UK, BBC World Service	15190ca	15400af				USA, KAIJ Dallas TX	5755va		
			17830af						USA, KATB Salt Lake City UT	7505na		
1000	1100	DRM/ m	UK, Christian Voice	9760eu		1100	1200		USA, KWHR Naalehu HI	9930as	11565as	
1000	1100		USA, AFRTS	4319usb	5446usb	5765usb			USA, WBCQ Kennebunk ME	5105na		
			6350usb	7507usb	10320usb	12133usb			USA, WBOH Newport NC	5920am		
			13362usb						USA, WEWN Birmingham AL	7425na	7520na	
1000	1100		USA, KAIJ Dallas TX	5755va					11875na			
1000	1100		USA, KATB Salt Lake City UT	7505na		1100	1200		USA, WHRI Noblesville IN	7315am	7535am	
1000	1100		USA, KWHR Naalehu HI	9930as	11565as		1100	1200	USA, WINB Red Lion PA	9320am		
1000	1100		USA, WBCQ Kennebunk ME	5105na		1100	1200		USA, WJIE Louisville KY	7490am	13595am	
1000	1100		USA, WBOH Newport NC	5920am		1100	1200		USA, WRMI Miami FL	9955am		
1000	1100		USA, WEWN Birmingham AL	7425na	7520na		1100	1200	USA, WTJC Newport NC	9370na		
			11875na				1100	1200	USA, WWCR Nashville TN	5070na	5935na	
1000	1100		USA, WHRI Noblesville IN	7315am	7535am				15825na			
1000	1100		USA, WINB Red Lion PA	9320am		1100	1200		USA, WYFR Okeechobee FL	5850na	5950na	
1000	1100		USA, WJIE Louisville KY	7490am	13595am				6015na	6155na	7355na	
1000	1100		USA, WRMI Miami FL	9955am					11855na			
1000	1100		USA, WTJC Newport NC	9370na		1100	1200		Zambia, Radio Christian Voice	9865af		
1000	1100		USA, WWCR Nashville TN	5070na	5935na	1130	1200		Belgium, Radio Vlaanderen Intl	9940as		
			15825na			1130	1200		Bulgaria, Radio	11700eu	15700eu	
1000	1100		USA, WYFR Okeechobee FL	5950na	9755sa		1130	1200	UK, BBC World Service	6190af	11940af	
1000	1100	vl	Vanuatu, Radio	4960do					15190ca	17830af	21470af	
1000	1100		Zambia, Radio Christian Voice	9865af		1130	1200	f	Vatican City, Vatican Radio	15595va	17515va	
1010	1020		Israel, Kol Israel	15640va	17535va	1145	1155		Rwanda, Radio	6055do		
1015	1100		Guam, TWR/KTWR	9865as								
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9704do						
1030	1057		Czech Rep, Radio Prague Intl	9880eu	11615eu							
1030	1100	mt hfa	Guam, AWR/KSDA	11900as								
1030	1100		Iran, Voice of the Islamic Rep	15600as	17660as							
1030	1100		UAE, Radio Dubai	13675va	15370va	15395va						
			21605eu									
1030	1100	t	UAE, Radio UNMEE	21550af								
1030	1100		UK, BBC World Service	6195as	9740as							
			15310as	17790as								
1030	1100		Vatican City, Vatican Radio	5890eu								

1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1104	vl	Pakistan, Radio	15100eu	17835eu	
1100	1115	mtwhf/vl	Vanuatu, Radio	4960do	7260do	
1100	1127		Iran, Voice of the Islamic Rep	15600as	17660as	
1100	1128		Vietnam, Voice of	7285as		
1100	1130		Tibet, Xizang PBS	4920as	6110as	9490as
1100	1130	t	UAE, Radio UNMEE	21550af		
1100	1130		UK, BBC World Service	6190af	11940af	
			15190ca	15400af	17790ca	17830af
			17885af	21470af		

1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

1200	1215	vl	Cambodia, National Radio	11940as		
1200	1230		Australia, HCJB	15425as		
1200	1230		France, Radio France Intl	17815af	25820af	
1200	1230	vl	Libya, Voice of Africa	15610af	17695af	
			21675af	21695af		
1200	1230		Malaysia, Voice of	15295as		
1200	1230		UAE, AWR Africa	15135as		
1200	1230		Uzbekistan, Radio Tashkent Intl	7285as	9715as	
			15295as	17775as		
1200	1259		Canada, Radio Canada Intl	9660am	15190as	
			13655am	15190as		
1200	1259		New Zealand, Radio NZ Intl	9885pa		
1200	1259		Poland, Radio Polonia	9525eu	11820eu	
1200	1300		Anguilla, Caribbean Beacon	11775am		
1200	1300		Australia, ABC NT Alice Springs	2310do	4835irr	
1200	1300		Australia, ABC NT Katherine	2485do		
1200	1300		Australia, ABC NT Tennant Creek	2325do		
1200	1300		Australia, Radio	5995pa	6020pa	6035va
			9475as	9560as	9580as	9590as
			11880as			

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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, China Radio Intl	9730as	9795va	
			11760pa	11980pa	15415as	17490va
			17650va			
1200	1300		Costa Rica, University Network	9725am	11870am	
			13750am			
1200	1300	DRM	Ecuador, HCJB	12005va	21455am	
1200	1300		Germany, Deutsche Welle	9655eu	15440eu	
1200	1300		Malaysia, Radio Malaysia	7295do		
1200	1300		Papua New Guinea, Cath Radio Network		4960va	
1200	1300		Papua New Guinea, NBC	4890do		
1200	1300		Singapore, Radio Singapore Intl	6080as	6150as	
1200	1300		South Korea, Radio Korea Intl	9650ca		
1200	1300		Taiwan, Radio Taiwan Intl	7130as		
1200	1300		UK, BBC World Service	6195va	9740as	
			12095eu	15190ca	15310as	15485eu
			17760as	17790as		
1200	1300		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
1200	1300		USA, KAJI Dallas TX	13815va		
1200	1300		USA, KTBN Salt Lake City UT	7505na		
1200	1300		USA, KWHR Naalehu HI	9930as	11565as	
1200	1300		USA, Voice of America	6160va	9645vc	
			9760va	15240va		
1200	1300		USA, WBCQ Kennebunk ME	9330na	17495na	
1200	1300		USA, WBOH Newport NC	5920am		
1200	1300		USA, WEWN Birmingham AL	7425na	7520na	
			9355na	13615na		
1200	1300		USA, WHRI Noblesville IN	7315am	11670am	
1200	1300		USA, WINB Red Lion PA	13570am		
1200	1300		USA, WJIE Louisville KY	7490am	13595am	
1200	1300		USA, WRMI Miami FL	15725na		
1200	1300		USA, WTJC Newport NC	9370na		
1200	1300		USA, WWCN Nashville TN	7465na	9985na	
			13845na	15825na		
1200	1300		USA, WWRB Manchester TN	9320na	12170na	
1200	1300		USA, WYFR Okeechobee FL	5850na	5950na	
			6015na	6155na	13695na	17750na
1200	1300		Zambia, Radio Christian Voice	9865af		
1205	1230	mtwhf	Austria, Radio Austria Intl	6155eu	13730eu	
			17715va			
1215	1300		Egypt, Radio Cairo	17670as		
1230	1258		Vietnam, Voice of	9840va	12020va	
1230	1300		Bangladesh, Bangla Betar	7185as	9550as	
1230	1300	vl	Libya, Voice of Africa	21675af	21695af	
1230	1300		Sri Lanka, SLBC	6005as	11930as	15745as
1230	1300		Sweden, Radio	13580va	15240na	15735va
1230	1300		Thailand, Radio	9855va		
1230	1300		Turkey, Voice of	15225va	15535eu	
1230	1300	a	UK, Wales Radio Intl	17745au		
1235	1245	as	Austria, Radio Austria Intl	6155eu	13730eu	
			17715va			
1240	1255		Greece, Voice of	9420eu	9690eu	15630af
			15650af			
1245	1300		Austria, Radio Austria Intl	6155eu	13730eu	
			17715as			

1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

1300	1329	DRM	Czech Rep, Radio Prague Intl	13580eu	21745af	
1300	1330		Canada, Radio Canada Intl	9815eu		
1300	1330		Ecuador, HCJB	12005va	21455am	
1300	1330		Egypt, Radio Cairo	17670as		
1300	1330		Turkey, Voice of	15255va	15535eu	
1300	1356		Romania, Radio Romania Intl	11830eu	15105eu	
1300	1400		Anguilla, Caribbean Beacon	11775am		
1300	1400		Australia, HCJB	15405as		
1300	1400		Australia, Radio	5995pa	6020pa	9475cs
			9560as	9580va	11660as	
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		Canada, Radio Canada Intl	9515am	13655am	
			17800sa			
1300	1400		China, China Radio Intl	7405am	9570am	
			9795va	11760pa	11980as	15180as
			17490va	17650va		
1300	1400	DRM	China, China Radio Intl	7250va	11810va	
1300	1400		Costa Rica, University Network	9725am	11870am	
			13750am			

1300	1400	DRM	Germany, Deutsche Welle	9655eu	15440eu	
1300	1400		Germany, Deutsche Welle	6140eu		
1300	1400		Germany, Overcomer Ministries	6110eu	13810eu	
1300	1400		Jordan, Radio	11690eu		
1300	1400	vl	Libya, Voice of Africa	21675af	21695af	
1300	1400		Malaysia, Radio Malaysia	7295do		
1300	1400		New Zealand, Radio NZ Intl	6095pa		
1300	1400		North Korea, Voice of	4405as	9335eu	
			11710na	13760eu	15245am	
1300	1400		Papua New Guinea, Cath Radio Network		4960va	
1300	1400		Papua New Guinea, NBC	4890do		
1300	1400		Singapore, Radio Singapore Intl	6080as	6150as	
1300	1400		South Korea, Radio Korea Intl	9570as	9700as	
1300	1400		Sri Lanka, SLBC	6005as	11930as	15745as
1300	1400		UK, BBC World Service	6190af	6195va	6195va
			9740as	11940af	12095eu	15190af
			15420af	15485eu	17760as	17790as
			17830af	17885af	21470af	
1300	1400		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
1300	1400		USA, KJES Vado NM	11715na		
1300	1400		USA, KNLS Anchor Point AK	11870as		
1300	1400		USA, KTBN Salt Lake City UT	7505na		
1300	1400		USA, KWHR Naalehu HI	9930as	11565as	
1300	1400		USA, Voice of America	9645va	9760va	
1300	1400		USA, WBCQ Kennebunk ME	9330na	17495na	
1300	1400		USA, WBOH Newport NC	5920am		
1300	1400		USA, WEWN Birmingham AL	7425na	7520na	
			9355na	13615na		
1300	1400		USA, WHRA Greenbush ME	17560na		
1300	1400		USA, WHRI Noblesville IN	11670am	15105am	
1300	1400		USA, WINB Red Lion PA	13570am		
1300	1400		USA, WJIE Louisville KY	7490am	13595am	
1300	1400		USA, WRMI Miami FL	15725na		
1300	1400		USA, WTJC Newport NC	9370na		
1300	1400		USA, WWCN Nashville TN	7465na	9985na	
			13845na	15825na		
1300	1400		USA, WWRB Manchester TN	9320na	12170na	
1300	1400		USA, WYFR Okeechobee FL	6155na	11560na	
			11830as	11865as	11970na	13695na
			17750na			
1300	1400		Zambia, Radio Christian Voice	9865af		
1315	1330	a	Russia, TWP	9485eu		
1330	1400	s	Guam, AWR/KSDA	11980as		
1330	1400	mtwhfa	Guam, AWR/KSDA	15275as		
1330	1400		India, All India Radio	9690as	11620as	
			13710as			
1330	1400		Laos, National Radio	7145as		
1330	1400		Sweden, Radio	15240na	15735va	
1330	1400		Uzbekistan, Radio Tashkent Intl	7285as	9715as	
			15295as	17775as		

1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

1400	1415		Russia, FEBA	9495as		
1400	1430		Thailand, Radio	9830as		
1400	1459	as	Canada, Radio Canada Intl	9515as		
1400	1500		Anguilla, Caribbean Beacon	11775am		
1400	1500		Australia, Radio	5995pa	6080pa	7260as
			9475as	9590as	11660as	11750as
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		China, China Radio Intl	7405am	9610va	
			9795va	11675as	11765af	13685am
			13680af	15125am	17490am	17650am
1400	1500		Costa Rica, University Network	9725am	11870arr	
			13750am			
1400	1500		France, Radio France Intl	7175as	9580as	
			11610as	17515as	17620as	
1400	1500		Germany, Deutsche Welle	6140eu		
1400	1500		Germany, Overcomer Ministries	6110eu	13810eu	
1400	1500		India, All India Radio	9690as	11620as	
			13710as			
1400	1500		Japan, Radio	7200as	11730as	11840pa
1400	1500		Jordan, Radio	11690eu		
1400	1500	vl	Libya, Voice of Africa	21675af		
1400	1500		Netherlands, Radio	9890as	11835as	12075as
1400	1500		New Zealand, Radio NZ Intl	6095pa		
1400	1500		Oman, Radio	15140eu		
1400	1500	DRM	Russia, Voice of	15780va		
1400	1500		Russia, Voice of	7390as	9745as	12055as
			15605as	15780as	17645as	
1400	1500		Singapore, Mediacorp Radio	6150do		
1400	1500		South Africa, Channel Africa	11825af		
1400	1500		Sri Lanka, SLBC	6005as	11930as	15745as

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1400	1500	Taiwan, Radio Taiwan Intl	15265as						
1400	1500	UK, BBC World Service	6190af	6195as					
		7105as/9740as	11940af	12095eu	15190ca				
		15310as	15485eu	15565me	15575me				
		17790as	17830af	17885af	21470af				
		21660af							
1400	1500	USA, AFRTS	4319usb	5446usb	5765usb				
		6350usb	7507usb	10320usb	12133usb				
		13362usb							
1400	1500	USA, KJES Vada NM	11715na						
1400	1500	USA, KTBN Salt Lake City UT	7505na	15590na					
1400	1500	USA, KWHR Naalehu HI	9930as	11565as					
1400	1500	USA, Voice of America	6160va	7125va					
		9760va	15160va	15425va					
1400	1500	USA, WBCQ Kennebunk ME	7415na	9330na					
		17495na							
1400	1500	USA, WBOH Newport NC	5920am						
1400	1500	USA, WEWN Birmingham AL	7425na	7520na					
		9355na	9955na						
1400	1500	USA, WHRA Greenbush ME	17560na						
1400	1500	USA, WHRI Nablesville IN	11670am	15105am					
1400	1500	USA, WINB Red Lion PA	13570am						
1400	1500	USA, WJIE Louisville KY	7490am	13595am					
1400	1500	USA, WRMI Miami FL	15725na						
1400	1500	USA, WTJC Newport NC	9370na						
1400	1500	USA, WWCN Nashville TN	7465na	9985na					
		13845na	15825na						
1400	1500	USA, WWRB Manchester TN	9320na	12170na					
1400	1500	USA, WYFR Okeechobee FL	6155na	11560as					
		11830na	11970na						
1400	1500	Zambia, Radio Christian Voice	9865af						
1415	1430	Nepal, Radio	3230as	5005as	6100as				
		7165as							
1430	1500	Australia, HCJB	15390as						
1430	1500	Germany, Pan American BC		15650eu					
1430	1500	Myanmar, Radio	5040do	5985do					

1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

1500	1515	w s	Germany, Pan American BC	15650me					
1500	1528		Vietnam, Voice of	7285va	9840va	12020va			
1500	1530	s	Hungary, Radio Budapest	6025eu	9715eu				
1500	1530		Mongolia, Voice of	12085eu					
1500	1530		Sri Lanka, SLBC	6005as	11930as	15745as			
1500	1530		Turkmenistan, Turkmen Radio		5030as				
1500	1530		UK, BBC World Service	6190af	11860af				
			11940af	15400af	15420af	17830af			
			21470af	21490af	21660af				
1500	1557		Canada, Radio Canada Intl	15455as	17720as				
1500	1559	as	Canada, Radio Canada Intl	9515am	13655am				
			17800am						
1500	1600		Anguilla, Caribbean Beacon		11775am				
1500	1600		Australia, HCJB	15390as					
1500	1600		Australia, Radio	5995pa	6080pa	7260as			
			9475as/9590as	9805as	11660as	11750as			
1500	1600		Canada, CBC Northern Service	9625do					
1500	1600		Canada, CFRX Toronto ON	6070do					
1500	1600		Canada, CFVP Calgary AB	6030do					
1500	1600		Canada, CKZN St John's NF	6160da					
1500	1600		Canada, CKZU Vancouver BC	6160da					
1500	1600		China, China Radio Intl	7160as	9610va				
			9785as/11940af	13685am	13640af	15125af			
			17490va	17650va					
1500	1600		Costa Rica, University Network	9725am	11870am				
			13750am						
1500	1600		Germany, Deutsche Welle	6140eu					
1500	1600		Guam, TWR/KTWR	12105as					
1500	1600		Japan, Radio	6190as	7200am	9505as			
			11730va						
1500	1600		Jordan, Radio	11690na					
1500	1600		Myanmar, Radio	5040do	5985do				
1500	1600		New Zealand, Radio NZ Intl	6095pa					
1500	1600		North Korea, Voice of	4405eu	9335eu				
			11710na	13760eu	15245am				
1500	1600		Russia, FEBA	7350as					
1500	1600		Russia, Voice of	4940me	4965me	4975me			
			7325me	7390as	11500as	11985me			
1500	1600		Seychelles, FEBA	7365as					
1500	1600		Singapore, Mediacorp Radio	6150da					
1500	1600		South Africa, Channel Africa	17770af					
1500	1600		UK, BBC World Service	5975as	6195as				
			7105as/9740as	12095eu	15190ca	15310as			
			15485eu	15565me	17790as				
1500	1600		USA, AFRTS	4319usb	5446usb	5765usb			
			6350usb	7507usb	10320usb	12133usb			
			13362usb						
1500	1600		USA, KJES Vada NM	11715na					
1500	1600		USA, KTBN Salt Lake City UT	15590na					
1500	1600		USA, KWHR Naalehu HI	9930as	11565as				

1500	1600		USA, Voice of America	6160af	7125va				
			9590af/9760af	9845af	12040af	15550af			
1500	1600		USA, WBCQ Kennebunk ME	7415na	9330na				
			17495na						
1500	1600		USA, WBOH Newport NC	5920am					
1500	1600		USA, WEWN Birmingham AL	9955na	11530na				
1500	1600		USA, WHRA Greenbush ME	17650na					
1500	1600		USA, WHRI Nablesville IN	13760am	15105am				
1500	1600		USA, WINB Red Lion PA	13570am					
1500	1600		USA, WJIE Louisville KY	7490am	13595am				
1500	1600		USA, WRMI Miami FL	15725na					
1500	1600		USA, WTJC Newport NC	9370na					
1500	1600		USA, WWCN Nashville TN	9475na	12160na				
			13845na	15825na					
1500	1600		USA, WWRB Manchester TN	9320na	12170na				
1500	1600		USA, WYFR Okeechobee FL	6280na	6155na				
			11830na	17750na					
1500	1600		Zambia, Radio Christian Voice	9865af					
1505	1530	as	Austria, Radio Austria Intl	13755ca					
1515	1550		Vatican City, Vatican Radio	12065va	13765va				
			15235va						
1530	1545		India, All India Radio	9910as					
1530	1600		Georgia, Radio Georgia	6180me					
1530	1600		Iran, Voice of the Islamic Rep	9635as	11650as				
1530	1600		UAE, AWR Africa	15225as					
1530	1600		UK, BBC World Service	6190af	11940af				
			15400af	17830af	21470af	21660af			
1540	1555		Austria, Radio Austria Intl	13775ca					
1545	1600	o	Germany, Bible Voice Broadcasting		15680me				
1545	1600	s	Germany, Pan American BC	15650me					
1555	1600	as	Austria, Radio Austria Intl	13775ca					

1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

1600	1615		Pakistan, Radio	11570va	11850va	15070va			
			15725va						
1600	1627		Czech Rep, Radio Prague Intl	5930eu	17485af				
1600	1627		Iran, Voice of the Islamic Rep	9635as	11650as				
1600	1628		Vietnam, Voice of	7220as	9550as	11630va			
			13740va						
1600	1630		Guam, AWR/KSDA	15235as					
1600	1630		Jordan, Radio	11690na					
1600	1630		UK, BBC World Service	6190af	11940af				
			15400af	17830af	21470af	21660af			
1600	1700		Anguilla, Caribbean Beacon		11775am				
1600	1700		Australia, HCJB	15390as					
1600	1700		Australia, Radio	5995pa	6080pa	7220as			
			7260as/9475as	11660as					
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	6160da					
1600	1700		Canada, CKZU Vancouver BC	6160da					
1600	1700	DRM	China, China Radio Intl	17510va					
1600	1700		China, China Radio Intl	9440af	9570af				
			9795af/11900af	11940af	13640af	17490va			
			17650va						
1600	1700		Costa Rica, University Network	11870am	13750am				
1600	1700		Ethiopia, Radio	5990af	7110af	7165af			
			9560af/9704af	11800af					
1600	1700		France, Radio France Intl	6010af	6170af				
			9730af/11615af	15160af	15605af				
1600	1700	a	Germany, Bible Voice Broadcasting		15680me				
1600	1700	DRM	Germany, Deutsche Welle	6140eu	71				

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1600	1700	USA, WBOH Newport NC	5920am	
1600	1700	USA, WEWN Birmingham AL	11530va	13615va
		15745va		
1600	1700	USA, WHRA Greenbush ME	17650na	
1600	1700	USA, WHRI Noblesville IN	13760am	15105am
1600	1700	USA, WINB Red Lion PA	13570am	
1600	1700	USA, WJIE Louisville KY	7490am	13595am
1600	1700	USA, WMLK Bethel PA	9465eu	
1600	1700	USA, WRMI Miami FL	15725na	
1600	1700	USA, WTJC Newport NC	9370na	
1600	1700	USA, WWCR Nashville TN	9475na	12160na
		13845na	15825na	
1600	1700	USA, WWRB Manchester TN	9320na	12170na
1600	1700	USA, WYFR Okeechobee FL	6085as	62E0na
		11830na	11865na	15130eu
		18980eu	21455va	17750eu
1600	1700	Zambia, Radio Christian Voice	4965af	
1615	1630	Vatican City, Vatican Radio	15595va	
1630	1645	Turkmenistan, Turkmen Radio	4930as	
1630	1700	Egypt, Radio Cairo	9855af	
1630	1700	Guam, AWR/KSDA	11975as	15235as
1630	1700	Slovakia, Radio Slovakia Intl	5920eu	7345eu
1630	1700	UK, BBC World Service	6190af	11940af
		15400af	15420af	17830af
		21660af		21470af
1630	1700	as UK, BBC World Service	11860af	21490af
1645	1700	Tajikistan, Radio	7245sirr	

1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

1700	1715	Israel, Kol Israel	9435na	15640na	17535va
1700	1727	Czech Rep, Radio Prague Intl	5930eu	5930eu	17485af
1700	1722	Vietnam, Voice of	9725au		
1700	1730	Azerbaijan, Voice of	6110me		
1700	1730	France, Radio France Intl		15605af	17605af
1700	1745	UK, BBC World Service	6190af	9630af	15400af
		21470af			
1700	1750	New Zealand, Radio NZ Intl	6095pa		
1700	1759	Poland, Radio Polonia	7265eu	7285eu	
1700	1800	Anguilla, Caribbean Beacon	11775am		
1700	1800	Australia, HCJB	15390as		
1700	1800	Australia, Radio	5995pa	6080pa	7220as
		7260as	9475as	11880as	
1700	1800	Canada, CBC Northern Service	9625do		
1700	1800	Canada, CFRX Toronto ON	6070do		
1700	1800	Canada, CFVP Calgary AB	6030do		
1700	1800	Canada, CKZN St John's NF	6160do		
1700	1800	Canada, CKZU Vancouver BC	6160do		
1700	1800	China, China Radio Intl	9570af	11670va	
		11900af	11940af	13640af	13830af
		15150af			
1700	1800	DRM China, China Radio Intl	17510va		
1700	1800	Costa Rica, University Network	11870am	13750am	
1700	1800	Egypt, Radio Cairo	9855af		
1700	1800	Eat Guinea, Radio Africa	7189af	15184af	
1700	1800	a Germany, Bible Voice Broadcasting		15680me	
1700	1800	DRM Germany, Deutsche Welle	6140eu	7125eu	
1700	1800	Germany, Overcomer Ministries	17550na		
1700	1800	Japan, Radio	9535am	11970eu	15355af
1700	1800	vi Libya, Voice of Africa	15660af	17635af	
		17695af	17880af		
1700	1800	Russia, Voice of	9405as	9890eu	11510af
		11675af	11985af		
1700	1800	DRM/as Russia, Voice of	11675eu		
1700	1800	DRM South Africa, Channel Africa	15265af		
1700	1800	Sweden, Radio	5955eu		
1700	1800	Taiwan, Radio Taiwan Intl	11550as		
1700	1800	UK, BBC World Service	3915as	5975cs	
		6195as	7160as	9410eu	9510as
		15310as	15485eu	15565me	12095va
1700	1800	USA, AFRTS	4319usb	5446usb	5765usb
		6350usb	7507usb	10320usb	12133usb
		13362usb			
1700	1800	USA, KTBN Salt Lake City UT	15590na		
1700	1800	USA, KWHR Naalehu HI	9930as		
1700	1800	USA, Voice of America	6020va	6160va	9760va
		7125va	9640va	9700va	9760va
		9850af	15255va	15410af	15580af
1700	1800	USA, WBCQ Kennebunk ME	9330na	17495na	
1700	1800	USA, WBOH Newport NC	5920om		
1700	1800	USA, WEWN Birmingham AL	11530va	13615va	
		15685va	15745va		
1700	1800	USA, WHRA Greenbush ME	17650na		
1700	1800	USA, WHRI Noblesville IN	13670am	15665am	
1700	1800	USA, WINB Red Lion PA	13570am		
1700	1800	USA, WJIE Louisville KY	7490am	13595am	
1700	1800	USA, WMLK Bethel PA	9465eu		
1700	1800	USA, WRMI Miami FL	15725na		

1700	1800	USA, WTJC Newport NC	9370na	
1700	1800	USA, WWCR Nashville TN	9475na	12160na
		13845na	15825na	
1700	1800	USA, WWRB Manchester TN	9320na	12170na
1700	1800	USA, WYFR Okeechobee FL	17795eu	18980eu
		21455eu		
1700	1800	Zambia, Radio Christian Voice	4965af	
1715	1730	Vatican City, Vatican Radio	4005va	5890va
		7250va	9645va	15595va
1730	1745	mtwhf UK, United Nations Radio	7170af	15495me
		17810af		
1730	1800	Belgium, Radio Vlaanderen Intl	9925eu	11640eu
1730	1800	Bulgaria, Radio	9500eu	11500eu
1730	1800	Georgia, Radio Georgia		11910eu
1730	1800	Guam, AWR/KSDA	9385me	
1730	1800	Liberia, ELWA	4760do	
1730	1800	vi Philippines, Radio Pilipinas		11720me
		17720me		15190me
1730	1800	Swaziland, TWR	3200af	9500af
1730	1800	Sweden, Radio	6065eu	
1730	1800	mtwhf USA, Voice of America	11975af	17895af
1730	1800	mtwhf Vatican City, Vatican Radio	13765af	15570af
		17515af		
1735	1745	vi/th Paraguay, Radio Nacional	9739sa	
1745	1800	Bangladesh, Bangla Betar	7185me	9550me
1745	1800	India, All India Radio	7410eu	9445af
		9950eu	11620eu	11935af
		15075af	15155af	17670af
1745	1800	UK, BBC World Service	3255af	6190af
		15400af	15420af	17830af
1751	1800	New Zealand, Radio NZ Intl	9845po	

1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

1800	1810	Zanzibar, Voice of Tanzania	11734da	
1800	1828	Vietnam, Voice of	11630va	13740va
1800	1830	Egypt, Radio Cairo	9855af	
1800	1830	a Germany, Bible Voice Broadcasting		15680me
1800	1830	s Germany, Universal Life	15675af	
1800	1830	South Africa, AWR Africa	3215af	3345af
		12130af		
1800	1830	UK, BBC World Service	3255af	5975as
		6190af	6195eu	9410eu
		15310me	15400af	15420af
		21470af		17830af
1800	1850	New Zealand, Radio NZ Intl	9845pa	
1800	1856	Romania, Radio Romania Intl	11940eu	15380eu
1800	1859	Canada, Radio Canada Intl	9530af	11770af
		13730af	15255as	
1800	1900	Anguilla, Caribbean Beacon	11775am	
1800	1900	mtwhf Argentina, RAE	9690eu	15345eu
1800	1900	Australia, Radio	6080pa	7220as
		7260as	9475as	11880as
1800	1900	Australia, Voice Intl	6115as	
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	China, China Radio Intl	11670va	11940va
		13640va	13760va	15150af
1800	1900	DRM China, China Radio Intl	17510va	
1800	1900	Costa Rica, IJUniversity Network	11870am	13750am
1800	1900	Eat Guinea, Radio Africa	7189af	15184af
1800	1900	Germany, Overcomer Ministries	17550na	
1800	1900	Greece, Voice of	7475eu	9420eu
		17705eu		15630eu
1800	1900	India, All Inaio Radio	7410eu	9445af
		9950eu	11620eu	11935af
		15075af	15155af	17670af
1800	1900	vi Liberia, ELWA	4760do	
1800	1900	Libya, Voice of Africa	15205af	15660af
		17635af	17695af	
1800	1900	Netherlands, Radio	6020af	9895af
1800	1900	Philippines, Radio Pilipinas		11720me
		17720me		15190me
1800	1900	Russia, Voice of	9480af	9745eu
		11510eu		9820eu
1800	1900	Sierra Leone, Radio UNAMSIL	6137af	
1800	1900	Swaziland, TWR	3200af	9500af
1800	1900	Taiwan, Radio Taiwan Intl	3965eu	
1800	1900	USA, AFRTS	4319usb	5446usb
		6350usb	7507usb	10320usb
		13362usb		12133usb
1800	1900	USA, KJES Vado NM	15385na	
1800	1900	USA, KTBN Salt Lake City UT	15590na	
1800	1900	USA, Voice of America	6040va	9760va
		9770va	9850af	11975af
		15580af	17895af	15410af

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1800	1900	USA, WBCQ Kennebunk ME	9330na	17495na
1800	1900	USA, WBOH Newport NC	5920am	
1800	1900	USA, WEWN Birmingham AL	11530va	13615va
		15685va	15745va	
1800	1900	USA, WHRA Greenbush ME	17650na	
1800	1900	USA, WHRI Noblesville IN	13760am	15665am
1800	1900	USA, WINB Red Lion PA	13570am	
1800	1900	USA, WJIE Louisville KY	7490am	13595am
1800	1900	USA, WMLK Bethel PA	9465eu	
1800	1900	USA, WRMI Miami FL	15725na	
1800	1900	USA, WTJC Newport NC	9370na	
1800	1900	USA, WWCR Nashville TN	9475na	12160na
		13845na	15825na	
1800	1900	USA, WWRB Manchester TN	9320na	12170na
1800	1900	USA, WYFR Okeechabee FL	13700eu	17795eu
		18980eu		
1800	1900	Yemen, Rep of Yemen Radio	9780me	
1800	1900	Zambia, Radia Christian Voice	4965af	
1815	1900	Bangladesh, Bangla Betar	7185eu	9550eu
		15520eu		
1830	1900	Georgia, Radio Georgia	11760eu	
1830	1900	Nigeria, Voice of	725af	
1830	1900	Serbia & Montenegro, Intl Radio	6100eu	
1830	1900	Slovakia, Radio Slovakia Intl	5920eu	6055eu
1830	1900	South Africa, AWR Africa	12130af	
1830	1900	Turkey, Voice of	9785eu	
1830	1900	UK, BBC World Service	3255af	6055af
		6190af 9630af	15400af	17820af
		21470af		
1845	1900	Albania, Radio Tirana Intl	7210eu	9520eu
1845	1900	Congo, RTV Congolaise	4765af	5985af
1851	1900	New Zealand, Radio NZ Intl	11725pa	

1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1915	Congo, RTV Congolaise	4765af	5985af
1900	1920	Turkey, Voice of	9785eu	
1900	1925	Israel, Kal Israel	15615eu	15640eu
1900	1928	Vietnam, Voice of	11630va	13740va
1900	1930	Germany, Universal Life	13820me	
1900	1930	Hungary, Radio Budapest	3975eu	6025eu
		11720eu		
1900	1930	Philippines, Radio Pilipinas	11720me	15190me
		17720me		
1900	1945	India, All India Radio	7410eu	9445af
		9950eu	11620eu	11935af
		13620af	15075af	15115af
1900	2000	Anguilla, Caribbean Beacon	11775am	
1900	2000	Australia, Radio	6080pa	7220as
		9500as	11650as	11880as
1900	2000	Australia, Voice Intl	6115as	
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	Canada, Radio Canada Intl	17765am	
1900	2000	China, China Radio Intl	7145af	9430af
		9585af 11940af	13760va	
1900	2000	China, China Radio Intl	12080va	
1900	2000	Costa Rica, University Network	11870am	13750am
1900	2000	Eqt Guinea, Radio Africa	7189af	15184af
1900	2000	Germany, Deutsche Welle	13590af	15545af
		17770af		
1900	2000	Ghana, Ghana BC Corp	3366do	4915do
1900	2000	Italy, IRRS	5755va	
1900	2000	Liberia, ELWA	4760do	
1900	2000	Libya, Voice of Africa	15205af	15315af
1900	2000	Malaysia, Radio Malaysia	7295do	
1900	2000	Namibia, Namibian BC Corp	3270af	3290af
		6060af		
1900	2000	Netherlands, Radio	7120af	9895af
		17810af		11655af
1900	2000	Netherlands, Radio	15315na	17660na
1900	2000	New Zealand, Radio NZ Intl	11725pa	17735na
1900	2000	Nigeria, Radio/Enugu	6025do	
1900	2000	Nigeria, Radio/Ibadan	6050do	
1900	2000	Nigeria, Radio/Kaduna	4770do	6090do
1900	2000	Nigeria, Radio/Lagos	3326do	4990do
1900	2000	Nigeria, Voice of	7255af	15120af
1900	2000	North Korea, Voice of	4405eu	13760eu
		15245eu		
1900	2000	Papua New Guinea, Cath Radio	Network	4960va
1900	2000	Russia, Voice of	7310eu	9890eu
1900	2000	Sierra Leone, Radio UNAMSIL	6137af	
1900	2000	Sierra Leone, SLBS	3316do	
1900	2000	Solomon Islands, SIBC	5020do	9545do
1900	2000	South Africa, Channel Africa	3345af	
1900	2000	South Korea, Radio Korea Intl	5975va	7275eu

1900	2000	a	Sri Lanka, SLBC	6010eu	
1900	2000		Swaziland, TWR	3200af	
1900	2000		Thailand, Radio	7155eu	
1900	2000	vl	Uganda, Radia	4976do	5026do
1900	2000		UK, BBC World Service		3255af
			6190af 6195eu	9410eu	9630af
			15310me	15400af	17830af
1900	2000		USA, AFRTS	4319usb	5446usb
			6350usb	7507usb	10320usb
			13362usb		
1900	2000		USA, KAIJ Dallas TX	13815va	
1900	2000		USA, KTBN Salt Lake City UT		15590na
1900	2000		USA, Voice of America		4950af
			9760va	9770af	6040va
			13670af	15410va	11975af
			17895af		15445af
1900	2000	mtwhf	USA, Voice of America		5965va
			11720va	11970va	9840va
1900	2000		USA, WBCQ Kennebunk ME		13725va
			17495na		7415na
1900	2000		USA, WBOH Newport NC		9330na
1900	2000		USA, WEWN Birmingham AL		5920am
			15685va	15745va	11530va
1900	2000		USA, WHRA Greenbush ME		13615va
1900	2000		USA, WHRI Noblesville IN		17650na
1900	2000		USA, WINB Red Lion PA		13760am
1900	2000		USA, WJIE Louisville KY		13570am
1900	2000		USA, WMLK Bethel PA		1370am
1900	2000		USA, WRMI Miami FL		13595am
1900	2000		USA, WTJC Newport NC		9465eu
1900	2000		USA, WWCR Nashville TN		15725na
			13845na	15825na	17250na
1900	2000		USA, WYFR Okeechabee FL		9475na
			15130eu	17750eu	12160na
			11890va		6085af
1900	2000	vl	Vanuatu, Radio	4960do	7350eu
1900	2000	vl	Zambia, Radio Christian Voice	4965af	17845va
1900	2000	vl	Zimbabwe, ZBC Carp	5975do	
1915	1925		Rwanda, Radio	6005do	
1930	2000	t h	Belarus, Radio Belarus Intl		7105eu
1930	2000		Belgium, Radio Vlaanderen Intl		7210eu
1930	2000	vl	Georgia, Radio Georgia		9925eu
1930	2000	mtw	Germany, AWR	15175eu	11760me
1930	2000		Iran, Voice of the Islamic Rep		9800af
1930	2000		Papua New Guinea, NBC		11750eu
1930	2000		Sweden, Radio	6065va	
1930	2000		USA, Voice of America		7260me
			13635me		9680me
1935	1955		Italy, RAI Intl	5970eu	9605eu
1945	2000	mtwhfa	Armenia, Voice of	4810eu	9960eu

2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2027		Czech Rep, Radio Prague Intl	5930eu	11600va
2000	2027		Iran, Voice of the Islamic Rep	9800af	11750eu
2000	2030	f	Germany, Universal Life	5775va	
2000	2030	vl/asmtwh	Italy, IRRS	5775va	
2000	2030	vl	Libya, Voice of Africa		11635af
2000	2030		Mongolia, Voice of	12015eu	15315af
2000	2030		Papua New Guinea, Cath Radio	Network	4960va
2000	2030		USA, Voice of America		4950af
			6095va	9760va	6040va
			11855af	11975af	9850af
			15445af	17745af	13670af
2000	2030		Vatican City, Vatican Radio	9660eu	11625eu
			13765eu		
2000	2030		Vietnam, Voice of	7220as	9550as
2000	2045		Swaziland, TWR	3200af	
2000	2050		New Zealand, Radio NZ Intl		11725pa
2000	2059	mtwhf	Canada, Radio Canada Intl		5850eu
			11690af	13700eu	7235eu
2000	2059		Spain, Radio Exterior Espana		9570va
2000	2100		Anguilla, Caribbean Beacon		11775am
2000	2100		Australia, ABC NT Alice Springs		2310do
2000	2100		Australia, ABC NT Katherine		4835irr
2000	2100		Australia, ABC NT Tennant Creek		2485do
2000	2100		Australia, Radio	6080pa	2325do
			11650as	11880as	7220as
2000	2100		Australia, Voice Intl	6115as	9500as
2000	2100		Canada, CBC Northern Service		9625do
2000	2100		Canada, CFRX Toronto ON		6070do
2000	2100		Canada, CFVP Calgary AB		6030do
2000	2100		Canada, CKZN St John's NF		6160do
2000	2100		Canada, CKZU Vancouver BC		6160do
2000	2100		Canada, Radio Canada Intl		17765am
2000	2100		Chile, Voz Christiana		11665af
2000	2100		China, China Radio Intl		7145eu
			9600eu	11640va	9440eu
			13760af		11940af
2000	2100	DRM	China, China Radio Intl		13630af
					12080va

Shortwave Guide



2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

2200	2205	Syria, Radio Damascus	12085eu	13610eu	
2200	2229	Canada, Radio Canada Intl 15170am	5960am	13785am	
2200	2230	Belgium, Radio Vlaanderen Intl	11635na		
2200	2230	vi Croatia, Croatian Radio	9925sa		
2200	2230	Germany, Deutsche Welle	9800na		
2200	2230	India, All India Radio	7410eu	9445eu	
		9910ou	9950au	11620eu	11715au
2200	2230	Liberia, ELWA	4760do		
2200	2230	smtwhf Serbia & Montenegro, Intl Radio	7230pa		
2200	2245	Egypt, Radio Cairo	9990eu		
2200	2245	New Zealand, Radio NZ Intl	15720pa		
2200	2250	Turkey, Voice of	9830va		
2200	2257	DRM Netherlands, Radio	15525na		
2200	2300	Anguilla, Caribbean Beacon	6090am		
2200	2300	Australia, ABC NT Alice Springs	2310do	4835irr	
2200	2300	Australia, ABC NT Katherine	5025do		
2200	2300	Australia, ABC NT Tennant Creek	4910do		
2200	2300	Australia, Radio	11880va	13620pa	15320pa
		17715pa	17585pa	21740as	
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	Chile, Voz Christiana	11665af		
2200	2300	China, China Radio Intl	9880eu		
2200	2300	Costa Rica, University Network	13750am		
2200	2300	Eat Guinea, Radio Africa	7189af	15184af	
2200	2300	Germany, Bible Voice Broadcasting		5925me	
2200	2300	Germany, Deutsche Welle	7115as	9720as	
2200	2300	vi Ghana, Ghana BC Corp	3366do	4915do	
2200	2300	Guyana, Voice of	3290do		
2200	2300	Malaysia, Radio Malaysia	7295do		
2200	2300	Namibia, Namibian BC Corp	3270af	3290af	
		6060af			
2200	2300	Nigeria, Radio/Enugu	6025do		
2200	2300	Nigeria, Radio/Ibadan	6050do		
2200	2300	Nigeria, Radio/Kaduna	4770do	6090do	
2200	2300	Nigeria, Radio/Lagos	3326do	4990do	
2200	2300	Nigeria, Voice of	7255af	15120af	17800af
2200	2300	Papua New Guinea, NBC	4890do		
2200	2300	Sierra Leone, Radio UNAMSIL	6137af		
2200	2300	vi 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	6195va	
		7105as 9605as	9740as	11955as	15400af
		17830af			
2200	2300	USA, AFRTS	4319usb	5446usb	5765usb
		6350usb	7507usb	10320usb	12133usb
		13362usb			
2200	2300	USA, KAIJ 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	15185va	
		15290va	15305va	17740va	17820va
2200	2300	USA, WBCQ Kennebunk ME	5105na	7415na	
		9330na	17495na		
2200	2300	USA, WBOH Newport NC	5920am		
2200	2300	USA, WEWN Birmingham AL	9355na	9975af	
		13615na	15745na		
2200	2300	USA, WHRA Greenbush ME	17650na		
2200	2300	USA, WHRI Noblesville IN	9495am	13770am	
2200	2300	USA, WINB Red Lion PA	13570am		
2200	2300	USA, WJIE Louisville KY	7490am	13595am	
2200	2300	USA, WMLK Bethel PA	15265eu		
2200	2300	mtwhf USA, WRMI Miami FL	6870na	15725na	
2200	2300	as USA, WRMI Miami FL	9955am		
2200	2300	USA, WTJC Newport NC	9370na		
2200	2300	USA, WWCR Nashville TN	7465na	12160na	
		13845na			
2200	2300	USA, WWRB Manchester TN	5050na	5085na	
		6890na			
2200	2300	USA, WYFR Okeechobee FL	11740na	15695na	
		15770na			
2200	2300	vi Vanuatu, Radio	4960do	7260do	
2200	2300	Zambia, Radio Christian Voice	4965af		
2205	2230	Italy, RAI Intl	11895as		
2229	2259	Canada, Radio Canada Intl	9525as	11810as	
		12035as			
2230	2257	Czech Rep, Radio Prague Intl	7345na	9415na	
2230	2300	Australia, HCJB	15525as		
2245	2300	India, All India Radio	9705as	9950as	
		11620as	11645as	13605as	

2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

2300	0000	Anguilla, Caribbean Beacon	6090am		
2300	0000	Australia, ABC NT Alice Springs	2310do	4835irr	
2300	0000	Australia, ABC NT Katherine	5025do		
2300	0000	Australia, ABC NT Tennant Creek	4910do		
2300	0000	Australia, HCJB	15525as		
2300	0000	Australia, Radio	9660pa	12080va	13620as
		15320as	17585pa	17715pa	17750as
		17795as	21740as		
2300	0000	Bulgaria, Radio	9700na	11700na	
2300	0000	Canada, CBC Northern Service	9625do		
2300	0000	Canada, CFRX Toronto ON	6070do		
2300	0000	Canada, CFVP Calgary AB	6030do		
2300	0000	Canada, CKZN St John's NF	6160do		
2300	0000	Canada, CKZU Vancouver BC	6160do		
2300	0000	Chile, Voz Christiana	11665af		
2300	0000	China, China Radio Intl	5990na	6145am	
		13680ca			
2300	0000	Costa Rica, University Network	13750am		
2300	0000	Egypt, Radio Cairo	11725na		
2300	0000	Germany, Bible Voice Broadcasting		5925me	
2300	0000	Germany, Deutsche Welle	7115as	9890as	
		15135as			
2300	0000	DRM Germany, Deutsche Welle	9800as		
2300	0000	vi Ghana, Ghana BC Corp	3366do	4915do	
2300	0000	Guyana, Voice of	3290do		
2300	0000	India, All India Radio	11620as	11645as	9705as 9950as
					13605as
2300	0000	Malaysia, Radio Malaysia	7295do		
2300	0000	Namibia, Namibian BC Corp	3270af	3290af	
		6060af			
2300	0000	New Zealand, Radio NZ Intl	17675pa		
2300	0000	Papua New Guinea, NBC	4890do		
2300	0000	Sierra Leone, Radio UNAMSIL	6137af		
2300	0000	vi Sierra Leone, SLBS	3316do		
2300	0000	Singapore, Mediacorp Radio	6150do		
2300	0000	vi Solomon Islands, SIBC	5020do	9545do	
2300	0000	USA, AFRTS	4319usb	5446usb	5765usb
		6350usb	7507usb	10320usb	12133usb
		13362usb			
2300	0000	USA, KAIJ Dallas TX	13815va		
2300	0000	USA, KTBN Salt Lake City UT	15590na		
2300	0000	USA, KWHR Naalehu HI	17510as		
2300	0000	USA, Voice of America	7215va	15185va	
		12055as	13755as	15145as	11965as
2300	0000	USA, WBCQ Kennebunk ME	5105na	7415na	
		9330na			
2300	0000	USA, WBOH Newport NC	5920am		
2300	0000	USA, WEWN Birmingham AL	9355na	9975af	
		13615na	15745na		
2300	0000	USA, WHRA Greenbush ME	17650na		
2300	0000	USA, WHRI Noblesville IN	9495am	13770am	
2300	0000	USA, WINB Red Lion PA	13570am		
2300	0000	USA, WJIE Louisville KY	7490am	13595am	
2300	0000	USA, WTJC Newport NC	9370na		
2300	0000	USA, WWCR Nashville TN	7465na	12160na	
		13845na			
2300	0000	USA, WWRB Manchester TN	5050na	5085na	
		6890na			
2300	0000	USA, WYFR Okeechobee FL	11740na	15695na	
		15770na			
2300	0000	vi Vanuatu, Radio	4960do	7260do	
2300	0000	Zambia, Radio Christian Voice	4965af		
2300	2306	Nigeria, Radio/Lagos	3326do		
2300	2315	Cuba, Radio Havana	9550ca		
2300	2330	vi Croatia, Croatian Radio	9925sa		
2300	2330	UK, BBC World Service	3915as	5965as	
		6195as 9605as	9740as	11945as	11955as
		15280as			
2300	2356	Romania, Radio Romania Intl	7280au	9590au	
		9645au	11940au		
2300	2359	Canada, Radio Canada Intl	5960am	13785am	
2305	2330	Austria, Radio Austria Intl	9870sa		
2330	0000	Lithuania, Radio Vilnius	9875na		
2330	0000	UK, BBC World Service	3915as	5965as	
		6035as 6195as	9605as	9740as	11945as
		11955as	15280as		
2330	0000	USA, Voice of America	7225as	7260as	
		11805as	11965as	12055as	13725as
		15145as	15205as		
2330	2358	Vietnam, Voice of	9840as	12020as	
2330	2359	DRM Sweden, Radio	9800na		
2335	0000	as Austria, Radio Austria Intl	9870sa		

Headnotes:

1. Reception of Deutsche Welle's 0400, 0500, 0600, 1600, 1900, 2000 and 2100 broadcasts have proven generally reliable for some North American listeners, so we list the programs available at these times. Consult the frequency section of the SWG for channels to try. An enhanced antenna suitable for your receiver will help in some cases.
2. Listings for US-based independent shortwave broadcasters are limited to general interest programming that departs from their largely primary formats of religious and political fare.
3. BBCWS stream abbreviations: (am)=Americas; (eaf)=East Africa; (eu)=Europe/North Africa; (me)=Middle East; (waf)=West Africa. During the hours when the (am) stream is unavailable, we've identified the streams and frequencies that may provide acceptable reception for some North American listeners. As with reception of DW, an enhanced antenna will help.
4. New Zealand moves to summer or daylight savings time on the first Sunday of October. The rest of the world makes their changes on the last Sunday in October. Listings for Radio New Zealand International reflect the station's move to summer time.
5. Radio Sweden spent the summer suggesting that significant changes were in the offing for its programs and schedule in the fall. At press time (late August), no specific announcements had been made. The schedule herein is the one in effect at press time.
6. While every effort is made to ensure maximum accuracy, please note that all times are approximate and all schedules and programs are subject to change.

0000 UTC/ 8pm E/5pm P - Page 45 Freqs

BBC WORLD SERVICE (am)

0000 D News; 0006 S Top of the Pops (British music charts), M Everywoman, T/H Documentaries, W Masterpiece (artistic ideas), F Assignment, A Sports International; 0032 M Westway Omnibus, T Music Feature, W White Label (new music), H Charlie Gillett (world music), F Music Biz, A John Peel (eclectic).

RADIO AUSTRALIA

0000 D News; 0005 S Keys to Music (enjoying the classics), A Inside Out (Pacific views); 0010 M AWAYE! (Aboriginal culture), T The Science Show, W The National Interest (Australian politics), H Background Briefing (documentary), F Hindsight (Australian history); 0045 A Ockham's Razor (science opinion).

RADIO CANADA INTERNATIONAL

0000 S/M The World This Weekend (news magazine), T-A The World at Six (domestic main evening newscast); 0030 S Radio Nomad (variety), M Maple Leaf Mailbag (w/CIDX report bimonthly), T-A As It Happens (interviews w/newsmakers).

RADIO EXTERIOR ESPANA

0000 S Visitors Book (travelers to Spain), M Window on Spain (culture), T-A News (international, Spain, Latin America); 0015 S/M Spanish history or culture series; 0017 T-A Spain Day-by-Day (feature magazine); 0035 S Radio Waves, M Radio Club (letters), W Entremeses (food & tourism), F American Chronicles, A Food in Spain; 0040 W History Notes, F Culture Notes, A Africa Today; 0045 T-A A Language Without Bounds (Spanish lesson).

RADIO JAPAN - NHK WORLD

0000 D News; 0010 S Hello from Tokyo (listener contact), M Weekend Japanology, T-A Songs for Everyone; 0015 T-A 44 Minutes (magazine); 0054 M Japan Music Scene.

RADIO NETHERLANDS

0000 S Wide Angle (in-depth), M Europe Unzipped;

T-A Newline; 0022 S The Week Ahead (on RN), M Insight (commentary); 0030 S Amsterdam Forum (conversations), M Vox Humana (culture, T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO NEW ZEALAND INTERNATIONAL

0000 S/A RNZ News, M-F Pacific Regional News; 0006 S At the Movies, M-F Wayne's Music (favorites), A Your Money; 0030 S Bookmarks, A Saturday Comedy Zone.

RADIO PRAGUE

0000 D News; 0005 S Magazine, M Mailbox, T-A Current Affairs; 0010 S Letter from Prague, M ABC of Czech (the language), W Czech Science, A The Arts; 0015 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Business Report, A Stepping Out (Prague nightlife).

RADIO UKRAINE INTERNATIONAL

0000 D News; 0010 S Ukrainian Diary (weekly review), M Music from Ukraine, T-A Ukraine Today (magazine); 0018 S The Whole World on the Radio Dial (DX program); 0035 S Hello From Kiev (listener letters/music), M Roots (culture & education); 0045 T-A Closeup (current issues).

WBCQ, Maine

5105 kHz.: 0000 S Jean Shepherd (stories/humor), M Firesign Theatre Hour (classic satire), A Allan Weiner Worldwide.

7415 kHz.: 0000 S The Peacock Project (1st A: Old Time Radio, 2nd: Voice of Savage Henry, 3rd: Tim Gaynor from Australia, 4th: A Different Kind of Oldies Show, 5th: The Hollow-State Hound), M Radio New York International, F Odin Lives (Norse legends), A Alan Weiner Worldwide.

9330 kHz.: 0000 M The Voice of Reason

WHRA, Maine

7580 kHz. 0030 T-A Radio Weather.

WHRI, Indiana

7315 kHz.: 0030 S DXing with Cumbre.

0100 UTC/ 9pm E/6pm P - Page 45 Freqs

BBC WORLD SERVICE (am)

0100 D News; 0106 S Play of the Week (radio theatre), M The Ticket (global arts survey), T Health Matters, W Go Digital, H Discovery (science), F One Planet (ecology), A Science in Action; 0132 T Quiz or panel game, W Music Review, H/A Westway, F The Word (writing & writers) [exc. 28th, World Book Club (discussion)]; 0145 H Heart & Soul (beliefs & values), A What's the Problem (advice).

CHINA RADIO INTERNATIONAL

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

RADIO AUSTRALIA

0100 D News; 0105 S Correspondents' Report, A Asia Pacific (regional current affairs); 0110 M-F Asia Pacific; 0130 S In Conversation (about science), M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor, A The Chat Room (interviews).

RADIO AUSTRIA INTERNATIONAL

0105 S/M Week in Review; 0110 T-A Report from Austria; 0125 S/M Listener Letters; 0135 S/M

Week in Review; 0140 T-A Report from Austria; 0155 S/M Listener Letters.

RADIO BUDAPEST

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

RADIO CANADA INTERNATIONAL

0100 S Global Village (world music), M Writers & Co. (books), T-A As It Happens (cont'd); 0130 H Dispatches (international report).

RADIO HABANA CUBA

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

RADIO NETHERLANDS

0100 S Wide Angle (in-depth), M Europe Unzipped, T-A Newline; 0122 S The Week Ahead (on RN), M Insight (commentary); 0130 S Amsterdam Forum (conversations), M Vox Humana (culture), T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO JAPAN - NHK WORLD

0100 D News; 0110 S Pop Joins the World, M-F Songs for Everyone, A Hello from Tokyo (listener contact); 0115 M-F 44 Minutes (magazine).

RADIO NEW ZEALAND INTERNATIONAL

0100 D RNZ News; 0105 S Feature, M-F In Touch with New Zealand (music, interviews, variety), A Eureka! (science); 0130 A Health Matters [or] Environment Matters.

[*may be preempted by live sport]

RADIO PRAGUE

0100 D News; 0105 S Magazine, M Mailbox, T-A Current Affairs; 0110 S Letter from Prague, M ABC of Czech (the language), W Czech Science, A The Arts; 0115 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Business Report, A Stepping Out (Prague nightlife).

RADIO ROMANIA INTERNATIONAL

0100 D Radio Newsreel; 0110 S The Week, M Focus, T-A Commentary; 0115 S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate), A Challenge for the Future; 0120 S RRI Encyclopedia, T Political Flash, W European Horizons, A Business Update; 0125 S Roots (culture/traditions), T Business Update, W Visual Arts, F Listeners' Letterbox, A Practical Guide; 0130 S Radio Pictures, M Romanian Itineraries, H Visit Romania, A Cultural Survey; 0135 S Romanian Itineraries, M Listeners' Letterbox, T Pages of Romanian Literature, W Talking Points or Living Romania [programs alternate], H Partners in a Changing World, F Guest at the Microphone, A Over Coffee (with artists); 0140 S Romanian by Radio, M/F The Skylark (folk music), H Stage and Screer, A Off Bucharest; 0145 S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Folk Music Box; 0150 M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

RADIO SLOVAKIA INTERNATIONAL

0100 D News; 0105 S Front Page Review (Slovak press), M Weekly Newsreel T-A Topical Issue; 0110 S Various features, M Listeners' Tribune (letters, magazine, Slovak music), T Insight Central Europe,

Shortwave Guide



W Tourism News or Environmental Update, H Business News, F Culture News or Back Page News (the offbeat), A Education, Science and Regional News.

VOICE OF RUSSIA

0100 D News; 0111 S/M Moscow Mailbag, T-A Commonwealth Update; 0130 D News in Brief; 0132 S Moscow Yesterday & Today, M Timelines, T Folk Box, W Jazz Show, H Musical Portraits, F Moscow Calling, A Christian Message from Moscow; 0146 F Music At Your Request; 0154 H Russia: People & Events.

VOICE OF VIETNAM

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

RADIO SWEDEN

0130 S Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); 0145 T Sports Scan, W Close Up (profiles of Swedes-1st), F Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

VOICE OF AMERICA (Special English)

0130 T-A News; 0140 T Agriculture Today, W/H Science Report, F Environment Report, A In the News; 0145 T Science in the News, W Explorations, H Making of a Nation, F American Mosaic; A American Stories.

WBCQ, Maine

5105 kHz.: 0100 S Firesign Theatre Hour (classic satire), A Tasha Takes Control.
7415 kHz.: 0100 S Marion's Attic (vintage recordings), M Radio New York International (cont'd), T The Secular Bible Study, A Tasha Takes Control.
9330 kHz.: 0100 M World of Radio.

WHRA, Maine

7580 kHz.: 0105 S Turn Your Radio On (southern gospel music).

WWCR, Tennessee

5070 kHz.: 0145 S Ask WWCR.

0200 UTC/ 10pm E/7pm P - Page 46 Freqs

BBC WORLD SERVICE (am)

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

RADIO AUSTRALIA

0200 D News; 0205 S Margaret Throsby (interviews and music), A Background Briefing (documentary); 0210 M-F The World Today (ABC Radio flagship news program); 0255 T-F Stock Market Report, A Reporter's Notebook.

[Special service: 0205 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only.]

RADIO BULGARIA

0200 D News; 0210 S/M Views Behind the News, T-A Events and Developments; 0220 S Keyword Bulgaria (Bulgaria and things Bulgarian), M Folk Studio (Bulgarian folk music), T Sports, W Magazine Economy, H The Way We Live, F History Club; 0230 S Answering Your Letters, M-F Keyword Bulgaria, A Radio Bulgaria Calling (for radio hobbyists); 0240 M Walks and Talks (interesting places), T-F Timeout for Music; 0245 S/A Timeout for Music.

RADIO HABANA CUBA

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

RADIO KOREA INTERNATIONAL

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

RADIO NEW ZEALAND INTERNATIONAL

0200 S/A* RNZ News, M-F In Touch with New Zealand (cont'd); 0205 S RPM (documentaries)*, A Home Grown (NZ music)*; 0230 A Musical Chairs (artist spotlight)*.

[*may be preempted by live sport]

RADIO TAIWAN INTERNATIONAL

0200 D News; 0210 S News Talk, M Taiwan Economic Journal, T Kaleidoscope (society), W On the Job, H Trends, F Politics Today, A Bookworm; 0220 S Taipei Magazine, M Discover Taiwan, T Mailbag Time, W Jade Bells & Bamboo Pipes (traditional music), H People, F Culture Express, A Stage, Screen & Studio; 0230 M Asia Pacific (from R. Australia), A Groove Zone; 0235 S Sound Postcard, H Wisdom.com, F New Music Lounge; 0240 S Hakka World (indigenous culture), T Sound Postcard; 0245 T Let's Learn Chinese, W Life Unusual (the offbeat), H Instant Noodles (the weird).

[This schedule also airs at 0700 for western North America.]

VOICE OF RUSSIA

0200 D News; 0211 M Sunday Panorama, T-S News & Views; 0230 D News in Brief; 0232 S Songs from Russia, M/F Russian by Radio, T Kaleidoscope (Russian events), W Musical Portraits, H Moscow Yesterday & Today, A Audio Book Club (Russian lit.); 0246 S You Write to Moscow; 0254 S/W Russia: People & Events.

WBCQ, Maine

5105 kHz.: 0200 S Tesla's Ear, A Lost Discs Radio Show (obscure singles).
7415 kHz.: 0200 S Pan Global Wireless, M Radio New York International (cont'd), A Lost Discs Radio Show (obscure singles).

WHRA, Maine

7580 kHz.: 0230 M DXing with Cumbre.

WRMI, Florida

6870/7385 kHz: 0230 S Voice of the NASB (US sw broadcasters consortium), M World of Radio.

WWCR, Tennessee

5070 kHz.: 0200 S DX Partyline; 0230 S World of Radio.

RADIO BUDAPEST

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

RADIO SWEDEN

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

VOICE OF VIETNAM

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

0300 UTC/ 11pm E/8pm P - Page 46 Freqs

BBC WORLD SERVICE (am)

0300 D News; 0306 S From Our Own Correspondent, M Talking Point (phone-in)[taped S 1406], T-F Outlook (magazine), A Pick of the World (BBC's best); 0332 S The Interview (trends); 0345 M-F Off the Shelf (book readings), A Write On (letters).

CHINA RADIO INTERNATIONAL

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

RADIO AUSTRALIA

0300 D News; 0305 S Australian Express (magazine), A Rural Reporter; 0310 M-F Regional Sports Report; 0320 M-F Life Matters (social issues); 0330 S Music Deli (diverse), A Australian Country Style; 0354 Heywire (young rural Australian opinion).
[Special service: 0305 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only.]

RADIO HABANA CUBA

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

RADIO NEW ZEALAND INTERNATIONAL

0300 S/A* RNZ News, M-F Pacific Regional News; 0305 S Sunday Drama* (radio plays); 0308 M-F Dateline Pacific; 0330 M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent, A Home Grown* (cont'd).

[*may be preempted by live sport]

RADIO PRAGUE

0300 D News; 0305 S Magazine, M Mailbox, T-A Current Affairs; 0310 S Letter from Prague, M ABC of Czech (the language), W Czech Science, A The Arts; 0315 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Business Report, A Stepping Out (Prague nightlife).

RADIO TAIWAN INTERNATIONAL

0200 D News; 0210 S News Talk, M Taiwan Economic Journal, T Kaleidoscope (society), W On the Job, H Trends, F Politics Today, A Bookworm; 0220 S Taipei Magazine, M Discover Taiwan, T Mailbag Time, W Jade Bells & Bamboo Pipes (traditional music), H People, F Culture Express, A Stage, Screen & Studio; 0230 M Asia Pacific (from R. Australia), A Groove Zone; 0235 S Sound Postcard, H Wisdom.com, F New Music Lounge; 0240 S Hakka World (indigenous culture), T Sound Postcard; 0245 T Let's Learn Chinese, W Life Unusual (the offbeat), H Instant Noodles (the weird).

[This schedule also airs at 0700 for western North America.]

Shortwave Guide

RADIO UKRAINE INTERNATIONAL

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

VOICE OF AMERICA, Africa Service

0300 M-F Daybreak Africa (morning newsmagazine); 0330 M-F News Headlines; 0333 M-F Business Report; 0345 M-F Dateline (documentary); 0355 M-F Opinion Roundup.

VOICE OF RUSSIA

0300 D News; 0311 S Music & Musicians, M This is Russia, T Musical Portraits, W/A Moscow Mailbag, H Science Plus, F Newmarket; 0330 D News in Brief; 0332 M Moscow Calling, T/H/A The River of Time, W Guest Speaker, F Russian history/culture; 0347 W Ladies of Character.

VOICE OF TURKEY

0300 D News; 0310 D Press Review; 0315 S Outlook M Tunes Spanning Centuries, T Last Week, W Live From Turkey, H Review of the Foreign Media, F Big Powers & the Armenian Problem, A Archaeological Settlements in Turkey; 0320 S The Stream of Love or DX Corner, T Hues & Colors of Anatolia, H Letterbox; 0325 M/A Music, F In the Wake of a Contest; 0330 S/T Music; 0335 S Turkish Arts, M Turks in the Mirror of Centuries, T From Past to Present, H Turkey's Off the Beaten Track Sites, F The Culture Parade, A The Travel Itinerary of Anatolia.

WBQC, Maine

5105 kHz.: 0300 A Squad 51 (musical menagerie). 7415 kHz.: 0300 S Michael Ketter Show (satire/free form), M Radio New York International (cont'd). 9330 kHz.: 0300 S World of Radio; 0330 S The RMF Show (extreme lyrics).

WHRI, Indiana

7315 kHz.: 0302 S 20 The Countdown Magazine (Christian rock charts); 0330 M DXing with Cumbre. 7535 kHz.: 0300 S Powersource Top 20 (Christian rock music)

WRMI, Florida

6870/7385 kHz.: 0300 S DX Partyline (from HCJB), M Waves:can (for DXers from AWR); 0330 S/M World Radio Network.

WWCR, Tennessee

5070 kHz.: 0300 S Radio Weather; 0330 S DX Radio School.

VOICE OF VIETNAM

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

0400 UTC/ 12am E/9pm P - Page 47 Freqs

BBC WORLD SERVICE (am)

0400 D World Briefing; 0432 S Letter (from a global correspondent); M-F The World Today, A Reporting Religion; 0445 S Instant Guide (backgrounder).

CHINA RADIO INTERNATIONAL

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

WBQC, Maine

7415 kHz.: 0400 S Tom & Darryl (electronic media), M-A Amos 'n Andy; 0415 T Odin Lives (old Norse

DEUTSCHE WELLE

0400 D News; 0405 S Inside Europe, M Mailbag, T-A Newslink Africa; 0430 T Insight (international issues), W World in Progress (development), H Money Talks (business), F Living Planet (environment), A Spectrum (sci-tech); 0445 T Business German.

RADIO AUSTRALIA

0400 D News; 0405 S The Europeans, A Books & Writing; 0410 M-F Bush Telegraph (rural life); 0430 S The Chat Room (interviews); 0435 A Book Talk; 0455 M-F Perspective (commentary).

[Special service: 0405 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only.]

RADIO HABANA CUBA

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

RADIO NETHERLANDS

0400 S Wide Angle (in-depth), M Europe Unzipped, T-A Newsline; 0422 S The Week Ahead (on RN), M Insight (commentary); 0430 S Amsterdam Forum (conversations), M Vox Humana (culture), T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO NEW ZEALAND INTERNATIONAL

0400 S/A RNZ News; M-F Checkpoint, A S Religion feature or series, A Tagata O Te Moana (Pacific magazine); 0440 S Jazz Spotlight.

RADIO ROMANIA INTERNATIONAL

0400 D Radio Newsreel; 0410 S The Week, M Focus, T-A Commentary; 0415 S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate), A Challenge for the Future; 0420 S RRI Encyclopedia, T Political Flash, W European Horizons, A Business Update; 0425 S Roots (culture/traditions), T Business Update, W Visual Arts, F Listeners' Letterbox, A Practical Guide; 0430 S Radio Pictures, M Romanian Itineraries, H Visit Romania, A Cultural Survey; 0435 S Romanian Itineraries, M Listeners' Letterbox, T Pages of Romanian Literature, W Talking Points or Living Romania (programs alternate), H Partners in a Changing World, F Guest at the Microphone, A Over Coffee (with artists); 0440 S Romanian by Radio, M/F The Skylark (folk music), H Stage and Screen, A Off Bucharest; 0445 S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Folk Music Box; 0450 M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

RvI, Belgium

0400 S Music from Flanders, M Radio World, T-A News; 0404 T-A Flanders Today (incl. press review, reports & CD of the Week); 0408 M Tourism in Flanders; 0414 M Brussels 1043 (letters).

VOICE OF AMERICA, Africa Service

0400 M-F News & Reports; 0415 M-F Focus (a topic in-depth); 0423 M-F Sports; 0430 M-F Daybreak Africa (morning newsmagazine).

VOICE OF RUSSIA

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

WBQC, Maine

7415 kHz.: 0400 S Tom & Darryl (electronic media), M-A Amos 'n Andy; 0415 T Odin Lives (old Norse

myths/music); 0430 M World of Radio.

WHRI, Indiana

7315 kHz.: 0400 S 20 The Countdown Magazine (cont'd).

WRMI, Florida

6870/7385 kHz.: 0400 D World Radio Network.

WWCR, Tennessee

3210 kHz.: 0400 M Worldwide Country Radio. 5070 kHz.: 0400 S Cyberline (digital communications).

0500 UTC/ 1am E/10pm P - Page 47 Freqs

BBC WORLD SERVICE (eu) - 6195, 9410, 12095
0500 D The World Today; 0532 S Reporting Religion, A People & Politics.

BBC WORLD SERVICE (wof) - 7160

0500 D The World Today; 0529 D African News; 0532 S African Perspective (life in Africa), M-F Network Africa, A African Quiz (current events-1st A) [or] This Week & Africa (exc. 1st A).

CHANNEL AFRICA, South Africa

0500 D News; 0515 S Inner Voice (African spirituality), M Nepod Focus, T-F Africa Rise & Shine (current affairs), A 37 Degrees (health & medicine); 0540 M UN Chronicle.

CHINA RADIO INTERNATIONAL

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

DEUTSCHE WELLE

0500 News; 0505 S Religion & Society, M Hard to Beat (sport), T-A Newslink Africa; 0515 S German by Radio, M Inspired Minds; 0530 S Africa This Week, M Hits in Germany [or] Melody Time, T A World of Music, W Arts on the Air, H Living in Germany, F Cool (youth culture), A Focus on Folk; 0545 H Europe in Capitals.

RADIO AUSTRALIA

0500 D News; 0505 S All in the Mind (the brain), A Australian Express (magazine); 0510 M-F Pacific Beat (Pacific islands magazine w/sports @ 0530); 0530 S The Ark (religious history), A All in the Mind 0535 M-F On the Mat (regional issues); 0549 S The Pulse (Aussie music now).

[Special service: 0505 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only.]

RADIO HABANA CUBA

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

RADIO JAPAN - NHK WORLD

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

RADIO NEW ZEALAND INTERNATIONAL

0500 D RNZ News; 0507 S Mana Korero (Maori magazine), M-F Worldwatch & Pacific Report, A The Mix ('live' music acts); 0530 M Letter (from a global correspondent); 0545 M-F Storytime.

VOICE OF AMERICA, Africa Service

0500 M F News & Reports; 0523 M-F Sports Report;

Shortwave Guide



0530 M-F News Headlines; 0533 M-F Business Report; 0545 M-F Dateline (documentary); 0555 M-F Opinion Roundup.

WBCQ, Maine
7315 kHz.: 0500 S Juliet's Wild Kingdom.

WHRI, Indiana
7315/7535 kHz.: 0500 A DXing with Cumbre.

WRMI, Florida
6870/7385 kHz.: 0500 D World Radio Network.

WWCR, Tennessee
5070 kHz.: 0500 S Ken's Country Classics; 0530 S Country Crossroads, M-F Natural Health Clinic.

0600 UTC/2am E/11pm P - Page 48 Freqs

BBC WORLD SERVICE (eu) - 9410, 12095
0600 D The World Today; 0632 S The Interview (trends), A World Football.

BBC WORLD SERVICE (waf) - 7120
0600 D The World Today; 0629 S News Update, M-A African News; 0632 S World Business Review, M-F Network Africa, A African Quiz (1st A) [or] This Week & Africa; 0645 S The Instant Guide (backgrounder).

CHANNEL AFRICA, South Africa
0600 D News; 0615 S Our Heritage, M UN Chronicle, T-F Africa Rise & Shine (current affairs), A Tam Tam Express (governance in Africa).

DEUTSCHE WELLE
0600 D News; 0605 S Inside Europe, M Mailbag, T-A Newslink Africa; 0630 T Insight (international issues), W World in Progress (development), H Money Talks (business), F Living Planet (environment), A Spectrum (sci-tech); 0645 T Business German.

RADIO AUSTRALIA
0600 D News; 0605 S The Buzz (sci-tech), A Verbatim (oral histories); 0610 M-F Regional Sports Report; 0620 M Ockham's Razor (science opinion), T In Conversation (about science), W Lingua Franca (about language), H The Ark (religious history), F Inside Out (Pacific views); 0630 S Hit Mix (pop/rock), A Jazz Notes; 0635 M Hit Mix, T Music Deli (diverse world/folk), W Jazz Notes, H Australian Country Style.
[Special service: 0605 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only. (continues to 0800)]

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

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

RADIO NEW ZEALAND INTERNATIONAL
0600 D News; 0605 S One in Five (disability issues), M-F Checkpoint (repeat of 0405), A Saturday Night (variety); 0630 S The Week in Parliament.

VOICE OF AMERICA, Africa Service
0600 S/A News & Reports, M-F Daybreak Africa (morning newsmagazine); 0623 S/A Sports; 0630 S/A News Headlines; 0633 S/A Main Street (life in America).

WRMI, Florida
6870/7385 kHz.: 0600 D World Radio Network (to 0900).

WWCR, Tennessee
3210 kHz.: 0630 S World of Radio.
5070 kHz.: 0600 S Worldwide Country Radio.

1000 UTC/6am E/3am P - Page 49 Freqs

BBC WORLD SERVICE (am)
1000 S/A News, M-F World Briefing; 1006 S From Our Own Correspondent, A Documentary; 1032 S In Praise of God (worship service), M-F World Business Report, A World Football; 1045 M-F Sports Roundup.

CHINA RADIO INTERNATIONAL
1000 D Real Time Beijing (world/national/city news, business, sports, press, sci-tech, culture, show-biz, music, features); 1015 S China Beat (popular music), A China Roots (traditional music).

RADIO AUSTRALIA
1000 D News; 1005 S Keys to Music (enjoying the classics), M-F Asia Pacific (regional current affairs), A Inside Out (Pacific views); 1030 M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor; 1045 A Lingua Franca (about language).

RADIO JAPAN - NHK WORLD
1000 D News; 1010 S Weekend Japanology, M-F Songs for Everyone, A Hello from Tokyo (listener contact); 0015 T-A 44 Minutes (magazine); 0054 M Japan Music Scene.

RADIO NEW ZEALAND INTERNATIONAL
1000 D News; 1006 M Music Mix (rock), T-H Today in Parliament, F Jazz feature; 1012 S Nightcap (light music), T Showtime (show tunes), W In a Mellow Tone (nostalgic music), H Beale Street Caravan (blues); 1035 S Sunday Supplement (NZ opinions).

WWCR, Tennessee
15825 kHz.: 1000 M-F Worldwide Country Radio;
1015 S Ask WWCR.
5070 kHz.: 1015 S A View from Europe; 1030 A World of Radio

1100 UTC/7am E/4am P - Page 50 Freqs

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

CHINA RADIO INTERNATIONAL
1100 D Real Time Beijing (world/national/city news, business, sports, press, sci-tech, culture, show-biz, music, features); 1115 S China Beat (popular music), A China Roots (traditional music).

HCBJ ECUADOR
1100 S Let My People Think, M-F Insight for Living, A Down Gilead Lane; 1130 S Renewing Your Mind, M-F Family Life Today, A Adventures in Odyssey.

RADIO AUSTRALIA
1100 D News; 1105 S Sunday Profile (current events), M-A Asia Pacific (regional current affairs); 1130 S Speaking Out (Aboriginal affairs), M Innovations (new products), T Earthbeat (environment), W Rural Reporter, H Smart Societies (social challenges), F The Chat Room (interviews), A All in the Mind (the brain).

RADIO JAPAN - NHK WORLD
1100 D News; 1110 S Hello from Tokyo (listener

contact), M-F Songs for Everyone, A Pop Joins the World; 1115 M-F Asian Top News (headlines from region's radio); 1125 M Japan Musicscape, T Basic Japanese for You, W Japan Music Travelogue, H Brush Up Your Japanese, F Music Beat.

RADIO NETHERLANDS
1100 S Wide Angle, A Europe Unzipped; M-F Newsline; 1122 S The Week Ahead, A Insight (comment); 1130 S Vox Humana (culture), M Research File (science) T EuroQuest (Europe in context), W Weekly Documentary, H Dutch Horizons, F The Good Life (development issues), A Amsterdam Forum (conversations).

RADIO NEW ZEALAND INTERNATIONAL
1100 S/A RNZ News, M-F Pacific Regional News; 1105 S/A Forces Programme (for NZ personnel serving in PNG & E. Timor); 1108 M-F Dateline Pacific; 1130 M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.

WWCR, Tennessee
15825 kHz.: 1110 A A View from Europe.

1200 UTC/8am E/5am P - Page 50 Freqs

BBC WORLD SERVICE (am)
1200 D Newshour; 1205 M-F Caribbean Business; 1210 M-F Caribbean Morning Report 2nd Edition; 1220 M-F Caribbean Magazine; 1230 M-F Newshour (cont'd).

HCBJ ECUADOR
1200 S Moody Presents, M-F Morning in the Mountains, A Hour of Decision; 1215 M-F Proclaim; 1230 S The Living Word, M-F Renewing Your Mind, A DX Partyline.

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

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

RADIO KOREA INTERNATIONAL
1200 D News; 1210 S Korean Pop Interactive (requests), M-F News Commentary, A Worldwide Friendship (letters, DX news); 1215 M-F Seoul Calling (magazine); 1230 S Korean Pop Interactive (cont'd), M-F Seoul Calling (cont'd), A Worldwide Friendship (cont'd); 1245 M Korea Today & Tomorrow (peninsula issues), T Korean Kaleidoscope (Korean society), W Wonderful Korea (tourism), H Seoul Report (interviews).

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

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

WHRI, Indiana
9495 kHz.: 1200 A Radio Weather; 1230 A DXing with Cumbre.

Shortwave Guide



WRMI, Florida
15725 kHz.: 1200 S Viva Miami (magazine), M-A World Radio Network; 1230 S Voice of the NASB (US private sw consortium).

1300 UTC/ 9am E/6am P - Page 51 Freqs

BBC WORLD SERVICE (am)
1300 D News; 1306 S From Our Own Correspondent (background), M-F Outlook (magazine), A Pick of the World (BBC's best); 1332 S In Praise of God; 1345 M-F Off the Shelf (book readings), A Write On (letters).

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

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

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

RADIO NEW ZEALAND INTERNATIONAL
1300 S/A RNZ News, M-F Pacific Regional News; 1305 S Tagata o te Moana, A New Music Releases; 1308 M-F Dateline Pacific; 1330 M Mailbox (letters & DX news) or RNZI Talk (station info), T Tradewinds (Pacific commerce), W The World in Sport, H Pacific Correspondent, F Sports Story.

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

WRMI, Florida
15725 kHz.: 1300 M-A World Radio Network; 1330 S World Radio Network.

WWCR, Tennessee
15825 kHz.: 1300 M-F Worldwide Country Radio.

1400 UTC/ 10am E/7am P - Page 51 Freqs

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

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

RADIO AUSTRALIA
1400 D News; 1405 S The Science Show, M-F PM

(domestic early evening newscast), A Background Briefing (documentaries); 1455 S Business Weekend, M-F Perspective (informed opinion), A Correspondent's Notebook.

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

RADIO NEW ZEALAND INTERNATIONAL
1400 D RNZ News; 1405 D Book Reading (in installments); 1430 M Bookmarks (NZ books/writers), T What's the Word? (NPR quiz), H For a Smile (BBC comedy), F Auckland Issues; 1440 S The Week in Parliament, W Diversions, A Nga Taonga Korero (Maori program).

WRMI, Florida
15725 kHz.: 1400 D World Radio Network.

1500 UTC/ 11am E/8am P - Page 52 Freqs

BBC WORLD SERVICE (am)
1500 D News; 1506 S Documentary, M Health Matters, T Go Digital, W Discovery (science), H One Planet (ecology), F Science in Action, A Sportsworld (live action from 1406); 1532 S In Praise of God (worship service), M Quiz [or] panel game, T Music Review, W/F Westway (drama serial), H The Word (writers & writing) [exc. 28th, World Book Club (discussion)]; 1545 W Heart & Soul (beliefs & values), F What's the Problem? (advice).

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

RADIO AUSTRALIA
1500 D News; 1505 S The National Interest, M-F Asia Pacific (regional current affairs), A Smart Societies (social challenges); 1530 M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor; 1555 S Perspective (informed opinion), A Business Weekend.

RADIO AUSTRIA INTERNATIONAL
1505 S/A Week in Review; 1510 M-F Report from Austria; 1525 S/A Listener Letters; 1535 S/A Week in Review; 1540 M-F Report from Austria; 1555 S/A Listener Letters.

RADIO CANADA INTERNATIONAL
1500 D News; 1505 S The Sunday Edition (cont'd.), A Quirks & Quarks (science).

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

RADIO NEW ZEALAND INTERNATIONAL
1500 S/A RNZ News, M-F Pacific Regional News; 1505 S/A Forces Radio; 1508 M-F Dateline Pacific; 1530 M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.

WHRI, Indiana
15105 kHz.: 1530 S DXing with Cumbre.
13760 kHz.: 1500 A DXing with Cumbre.

WRMI, Florida
15725 kHz.: 1500 D World Radio Network.

WWCR, Tennessee
12160 kHz.: 1500 A Golden Age of Radio.

1600 UTC/ 12pm E/9am P - Page 52 Freqs

BBC WORLD SERVICE (am)
1600 S/A News, M-F Europe Today; 1606 S Sunday Sportsworld, A Sportsworld (live action from 1406).

DEUTSCHE WELLE
1600 D News; 1605 S Mailbag, M-F Newslink Asia, A Hard to Beat (sport); 1615 A German by Radio; 1630 M Insight (international issues), T World in Progress (development), W Money Talks (business), H Living Planet (environment), F Asia This Week, A Cool! (youth culture); 1645 M Europe in Capitals (city profile).

RADIO AUSTRALIA
1600 D News; 1605 S Books & Writing, M-F Margaret Throsby (interview/music), A Hindsight (social history); 1635 S Book Talk.

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

VOICE OF GREECE
1600 A Hellenes Around the World (Greek popular & traditional music, letters).

WRMI, Florida
15725 kHz.: 1600 S/A World Radio Network.

WWCR, Tennessee
15825 kHz.: 1600 S Latin Catholic Mass, M-F Worldwide Country Radio.

1700 UTC/ 1pm E/10am P - Page 53 Freqs

BBC World Service (aof) - 21470
1700 D News; 1706 D Focus on Africa; 1745 S-H Sports Roundup, F Football Extra.

BBC World Service (me) - 12095, 15565
1700 D World Briefing; 1720 D British News; 1732 S Instant Guide (background), M-F World Business Report, A The Interview (trends); 1745 S-H Sports Roundup, F Football Extra.

CHANNEL AFRICA, South Africa
1700 D News; 1715 S/A Africa This Week, M-F Dateline Africa (current affairs).

RADIO AUSTRALIA
1700 D News; 1705 S Sound Quality (innovative music), M-F Australia Talks Back (phone-in), A The Spirit of Things (spiritual matters).

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

VOICE OF AMERICA, Africa Service
1700 S Reporters' Roundtable, M-A News; 1706 M-F Talk to America (global phone-in), A News & Reports; 1720 A Sports; 1730 S Music Time in Africa; 1733 A Press Conference USA.

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

WHRI, Tennessee
13760 kHz.: 1730 A Radio Weather

Shortwave Guide



WRMI, Florida
15725 kHz.: 1700 S/A World Radio Network.

WWCR, Tennessee
15825 kHz.: 1715 H Ask WWCR; 1730 T Old
Record Shop (vintage recordings).

1800 UTC/ 2pm E/11am P - Page 53 Freqs

ALL INDIA RADIO

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

BBC WORLD SERVICE (eaf) - 21470

1800 S/A News, M-F World Briefing; 1806 S From Our Own Correspondent, A The Ticket (global arts revue); 1820 M-F British News; 1832 S Global Business (trends), M/F Fast Track (African sport), T Postmark Africa (answers), W Africa Live (phone-in), H Arbeat.

BBC WORLD SERVICE (me) - 12095

1800 D News; 1806 S Pick of the World (BBC's best), M/W Documentaries, T Masterpiece (cultural ideas), H Assignment (one topic), F Sports International (magazine); 1832 M Music Feature, T White Label (new music releases), W Charlie Gillett (world music), H The Music Biz, F John Peel (electic music); 1845 S Write On (letters).

RADIO AUSTRALIA

1800 D News; 1805 S-H Pacific Beat (Pacific islands magazine), F Pacific Review, A Best of 'Late Night Live' (interviews); 1830 F Country Breakfast (rural life); 1835 M-F On the Mat (regional issues).

VOICE OF AMERICA, Africa Service

1800 S/A News & Reports, M-F Africa World Tonight; 1805 S On the Line (US foreign policy), A Our World (science magazine); 1830 S/A News Headlines, W Straight Talk Africa (continental phone-in); 1833 S/A On the Line (US foreign policy); 1855 S/A Government Editorial.

WBCQ, Maine

7415 kHz.: 1845 M-F Planet World News
9330 kHz. 1845 M-F Planet World News
17495 kHz.: 1800 M-F Old Time Radio Theatre;
1845 M Planet World News

WHRI, Indiana

15665 kHz.: 1805 S Pat Boone (variety).

WRMI, Florida

15725 kHz.: 1800 S/A World Radio Network.

WWCR, Tennessee

12160 kHz.: 1800 M-F Natural Health Clinic; 1830 M-F Stairway to Health.

1900 UTC/ 3pm E/12pm P - Page 54 Freqs

ALL INDIA RADIO

1900 D News; 1905 D Press Review; 1910 S Women's World, M/W/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interviews-2nd/4th), H Panorama of Progress, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); 1920 S/M/W/F Film Songs, T Light Classical Music, H Light Instrumental Music, A Karnatak Classical Music; 1930 D

Commentary; 1935 S/H/F Film Songs, M Karnatak Vocal Music, T Folk Songs, W/A Light Music.

BBC WORLD SERVICE (eaf) - 12095

1900 D News; 1901 A In Concert; 1906 S Top of the Pops (British music charts), M-F Focus on Africa; 1932 M-F World Business Report; 1945 MTHF Analysis, W From Our Own Correspondent.

BBC WORLD SERVICE (waf) - 15400, 17830

1900 S/A World Briefing, M-F News; 1906 M-F Focus on Africa; 1920 S/A Sports Roundup; 1932 S The Interview (trends), M-F World Business Report, A Voices from the Market (drama series); 1945 MTHF Analysis, W From Our Own Correspondent.

RADIO CANADA INTERNATIONAL

1900 D CBC News; 1905 S Tapestry (spiritual matters), M-F Richardson's Roundup (variety), A Definitely Not the Opera (popular culture).

DEUTSCHE WELLE

1900 News; 1905 S Hard to Beat (sport), M-F Newslink Africa, A Religion & Society; 1915 S Inspired Minds, A German by Radio; 1930 S Hits in Germany [or] Melody Time, M A World of Music, T Arts on the Air, W Living in Germany, H Cool (youth culture), F Focus on Folk, A Africa This Week, 1945 W Europe in Capitals.

RADIO AUSTRALIA

1900 D News; 1905 F Rural Reporter, A Earthbeat (environment); 1910 S-H Pacific Beat (regional magazine w/Sport @ 1929); 1930 F Australian Country Style (music), A The Makers (artists & performers); 1935 M-F The Best of 'Bush Telegraph' (rural life); 1945 A Health Bits.

RADIO NETHERLANDS

1900 S Documentary, A Vox Humana (culture); 1930 S/A News; 1935 S Wide Angle (in-depth), A Europe Unzipped; 1955 S The Week Ahead (on RN), A Insight (commentary).

VOICE OF AMERICA, Africa Service

1900 S News & Reports, M-F News, A Hip Hop Connections (music); 1906 M-F Border Crossings (music—exc. T Housecall (medical info)); 1923 S Sports; 1930 S Music Time in Africa (part 2), M-F World of Music, A News Headlines; 1933 A Press Conference USA.

WHRI, Indiana

15665 kHz.: 1930 A DXing with Cumbre.

WRMI, Florida

15725 kHz.: 1900 S/A World Radio Network.

WWCR, Tennessee

15825 kHz.: 1900 A U.S. Presidential Radio Address/Democratic Response; 1930 W Ask WWCR.

2000 UTC/ 4pm E/1pm P - Page 54 Freqs

BBC WORLD SERVICE (eaf)(waf) - 12095, 15400, 17830

2000 D Newshour.

DEUTSCHE WELLE

2000 D News; 2005 S Mailbag, M-F Newslink Africa, A Inside Europe; 2030 M Insight (international issues), T World in Progress (development), W Money Talks (business), H Living Planet (environment), F Spectrum (sci-tech); 2045 M Business German.

RADIO AUSTRALIA

2000 D News; 2005 F Pacific Review, A Austral a All Over; 2010 S-H Pacific Beat (regional magazine w/Sport @2029), 2030 F The Buzz (technology).

RADIO CANADA INTERNATIONAL

2000 D CBC News; 2005 S Cross Country Checkup (national phone-in), M-F Richardson's Roundup

(cont'd), A Definitely Not the Opera (cont'd).

RADIO NETHERLANDS

2000 S Vox Humana (culture), A Amsterdam Forum (conversations); 2030 S/A News; 2035 S Wide Angle (in-depth), A Europe Unzipped; 2055 S The Week Ahead (on RN), A Insight (commentary).

VOICE OF AMERICA, Africa Service

2000 S/A Nightline Africa (weekend magazine), M-F Africa World Tonight.

ALL INDIA RADIO

2045 D Press Review; 2050 S/T Instrumental Music, M/F Folk Songs, W Light Music, H Classical Indian Vocal Music, A Regional Indian Devotional Music.

WBCQ, Maine

5105 kHz.: 2000 M-F The Voice of Reason
7415 kHz.: 2000 T The Last Roundup (classic radio).
9330 kHz.: 2000 S/A Radio Weather; 2030 S Northern Lights
17495 kHz.: 2000 M-F Radio Caroline; 2030 A World of Radio.

WHRI, Tennessee

13760 kHz.: 2030 S DXing with Cumbre.

WRMI, Florida

15725 kHz.: 2000 A World Radio Network.

WWCR, Tennessee

15825 kHz.: 2000 M DX Radio School, H DX Partyline, F Real Radio; 2030 H World of Radio, F Ask WWCR.
12160 kHz.: 2000 S Worldwide Country Radio;
2030 A World of Radio.

2100 UTC/ 5pm E/2pm P - Page 55 Freqs

ALL INDIA RADIO

2100 D News; 2105 D Commentary; 2111 S Regional Film Songs, M/A Classical Indian Vocal Music, T Karnatak Vocal Music, W/H Instrumental Music, F Orchestral Music; 2120 S Sports Roundup (1st wk)/Feature (2nd)/Film Story (3rd)/Discussion (4th), M Faithfully Yours (letters), T Cultural Talk, W Radio Newsreel, H Panorama of Progress, F Focus (magazine-1st wk)/Horizon (literature-2nd/4th)/Indian Music (3rd), For Youth (1st)/Indian Classics (books-2nd)/From the Archives (3rd)/Quiz Time (4th); 2130 M DXers Corner (2nd/4th), T/W Film Songs, H Classical Half-Hour, A Old Film Songs; 2140 F Film Songs; 2145 M Film Songs; 2150 S Karnatak Vocal Music.

BBC WORLD SERVICE (am)

2100 D News; 2101 A Play of the Week; 2106 S Everywoman (magazine), M Health Matters, T Go Digital, W Discovery, H One Planet, F Science in Action; 2132 S Westway Omnibus, M Quiz or panel game, T Music Review, W/F Westway (drama serial), H The Word (writers & writings) [exc. 28th, World Book Club (discussion)]; 2145 W Heart & Soul (beliefs & values), F What's the Problem? (advice).

(*Special service to the Caribbean on 5975, 11675, 15390 kHz.: 2115 M-F Caribbean Report. Special service to the Falklands on 11680 kHz.: 2130 T/F Calling the Falklands.)

DEUTSCHE WELLE

2100 News; 2105 S Hard to Beat (sport), M-F Newslink Africa, A Religion & Society; 2115 S Inspired Minds, A German by Radio; 2130 S Hits in Germany [or] Melody Time, M A World of Music, T Arts on the Air, W Living in Germany, H Cool (youth culture), F Focus on Folk, A Africa This Week; 2145 W Europe in Capitals.

RADIO AUSTRALIA

2100 D News; 2105 F Verbatim (oral history), A Australia All Over; 2110 S-H AM (morning news magazine); 2130 S Country Breakfast (rural life),

Shortwave Guide



M-F RNZI Pacific Dateline; 2145 A Asia Sunday.

RADIO CANADA INTERNATIONAL

2100 S/A The World This Weekend, M-F The World at 6; 2130 S Maple Leaf Mailbag (w/CIDX Report fortnightly), M-F As It Happens (interviews with newsmakers), A Radio Nomad (variety).

RADIO JAPAN - NHK WORLD

2100 D News; 2110 S Pop Joins the World, M-F Songs for Everyone, A Weekend Japanology; 2115 M-F Asian Top News (headlines from region's radio); 2125 M Japan Musicscape, T Basic Japanese for You, W Japan Music Travelogue, H Brush Up: Your Japanese, F Music Beat; 2154 A Japan Music Scene.

RADIO ROMANIA INTERNATIONAL

2130 D Radio Newsreel; 2140 S The Week, M Focus, T-A Commentary; 2145 S World of Culture, M Sundry Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate), A Challenge for the Future; 2150 S RRI Encyclopedia, T Political Flash, W European Horizons. A Business Update.

VOICE OF AMERICA, Africa Service

2100 M-F News; 2106 M American Gold, T Roots and Branches, W Classic Rock, H Top 20, F Country Hits.

WBCQ, Maine

5105 kHz.: 2100 M-F Radio Caroline.
7415 kHz.: 2100 S CW Junction (country music concerts), M Jean Shepherd (stories/humor), T The Last Roundup (classic radio), F Frankie V Radio Show; 2130 H The Last Roundup, F Pab Sungenis Project.
9330 kHz.: 2130 S Science Rocks.

WHRA, Maine

17650 kHz.: 2100 F DXing with Cumbre.

WHRI, Indiana

9495 kHz.: 2130 A DXing with Cumbre.

WRMI, Florida

15725 kHz.: 2100 A World Radio Network; 2130 S Voice of the NASB (consortium of US private sw broadcasters).

2200 UTC / 6pm E / 3pm P - Page 56 Freqs

ALL INDIA RADIO

2200 D News; 2210 D Commentary; 2215 S Women's World, M/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interview-2nd/4th), W Book Review (1st)/Window on Science (2nd/4th)/Times & Lives (biography-3rd), H General Talk, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); 2225 D Film Tune.

BBC WORLD SERVICE (am)

2200 D The World Today; 2232 F People & Politics, A The Interview (trends).

RADIO AUSTRALIA

2200 D News; 2205 F Asia Pacific (regional current affairs), A Correspondents' Report; 2210 S-H AM (morning news magazine); 2230 F Saturday AM (morning news magazine), A Music Deli (international); 2240 S-H Australia Wide (national report); 2254 A H Perspective (commentary).

RADIO CANADA INTERNATIONAL

2200 S/A The World This Weekend, M-F The World at 6; 2230 S Maple Leaf Mailbag (w/CIDX Report fortnightly), M-F As It Happens (interviews with newsmakers), A Radio Nomad (variety).

RADIO PRAGUE

2230 D News; 2235 S Mailbox, M-F Current Affairs, A Insight Central Europe (regional magazine); 2240

S ABC of Czech (the language), T Czech Science, F The Arts; 2245 S Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), M Talking Point (Czech issues), T One on One (interview), W Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), H Business Report, F Stepping Out (Prague nightlife).

RvI, Belgium

2200 S Radio World, M-F News, A Music from Flanders; 2204 M-F Flanders Today (incl.press review, reports & 'CD of the Week'); 2208 S Tourism in Flanders; 2214 S Brussels 1043 (letters).

VOICE OF TURKEY

2200 D News; 2210 D Press Review; 2215 S Tunes Spanning Centuries, M Last Week, T Live From Turkey, W Review of the Foreign Media, H Big Powers & the Armenian Problem, F Archaeological Settlements in Turkey, A Outlook; 2220 M Hues & Colors of Anatolia, W Letterbox, A The Stream of Love or DX Corner; 2225 S/F Music, H In the Wake of a Contest; 2230 M/A Music; 2235 S Turks in the Mirror of Centuries, M From Past to Present, W Turkey's Off the Beaten Track Sites, H The Culture Parade, F The Travel Itinerary of Anatolia, A Turkish Arts.

WBCQ, Maine

5105 kHz.: 2200 S Allan Weiner Worldwide.
7415 kHz.: 2200 M Radio Weather, W World of Radio, H Planet World News Roundup, F Pab Sungenis Project (cont'd), A Radio Timtron Worldwide; 2230 W The Music Download Scene, H Uncle Ed's Musical Memories, F Wanton Display of Control & Disruption (audio animation).
9330 kHz.: 2200 S Allan Weiner Worldwide, A The Country Music Hour.
17495 kHz.: 2200 W World of Radio.

2300 UTC / 7pm E / 4pm P - Page 56 Freqs

BBC WORLD SERVICE (am)

2300 D News; 2306 S Documentary, M-F Outlook (magazine), A Pick of the World (BBC's best); 2332 S Quiz or panel game; 2345 M-F Off the Shelf (book readings), A Write On (letters).

CHINA RADIO INTERNATIONAL

2300 D News & Reports; 2310 A Report on Developing Countries; 2315 F Cutting Edge (sci/tech); 2320 A CRI Roundup; 2330 S People in the Know (China's leading personalities), M Biz China, T China Horizons (China outside Beijing), W Voices from Other Lands, H Life in China, F Listeners' Garden, A In the Spotlight (cultural magazine).

RADIO AUSTRALIA

2300 D News; 2305 F Country Breakfast (rural life), A The Europeans; 2310 S-H Asia Pacific (regional current affairs); 2330 S Verbatim (oral history), M The Europeans, T Rural Reporter, W The Arts on RA, H The Buzz (technology issues), F Hit Mix (pop/rock), A Innovations (new products).

RADIO AUSTRIA INTERNATIONAL

2305 S/A Week in Review; 2310 M-F Report from Austria; 2325 S/A Listener Letters; 2335 S/A Week in Review; 2340 M-F Report from Austria; 2355 S/A Listener Letters.

RADIO BULGARIA

2300 D News; 2310 S/A Views Behind the News, M-F Events and Developments; 2320 S Folk Studio (Bulgarian folk music), M Sports, T Magazine Economy, W The Way We Live, H History Club, A Keyword Bulgaria (Bulgaria and things Bulgarian); 0230 S-H Keyword Bulgaria, F Radio Bulgaria Calling (for radio hobbyists), A Answering Your Letters; 0240 S Walks and Talks (interesting places), M-H Timeout for Music; 0245 F/S Timeout for Music.

RADIO CANADA INTERNATIONAL

2300 D CBC News; 2305 A Quirks & Quarks (science), S Global Village (world music), M-F As It Happens (interviews with newsmakers)[began at 2230]; 2330 W Dispatches (world events in Canadian perspective).

RADIO NEW ZEALAND INTERNATIONAL

2300 F/A News, S-H Middy Report; 0012 F Focus on Politics, A The Week in Parliament; 2333 F The Sampler (latest CDs), A Spectrum (life in NZ).

RADIO ROMANIA INTERNATIONAL

2300 D Radio Newsreel; 2310 S Focus, M-F Commentary, A The Week; 2315 S Sunday Studio, M Pro Memoria (history), T Business Club, W Society Today, H Cards on the Table (debate), F Challenge for the Future, A World of Culture; 2320 M Political Flash, T European Horizons, F Business Update, A RRI Encyclopedia; 2325 M Business Update, T Visual Arts, H Listeners' Letterbox, F Practical Guide, A Roots (culture/traditions); 2330 S Romanian Itineraries, W Visit Romania, F Cultural Survey, T Visual Arts; 2335 S Listeners' Letterbox, M Pages of Romanian Literature, T Talking Point: or Living Romania (programs alternate), W Partners in a Changing World, H Guest at the Microphone, F Over Coffee (with artists), A Romanian Itineraries; 2340 S/H The Skylark (folk music); W Stage and Screen, F Off Bucharest, A Romanian by Radio; 2345 M Romanian Hits, W Romanian Musicians, F Folk Music Box, A DX Mailbag; 2350 S Romanian Folk Music At Its Best, M Sports Roundup, T Athlete of the Week, W Sports Club H Football Flash, F Sports Weekend.

WBCQ, Maine

5105 kHz.: 2300 D Radio Six International (independent/small label music).
7415 kHz.: 2300 S Le Show (satire/entertainment), W Off the Hook (public telecommunications issues), H Godless Irene I Music Show, A The Real Amateur Radio Show; 2330 T Duhh News, H Steppin' Out of Babylon (progressive views), A Fred Flintstone Music Show.
9330 kHz.: 2300 S The Voice of Reason.

WHRI, Indiana

9495 kHz.: 2330 A DXing with Cumbre.
13770 kHz.: 2330 A Radio Weather.

WWCR, Tennessee

9475 kHz.: 2345 A Ask WWCR.

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D'Angelo, *NASWA Flash Sheet*; *DX Listening Digest*, Anker Petersen, Adrian Sainsbury-R. *NZ Intl*; *DX Window*; ODXA/DX Ontario; Prime Time SW, Rumen Pankov, Bulgaria; Larry Van Horn N5FPW, MT Asst. Editor; Loyd Van Horn W4LVH, Sylva, NC; *BCL News*; *Cumbre DX*; *Hard Core DX*; *NASWA Journal*.

Catch a Wave and Monitor a Flat Top!

“AA 305, on centerline, on glide slope, three quarters of a mile, call the ball.”
“305 Hornet Ball, 3.5”

In most cases, a radio monitor hearing this conversation on his scanner wouldn't have a clue about what he was hearing. But let a true, dyed-in-the-wool *Milcom* hobbyist hear this from a scanner speaker and it will shoot the old blood pressure right off the chart. They know the significance of the “Ball” and they know they are listening to communications from a US Navy aircraft carrier.

Unfortunately, if you don't live along the east or west coast of the United States, you have a better chance of winning the Power Ball lottery than monitoring carrier communications. The reason is simple – most of the carrier communications with the aircraft occurs in the UHF line-of-sight spectrum (225-400 MHz). But, for those that live near offshore areas where the big flat tops roam, monitoring a carrier strike group is some of the most exciting listening on the planet.



Call the Ball!
At sea aboard USS George Washington (CVN 73) Jul. 15, 2002 - Arresting Gear Officer Lt. Stacey Wright from San Francisco, CA, watches the landing area as an EA-6B “Prowler” from the “Scorpions” of Tactical Electronic Warfare Squadron One Three Two (VAQ-132) lands on the flight deck. U.S. Navy photo by Photographer's Mate 3rd Class T.J. Talarico.

❖ There is a Plan!

The cockpit of a military aircraft is a busy place. To help the aviators reduce the workload, the aircrew uses a set of presets in their radio (20 channels). It is much easier to tell the pilot to change to “button 16” or “push 16” than it is to tell them to change to 335.850 MHz or Marshal.

The frequencies used for each of these presets is dynamic and can change frequently, but the usage of each carrier preset usually does not.

Here is a list that appears to be in use on both coasts. Again, minor variations can exist, but this seems to be the most common plan based on hundreds of actual intercepts.

Button 1	Tower and Land/Launch
Button 2	CCA Departure (Carrier Controlled Approach)
Button 3	Strike Net
Button 4	Positive Identification and Radar Advisory Zone (PIRAZ) [Call sign: Red Crown]
Button 5	Surface Combat Net
Button 6	Command and Control Warning Net
Button 7	Strike A
Button 8	Strike B
Button 9	Fighter Control A
Button 10	Fighter Control B
Button 11	Fighter Control C
Button 12	Fighter Control D
Button 13	Usually a wing or carrier aerial refueling common
Button 14	Fleet Common-Tactical/Warning [277.8 MHz]
Button 15	CCA/LSO Paddles
Button 16	Marshal
Button 17	CCA-B
Button 18	CCA Overload
Button 19	Carrier Air Wing Common
Button 20	Squadron/Unit Common

❖ What's the Frequency, Kenneth?

The most difficult part of monitoring the UHF spectrum is figuring out what portion of the spectrum you should be in.

The 225-400 MHz band uses 25-kHz spacing. There is 175 megahertz of spectrum space in this band and, using 25 kHz spacing, that equals 40 frequencies per one megahertz, or a whopping 7000 possible frequencies on which to watch for activity! Fortunately, the band is divided into blocks assigned to the various military services, Federal Aviation Administration, and some miscellaneous government agencies. So that can help in cutting down our search once these blocks are mapped out.

But, when a carrier is offshore, they sometimes do pick frequencies assigned to other services, so we should expect the unexpected. Inter-

estingly, carrier operations appear to favor xxx.x00 and xxx.x50 frequencies (i.e., 234.100 or 234.050 MHz). This is a good starting point to search the spectrum. We have observed that xxx.x25 and xxx.x75 frequencies are being used by squadron and carrier air wings in increasing numbers.

Speaking of squadron/wing discrete frequencies, it really helps to know which air wing is currently assigned to the flat top you are trying to monitor. In most cases the squadrons of that wing will still use at least one of their regular squadron common or tactical frequencies in button position 20. Having a list of those frequencies and call signs will surely help you follow activity on “button 20.”

There are a couple of frequencies that do remain constant. Of course, 243.000 MHz is the UHF international emergency channel or “guard” channel. The other frequency that is common is 277.800 MHz, also known as fleet common or tactical. This has been observed on “button 14.”

❖ Some HF Frequencies to Watch

Most of the radio communications from an aircraft carrier, her escorts, and aircraft take place on line of sight frequencies and secure military satellite channels, but radio hobbyists can still occasionally hear HF activity. The most notable users of the HF spectrum are the HF data link voice coordination nets (zF CWC designator). These nets use upper sideband (USB) and once the net is operational, they usually drop their first letter and use single letter calls.

HF Data Link Voice Coordinator Nets

2370.0	3151.0	3265.0	4156.0	4430.4	4432.0
4433.0	4433.5	4434.5	4620.0	4939.0	5333.0
5425.0	5425.0	5729.0	6224.0	6235.0	6249.5
6439.4	6723.0	6786.5	8246.0	8667.0	9283.5
11114.5	11123.6	13893.6	kHz		

If you would like to hear the digital Link 11 signal that is being coordinated on this net, here are a few frequencies that have carried that unusual “racket” on HF.

2150.0	2830.0	3000.0	3231.0	3974.0	4010.0
4038.0	4181.0	4442.0	4779.0	4811.0	5056.0
5335.0	5380.0	5404.5	5460.0	5725.0	5726.0
5910.0	6123.0	6228.0	6249.0	6706.0	6747.0
6936.5	6940.5	7380.0	7896.5	8010.0	8028.0
8030.0	8116.0	8981.0	9010.0	9259.0	10895.0
10925.0	11008.0	11410.0	11445.0	12184.0	
13530.5	14760.0	14764.1	15065.0	kHz	

Another user of not only the UHF milair spectrum, but also the HF spectrum, is the Carrier Group Air Warfare Commander Net (zW).

Like the Foxtrot Nets above, look for this net to use USB.

HF Air Warfare Commander Net

2518.0 3307.0 4101.0 4395.0 5868.5 6242.0
6689.4 6590.0 7893.5 8149.0 8246.0 8668.5
8776.0 9285.0 10608.0 10848.6 11139.0 kHz

We have possibly identified several instances where the top commander of all the battle group warfare disciplines, the Composite Warfare Commander, has shown up either with his own HF net or piggy backing off one of the other HF user nets. Mode is USB.

HF Composite Warfare Commander
3307.0 4102.4 5708.0 7893.5 kHz

We have more than our share of frequencies that are associated with carrier strike group activity, but we have not tagged them for an actual usage yet. Again the mode is USB.

2069.0 2250.5 3100.5 3101.0 3125.0 3166.0
3167.4 3176.0 3371.0 4150.5 4153.0 4154.0
4372.0 4394.4 4395.0 4433.0 4528.0 4562.0
4623.5 4545.0 4720.0 4721.0 4732.0 4878.5
4973.5 5228.6 5404.0 5411.0 5437.0 5699.0
5840.0 5908.0 6242.0 6693.0 6953.0 6967.0
7653.0 7783.0 7945.0 8252.0 9008.0 9023.0
9215.0 9257.0 9257.6 9323.0 10233.6 10376.5
10570.0 10618.5 10923.5 11206.4 11220.0
11266.4 11476.0 11498.0 13415.0 14360.0
14364.0 20854.0 23200.0 23271.0 kHz

◆ **A Sky Full of Call Signs**

Literally, a whole book could be written on this subject. One of the more interesting traits of the Milcom community is their ability to collect frequencies and call signs. Aircraft working with the "boat" or carrier do use a variety of call signs.

First we have the typical squadron static tactical call sign - a word (that usually has a close tie to the squadron nickname) followed by two numbers. Sometimes, depending on the operation, you might find all the wing aircraft involved in a particular mission using the same call sign.

The carriers themselves have a wide variety of call signs depending on the net they are operat-

ing on. When the ship is entering or leaving port, or communicating with other ships on marine frequencies, they will usually use their four letter international call sign (i.e. NZFF, NJQM, etc).

On selected UHF circuits you might hear other units in the strike group calling the carrier using their tactical call signs (i.e. Climax, Eagle Cliff, Panther, etc). Similar call signs are used by all US Navy ships on satellite systems like INMARSAT. Readers can find a comprehensive list of Navy INMARSAT call signs in my November 1998 *MT Milcom* column.

All the ships in the Navy primarily use a daily changing tactical call known as "3 letter call signs" or tri-graph calls (i.e. 11L, 14J, etc). These calls change daily at 0001 Zulu fleet wide and are designed to deny the enemy information on who they are listening to and what kind of operations they are conducting.

Finally, you might hear a series of two letter call signs on either HF or UHF frequencies used by the Composite Warfare Commander (CWC) and his subordinates. The CWC is the overall battle group commander who acts as the central

command authority for the entire carrier or amphibious battle group. The CWC designates subordinate warfare commanders who are assigned to the CWC for air warfare (AWC), surface warfare (SUWC), undersea warfare (USWC), strike (STWC), and space and electronic warfare commander (C2W). Supporting the CWC and his warfare commanders are coordinators who manage force sensors and assets within the battle group.

Subordinate Warfare Commander/Coordinators are identified by a two letter designation. Amphibious group CWC call signs use a first letter of "L." Carrier strike groups have different first letters as indicated in table one. Fifth Fleet Group uses the first letter of "X." Note: the small "z" is the first letter of the call sign and indicates the identity of the carrier battle group.

So fire up that shortwave or, if you live along the East or West Coast, your scanner in the milair band and listen in to some of the best military comms in the world. You might be lucky to enough hear someone "call the ball."

Until next month, 73 and good hunting.

Table 2: CWC Subordinate Warfare Commander/Coordinator Call Signs - 2nd Letter

Subordinate Warfare Commander or Coordinator	Call sign (Notes)
Officer in Tactical Command (OTC)	zA
Composite Warfare Commander (CWC)	zB
HF Data Link Coordinator	zF (HF frequencies)
Helicopter Element Coordinator (HEC)	zL
Screen Coordinator (SC)	zN
Strike Warfare Commander (STRIKE)	zP (UHF usually buttons 3/7/8)
Command & Control Warfare Commander (C2W)	zQ (UHF button 6)
Air Resource Element Coordinator (AREC)	zR
Surface Warfare Commander (SUWC)	zS
Undersea Warfare Commander (USWC)	zX
Air Warfare Commander (AWC)	zW (HF/UHF frequencies)
Sea Combat Commander (SCC)	zZ (UHF Button 5)
Submarine Element Coordinator (SEC)	SEC
Force Over-the-Horizon Track Coordinator (FOTC)	FOTC
Amphibious Groups	
CWC designation for CPR-7	LB
Information Warfare Commander, FIWC Det	LQ
Sea Combat Commander, Surface (USS Boxer)	LS
Air Defense Commander, TACC	LW
Sea Combat Commander, Sub Surface (USS Boxer)	LX
Sea Combat Commander	LZ

Table One: US Navy Aircraft Carriers and Their Wings

Hull No	Name	Airwing	Aircraft Tailcode	Homeport	CWC ID (See Table 2)	Intl/Tac Call sign
CV-63	Second line: Kitty Hawk	Navy/Marine CVW-05	Corps squadrons attached to airwing as of press time. NF	Yokosuka, Japan	Foxtrot	NZFF/Panther VF-102 VFA-27 VFA-192 VFA-195 VAQ-136 VAW-115 HS-14 VS-21 VRC-30 Det 5
CVN-65	Enterprise	CVW-01	AB	Norfolk, VA	Echo	NJQM/Climax VF-211 VMFA-312 VFA-82 VFA-86 VAQ-137 VAW-123 HS-11 VRC-40 Det 2
CV-67	Kennedy	CVW-17	AA	Mayport, FL	Bravo	NJFK/Eagle Cliff VF-103 VFA-34 VFA-83 VFA-81 VAQ-132 VAW-125 HS-15 VS-30 VRC-40 Det ?
CVN-68	Nimitz	CVW-11	NH	San Diego, CA	November	NMTZ/Old Salt VFA-41 VFA-14 VFA-97 VFA-94 VAQ-135 VAW-117 HS-6 VS-29 VRC-30 Det 3
CVN-69	Eisenhower	Not assigned		Norfolk, VA		NIKE/Ike
CVN-70	Vinson	CVW-09	NG	Bremerton, WA		NCVV/Gold Eagle VFA-22 VMFA-314 VFA-146 VFA-147 VAQ-138 VAW-112 HS-8 VS-33 VRC-30 Det 4
CVN-71	Roosevelt	CVW-08	AJ	Norfolk, VA		NNTR/Black List VF-213 VFA-15 VFA-87 VAQ-141 VAW-124 HS-3 VS-24 VRC-40 Det 5
CVN-72	Lincoln	CVW-02	NE	Everett, WA		NABE/Union VFA-2 VMFA-323 VFA-151 VFA-137 VAQ-131 VAW-116 HS-2 VRC-30 Det 2
CVN-73	Washington	CVW-07	AG	Norfolk, VA	Golf	NINGW VF-143 VF-11 VFA-136 VFA-131 VAQ-140 VAW-121 HS-5 VS-31 VRC-40 Det ?
CVN-74	Stennis	CVW-14	NK	San Diego, CA	Charlie	Courage VF-31 VFA-115 VFA-113 VFA-25 VAQ-139 VAW-113 HS-4 VS-35 VRC-30 Det 1
CVN-75	Truman	CVW-03	AC	Norfolk, VA	Hotel	VF-32 VMFA-115 VFA-37 VFA-105 VAQ-130 VAW-126 HS-7 VS-22 VRC-40 Det 3
CVN-76	Reagan	Not assigned		San Diego, CA		
CVN-77	Bush	Not assigned/building				

Marine Emergency Communications

As a member of the Canadian Coast Guard Auxiliary, I am interested in marine emergency communications. Of course, when a mayday is heard, all radio operators know to listen and monitor the information so they may be able to help.

Over the past few months, there have been several marine emergencies that could have been monitored by some of you listeners. I have heard some of the VHF and HF calls here. Other emergency information was relayed from readers and amateur radio operators.

In fact, I was just writing this column after having checked into the Maritime Mobile Service Net, (MMSN) on 14.300 USB. I mentioned the topic of this column and was contacted by Bernie NP2CB. He mentioned a rescue that the Pacific Seafarers Net and the MMSN had been involved in. The Assistant MMSN Manager Tom, VE3II, sent me the following details.

On June 25, VK4CEJ reported to the net that he had a message from the *SV Fingolfin*, 680 nm north of Nuka Hiva in French Polynesia, with a medical emergency. There were only two people on board, and

due to running out of medication during the longer than expected voyage, one person could not help with vessel routines. They had little fuel and light winds prevented sailing. They arranged for a ship to help transfer medication.

Unfortunately, the delivery ship collided with the *Fingolfin*, which was badly damaged. Not only was the female on board injured, but the medication transferred was the wrong type. Both suffered from exhaustion and dehydration. The *Fingolfin* issued a mayday.

Through the help of many amateur radio operators in the US, French Polynesia, and Australia, an hourly schedule was maintained on amateur and marine frequencies. A French Navy vessel was contacted and help was arranged. This contact was kept up for two days until the people were evacuated from the vessel. They were admitted to a hospital in Nuka Hiva and have since been released.

Full details of this amazing rescue, as well as others, can be seen at the MMSN web site (<http://www.mmsn.org>). Letters of commendation to the net manager, K5SIV, have come from the U.S. Coast Guard and the French Navy. This, along with two other medical situations, continues to show the skill and dedication of amateur radio operators in handling emergency radio traffic.

My editor also relayed a message about frequent piracy in the Malacca Straits. Ships have been hijacked, people marooned or killed, and the ship sailed into port under a phantom identity. The MMSN also relayed a message about piracy that occurred between Panama and the Galapagos Islands in April 2004.

MT reader Jon Van Allen, KF7YN, the Radio Electronics Officer aboard the *APL Singapore* informed me of a rescue from their ship. On their way to Dutch Harbor, Alaska, a crewmember suffered chest pain and breathing problems. Medical Health Services were contacted by satellite phone and the helicopter evacuation was arranged through USCG Kodiak.



Alaskan ferry in Wrangell

Contacts were made on the satellite phone and then switched to 4125 kHz USB. Jon says that 4125 is a good frequency to monitor on the Pacific Coast. Jon's list of frequencies to monitor is included in Table 1.

Table 1: Alaskan Frequencies

Courtesy Jon Van Allen KF7YN (Freqs kHz, USB)

Duplex Pairs - Ship/Coast	
2131 / 2309	2134 / 2312
2237 / 2397	2240 / 2400

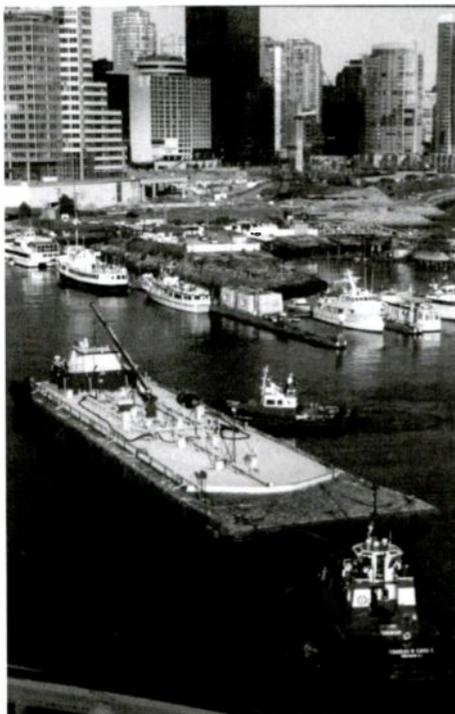
Simplex Frequencies			
2003	2006	2115	2118
2379	2382	2419	2422
2427	2430	2447	2450
2479	2482	2506	2509
2512	2535	2538	2563
2590	2616	3258	3261
4366	4369	4396	4402
4420	4423		

Weather Channels for Environment Canada or NOAA (MHz, FM)

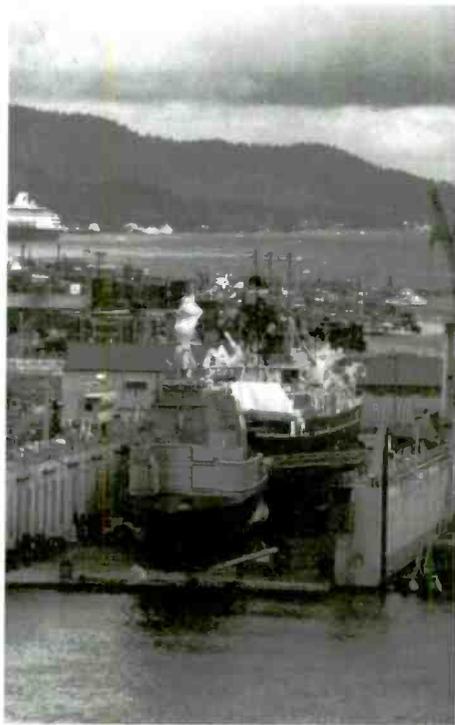
(1) 162.550	(2) 162.400
(3) 162.475	(4) 162.425
(5) 162.450	(6) 162.500
(7) 162.525	(8) 163.275

◆ Inside Passage Monitoring

I voyaged to Alaska this July aboard the *Norwegian Sun*. I monitored the VHF channels and found quite a bit of activity from Vancouver to Skagway and back. Of course, channel 16 is used for calling or distress. Many marinas use channel 73 for communications.



Fuel barges in Vancouver Harbour refuel the cruise ships.



Drydock in Ketchikan, Alaska.

Vessel traffic control uses several frequencies. Tofino, British Columbia, uses channel 74 and will switch vessels to other frequencies when they reach certain areas. Seattle uses channel 5A and channel 14. Vancouver is on channel 12, while Victoria is on channel 11. Channels 11, 12 and 14 are the main traffic control channels, while channel 13 is bridge to bridge communications on commercial vessels. Pleasure craft are asked to avoid using these channels.

Another source of information is the continuous weather broadcasts. My small marine handheld radio picked up these transmissions at quite a range. I was seldom out of range of a weather radio. The Canadian Coast Guard Stations use 161.65 MHz or 161.775 MHz for their weather broadcasts and marine notices. However, the NOAA or Environment Canada Weather Radio frequencies are also used on the Pacific Coast for marine weather. In fact, San Diego has established a broadcast on 162.425 MHz which can be heard 30 to 40 nautical miles out to sea.



Cruise ship Canadian Empress in Quebec City

I found Comox, BC, Coast Guard Radio on 161.775, with remotes from Texada Island on weather channel 1 and Port Hardy on weather channel 3. Weather channel 5 was active in Ketchikan, Alaska. Most weather radio stations near a body of water will also include marine weather broadcasts.

The Coastguard from Juneau and Ketchikan were heard on channels 16, 21A and 22 A. Many VHF channels were found to be active in this area. The marine VHF channels are standard throughout the world and frequencies can be found below or in the Reference Library at <http://www.monitoringtimes.com>. The weather channels are included in the table.

I have also been informed there is an Alaska Emergency Frequency of 5167.5 USB. I would like to know how this is used and if it is active. In fact, I can activate this frequency on my Yaesu FT-897 amateur radio through use of the menu.

❖ Marine Radio Interference

My editor also received a letter from the *MS Endeavor*, a small passenger ship which cruises the Antarctic during the summer season. Sven Thorell, the radio officer, reported they were receiving interference from a Russian broadcasting station on 62353 kHz. Since this is a dedicated marine frequency band, the interference could be dangerous in an emergency situation.

I emailed the ITU and asked if there were exceptions for these marine frequencies. Their reply was that they were dedicated to marine use for wide-band telegraphy, facsimile and special transmissions systems. They said that harmful interference should be reported to the respective national telecommunication agency to directly contact the administration of the interfering station or report to the Radiocommunication Bureau. I hope this helps in this matter. (Details of this matter can be found in *Closing Comments*).

❖ Local Marine Monitoring

The Kingston area has had its share of interesting marine radio traffic. Channels 16, 13 and 22 were active when a tug and barge went aground near Alexandria Bay New York. 12,000 thousand gallons of Calcium Chloride brine escaped into the St. Lawrence River and traffic on the St. Lawrence Seaway was halted for several hours. Over the

next several days, the lightening, release and repair of the vessel could be monitored.

We have had heavy traffic on the Seaway and the vessel traffic control stations have been busy. Channels 11, 12, 13, and 14 are used in this area. Several mayday calls answered by the *CCGS Bittern*. A poker run involving over a hundred high-speed boats and the CORK Regatta (Canadian Olympic Training Regatta Kingston) of approximately 400 sailboats have kept the radios busy.

❖ Reader Input

I appreciated the kind comments of Al Bauernschmidt, N3KPJ. Like myself he began listening to Marine Radio on the old 2 MHz AM Marine Channels. He also reported a daily yachting net for the east coast, at approx. 1230 UTC, on 8152 kHz USB. They do shift to other channels if needed and have used 8164 kHz USB. I believe this is the Cruisetimers Net



Container ship President Truman, APL, in Vancouver.

❖ Australian Marine Frequencies

I was also made aware of some 27 MHz frequencies used for marine work in Australia. I have not been able to monitor these, but include them so readers may tell me if they are valid.

Australian Maritime Safety	26.100.5
Sydney Ports Corp.	27.695, 27.715, 27.745
Australian Volunteer CG	27.840, 27.880, 27.960, 27.980
Marinas, Rescue, etc.	27.880, 27.940

I again thank the readers for the information received and look forward to more reports in the future. Frequency information from any area or country is of great help. I enjoy tuning into other HF marine communications. I monitor from home or as a Captain or Mate on the local tour vessels *Island Queen* and *Island Belle*.

Chan	Freq MHz		
5A	156.250	16	156.800
11	156.550	21A	157.050
12	156.600	22A	157.100
13	156.650	73	156.675
14	156.700		

Win Some, Lose Some.

Clear Channel Radio, the company people seem to love to hate, has good news and bad news for DXers this month.

Good news first. Back in May, I reported the radio giant planned to move 50,000-watt heritage station WWVA-1170 from Wheeling, West Virginia, to Stow, Ohio, a Cleveland suburb. In late July, the company announced it's withdrawn the application to move the station; WWVA will stay put in Wheeling. Published reports suggested pressure from the West Virginia Congressional delegation contributed to the change of heart.

Now, the bad news. According to the *New York Times*, Clear Channel plans to install IBOC digital equipment at 100 of its stations over the next year. They plan to convert an additional 100 stations each subsequent year. (With 1,200 stations, at this rate it will take the company 12 years to convert all its stations.) Conversion will begin in the 100 largest markets.

CEO John Hogan told the *Times* it will cost the company about \$100,000 for each station converted to IBOC operation. Obviously Clear Channel believes it can afford this investment.

At many smaller stations, \$100,000 for IBOC equipment is out of the question. FCC fines of less than \$10,000 are often reduced, after stations are able to convince the Commission their financial condition makes payment impossible. \$100,000 or more for digital gear simply is not going to happen at these stations. I think you can reasonably assume the conversion to IBOC digital will not be universal.

I should say, I don't think it's reasonable to blame Clear Channel for everything that's wrong with radio. A lot of it was going wrong well before ownership consolidation came along. Clear Channel stations are certainly well-run from a technical standpoint; I can't recall the last time I've seen one cited

for a technical violation, and their stations don't show up among the numerous AM operations operating at night with day facilities. Clear Channel may not be the solution, but they aren't the problem either.

Bye bye, licenses, Part 2

Last month, I reported the revocation of four AM licenses in the southern US. This month, an action of the Canadian Radio-television and Telecommunications Commission (CRTC) has raised a ruckus north of the border. The license of CHOI-98.1 "Radio X" in Quebec City was to expire at the end of August.

Radio X had already received a short-term (two-year) renewal in 2002. Canadian licenses are normally valid for seven years.

The station was found to have violated regulations regarding French-language vocal music (presumably they were airing too many English-language records?) and submission of recordings of their broadcasts. The Commission also warned that it had received complaints of abusive broadcasts, and that continued violations could lead to additional sanctions, up to and including re-

vocation of license.

As the two-year period expired, the CRTC continued to receive complaints. They found that Radio X had aired comments abusive of the disabled, women, and racial minorities. Station announcers had urged listeners to harass employees of competing station CJMF and its advertisers. And, they'd urged listeners to pirate cable and satellite TV.

So, the Commission refused to renew the CHOI license. They've issued a call for applications for a new station to use CHOI's 98.1 frequency. Station owners Genex Communications have appealed the decision. They're enlisting their listeners as well – the station website on <http://www.choiradiox.com> urges listeners to "sup-

port your radio station; support your freedom of expression" (in French).

Musical Chairs in Cleveland

Salem Communications is swapping around a number of stations in northern Ohio. Read carefully, it's confusing:

- WKNR-850, which used to be WRMR, remains WKNR.
- WHK-1220, which used to be WKNR (and after that, WHKC), becomes WHKW.
- WRMR-1420, which was originally WHK (and after that, WHKK) becomes WHK again.
- WHKW-1440 (which is WHKW for the second time, after a brief period as WFHM), changes to something else.

Oh, and just to confuse people a bit more ... most of the talk shows on WCCD-1000 are moving to WHK. Presumably, that means the one on 1420...

Bits and Pieces

New Station: Patrick Griffith reports construction is nearly complete at new station KJMP-870 Pierce, Colorado. The station has built a three-tower array near Ault, between Fort Collins and Greeley. This station is likely to be on the air by the time you read this; Patrick has heard reports that it was already testing in July. The directional pattern will favor the northwest, though I suspect it should be widely DX-able to the east just before Colorado sunset.

High-Band Skip: While the sporadic-E VHF DX season has been particularly poor this year, there was one huge bright spot. The opening of July 6 brought extremely rare high-band skip, with at least four DXers reporting skip signals above channel 7. Tim Katlic in upstate New York managed to get a photo of WLOX channel 13, Biloxi, Mississippi – and identified four other stations. There are solid reports of more rare skip in the 222 MHz ham band – and even one tantalizing report of skip in the 432 MHz band! (I've not been able to find any details, and I really doubt there's anything to it)

Will CHOI's appeal succeed? Or will there be a 40,000-watt hole in the Quebec radio dial? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to dougsmith@monitoringtimes.com. Good DX!



Will CHOI-98.1 still exist for the winter skip season? Stay tuned...

Magnetic Field and Pirate Radio Activity Declining?

The level of shortwave pirate activity during the late summer of 2004 reached lows not seen for several years. As usual, *Monitoring Times* readers heard a variety of stations this month, but some weeks saw very little pirate broadcasting on shortwave frequencies. This unusual situation has led to some wild speculation in pirate DXing circles. Why did this sudden bout of inactivity develop?

Some traditional scapegoats have been trotted out. Summer DXing is frequently more unpleasant than DXing during the fall and winter months, given longer daylight hours and greatly increased static levels on shortwave bands. So, one theory has been that the temporary relative lull in pirate broadcasting is not abnormal at all. Weak pirate signals are obscured under these summertime conditions of propagation and weather, leading inevitably to less pirate broadcasting, pending a return to better conditions during the forthcoming winter DX season.

A wilder theory was actually put forward by the *New York Times*. The *Times* reported in April that several experts, including geophysics professor Dr. John A. Tarduno of the University of Rochester, have discovered that the earth's magnetic field is significantly changing. According to these experts, both the level and the polarity of the earth's magnetic field has been measured to be weakening. In one sense, the north pole vs. south pole magnetic field is starting to show signs that it may be reversing. In another sense, the strength of the magnetic field is weakening.

Although any serious change in the earth's magnetic field is probably thousands of years off, or maybe even longer, it is possible that some more subtle effects may already be taking place on planet earth. Some DXers looking for a convenient scapegoat have started to blame the magnetic field for unknown radio propagation effects. Of course, they might be as accurate if they blamed the situation on the St. Louis Browns, but scientific accuracy seldom gets in the way of some interesting DX rumors.

The American League is doing nothing about the St. Louis Browns, but the European Space Agency plans to launch three "Swarm" satellites to monitor the earth's magnetic field, with a goal of increasing the accuracy of forecasting of the impact of the magnetic field on conditions here on Earth.

◆ KFAR Burglarized

Last month we discussed various FM pirates across the United States, including KFAR in Knoxville, TN. Since then,



the station was burglarized, and their equipment was stolen. The station web site has a list of new equipment that they hope will be donated, so that the station can function once again. You can check this situation out for yourself at <http://www.kfar.org/> on the internet.

◆ Braveheart Radio

According to the *Pittsburgh Post Gazette*, Darrell W. Sivik of Meadville, PA, was arrested in March on weapons charges, and was detained in an Erie, PA prison. The newspaper reported that Sivik is the operator of **Braveheart Radio**, a pirate that has thus far not been heard by any *Monitoring Times* readers. Authorities allege that he was in possession of machine guns. Although not typical of pirate radio operators, the situation reminds us of Steve Anderson at the now-defunct KSMR.

◆ What We Are Hearing

Monitoring Times readers heard all of these North American shortwave pirate broadcasters this month. Pirate radio stations operate on a sporadic schedule, but shortwave pirate broadcasting increases noticeably on weekends and during major holiday periods. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but the primary North American pirate frequency of 6925 kHz, plus or minus 30 or 40 kHz remains the best place to scan for the pirates. More than 90% of all North American shortwave pirate broadcasts are heard on or near 6925 kHz.

Big Thunder Radio- They now supplement their rock music with promotions for the **Free Radio Network web site**. (bighunderradio@hotmail.com e-mail)

Black Mountain Radio- Mike O'Farad's normally features rock music, but on other occasions his station has programmed ethnic music, sometimes using **WBMR** call letters. (Uses wbmrradio@hotmail.com e-mail)

Captain Morgan- Their rock music is sometimes mixed with theme songs from old TV shows. They were quite active during the summer, when other stations were silent. (None, says to send reports to ACE, and has QSLed lately)

Grasscutter Radio- They still play rock music during their shows, which often are followed by attempts at two-way QSO communications with other pirates. (Uses grasscutterrado@yahoo.com e-mail)

KIPM- Alan Maxwell's existentialism drama pirate is still the most elaborate production of any North American unlicensed station. (Elkhorn)

Radio First Termer- Somebody has been relaying this historic documentary about radio broadcasting to American soldiers during the Vietnam war. The QSLs that they promise are ob-

scene, but nobody has received one yet. (None)
Radio Piraña International- This station announced a series of August broadcasts on 6307.3 kHz as their final South American pirate transmissions. It remains to be seen if the station will reactivate in the future. (Santiago)

Ragnar Radio- The Great Lakes is still the alleged transmitter location for this rock music pirate, who often also tries to start two-way pirate QSO conversations. (Uses rangarradio@yahoo.com e-mail)

Undercover Radio- They mix rock and new age music with occasional attempts at pirate humor and parodies. (Merlin)

Voodoo Radio- You won't find much voodoo on this one, which normally plays rock music. (Elkhorn)

WHYP- The James Brownard memorial station remains one of the most active North American pirates. Their rock music and pirate parody shows use the same call letters as Brownard's **WHYP** in North East, PA. (Providence)

Z-Rock Radio- Although a few DXers heard a rock music program from this new one, we don't know much about them. (Unknown)

◆ 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 69, Elkhorn, NE 68022; PO Box 28413, Providence, RI 02908; PO Box 293, Merlin, Ontario NOP 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 submitting pirate loggings with a hope that pirates might QSL the logs remain *The ACE* (\$2 US for sample copies via the Belfast address above) and the e-mailed *Free Radio Weekly* newsletter, still free to contributors via niel@ican.net. The *Free Radio Network* web site, another outstanding source of content about pirate radio, is found at <http://www.fm.net> on the internet, and a few pirates will occasionally QSL a report left on the FRN.

◆ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Scott Barbour Jr-Intervale,NH; Artie Bigley, Columbus, OH; Ross Comeau, Andover, MA; Rich D'Angelo, Wyomissing PA; Gerry Dexter, Lake Geneva, WI; John Figliozzi, Halfmoon, NY; Harold Frodge, Midland, MI; David Gibson, Monroeville, PA; Harry Helms, Wimberly, TX; Chris Lobdell, Stoneham, MA; Larry Magne, Penn's Park, PA; Greg Majewski, Oakdale, CT; Ed Orlett, Columbus, OH; Lee Reynolds, Lempster, NH; Fred Roberts, Germany; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Mike Wolfson, Ashland, OH; and Niel Wolfish, Toronto, Ontario.

SATELLITE SERVICES

MT TRANSPONDER GUIDE www.monitoringtimes.com/mtssg.html

All Frequencies MHz

Robert Smathers

robertsmathers@monitoringtimes.com

Panamsat Galaxy 4R

C-Band - 99 degrees West longitude

1(H)	3720	Digital audio services (digital) / Data Transmissions
2(V)	3740	Occasional video
3(H)	3760	Analog SCPC Audio Services / Digital audio services (digital) / The Reformation Channel (digital)
	1402.00	58.00 Andy Thomas Radio Network
	1398.20	61.80 Performance Racing Network (occ)
	1396.00	64.00 Kansas Audio Reader Network
	1395.10	64.90 Occasional Audio
	1394.70	65.30 WJR-AM, Detroit, MI - talk radio
	1390.95	69.05 Occasional Audio
	1383.10	76.90 KIRO-AM Seattle, WA - news/talk
	1382.30	77.70 Motor Racing Network (occ)
	1381.20	78.80 KJR-AM Seattle, WA - ESPN Radio
4(V)	3780	WB Network / Global Digital Media Xchange (digital)
5(H)	3800	FamilyNet (digital) / WLPG-TV Detroit, MI - Christian Television Network (digital) / WLFG-TV Grundy, VA - Living Faith Television (digital) / KCHF-TV Santa Fe, NM and KDAZ-AM 730 Albuquerque, NM - religious (digital)
6(V)	3820	Atlantic Satellite NY (digital)
7(H)	3840	Data Transmissions
8(V)	3860	Panamsat occasional video feeds (digital)
9(H)	3880	Televisa (digital)
		XEW-TV Red Canal 2
		KHGC-TV Red Canal 5
		XEQ-TV Red Canal 9
10(V)	3900	Occasional video
11(H)	3920	Mexican occasional video feeds (digital)
12(V)	3940	Occasional video
13(H)	3960	Occasional video
14(V)	3980	Occasional video
15(H)	4000	World Harvest Television
	6.48, 7.30	WHFZ-FM Bremen, IN - contemporary Christian
	7.46	WHRI Americas - World Harvest Radio Angel 1
	7.55	WHRI Europe - World Harvest Radio Angel 2
	7.64	KWHR Asia - World Harvest Radio Angel 3
	7.73	KWHR South Pacific - World Harvest Radio Angel 4
	7.82	WHRA Africa/Middle East - World Harvest Radio Angel 5
16(V)	4020	Shepherd's Chapel Network (Dr. Pastor Murray)
17(H)	4040	Buena Vista Syndication (analog) / Buena Vista International (digital)
18(V)	4060	Fox Network, 20th Century Fox Syndication (digital)
19(H)	4080	Fox Network, 20th Century Fox Syndication (digital)
20(V)	4100	Occasional video
21(H)	4120	Occasional video
22(V)	4140	Occasional video
23(H)	4160	Occasional video
24(V)	4180	MVS Television Empresarial (digital)

Panamsat Galaxy 4R

Ku-Band - 99 degrees West longitude

1(H)	11720	Data Transmissions
2(V)	11740	Data Transmissions
3(H)	11760	Occasional video
4(V)	11780	Headend in the Sky (digital) / Toon Disney, Lifetime Movie Network (digital)
5(H)	11800	Headend in the Sky (digital) / Goodlife Television (digital)
6(V)	11820	Headend in the Sky (digital) / National Geographic Channel (digital)
7(H)	11840	Headend in the Sky (digital)

8(V)	11860	Data Transmissions
9(H)	11880	Headend in the Sky (digital)
10(V)	11900	Headend in the Sky (digital) / Outdoor Life Network (digital)
11(H)	11920	Headend in the Sky (digital) / ESPNNews, GSN (digital)
12(V)	11940	Headend in the Sky (digital)
13(H)	11960	Data Transmissions
14(V)	11980	Data Transmissions
15(H)	12000	Data Transmissions
16(V)	12020	Data Transmissions
17(H)	12040	Headend in the Sky (digital)
18(V)	12060	Headend in the Sky (digital)
19(H)	12080	Data Transmissions / Occasional video
20(V)	12100	Data Transmissions
21(H)	12120	Data Transmissions
22(V)	12140	Headend in the Sky (digital) / Fox Movie Channel, Bloomberg Television (digital)
23(H)	12160	Headend in the Sky (digital)
24(V)	12180	Spacecom Systems Spacelink / FM Cubed Transmissions (digital)

SES Americom Americom-4

C-Band - 101 degrees West longitude

1(V)	3720	Data Transmissions
2(H)	3740	Data Transmissions
3(V)	3760	Data Transmissions / Daystar Television Network (digital)
4(H)	3780	Data Transmissions
5(V)	3800	Occasional video
6(H)	3820	Data Transmissions
7(V)	3840	Data Transmissions
8(H)	3860	NBC / Telemundo / Mun2 (digital)
9(V)	3880	Occasional video
10(H)	3900	Occasional video
11(V)	3920	Occasional video
12(H)	3940	Occasional video
13(V)	3960	Data Transmissions / UCTV (digital)
14(H)	3980	NPS Fox Sports Net (digital)
		Fox Sports Net West 2
		Fox Sports Net Detroit
		Fox Sports Net Pittsburgh
		Fox Sports Net Rocky Mountain
		Fox Sports Net North - Minnesota
		Fox Sports Net North - Wisconsin
		Comcast Sportsnet - Mid-Atlantic
15(V)	4000	Data Transmissions / NOAAPORT Data Transmissions (digital)
16(H)	4020	NPS Fox Sports Net (digital)
		Fox Sports Net Midwest
		Fox Sports Net Northwest
		Fox Sports Net Arizona
		Fox Sports Net South
		Sunshine Network
		Fox Sports Net West
		Fox Sports Net Southwest
17(V)	4040	Occasional video
18(H)	4060	Comcast (digital)
19(V)	4080	Comcast (digital)
20(H)	4100	CBandNet Internet by Satellite Service (digital)
21(V)	4120	Data Transmissions / Safe TV (digital) / God's Learning Channel (digital) / Sky Angel (digital) / Familyland (digital)
22(H)	4140	MSNBC (VC2+)
23(V)	4160	Data Transmissions / La Familia Television Network (digital)
24(H)	4180	Bravo - East (VC2+)

SES Americom Americom-4

Ku-Band - 101 degrees West longitude

1(V)	11720	Data Transmissions
2(H)	11740	Fordstar Business Television (digital)
3(V)	11760	Data Transmissions
4(H)	11780	Data Transmissions
5(V)	11800	Data Transmissions
6(H)	11820	For the People (digital)

		For the People's New Abilities TV Network
		Yesterday USA Radio
		American Jukebox Classics
		Liberty Broadcasting
		Escape Radio
		KCAA-AM Los Angeles area - talk format
		Brother R.G. Stair (digital) /
		3 Angels Broadcasting Network (digital)
7(V)	11840	Data Transmissions
8(H)	11860	Taiwan International Satellite TV (digital)
		Skylink Television
		TTV America
		CTV America
		CTS America
		Taiwan International Satellite TV (TIS-TV)
		TIS-TV Cable
		Paccia TV
		CCTV-4
		CEN-Movie
		MAC-TV Macroview TV
		International Family Television
		TAN-TV 1
		TAN-TV 2
		Asia After Dark (adult)
		BCC Taiwan radio
		BCC News radio
		BCC Pop radio
		Liaoning TV
		South-East TV Station
		Super Value Channel
9(V)	11880	Data Transmissions
10(H)	11900	Data Transmissions
11(V)	11920	Data Transmissions
12(H)	11940	Data Transmissions
13(V)	11960	Data Transmissions
14(H)	11980	Data Transmissions / Adventist TV, Lifetalk Radio (digital)
15(V)	12000	Data Transmissions
16(H)	12020	Data Transmissions
17(V)	12040	Occasional video
18(H)	12060	Hotelevision (digital)
19(V)	12080	Data Transmissions
20(H)	12100	Data Transmissions
21(V)	12120	SES-Americom (digital)
		American Law Network
		TV Trwam
		Radio Maryja
		Ecuador TV
		Free-X TV (adult)
		X-Dream TV (adult)
		BackROOM TV (adult)
		Vietnam TV
		Vietnamese Public Radio 1
		Vietnamese Public Radio 2
		STDM Radio
		QueHuong Radio
		Dhammadakaya TV
22(H)	12140	Data Transmissions
23(V)	12160	Data Transmissions
24(H)	12180	Data Transmissions / RTP International (from Portugal), RDP International (from Portugal) (digital)
25(V)	11535	South-American beamed transponder
26(H)	11535	South-American beamed transponder
27(V)	11655	South-American beamed transponder
28(H)	11655	South-American beamed transponder

NASA News

In Clarke Belt news this month, NASA Television has changed satellites with very little warning. NASA Television can now be found on AMC-6 C-band (72 degrees West longitude), transponder 9. For those in Alaska, Hawaii or who cannot receive the AMC-6 satellite, NASA Television is on AMC-7 C-band (137 degrees West longitude), transponder 18. When there are two live events going on at the same time, NASA Television's alternate programming channels are AMC-6 C-band, transponder 5 and AMC-7 C-band, transponder 17.

Gearing Up

October signals the start of the prime LF DXing season in North America. From now until mid-spring, we can expect lower static levels and enhanced signal levels on the frequencies below 500 kHz. Are you ready to join in? If your radio hobby has been on hold during the warmer months, now is the time to look over your antenna system, check your receiver, and get your listening records in order for a new season.

◆ Antennas

An old adage says that antennas put up during the most severe weather always provide the best performance. While this is a humorous statement (and I've seen such antennas work surprisingly well), the truth is that you're much better off taking some time now to check over your system, rather than waiting until there is a risk of sliding off an ice-covered roof or getting frostbite on your fingers!

Start with a thorough visual inspection of your antenna and its supports. Are there any frayed wires or support lines, loose connections, or signs of corrosion in your system? These are the main culprits of antennas, and they could be enough to take you "off the air" when the weather turns foul. Repair or replace any weak parts of your antenna system now to ensure uninterrupted service through the winter.

Make sure that feedlines are well secured and that all connectors are sealed from moisture. Are there any branches or other moving objects that might contact the antenna during heavy winds? Now may be the time to do a little trimming. If you use a directional outdoor antenna, such as a loop, check its heading accuracy using a compass, and make adjustments as needed.

◆ Your Receiver

Today's receivers rarely drift out of adjustment like those of yesteryear. However, many LF enthusiasts still use vintage gear, and it may be worth a quick check to be sure the dial accuracy is within reason. A simple test can be made by tuning in several known beacons at the low, mid, and upper range of the 190-535 kHz band.

For vintage gear, you should also test the tubes periodically and replace any that show signs of weakness. An excellent source for replacement tubes and other vintage components is Antique Electronic Supply, of Tempe, AZ (<http://www.tubesandmore.com>).

While you're going over your receiver, use a quick spray of contact cleaner/lubricant on any controls or switches that are noisy. One of my

favorite brands for this job is DeoxIT made by Caig Laboratories (<http://www.caig.com>). It's fairly expensive, but it seems to last longer than the others I've tried.

Even if you have a modern "kilobuck" receiver, it is not immune to developing problems during periods of storage, or from faulty rear panel connections. Fire up your rig and check it out against some "reference" signals you logged last season. Are the signal levels where they ought to be? Are all accessory items connected to your receiver working properly? Servicing modern rigs is not always a practical option for the do-it-yourselfer, so seek factory assistance if you come across a difficult problem.

◆ Read the Manual!

This might seem like an odd question, but how long has it been since you've read the owner's manual for your radio? Many of today's rigs are so feature-rich that it's difficult to keep all of the operating information straight in your head – especially for rarely-used controls or menu settings. Take an evening or two and go through the book that came with your receiver. Try out some of those obscure features. Properly used, they might be the key to pulling in some new DX this season.

When I attend DXpeditions, I normally set aside an hour or two to read through the manual for my receiver. This is a good activity for those times when radio conditions are not at their best. You'd be amazed how much new (or forgotten) information can be gleaned from such a review, especially when it can be done at total leisure.

Need a replacement manual for your receiver? You can check the many online sources for reprints (search for "equipment manuals"), or perhaps find a downloadable copy at the Boat Anchor Manual Archive (<http://bama.sbc.edu>).

◆ Listening Resources

A good receiving setup is only part of the puzzle for successful DXing. You also need good reference material if you plan to break any new ground this year. One of the most useful tools is a logbook. You can make up your own log sheets and put them in a 3-ring binder, or adapt a Ham/SWL logbook for LF use. As a minimum, your log should include these categories: Frequency, ID, Location, time of intercept, and ID pitch (400 Hz or 1020 Hz for North America).

If you want to go into a bit more detail, you could include the ID format (dash after ID [DAID], or no dash) and the number of IDs per minute. It's also helpful to have a "notes" column where you can jot down anything unusual about the signal.

A beacon directory is another must. While

there are some useful online sources for this material, I know of no single site showing all navigation aids for a particular region. The <http://www.airnav.com> website, for example, does a great job of listing many North American beacons, but it omits 2-letter "compass locator" stations, such as RO/400 kHz in Rochester, NY, which is a widely reported station.

The *North American NDB handbook* is published by Michael Oexner in Germany. A special feature of this guide is that it comes tailored for your geographic location, showing the distances to all beacons in miles or kilometers. The cost of the guide is \$35 for surface delivery to the U.S. When ordering, you need to specify the geographic coordinates of your listening post (recommended format: degrees/minutes/seconds), and state whether you prefer the distances to be in miles or kilometers. Orders may be sent to: Michael Oexner, Hainfelder Str. 1, D-76835 Roschbach, Germany. E-mail inquiries on the handbook may be directed to Mr. Oexner at michael.oexner@web.de.

The *BeaconFinder* offers another option for North American LF listeners. Its focus is on non-directional beacons, but it also includes utilities operating from 0 to 150 kHz, as well as Lowfer and Medfer experimenter stations. Now in its second edition, the guide has undergone a significant overhaul, and has an entirely new Canadian database. Cost for the *BeaconFinder* is \$13.95 post-paid anywhere in North America, and \$16.95 elsewhere. Orders may be sent to: Kevin Carey, P.O. Box 56, West Bloomfield, NY 14585.

◆ News and Tidbits

I have identified a possible circuit for building a simple longwave receiver. This is a solid state regenerative set, with a minimal parts count. This winter, I will build a prototype of the receiver to verify its performance, and if all goes well, I will share my findings here. Stay tuned for more information as we approach spring.

Our best wishes are with Jacques d'Avignon (VE3VIA) and Ken Alexander (VE3HLS) as they participate in a longwave DXpedition to Miscou Island, NB, this month. In addition to DXing, they will study the effects of trans-oceanic propagation on European Broadcast signals. On past expeditions, a late afternoon drop in signal strengths has been noted, followed by a recovery that lasts well into the evening. They will try to correlate that phenomenon with the signals of beacons and mediumwave stations overseas. I look forward to reporting their results in a future issue. Good luck, guys.

That's it for another month, 73, and best LW DX.

ON THE HAM BANDS

THE FUNDAMENTALS OF AMATEUR RADIO

T.J. "Skip" Arey, N2EI

tjarey@monitoringtimes.com

Fun with Forty Meters and Googling N2EI

As you regular readers of Old Uncle Skip's ham radio rants know, I always end my column with an invitation to meet me at the bottom end of the 40 meter band. This is no idle request. On those evenings when the real world allows me the freedom to play radio, I am most often camped near 7040 kHz, the recognized CW QRP *Calling Frequency* for my favorite band.

If that segment of the 40 meter CW frequencies is overly occupied, I will move up the band a bit to see who is around, often all the way up to the CW band edge of 7150. After that, I tend to slide down into the Extra Class segment (7000-7025) to scare up a QSO or two.

However, if some cosmic anomaly occurred that wiped out all amateur radio communication beyond that 150 kHz of 40 I most commonly frequent, I'd probably be the last to know. With the exception of some light contesting, chasing DX, looking out for some Special Event Station or, most importantly, researching some aspect of the ham radio hobby to share in the pages of *MT*, I tend to my happy handful of frequencies at the bottom end of 40.

But every now and again something occurs that wakes me up to, not only a better future for my favorite frequencies in the ham radio spectrum, but also for the wider environs of my beloved 40 meter band. In July of 2003, The International Telecommunications Union's *World Radiocommunication Conference* developed a working agreement whereby shortwave broadcasting stations will vacate 7100 through 7200 kHz in ITU regions 1 (largely Europe, Africa, Southwest Asia, Russia) and 3 (essentially East Asia, the Pacific Rim and Oceania) by the year 2009. (For those of you uninitiated to ITU-speak, the United States, Canada, Central and South America make up what is known as Region 2.)

Moving the shortwave broadcasters out creates a worldwide 200 kHz wide *amateur radio only* section of 40 meters! It would allow region 1 and 2 countries to grant phone privileges up through 7200 kHz! I know that 2009 is a long way off, but it's worth noting just the same. Anybody who plays radio on 40 meters in the evening knows that, in addition to the odd QSO, you can "enjoy" quite a few shortwave broadcasts from around the world. This plan to move the broadcasters away from the ham fre-

quencies opens up another series of possibilities.

But wait! There's more! As you may know, most ham stations in Regions 1 and 3 are currently limited to 7075 – 7100 kHz for phone contacts. This does not line up with the current 7150 – 7300 kHz U.S. phone band. Under the current circumstances, if you want to work any ITU Region 1 or 3 DX on 40 meters, you need to be prepared to work *Split Frequency*, with the DX station calling in his portion of the band while listening for you calling on the U.S. portion of the band. Not the most efficient use of the spectrum, to say the least. (And it gives this old CW op a headache as well, but that's another story.)

The American Radio Relay League (ARRL) has proposed a new band plan to the Federal Communications Commission that would extend U.S. phone transmissions down through 7125 kHz on 40 meters. If this plan goes into effect (supported by other ITU Region 2 countries),

along with ITU Region 1 and 3 administrations granting phone mode up through 7200 kHz, this would allow for a solid 75 kHz overlap for all three regions on 40 meter phone. Not too shabby!

Now why would Old Uncle Skip be so happy that Fox Charley Charley might want to grab a 25 kHz chunk of his beloved CW frequencies to make this grand plan come to fruition? Simple. If the DX stations can share frequencies with the U.S. stations, they are likely to move all their phone operations up toward that 75 kHz over-

lapping band segment to avoid the complications and hassles of running a split frequency operation. As it is now, down in the 7075-7100 segment, the DX stations are often making noise in my primo CW operating territory. If they can migrate up above 7125 kHz, they are up in an area of the CW band that is at the very top of the old Novice / Technician Plus CW Band where there is very little activity of late. I'm all for it.

It's not likely that we will see much action on this band plan before the shortwave broadcasters get off the band. But the future for 40 meter DXing (and even CW operation) looks bright indeed.

So is there a downside to this? Well... yes. The 40 meter ham band is not completely in the clear in this new plan. While chasing DX will be

fun and fine, domestic communication on the upper end of the 40 meter band will still be subject to continued shortwave broadcast interference. Note that the shortwave broadcasters agreed to vacate 7100-7200 kHz. The *41 meter* shortwave band currently covers 7100-7300 kHz. The big broadcast blasters will still be able to congregate on that upper 100 kHz segment that many U.S. hams use for domestic QSOs.

As it stands right now, hams have always worked their way in between those broadcast stations as best they could. Only time will tell if a number of those SWBC stations vacating that lower 200 kHz segment will set up shop in the remaining 100 kHz segment. That would make it more difficult for domestic hams to find a place to gather.

Of course, those phone folks are always welcome down in the CW portion of the band. Just unplug the microphone, plug in your key and enjoy broadcast interference free ham radio! (I always have an ulterior motive and it is always to turn folks into CW ops.)

By the way, one brief curmudgeonly crack: With these potential improvements to the ham radio operator's lot in relation to 40 meters – changes that increase worldwide access to interference free communication over a significant portion of a band – why are there still people carping about how amateur radio is *always* on the losing end of frequency management decisions?

◆ Search Engine Ego Trip

As everybody in the world with access to any form of media knows, one of the biggest business events in modern history must be the initial public offering of stock by Google™. In a very short period of time Google has become the Internet search engine of choice for many computer users.

In my real world job, one of my tasks involves teaching very bright folks with no computer skills how to get up to speed with using the Internet. To get them comfortable with search engines, I usually have them bring up Google and enter their name to see what pops up. In many cases, an amazing amount of information is displayed, some of it quite surprising and, on a few occasions, a bit embarrassing.

I am sure most computer savvy hams have used sites such as QRZ (<http://www.qrz.com>) or other similar places on the Web to track down who is behind a particular callsign during or after a QSO. These sites are great, but I wondered how the standard search engines fared with callsigns. While Old Uncle Skip is somewhat



Antique British Broadcasting System Emblem – Someday soon shortwave broadcasters will be off of much of 40 meters

atypical, being a world reknowned radio sage and all (insert sardonic grin here) I thought it might be interesting to drop my call in the Google search engine and see what came of it. This is all the more fun because, since search engine's methods of ordering information are highly proprietary, I thought it might be fun to see how Google thinks concerning someone like me who takes great pride in thinking differently.

Entering N2EI brought up a good representative sample of information about Old Uncle Skip.

Right off the bat, Google takes folks to <http://www.tjarey.com/radio/radio.html> - the part of my personal Web site that deals with my radio hobby journalistic pursuits. That's fairly cool beans as far as I am concerned. Knowing that entering my call will tell folks a bit about me and my radio hobby activities couldn't be better if I had paid someone to do that for me.

Many hams set up personal Web pages to let folks know about themselves and their radio activities. Entering their call signs led to varied results, but their personal pages could usually be discovered on the first round of a search. Next time you finish a QSO you might want to check out your new found friend by this method.

What comes up next is very interesting. Google brings up a series of hits on postings I have made to various radio related Internet newsgroups. I've been known to follow and post regularly to a number of such groups, most notably QRP-L and the Elecraft Users Group. Some of these posts are fairly old and must jump into the search mix by way of archives. I could see this as being useful.

I am reaching that point in life where some aspects of memory are becoming somewhat fleeting. Add to that my rather tangential way of thinking in the first place, and it's a wonder I remember what street I live on. But more than once I have been in a situation where I can recall someone posting something to a newsgroup but not exactly drawing a bead on when and where. Searching on the call sign and a word or two about the subject is likely to bring me fairly close to the mark if my N2EI Google results are any indication of things.

Next came indexes of articles in *The QRP ARCI Quarterly* and *The NJQRP Homebrewer and The NASWA Journal* - three club level publications I have done some work for in the past. It appears that these hits are the result of how the three clubs took steps to organize information on their club Web pages.

The next post brings us into the realm of the slightly weird (for some folks anyway). Roger Wendell WBØJNR runs a website <http://www.rogerwendell.com/radiotattoos.html> related to radio body art. As anyone who has met me knows, I sport a tattoo of a schematic diagram of a Crystal Radio taken from the 1921 publication *Practical Wireless Telegraphy*. My dedication to radio is more than skin deep! Anyway, if you want to see a picture of my right shoulder (taken on a very cold day during the 1998 QRP to the Field contest), swing past Roger's Web site.

But this points out something. While I have no qualms or regrets about anything I find about myself on the Internet, you may not feel the

same way about yourself. If you encounter something posted that you take issue with, by all means enter into a dialog with the Web Master of that site and try to get things cleared up.

The next group of searched sites bring up some more great pictures. One is Fred Osterman N8EKU's Universal Radio Customer Cats Page <http://www.universal-radio.com/cuscat18.html> where you will find my cat Crow sleeping in a jigsaw puzzle box. Next comes a graphic of my K1 Vacation Station at the Elecraft Web Site <http://www.elecraft.com/PictureGallery/pics.htm> and a picture of my Tuna Tin II transmitter at <http://www.clocksusa.com/tuna/tt2page2.html>. Like I said, you never know what's out there in association with your name or even your call sign.

Interestingly, the next reference is the first one related directly to my work in *Monitoring Times*. It refers to a memorial I wrote for my

dear departed friend and mentor Bill Cheek that is posted among other things at <http://www.grove-ent.com/mtappeal.html>. I had forgotten I had written that piece, but a day does not go by that I don't have some good thoughts about Bill. Usually when I am down at my workbench.

So drop your call on Google, Yahoo, Dogpile or your other search engine of choice and see what pops up; you may be surprised, but I hope you won't be embarrassed. Have fun either way. I'll see you on the bottom end of 40 meters.

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after '993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology

UNCLE SKIP'S CONTEST CORNER	
California QSO Party	Oct 2, 1600 UTC - Oct 3, 2200 UTC
RSGB 21/28 MHZ Contest (SSB)	Oct 3, 0700 - 1900 UTC
ARS Spartan Sprint	Oct 5, 0100 - 0300 UTC
YLRL Anniversary Party (CW)	Oct 6, 1400 UTC - Oct 8, 0200 UTC
432 MHz Fall Sprint	Oct 6, 1900 - 2300 Local Time
Pennsylvania QSO Party	Oct 9, 1600 UTC to Oct 10, 0500 UTC and Oct 10, 1300 - 2200 UTC
FISTS Fall Sprint	Oct 9, 1700 - 2100 UTC
North American Sprint (RTTY)	Oct 10, 0000 - 0400 UTC
10-10 International 10-10 Day Sprint	Oct 10, 0001-2359 UTC
YLRL Anniversary Party (SSB)	Oct 13, 1400 UTC - Oct 15, 0200 UTC
Microwave Fall Sprint	Oct 16, 0600 - 1300 Local Time
RSGB 21/28 MHZ Contest (CW)	Oct 17, 0700 - 1900 UTC
W/VE Islands QSO Party	Oct 23, 1600 UTC - Oct 24, 2359 UTC
50 MHZ Fall Sprint	Oct 23, 2300 UTC - Oct 24, 0300 UTC
FISTS Coast to Coast Contest	Oct 24, 0000 - 2400 UTC
CQ Worldwide DX Contest SSB	Oct 30, 0000 UTC - Oct 31, 2400 UTC
10-10 Int. Fall Contest CW	Oct 30, 0001 UTC - Oct 31, 2359 UTC
ARCI Fall QSO Party	Oct 30, 1200 UTC - Oct 31, 2400 UTC

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\$399^{US}	ALINGO DJ-X10 All Mode Wideband Receiver
	<ul style="list-style-type: none"> - 0.1 to 2000 MHz continuous. (unblocked) - NFM, WFM, AM, USB, LSB & CW - Channel scope - 1200 memory channels - Various scanning modes - Menu system - Alpha-numeric tag with text edit - Ext. power DC jack - Scans 25 channels per second - Dual VFO's
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Phone:	416-667-1000
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✓	Sounds of Longwave 60-minute Audio Cassette featuring WWVB, Omega, Whistlers, Beacons, European Broadcasters, and more! \$13.95 postpaid
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Kevin Carey P.O. Box 56, W. Bloomfield, NY 14585	

In Search of the Ideal Antenna: Part 2- Some Practical Approaches

Last month we considered the value of various antenna characteristics. This month we consider various practical antennas which offer some of those characteristics. As with last month's discussion, let's keep in mind that, according to the principle of reciprocity, antenna characteristics such as gain, radiation pattern, polarization and so forth are the same whether the antenna is used for transmitting or for receiving.

◆ Approaching the Ideal

The basic function of any receiving antenna is to capture energy from desired radio signals which propagate to its location. If there are also sufficient undesired signals at the antenna to degrade reception, then a directivity pattern which can help reduce this interference will be useful.

Any length of wire or other conductor which we connect to the receiver's antenna input can serve as a receiving antenna to some degree. Because of its small size, low cost, and ease of installation, just a short length of wire may be the ideal antenna in applications where it adequately supports the desired receiving.

In more demanding situations, selecting antennas with appropriate characteristics such as being nondirectional, or having horizontal and/or vertical directivity, higher gain, or compatible polarization, may help maximize useful reception. Cost, size and ease of installation are also important.

◆ Directivity and Gain

Below the HF Band:

Antennas which possess useful directivity

are often called "beam" antennas. At frequencies below HF, common beams include phased vertical arrays and wire beams such as the inverted-L, long-wire, V, and the rhombic. The very large size of antenna elements and masts at these frequencies makes them impractical for modest-budget installations.

A more common directional receiving antenna at these frequencies is the small loop. Its major lobes are not at all narrow, but it has very sharply defined nulls which are quite useful for "nulling out" interference. Loops can be used alone, or as the element of an active (amplified) antenna.

Although the highly-directional Beverage beam is very long, it is relatively easy to erect, so when enough space is available it is often an ideal, directional, receiving antenna.

On the HF Band:

Popular medium-gain beam antennas for HF are the Yagi-Uda, the various quad beams, and the log-periodic directional-arrays (LPDAs). For multi-band coverage LPDAs are quite useful. In the upper portions of the HF band, all these beams are small enough that it is practical to rotate them by remote control. This allows us to direct their beams to any desired azimuth.

Relatively common, modest-gain wire beams which are seldom rotated include the W8JK*, lazy-H, and bi-square. Slopers are relatively low-gain wire beams which are also relatively common on HF; however, their size prohibits rotating them.

Antennas for near-vertical incidence skywave (NVIS) are, in effect, beams with their major lobes pointing at high vertical angles. Typi-

cally, NVIS antennas are wire antennas, such as the half-wave dipole, mounted a quarter wave above ground.

On the VHF, UHF and Microwave Bands:

With the exception of the sloper and wire beams, the beams popular at HF are also popular on into the VHF band. At these frequencies with their short wavelengths, the resulting smaller beams facilitate ease of remote control of both azimuth and elevation – useful for work like satellite communications and moon bounce.

Moving on up to UHF and microwave frequencies, we begin to see reflector beams such as the parabolic dishes, corner, trough, axial-mode helix, and horns. These beams typically yield high gain and directivity. Non-reflector types, usually of moderate gain and directivity, include open-ended wave guide beams and beams using lenses made of either dielectric and/or metal.

The relatively small size of antennas at these frequencies facilitates making arrays of several antennas feeding the same receiver. This gives an increase in both gain and directivity.

◆ Non-Directional Antennas Below HF:

Top-loaded vertical towers are used here, but more for transmitting than receiving. Random-length wire receiving-antennas are often useful at these frequencies. However, receive-only antennas at these frequencies are often active antennas with relatively short vertical elements. Small loop antennas should also be mentioned here: Although their nulls are quite directive, their main lobes are broad and relatively non-directional.

At HF:

Quarterwave, 1/2 wave, and 5/8 wave ground-plane antennas are popular for non-directional work at HF. Although somewhat large, the discone is sometimes chosen over the quarterwave for its multi-band coverage. It is of practical size on HF, especially in the upper portion of the band.

VHF and Higher:

Here, common non-directional antennas are usually one of the ground plane antenna variants. Again, the discone often replaces the quarter wavelength ground plane when multi-band coverage is desired. Vertical half-wavelength dipoles find some application here. For HTs the rubber duck and its variants are useful at these frequencies.

Table One

Typical gain values relative to a half-wavelength dipole (dBd), and relative degree of horizontal directivity for some common antennas. Vertical directivity is not included as it will often vary dramatically with height of the antenna above ground.

Type Of Antenna	Gain In Dbd	Horizontal Directivity
Table-Top Loop	Low	Relatively Non-Directional, but with Highly Directional Nulls
Beverage	Low	Highly Directional
1/4-Wavelength Ground Plane	-1.8	Non Directional
Discone	-1.8	Non Directional
1/2-Wavelength Dipole (Horizontal)	0	Slightly Directional
1/2-Wavelength Dipole (Vertical)	0	Non Directional
5/8-Wavelength Ground Plane	1.2	Non Directional
2-Element Yagi-Uda	5	Moderately Directional
8-Element Coaxial Collinear	6	Non Directional
2-Element Cubical Quad	7	Moderately Directional
3-Element Yagi-Uda	8	Significantly Directional
3-Element Cubical Quad	10	Significantly Directional
Axial-Mode Helical	10 - 50	Significantly Directional To Highly Directional
Parabolic-Dish Reflector	15 - 50	Significantly Directional To Highly Directional

This Month's Interesting Antenna-Related Web site:

This site offers definitions of ideal transmitting and receiving antennas, as well as a wide ranging coverage of practical antennas. <http://murray.newcastle.edu.au/users/staff/eemf/ELEC351/SProjects/Marriott/wrb352.htm#intro>

◆ **Antenna Polarization**

Below HF, most signals are vertically-polarized, and so antennas are also generally vertically polarized at those low frequencies.

On HF, because signals reflected from the ionosphere may return with any polarity, both horizontal and vertical antenna-polarization are common.

Above HF, where propagation is more likely to be line-of-sight, polarization is often dictated by the service we're using. TV signals are horizontally polarized to reduce reception of man-made noise. Much VHF and UHF work uses vertical polarization, due to the ease with which this is implemented on mobile-vehicle antennas.

In situations where polarization changes rapidly, as in satellite work, circularly-polarized antennas such as axial-mode helix or turnstile antennas are useful. Polarization-diversity antenna systems are also useful for this purpose.

◆ **Bandwidth**

For our purposes, bandwidth can be defined as the range of frequencies over which an antenna will function optimally. In many communication applications, including shortwave listening, broadcast-band DXing, CB, and ham radio, it is common to ignore bandwidth considerations when selecting a receiving antenna.

For HF and lower frequencies, this usually causes no problem partly because quality of reception is primarily determined by received-noise level at those frequencies, so reception quality doesn't necessarily degrade just because received signals are outside the antenna's bandwidth.

Above HF, the diameter of typical antenna elements is greater in relation to wavelength than is true at lower frequencies. Thus, without special design, the bandwidth of antennas at these higher frequencies may cover all, or a significant portion of the band for which they are designed.

◆ **What Antenna is Ideal for Your Needs?**

When installing expensive installations, such as governmental or commercial receiving stations, usually there is a survey of receiving conditions at the intended site. This would include field-strength measurements of the desired signals, and measurements of interference, signal-polarization conditions, and both horizontal and vertical angles of arrival of the desired signal. Other preparations would include a topographical study of the signal paths if they are very near the earth, and local weather patterns as they might effect reception.

It seems likely that most MT readers select their antennas on a more informal basis than that just described. Often our selection is based on the manufacturer's advertising hype. If that's

your approach, it's worth the time it takes to become familiar with Kurt Sturba's writings before you buy.

Or, we may just decide that interference would be excessive if we used a non-directional antenna, and that a directional antenna would reduce that interference. Or, if we know someone who has had success with a particular antenna design, then that may influence our choice. Whatever the case, table one may give you a bit of help for comparing some antenna performance variables.

Obviously there is not one "ideal" antenna for all applications. However, by considering the requirements of a particular receiving system, it is usually possible to select one or more antennas which can support the desired reception.

RADIO RIDDLES

Last Month:

I asked: "According to the principle of reciprocity, mentioned at the beginning of this month's column, antenna characteristics such as gain, pattern, feed point impedance, radiation resistance and so forth are the same whether the antenna is used for transmitting or receiving. Does this mean that an ideal receiving antenna will also be an ideal transmitting antenna, and vice versa?"

Well, actually the same antenna can often be used for both transmitting and receiving with good results. But this is not always the case. For example, the radiation-reception pattern of an antenna whose main lobe is transmitting a good signal to a distant receiving antenna may, if used for reception, have minor lobes that are too responsive to interference coming from directions off the main beam. Or, an antenna reception-pattern serving well for receiving may have minor lobes which, when the antenna is used for transmitting, cause intolerable interference at some locations in the off-beam direction.

This Month:

Obviously antenna directivity can be quite useful. Can an antenna ever be too directional?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

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Four Foot Steel with four different antennas *pictured above*. Other uses include a versatile Meteorological sensor platform, surveillance cameras and supports for Photographic and studio lighting. Stacked arrays have multiple Military applications: amphibious operation voice and code communications plus RDF.

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- 6. Two Meter Stainless Steel (small thick 4" pads) 20.3# \$599.00

The advantage of flush pads is they can accommodate larger base amounts without blocking ground plane mounting holes. Flush bases are more desirable when two extra pounds are not critical. 12- and 24-foot designs available direct from factory. Special Stainless or Rubber coated U-bolts available at additional charge.

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Getting Back to the NC-57

Regular readers will remember that, back in the July issue, I introduced the National NC-57 as a substitute for the NC-46 I had originally intended to restore. However, in August and September, I went down another path for awhile – providing you with a couple of installments of “Methodical Radio Restoration.”

This series of articles, to be presented occasionally, will develop an organized approach to radio repair, pulling together various techniques that have been used in the individual radio restorations covered in the column. This very good idea was not exactly mine; I came up with it in response to a reader request for some more general articles.

◆ Inside the NC-57

Now I'd like to return to the NC-57. This radio appeared about 1947, replacing the NC-46 as National's low-priced communications receiver – competing with such radios as the very popular Hallicrafters S-40. While the National radio does not have the sharp appearance of the Raymond Loewy-designed S-40, it does have a fresh post-war look. And it has a couple of features lacking in the S-40. For one thing, it boasts a voltage-regulated oscillator. For another, it tunes all the way to the top of the 6-meter band (54 MHz) while the S-40's range ends at 43 MHz.

Another important contrast with the S-40 is not apparent until one looks inside the NC-57. While the S-40 (which we restored in a previous series of articles) is built pretty much like a consumer broadcast set, the NC-57 is put together in National's famous “battleship” style. Small parts are generally supported at both ends on terminal strips instead of being allowed to

“float” on their leads; most long lead runs are laced into cables; most components are of generally higher quality. Obvious examples are the tuning capacitors and i.f. transformers. The latter are permeability tuned as opposed to the S-40's broadcast-receiver-style compression trimmers.

Now that I've studied this radio, it's hard to imagine why anyone who had really considered both sets would have preferred the competing S-40. Yet, judging by the much greater frequency with which the S-40, in its various variations, appears on the tables at radio meets, that radio was far more popular. Even I much preferred it as a kid, and was hardly even aware of the NC-57. The attraction was all in the looks, I guess. After all, one rarely looked under the chassis when shopping for a new receiver.

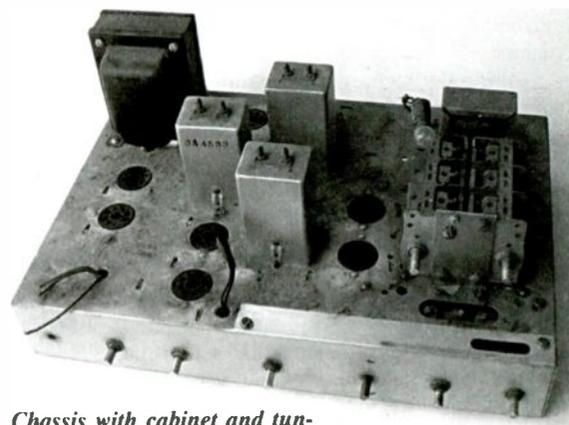
Replacing the NC-57's capacitors is going to be a little more work than was required for the S-40. This is primarily because of the short lead lengths on small components – most of which are mounted very close to tube socket lugs or terminal strips. But this promises to be a restoration that will very much worth while. I'm really looking forward to firing up the end product!

The NC-57 has a conventional superheterodyne circuit using a 6SG7 r.f. amplifier, a 6SB7Y oscillator/mixer, two 6SG7 i.f. amplifiers, a 6H6 AVC/noise limiter/detector, 6SN7 first audio/beat frequency oscillator, 6V6 audio amplifier, VR-150 voltage regulator, and 5Y3 rectifier.

On the front panel are a send/receive switch; headset jack; BFO pitch, AF gain, r.f. gain and tone controls, main tuning and bandspread controls; a bandswitch; and a BFO/AVC/Noise limiter control. The radio's five bands cover .54-1.55, 1.55-4.4, 4.4-12, 12-35, and 35-54 MHz.

◆ Owner Mods and Other Problems

We took a brief look inside this set in July and discovered that the chassis top was covered in a kind of gummy dust. However, there ap-



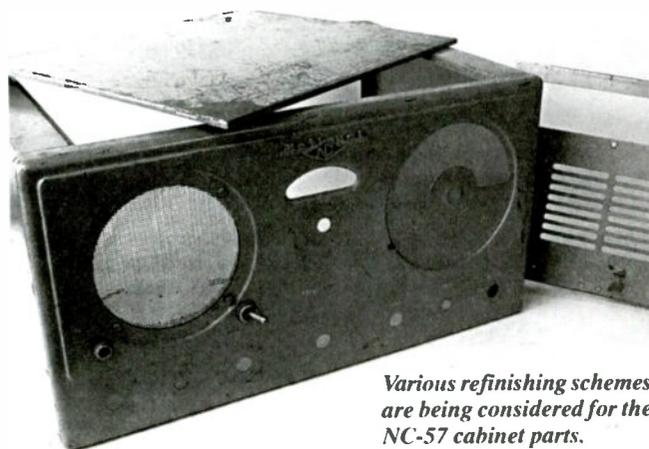
Chassis with cabinet and tuning dial assembly removed is ready for deep cleaning.

peared to be little or no corrosion under the dust layer. It was also apparent that the send/receive switch, originally connected in series with the power transformer center tap, had been rewired to disconnect the speaker instead. I can't guess why. A clumsily-installed power resistor found under the chassis indicated a past or present problem. We also saw the remains of an owner-added phonograph connection that had been run out of the set through the keyway of the accessory socket on the rear apron. Other than those things, the radio seemed untouched and in pretty decent condition.

This month's work session began with removal of the tubes, checking each type against the designation stamped near its socket. I found that some swaps had been made. A 6SH7 had been substituted for the 12SG7 r.f. amplifier; a 6SA7 had been substituted for the 6SB7Y oscillator/mixer; a 6AC7 had been substituted for one of the 6SG7 i.f. amplifiers. These are all workable swaps according to a reliable tube substitution guide, but it does suggest that some kind of electrical trauma had destroyed the original tubes. Rather than purchase exact replacements, a previous owner had apparently made use of tubes he already had on hand.

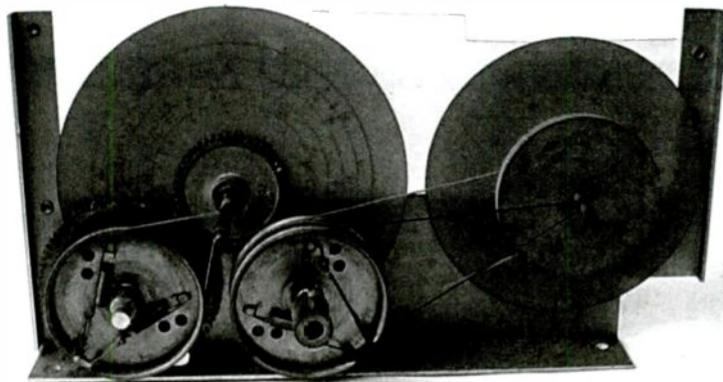
All tubes were found to be okay upon checking with my military TV-7 tube tester – with one exception. The 6SH7 tested weak. It may have been in that condition when removed from the previous owner's junkbox – or perhaps it was stressed after installation by the same problem that caused the original to fail.

One significant clue might well be the non-original replacement power resistor mentioned earlier. It happens to be a dropping resistor for



Various refinishing schemes are being considered for the NC-57 cabinet parts.

the VR-150 tube that supplies screen (or oscillator plate, in the case of the 6SA7) voltages for these tubes. Specified in the parts list as a 3900-ohm, 2-watt unit, its jerry-rigged replacement is a 10-watt unit of about 14,000 ohms. It seems that something destructive happened to the 3900-ohm unit – most likely a shorted capacitor. This could most certainly have been part of a chain of events that destroyed the three original tubes.



The tuning dial assembly was easily removed as a complete unit, facilitating the restringing process.

◆ Removing the Cabinet

The next project was the complete removal of the cabinet. Much of it is terribly scratched and will have to be repainted, though I intend to explore the possibility of restoring and touching up the finish on the front panel. The cabinet removal job was slowed down by the difficulty of breaking loose the control knob set screws. I had to use my bench grinder to modify a screwdriver until it was slender enough to clear the access holes in the knobs, yet have a thick enough blade to properly engage the wide slots on the screws.

Using this strategy, I was able – with some difficulty – to remove all the knobs but one, the BFO pitch control. That one defeated my best efforts, and I was about to consider drilling out the screw when I happened to take a look under the chassis. It turned out that a shaft from this knob was connected to the shaft of the BFO control by an easily-released coupling. I undid that and *voilà!* The control knob, with its stub of a shaft, slipped right out.

Incidentally, in doing some reading about this radio, I discovered that some versions may have knobs secured by spring clips instead of screws. To release them, one apparently presses a small screwdriver or other tool into the access hole where one would ordinarily expect to find a set screw. Watch out for that if you should begin to work on one of these sets!

Before I was free to remove the cabinet, I also had to disconnect the front-panel-mounted speaker. The leads to the speaker-mounted output transformer had to be cut because they could be unsoldered only from under-chassis terminals that were all but inaccessible. I'll reconnect and insulate them with shrink tubing during re-assembly.

Once the cabinet was off the set, I decided to remove the main tuning and bandspread dial/dial drive assembly from the chassis. It would then be much easier to restring with new dial cord. The removal would also facilitate cleaning the various chassis crevices located in front of the tuning capacitors. The job was easier than it looked, requiring only backing out a couple of screws from the mounting bracket and loosening the couplings connecting the assembly with the bandspread/main tuning capacitor.

Besides restringing the assembly, I plan to replace the sheet of heavy plastic material mounted in front of the indicator dials. It is dis-

colored, badly warped, and has separated from several of its fastening rivets. A new flat piece will definitely improve the appearance of the dial windows. Though their markings are perfectly legible, the dial discs themselves are yellowed with age. I wish I could somehow create new clear ones. Perhaps it could be done photographically, though I probably won't try it. I might experiment with the color of the dial lamp. Perhaps a blue lamp (if I can get one) would tend to neutralize the yellow color.

◆ Recommended Books

For some months, an interesting little book has been sitting on my shelf waiting for some space in the column. Now it looks like the time has come. The book is *Old-Time Secrets of making Permanent Magnets*, published this year by Lindsay Publications, P.O. Box 538, Bradley, IL, phone 815-935-5353, fax 815-935-5477. 5-1/2" X 8-1/2". Soft cover. 120 pages. \$9.95 plus \$1.50 s&h. Order directly from the publisher. Mention that you read about it in "Radio Restorations!"

Old-Time Secrets of making Permanent Magnets is a compendium of chapters, articles, and bits and pieces from 19th century and early 20th century sources, including physics texts and the magazine *Machinery*. Two of the articles describe how magnetos were mass-produced by the Remy Company in 1919 for the exploding automobile industry. Also is included is a complete booklet on permanent magnets published by The Esterline Company of Indianapolis in 1919.

According to Lindsay....."Yes, you can make powerful permanent magnets. No, they're not going to be as powerful as modern samarium or neodymium magnets, or even the classic Alnico types. But revealed are precisely the techniques used to create the powerful magnetic magazine used by Michael Faraday to invent the disc generator that so intrigues the perpetual motion and free energy crowd..."

Like most Lindsay publications, this one is crammed with arcane knowledge and fascinating illustrations. Request a free Lindsay catalogue (see request form at <http://www.lindsaybooks.com>). You'll enjoy it!

While we're talking about books, readers

have often asked me for recommendations regarding books on radio repair. Though several have been published in the last couple of decades, I can think of none more helpful than the titles by William Marcus and Alex Levy published by the McGraw Hill Book Company in the mid 1950s. They were very popular and turn up frequently at radio meets. The ones in my library are *Elements of Radio Servicing*, *Practical Radio Servicing*, and *Profitable Radio Troubleshooting*. There may be others. Though the books are similar in appearance, they are written from different points of

view and each has some information not included in the others.

The nice thing about these books is that both authors have a vocational school teaching background and were writing for professional radio repairmen. Thus, their information is presented in a very down-to-earth style free of abstractions and theory. You may also come across *Radio Servicing* by Abraham Marcus, which is a recommended acquisition as well. I believe that the two Marcuses are related. They have also co-authored some books on radio.

I'll see you next month, when we'll continue our restoration of the NC-57 – beginning with deep cleaning of that sizzly chassis top and, perhaps, complete the recapping phase. See you then!

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Uniden BC898T Scanner

The Uniden BC898T is a 500 channel, tabletop scanner which follows conversations in conventional and several different types of analog trunked systems.

It is convenient to view the new BC898T as a significantly modernized version of the older BC895XLT (Dec. 1997 *MT*). Neither model supports a text label feature.

The BC898T is powered by 12 VDC and an AC operated wall wart power supply is included.

◆ Frequency Coverage

The BC898T tunes all the "traditional" scanner frequencies with the addition of 216 - 400 MHz. Top end frequency coverage ends at 956 MHz and it doesn't tune the 75 MHz and commercial FM broadcast bands like the older, non-trunking BC9000XLT. The discontinued BC9000XLT tunes to 1300 MHz, but is too susceptible to reception of cellular telephone signals to meet today's more rigid FCC standards.

The manual specifies coverage of 50 - 54 MHz, but our BC898T cannot detect the 54.000 MHz signal from either of our signal generators when the radio is tuned to 54.000 MHz. Reception at 53.995 MHz and below is fine.

As in other reviews, we recommend that you download an electronic copy of the owner's manual from the Support section at <http://uniden.com> because there are many features we don't have space to discuss.

◆ Steps, Modes

The BC898T supports more emission modes and types of trunking than the earlier BC895XLT. The new model lets you choose among AM, FM, and NFM (Narrow FM) modes for conventional systems. The Narrow FM mode is useful in light of the new FCC band plan regulations which allocate frequencies closer together and mandate that stations transmit with lower deviation and require less bandwidth.

One of the restrictions we noted with the earlier BC895XLT was that a user could not choose AM or FM mode, a flexibility which is valuable for monitoring in the military aircraft bands. The BC895XLT mode is set internally according to frequency and you have no say in the matter.

The new BC898T is more flexible. There is a default mode for each frequency, but the new model lets you override the default and choose AM, FM, or NFM.

Tuning step sizes are 5, 6.26, 12.5, and 25 kHz.

The BC898T's 500 memory channels

are divided into 10 banks of 50 channels each. This is an increase from the BC895XLT's 300 channels. Each channel may be marked for selectable rescan delay, attenuation, and recorder activation.

◆ Trunking Capabilities

The older BC895XLT supports only Motorola trunking and doesn't permit scanning a mixture of conventional systems and multiple trunked system banks. The BC898T supports more types of trunked systems and lets you scan a mixture of several trunked and conventional systems one after another. Like other Uniden models, you can mix conventional and trunked frequencies within the same bank, although no two trunked systems can occupy the same bank.

The BC898T tracks signals in these analog trunked systems: LTR; Motorola Type 2 VHF, UHF, 800, and 900 MHz band; Motorola Type 1; EDACS wideband (9600 bps), narrowband (4800 bps), and SCAT.

Due to the way Uniden implements trunk tracking, you must know the appropriate channel numbering for each EDACS and LTR system before programming its frequencies into the BC898T.

Each trunked bank supports 100 talk group IDs divided in 10 lists of 10 IDs.

◆ Scanning and Searching

You can designate one conventional channel in each bank as a priority channel. When the priority feature is active, the BC898T checks the priority channel in each unlocked bank for activity.

Ten pairs of frequencies may be programmed for limit searching and limit search banks may be "chained" or linked together to search multiple ranges in succession. Up to 100 frequencies may be skipped during a limit search - half as many as the BC796D (May 2004 *MT*).

Auto Store permits unique, active frequencies found during a limit search to be stored automatically in selected banks.

◆ Other Features

A small, 5 bar S-meter displays relative signal strength.

The recorder feature routes low level audio

to the Line jack on the BC898T's front panel for memory channels marked with the Record flag. This differs from the older BC9000XLT which provides low level audio at its Line jack whenever the squelch is open. The BC9000XLT had an additional jack on the rear panel used to remotely control non-VOX recorders in conjunction with a Record flag.

◆ Computer Control

The BC898T uses an industry standard DB9 9-pin connector for computer interfacing. Optional software will be available for purchase from the Uniden web site.

You can download a description of the BC898T's computer interface commands from the Uniden web site only after pledging to abide by Uniden's licensing agreement.

◆ Performance

Our BC898T is sensitive below 512 MHz and fairly sensitive above 806 MHz. Like the other Uniden models we've connected to a rooftop antenna, our BC898T receives intermod in the VHF-high band when paging signals mix with 162 MHz range NWR broadcasts.

There is a pronounced chuffing noise when using the VFO tuning knob with the squelch open. The chuffing is much louder on our BC898T than on the BC9000XLT.

The squelch has a reasonable degree of hysteresis, but more than the GRE/Radio Shack models we tested. The squelch threshold varies by a small amount depending on the band.

The audio level and fidelity produced by the top mounted speaker are adequate. The audio circuitry produced less than 3% distortion into a resistive load at maximum volume. As with most tabletop scanners, an external speaker pointed directly at the listener sounds better.

Our BC898T scans a mixture of conventional memory channels at a rate of about 25 channels/second. The older BC895XLT we tested scans at 85 channels/second because it scans them in order of frequency.

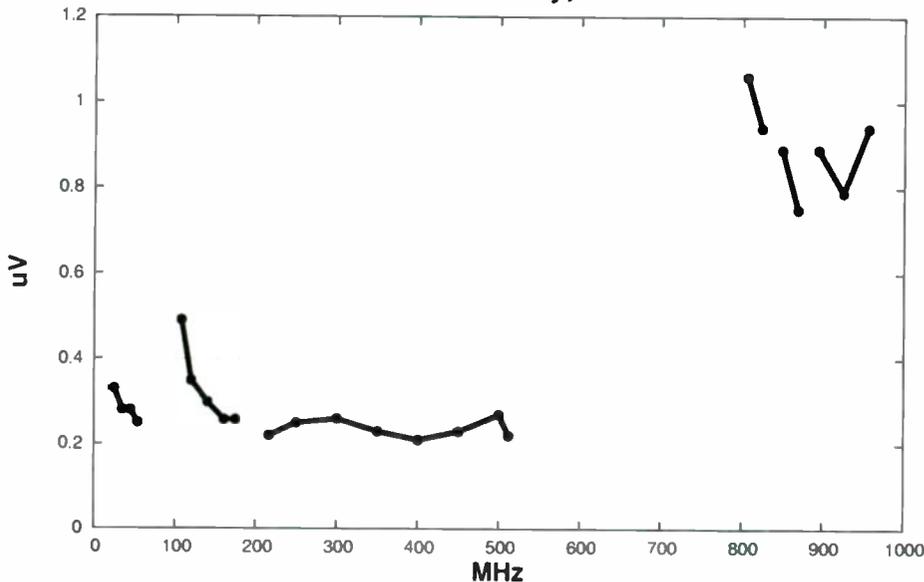
The BC898T performs limit searches at a rate of about 240 steps/second when using 5 kHz steps. Searches with larger steps are slower.

Our BC898T is programmed with two banks of conventional frequencies, two other banks with Motorola Type II systems, and a bank with an EDACS system. The radio scans each bank smoothly, without significant hesitation when switching banks.

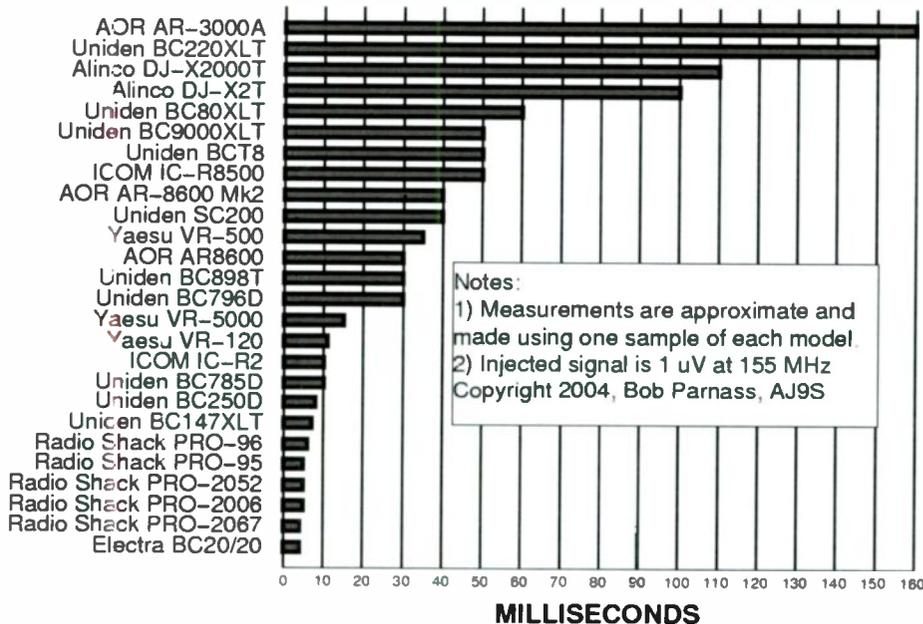
The tone display feature shows the subaudible code transmitted by a station



Uniden BC898T FM 12 dB SINAD Sensitivity, s/n 322Z44000006



SQUELCH TAIL LENGTH



within about one second or less and identifies it as either CTCSS or DCS. That's much faster than older Uniden models and more flexible than the Radio Shack PRO-2067 and PRO-92. The Radio Shack models are quick, too, but those models force you choose either CTCSS or DCS before displaying the transmitted code.

The variety of widely spaced keys make the BC898T easier to operate and program than the smaller BC796D mobile and BC296D handheld (April 2004 MT). The last two models have fewer keys and employ a complicated system of nested menus requiring multiple keypresses.

The Uniden BC898T is in stock at Grove Enterprises for \$202.95 plus shipping. Call 1-800-438-8155 or email order@grove-ent.com for ordering information.

◆ Bottom Line

The BC898T works well and is a significant step up from the BC895XLT. If you don't require APCO 25 digital capability or text labels, the BC898T is a considerably better value than the BC796D for desktop use.

◆ CSI Flex Series Multiprotocol Decoder

We reviewed the Connect Systems Inc. Flex Series Multiprotocol Decoder in July 2004. A photograph of the front panel was omitted from the column inadvertently and is reproduced here.



Measurements

Uniden BC898T Scanner S/N 322Z44000006

Uniden America Corp.
4700 Amon Carter Blvd.
Fort Worth, TX 76155
tel. (800) 554-3988
<http://www.uniden.com>

Frequency coverage (MHz):

25 - 53.995
108 - 174
216 - 512
806 - 823.9875
849.0125 - 868.9875
894.0125 - 956

Step sizes (kHz):

5, 6.25, 12.5, and 25,
user selectable

Modes: AM, FM, NFM, user selectable

NFM modulation acceptance: 11 kHz

Audio output power at external

speaker jack (see text):

0.72 watts @ 2.6% distortion

Attenuator:

22 dB @ 40 MHz, 20 dB @ 155 MHz,
17 dB @ 460 MHz, 16 dB @ 860 MHz

IFs (approx., in MHz):

380, 45, 0.450

Squelch tail near threshold (1 uV @ 155

MHz): 30 ms.

Practical memory scan

speed (approx.): 25 channels/sec

Search speed:

240 steps/sec (5 kHz step size)

Race Scanning



Chapters:

- History of race comms.
- What you can hear
- Racing terms
- Racing flags
- Choosing a scanner
- Tips and tricks
- Racing frequencies

By Richard Haas, Jr. Listening to a scanner radio at the track adds a dramatic new element to the race fan's experience. This book will help you be properly equipped and informed to enjoy the race from a new perspective. Listen to, and understand exciting real-time transmissions from the driver's seat and support communications from behind the scene. Printed September 2003 with up-to-date frequencies. #0031 **Only \$4.95** (+\$2.00 ship)

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Protect Your Passwords

What do office computers, private information databases, hobby websites, banking and credit card sites, Yahoo special interest groups, on-line personal diet journals, on-line movie, music and program accesses sites and even Walmart.com all have in common? Answer: In order to use them you must know your password for each site.

Of course you could have one common password for every site. But stop and think of the financial and personal havoc that any malevolent person who stumbled upon your password could cause! That's enough nightmares for me, thank you.

You could save the passwords to a file. But saving passwords to a file is an oxymoron! If you can retrieve them, so can anyone else. One answer, albeit a bit of circular reasoning, is to encrypt the password file by using yet another password. Although providing another level of security, this is just another password to remember.

As our use of on-line services increases, the password issue is becoming more severe. So what can one do to tame the mess? This month we will look at a solution based on biometrics, the science of identifying a person by their unique physical biological properties. Biometric data cannot be "passed back" to another person to use as can a password, magnetic strip, keycard or even an RFID tag. The biometric data permanently "stays" with the authorized user as part of their body.

There are a number of electronic biometric methods including retinal scan, iris scans, voice pattern, palm print, hand pattern, blood vessel mapping and fingerprinting. The most common and low cost biometric in use today is the electronic fingerprint used by immigration authorities at many airports. With the advent of low cost silicon fingerprint detectors, this technology has migrated into consumer products.

Two types of silicon fingerprint detectors are currently available. The first is the optical scanner which literally takes a high resolution picture of the curls, swirls, loops, whorls, arches and bifurcation of the lines of on a finger, referred to as minutia. Figure 1 shows a typical fingerprint image with the main minutiae points indicated by small circles.

The second type of detector, the capacitance scanner, "images" the fingerprint by detecting the high and low points of the fingerprint features via their capacitance differences. The image that results is adequate for fingerprint analysis. The capacitor scanner is cheaper and,

from a software perspective, is simpler, since it does not require optical image manipulation and conversions. This makes it perfect for use in relatively low cost products as we shall see. All electronic fingerprint devices have the same basic steps of operation.

◆ Using an Electronic Fingerprint ID

First, the authorized user must register, or enroll, their fingerprint "image" in the unit's main compare template. This process is a critically important step in the reliable operation of the device. This "image" will be stored and become the authorized template against which all access request images will be compared against for identity verification.

To insure the most accurate image, the registration finger should be clean and applied to the sense surface with a "normal" pressure. The pressure is an important factor, since pressure causes deformation of the skin. Gross difference in finger pressure will cause relative dimension changes of the fingerprint image. Depending on the software included with a particular product, a number of registration images of the same finger will be required. Here, the unit is looking for registration image repeatability. This is to maximize the chances of the authorized user being recognized and allowed access in the future.



Figure 1 - Fingerprint Image - Notice the Small Circles Which Indicate Various Minutiae Points

In the fingerprint business, not recognizing the authorized user is called a false negative. Erroneously allowing access to an unauthorized user is deemed a false positive. These situations are the bane of the electronic fingerprint industry and are greatly affected by the image analy-

sis algorithms which compare programming unique to each fingerprint product. Image capture and minutia identification are key product elements. How well a unit compares the authorized user's fingerprint pattern to an image from a "fingerprint" which is requesting access is the final test of any fingerprint product.

Making the compare program too tight can cause lots of false negatives and frustration. On the other hand (no pun intended), if the compare program is too loose, you lose security by increasing the chances of a non-authorized person being accepted. It's a technical tightrope that needs careful programming and hardware matching.

Where higher levels of security are demanded - for example, national security - layers of biometrics devices are used: fingerprint, retinal and password, together. For a product that is well designed, the fingerprint can be a very effective and convenient first line security method for personal use.

In recent years there have been many companies jumping into the consumer biometrics business with the predictable result that some of the products did not perform a real security function. In order to achieve ease of use and low development costs, many of these products had little user tolerance. Either they were easy to use but useless, since their levels of false positives were so high, or the authorized user had a difficult time being recognized.

◆ Stik or Shtick?

Having founded and managed a biometrics company in 1998 (though no longer in the business), I'm always looking for new biometric products. That's how I discovered the BioStik product by Index Security Inc. Over the past years I have tested many low cost fingerprint products that had their problems, so I looked at the BioStik with skepticism, but was pleasantly surprised.

The BioStik is not a fingerprint capture unit. Instead it is a car key-sized USB 128M flash memory whose access is secured via its on-board capacitance fingerprint sensor. Therefore, files holding passwords can be securely stored on the BioStik and carried from computer to computer without worry.

BioStik works with Windows (except 3.1 or NT), MAC or Linux (2.4.x) operating systems. See Figure 1. This product requires *no* software to be loaded on the computer of use. All fingerprint programming is imbedded in the small unit. This is an important feature of the BioStik which makes it completely portable and

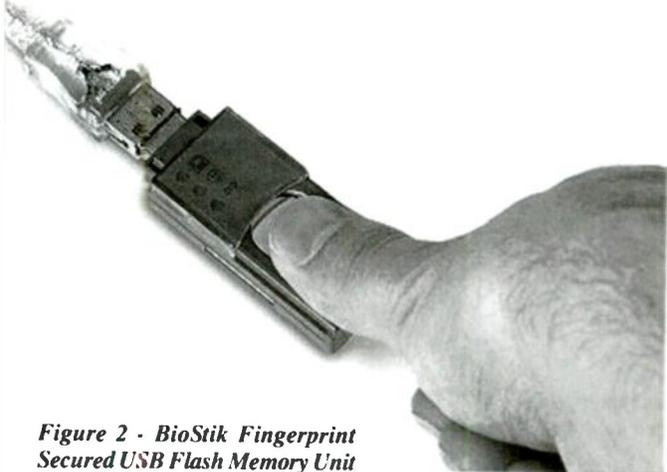


Figure 2 - BioStik Fingerprint Secured USB Flash Memory Unit

usable with most any computer having a USB port.

If your computer uses Windows 98 or MAC8.6 (yes, it works with MACs) then you will have to load a small USB driver. This is a requirement of these operating systems and not a limitation of the BioStik. Since BioStik is powered from the USB port, no additional power source is required. This is truly a self contained biometric product.

◆ **Enrolling in the BioStik**

Since the unit is totally portable it communicates to the user via a group of three LEDs. First, make sure you loaded any USB drivers before you first use the unit. Enrollment is a relative easy task.

The switch on the side of the BioStik must be placed in the enrollment position away from the USB port. Once plugged into a USB port, the red LED will blink.

If you are using the BioStik for the first time and it has no enrolled user, the orange enrollment LED will light, indicating it's ready to take a scan of your finger. Slide back the protective transparent cover over the sensor. Place your clean finger on the center of the sensor using just enough pressure to contact the fleshy part of your finger. Remember which finger you used!

If the BioStik got a good image of your fingerprint, the green LED will light. If the red LED lights, it does not like the image. Remove your finger and reposition it to allow more of the fleshy part of your finger to contact the sensor. Still no joy? Try a different finger until you get a green.

Once a green LED appears, you will still have to repeat taking off and replacing your finger with a different finger a number of times. Remember which fingers you enrolled! I repeated the process four more times, so the unit has templates of five different fingers. When the BioStik blinks green and all LEDs are dark, enrollment is complete. While the BioStik is connected to the USB port, move the enrollment switch back to the normal position.

◆ **Want to Change Authorized User?**

If an authorized user is already enrolled, they will have to "open" the unit with their fingerprint before you can enroll a new authorized user. This protects anyone from finding the BioStik and gaining access to your files by

replacing your enrolled fingerprint with theirs.

◆ **Touched By A User**

Plug the BioStik into the USB port of the computer you wish to use via the included USB extension cable. The red LED will flash. Place one of the fingers that you enrolled on the center of the sensor, using the same pressure that you enrolled with.

When the fingerprint is recognized, the green LED by the smiley face will light and you will see that your computer system now shows an available "removable drive." This drive is the memory inside the BioStik and it can be used just like any other drive, writing and erasing files to it.

If BioStik does not recognize the fingerprint, no new drive will be added to the system and the BioStik will not allow file access. Also, if you unplug it from one computer and plug it into another computer, no files will be accessible until you re-identify yourself as an enrolled user via your fingerprint. Personal data and files on a lost BioStik may be gone, but they do not become public knowledge!

◆ **How Do I Use BioStik?**

As I said at the beginning, I'm not sure if it's data overload or an early senior moment, but I often forget my passwords. So I made a text file, which can be read by just about any computer. In the text file I keep a list of my user name, password and web address for each of my password protected programs or on-line sites. Where is the file kept? On the biometrically secure BioStik that I carry with me, of course. My password test file takes very little memory, which leaves lots of BioStik space for other file storage.

The BioStik is one of the best implementations of fingerprint security I have used. It works well with an excellent balance between ease of operation and security. As we have described above, it can be used to securely store private, important files. If the files are saved on the BioStik as encrypted files and additional real-time encryption methods are utilized, the result is a very high overall level of data security. The choice is yours.

The BioStik is available from one of my favorite companies <http://www.CyberGuys.com> at \$159 for the 128MB version and \$225 for the 256MB version. Index Security, the makers of the BioStik, have a website at <http://www.index-security.com>.

◆ **Next Time**

A new version of an already great program that we looked at a few years ago has just been released. A number of spectacular features have been added to the user interface which makes it even more useful and at the same time easier to use. Can the new steroid-version be used on an old Pentium computer using a slow dial-up connection? Next time: AirNav Live Flight Tracker 3.

Digital Digest, continued from page 37

LECAIRE Embassy Cairo, Egypt
NEWDELHI Embassy New Delhi, India
RABAT Embassy Rabat, Morocco

Mexican Army

The Mexican forces run various networks using animal, metal and planet names (kHz):

4650.0 5263.0 5590.0 7777.0 9025.0 9060.0
10135.0 10144.0 10444.0 11130.0

ARBOL	PANTERA
BRONCE	PLATA
COBRE	RM2,12
DELTA1,6,7,8	ROBLE
GALAXIA	VALLE
MARMOL	ZORRO
ORO	

French Navy

The French Navy also seems to be gearing up with ALE. Check out their rapidly developing network (kHz):

9093.6 10310.6 10509.6 11453.6
12144.6

1TM652	Minesweeper "Céphée"
1, 2TLFUO	Naval Base, Toulon
1TLFUF	Naval Base, Fort de France
1TLFUE	Naval Base, Brest
1PS601	Submarine "Rubis"
1PR91	Aircraft Carrier "Charles de Gaulle"
BREST	Naval Research Laboratory, Brest
CTSN	Naval Technical System Laboratory Toulon
PIPADY	Naval Study Center, Pipady
TLFUV	Naval Base, Djibouti

That's all for this month. Keep the letters and emails coming and good digital DX.

Resources

UMC's ALE ID Database
<http://www.chace-ortiz.org/umc/identia.html>
PC-ALE
<http://www.chbrain.dircon.co.uk/pcale.html>
MultiMode
<http://www.blackcatsystems.com/software/multimode.html>
WUN's ALE FAQ
<http://www.wunclub.com/files/aieinfo.html>

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- ◆ SWL IR Remote for Drake R8/A/B \$89.95
- ◆ SWL IR Remote for Yaesu FRG-100 \$79.95
- ◆ SWL IR Remote for Yaesu FRG-880J \$79.95
- ◆ SWL IR Remote for ICOM Transceiver ... \$69.95
- ◆ SWL IR Remote for ICOM IC-R75. \$79.95
- ◆ SWL IR Remote for JRC NRD-535 \$89.95
- ◆ SWL IR Remote for Lowe HF-150, HF-225 \$79.95
- ◆ SWL IR Remote for Kenwood R-5000 \$79.95
- ◆ SWL IR Remote for Uniden Scanners \$89.95

www.swl-remotes.com

Black Light Goes Solid State

By Bob Grove W8JHD

Most of us have been fascinated at one time or another by ultraviolet light, or "black light" as it is popularly known. Occupying frequency ranges much higher than visible light, UV illumination of fluorescent materials can produce brilliant color radiation. This is because the higher-energy, higher-frequency, invisible UV causes lower-frequency (visible) photons of light to be emitted from the fluorescent materials.

More than a visual curiosity, black light has many useful applications including counterfeit currency and bank note detection, germicidal sterilization, revealing flaws and damage repairs in art objects, gem and mineral analysis, and verifying age in documents, photographs and fibers.

UV is in three bands: UV-A (long wave, 315-400 nanometers), UV-B (medium wave, 280-315 nM), and UV-C (short wave, 100-280 nM). This differentiation can be useful in analytical applications; for example, rock collectors know that fluorescent specimens often react differently under long wave and short wave UV.

◆ Producing black light

Ionized mercury vapor emits wideband radiation from visible light up through 150 nM – this high-end UV-C is the ozone-producing, germ-killing, sun-burning, cancer-causing wavelength. It is dangerous to work with unless special precautions are taken while it is turned on – short exposures and filtered eyeglasses are minimum requirements.

Less-harmful long wave is the most popular for inducing fluorescence. Inexpensive UV-A tubes and fluorescent fixtures are commonly available from super-chains like Wal-Mart, Lowe's and Home Depot, especially around Halloween for party ambiance. The protective sleeve on the tube will be well marked, and the tube glass will appear black.

Before purchasing a fluorescent black light – that's what you want – check the tube for the marking "BLB" (black light blue); that's a sure sign that it is an acceptable, Wood's-glass-enclosed, longwave (UV-A 365 nM) source which produces 365 nM UV-A while filtering out UV-B, UV-C and most visible light.

Sun tanning, aquarium lighting and plant lights are "BL" lamps which produce a combination of visible light and UV. They are worthless as UV sources for visual effects.

Cheap, screw-in, incandescent party lights produce minor amounts of UV-A which makes glow-in-the-dark paint glow, but not much else.

Typical indoor fluorescent lighting are internally-coated with tri-phosphors which produce full-spectrum white light.

All fluorescent tubes are the same internally, using mercury vapor to produce rich UV, but with

different quartz-glass envelopes and appropriate filtering to select the desired radiated light wavelengths.

CAUTION: Never stare at a mercury-vapor UV lamp, especially UV-C (shortwave). The human retina does not respond to the invisible beam in order to constrict the pupil to protect itself, so the intense energy can cause irreparable retinal damage.

◆ Along Comes the UV LED

Recently, UV-producing light-emitting diodes have been developed. Some of the cheaper LEDs barely qualify, emitting substantial visible blue light around 400 nM along with the UV. It's a competitive industry, and devices are improving.

Dispersion (beamwidth) from these LEDs is as important as, if not more important than, luminosity (total intensity). A 10,000 millicandela LED with a 10 degree viewing angle may produce effects as strongly as a 4,000 mcd LED with a 40 degree viewing angle because it concentrates its beam into a narrower swath rather than spreading it out over a large area.

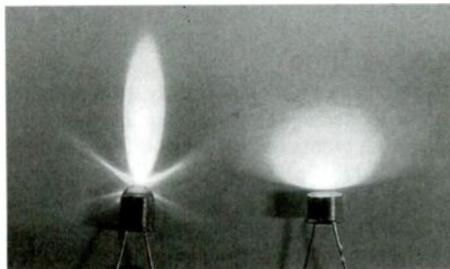
Available in both 3 and 5 mm diameter packaging, the light output is identical for devices with the same electrical ratings, the choice of size being for the convenience of mechanical layout.

Presently, LED blacklight technology is only capable of producing the longer-wavelength UV-A; fortunately, this is the more desirable wavelength for most applications.

◆ Enter Nichia

A Japanese LED manufacturer, Nichia, has been releasing a series of LEDs with progressively higher frequencies. We sampled two devices produced in tiny, metal TO-92 transistor-style packages. Selling for typically \$6 in small quantities, they put out considerable UV-A (375 nM), along with some visible light. Their power dissipation is rated at about 2 milliwatts.

Since both packages include glass front lenses, an obvious question which we asked the manufacturer was, why not make the lenses out of Wood's glass to filter out the visible light?



The convex lens focuses the light into a narrow beam compared to the flat-lens model.

The answer? Because no one had requested it! It seems that most applications require the UV while ignoring the presence of visible light.

◆ The Two Models

Nichia's NSHU550A has a flat lens with a beamwidth dispersion of 100 degrees. That's pretty wide, but works well for automatic currency readers in change machines, a major application. Their NSHU550A has a much-narrower 10 degree dispersion, making it ideal for small flashlights and devices which require an intense, focused beam.

Both devices work best when operated at a current of 20 milliamperes (25 mA max.); that occurs with a bias of about 3.5 volts DC. For brightness control (usually AC-powered instruments), they can be pulsed at line frequencies up to 80 mA; this is especially effective when used with substances that continue to phosphoresce after the LED turns off.

Calculating the correct series resistance for current limiting an LED is as simple as Ohm's law. For example, since a Nichia LED requires 3.5 VDC @ 20 mA for correct operation, a minimum of three 1.5 volt cells would be necessary for battery operation; since this produces 4.5 volts, we must drop one volt at 20 mA current. Ohm's law tells us to divide that 1 volt by 20 mA (0.02 A) to find the correct value of resistance: 50 ohms. A standard 47 ohm resistor does the job nicely.

Similarly, for a 9 volt battery we would use 330 ohms, and for 12 volt operation, 470 ohms.

Using Nichia LEDs in series is also a simple math exercise. Each LED is an additional 3.5 volts, proportionately reducing the required series resistance. And in parallel, simply add an additional 20 mA to the calculation for the series resistance for each additional LED.

When in doubt, insert a millimeter, or a multimeter set to read milliamperes, in series with the LED as you gradually increase voltage while selecting the proper resistance. Start with a high resistance and work down, watching the meter for the proper 20 mA current.

◆ In Conclusion

LEDs continue to capture attention and imagination. UV LEDs offer a compact source of blacklight for experimentation, so long as proper care is taken for their safe operation. For more information on UV and devices which produce blacklight, visit the following web sites:

http://www.3rdplanetsamples.com/sales_inquiries.htm
<http://www.3rdplanetsamples.com/shortclamp.htm>
<http://www.theledlight.com/technical.html>
<http://www.nichia.com>

Can you hear me now? C. Crane's Bionic Ear

There are more things in heaven and earth, Horatio, *Than are dreamt of in your philosophy.*

—Hamlet, Act I, Scene V

The Bard of Avon had a point: we don't understand it all; there's more here than

meets the eye, and very often there's more here than meets the ear. Years later, the *X Files* would echo the sentiment: the truth is out there.

I had that brought home dramatically recently by a piece of gear offered by C. Crane. It's called the Bionic Ear, and instead of being an eye-opener, it's an ear-opener! The Bionic Ear consists of three main components.

The first is a tubular assembly that looks for all the world like an ordinary 2-D-cell flashlight, except that at the end where you would expect the bulb and lens, there's a microphone. At the back end, there is a jack for plugging in headphones. In between there is a knob that serves as an on/off switch and a volume control for a built-in solid state amplifier connected to the microphone. The manual refers to the microphone/amplifier assembly as the "Bionic Ear" proper.

The second component is a pair of comfortable stereo headphones with separate volume controls for each ear. The last piece is a 12-inch parabolic reflector—called the Bionic Booster—that the Bionic Ear slides into. Together, the Bionic Ear and Bionic Booster measure 17 inches long by 12.5 inches wide by 5.5 inches deep and weigh about a pound.

To get ready for use, remove the rear cap of the Bionic Ear, snap a 9-volt battery onto the plug provided, tuck the battery into a foam rubber enclosure and slide it into the Bionic Ear. Replace the rear cap, plug in the headphones, and you're done.

If you use the Bionic Ear without the Bionic Booster, it functions as an omni-directional microphone that can increase sound by up to 40 decibels. When you slide the Bionic Ear into position in the Bionic Booster, it becomes highly directional, allowing you to easily locate the source of sounds and suppress background sounds. The Bionic Ear has an automatic shut-off, so that if a sound exceeds 100 decibels, your hearing is protected.

I tried the Bionic Ear/Bionic Booster combo one morning early when the birds were putting on what many have called "The Morning Chorus." As I slowly scanned the woods across from my house, I could hear all manner of birds singing, and I could get a pretty fair idea of the general heading to their location. At one point, I heard a faint "caw-caw-caw" in the distance. When I slipped the headphones off, I couldn't hear the crow that was calling, but when I put them back on, there he was again. Fox Mulder take note: the crow is out there.

With a little research on the Internet, I learned that the Bionic Ear has been used to eavesdrop on two Iraqi soldiers talking at a border post some 3-4 miles away. One really obvious application of this technology (besides wildlife observation and research), would be in search and rescue operations, listening for the faint sounds of someone in distress. The price of the potentially lifesaving Bionic Ear/Bionic Booster is \$179.95 and seems clearly worth it.

◆ Shedding a Little Light on the Subject

For those of you who, like me, think it's a good idea to have a flashlight on your person "just in case," now you have no excuse, thanks to the Pak-Lite. At first glance, the Pak-Lite, which measures 2-3/8 inch long by 1 inch wide by 5/8 inch deep, looks like an ordinary 9-volt battery. But look at little closer, and you'll see a chunk of black plastic with two clear bumps on the end.



The Pak-Lite may be a tiny flashlight, but it lasts a long time.

The Pak-Lite, you see, is the ultimate minimalist flashlight. The lithium 9-volt cell is the body of the flashlight, and small black plastic assembly at the end holds two LED bulbs and a tiny high/low/off switch. On high, the battery will last for 200 hours; on low, 1,200 hours. The shelf life of the battery is 10 years; the bulbs are good for 100,000 hours, and the switch is rated at 100,000 cycles. It's only \$29.95 with the lithium cell, or \$22.95 with an alkaline battery, and it's small enough to slip in the "watch" pocket of your jeans. What's not to like?

For more information about either of these products, visit <http://www.ccrane.com> or call 1-800-522-8863.



The Bionic Ear boosts sound by up to 40 decibels.



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MT



REVIEW

The Kaito WRX911 Notes From a Poor Man's Shortwave Listening Post

By Eric Bryan

After enjoying my Grundig Mini World 100PE, I came across some online references favorably comparing the Kaito WRX911 to the Grundig. Both radios are Chinese (Tecsun made) single conversion pocket analogs in the \$30 price range.

Intrigued by the reports on the Kaito and having a fascination for miniatures (as well as being unable to resist the electric blue in which it's available), I ordered the WRX911.

Out of the Box Impressions

The Kaito came tucked in a black, simulated velvet carrying bag/pouch, with a set of mini earphones.

The electric blue finish is startling in the flesh, with tremendous eye-appeal. (The radio is also available in black.)

After having gotten used to the Grundig, the Kaito seemed a little big and boxy (4-1/2"x3"x1"). It also felt hollow and light compared to the Grundig's compact density. The Kaito's horizontal layout makes it look and sit like a scaled-down version of a full-sized tabletop portable (whereas the Grundig's vertical layout makes it more of a handheld and not a tabletop, set).

Controls and Features

The Kaito has a wrist strap, two little feet for sitting vertically on a table, and a flip-out stand (and two little angled feet) which allows the unit to lean back at about a 30° angle. This feature gives the speaker more

projection, and makes the radio eminently more stable than when sitting vertically.

A telescopic antenna (about 19" extended) folds against the top of the set, and will swivel in just about any direction. However, when the radio is sitting upright, low antenna angles will tip the Kaito over. When resting against its flip-out stand, the set won't topple, but antenna angles and rotation are limited.

There is an ON/OFF switch separate from the volume control (which operates in reverse to the usual - UP is volume up, DOWN is volume down), a horizontally sliding bandswitch selector, and earphone and AC adapter jacks.

The bandswitch is smooth and quiet when switching between bands, but the tiny orange band selection indicator can be hard to see, depending on the angle of the set. There is no dial light, so in the dark I inevitably get lost and have to switch to the bottom or top band and count my way to the desired band.

The relatively thick tuning thumbwheel gives the Kaito a heavier, bigger radio feel than the Grundig. A flaw here was that the needle scraped against the dial face in places, so I opened the radio and slightly bent the needle away from the dial. The tuning wheel is now very smooth and a pleasure to use.

The analog dial face is about 2"x1-5/8" and easy to read. A red LED lights for power on, and a pale greenish LED operates as a signal strength indicator. (On a strong signal the green LED is very bright, and it's absolutely piercing during night bedside operation.

I don't watch it straight on when bandscanning in darkness, and sometimes cover it or face it away from me when I find a station to listen to. It even illuminates a patch of wall and casts dancing shadows as it flickers.)

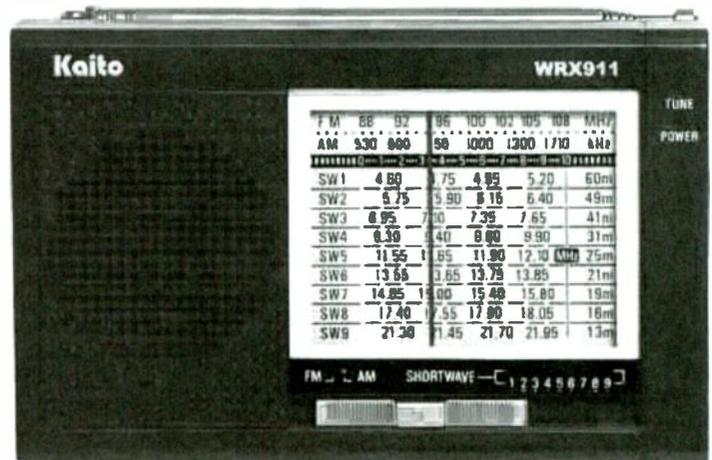
Coverage

The following bands and frequencies are listed on the WRX911's dial, but there is fairly generous overlap on each end of the SW bands. For example, SW4 tunes from well below 9300 to above 10000 kHz, and the actual bandspread of 49 meters is about 5655-6600 kHz.

FM	88-108	MHz	
AM	530-1710	kHz	
SW1	4.60-5.20	MHz	60m
SW2	5.75-6.40	MHz	49m
SW3	6.95-7.65	MHz	41m
SW4	9.30-9.90	MHz	31m
SW5	11.55-12.10	MHz	25m
SW6	13.55-13.85	MHz	21(22)m
SW7	14.85-15.80	MHz	19m
SW8	17.40-18.05	MHz	16m
SW9	21.30-21.95	MHz	13m

Performance

I have found shortwave sensitivity and selectivity to be about equivalent to the Grundig, both when comparing via the whips or with a clip-on wire. When compared side by side with just the whips, the Kaito is almost as sensitive on most frequencies as my Sony ICF SW1 (compact digital), which (in 1988) cost more than ten times as much as the WRX911. It was a delight to learn that



the Kaito (and Grundig) could approach the Sony in sensitivity.

The Kaito handles a 7 meter clip-on wire antenna perfectly, which greatly improves SW reception on most frequencies. Also, as with the Grundig, the clip-on wire improves MW reception.

Selectivity is such that signals of comparable strength 10 kHz apart can be separated and listened to easily. For example, the various big broadcasters which line up in the evenings on 9570, 9580, 9590, and 9600 kHz are all easily tuned to, separated, and listened to without interference from each other.

Signals of comparable strength 5 kHz apart can be separated and listened to, though usually with some interference from the adjacent station. For instance, I'm able to separate RAI Italy on 11765 from RHC Cuba on 11760, when RAI's signal comes in well enough to compete in strength with RHC's. When the signals are of similar strength, stations 5 kHz apart are still listenable enough, good enough to get station IDs, etc. But it takes careful tuning to separate signals which are 5 kHz apart.



Image Problem

Images are the curse of single conversion sets, and the worst of these on the Kaito appear on 60 meters. Here on the U.S. West Coast, the too-powerful gospel stations on 49 meters and Radio Thailand which comes crashing in on 5890 all bounce down 910 kHz

(twice the IF frequency of 455 kHz) onto 60 meters. Also, on both the Grundig and the Kaito, a signal on 5070 appears as a ghost on 5980, sometimes damaging the BBC on 5975. A general rat's nest around 6000 kHz can sometimes make finding RHC on that frequency a challenge, though this isn't all the Kaito's fault: the Sony SW1 often shows a similar mess around that channel, too.

Further, a station on 5755, and the over-strong Radio Thailand on 5890, sometimes appear in the background of other stations up the 49 meter band. This is a characteristic of both the Kaito and Grundig, and decreases greatly or is eliminated when the wire antenna is detached.

Sometimes an image of CHU from 14670 kHz shows up on 22 meters at 13760, but it's usually not strong, so it's not a big interference problem.

Other than the images, there are very few audible stations on 60 meters besides WWV

5000 and Radio Rebelde Cuba on 5025. An outdoor longwire would probably enliven that band.

If the images and spurious signals on 49 meters are bad enough so that I need to unclip the wire and use just the whip, I can usually still listen to BBC 5975 and the stations in the 6100-6200 kHz range while reducing or eliminating the sounds of other very strong stations in the background. For instance, Radio Japan on 6110, REE Spain on 6125, Radio Netherlands on 6165, VOV Vietnam on 6175, CRI on 6190, and BBC on 6195 are all usually available, though VOV often needs the wire.

If CBC on 6160 is strong, and RN on 6165 not overly strong, the Kaito can separate them. When CRI signs off, Mexico usually comes in on 6185. In fact, on both the Kaito and Grundig, Mexico has sometimes been quite listenable, and occasionally even strong, with just the whips, lighting up the Kaito's green LED brightly.

Repositioning the whip sometimes helps reduce images and spurious signals, allowing the desired station to come in more clearly.

A side note: The Grundig has a 5910 kHz image of WWV 5000; the Kaito doesn't. Otherwise, both sets have identical jumbles of images and spurious signals on 49 meters (the Grundig doesn't tune to 60 meters).

To me, some of the image problem blame rests with the stations which, for my reception area, are using too much power. More reasonable signal strengths of these stations would mean fewer and weaker images, mak-

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ing genuine signals which are hampered by image interference more listenable. Radio Thailand is the strongest SW signal I've ever heard. It's as strong as the local MW station. They would have a strong signal in my area with half the power.

Reception Results

Probably the best way to give a performance report of the Kaito is to offer my "DX" results so far. The indoor clip-on wire was usually used, though the stations were almost always audible via just the whip. I tune in all of these stations regularly or semi-regularly; for example, I listen to REE Spain and shoot for RAI Italy and Radio Cairo daily. All of the usual monster stations are a given, and so are not listed. Frequencies usually cross-checked on Sony ICF SW1.

Argentina	15345
Bulgaria	9700 11700 (one of first stations heard on Grundig)
Chile	15375
Croatia	(via Germany) 9925
Czech Rep	9870 11600
Ecuador	9745
Egypt	11855
France	13610
Greece	11665 (plus the CA relays)
Israel	11585 11590 17535
Italy	11765 11800
Kuwait	11675 15110 15505
Libya	(or UAE?) 15435
Lithuania	11690
Mexico	6185
Nigeria	7255 17800
Portugal	15480
S Africa	7215 116?? (TWR) 7265 9770 15215 (Channel Africa)
Spain	6125 11790(?) 15110 15385 15485
Sudan	11665 15325
Sweden	(via RCI) 6010
Switzerland	15445
Vatican	15570
Vietnam	(via Canada) 6175
Wales	(via England) 9795

All the above are received about equally on the Kaito and Grundig. Unrecorded are numerous unIDed Muslim calls to prayer and Arabian music on 19, 25, 31, and 41 meters. If IDed, they would probably add two or three countries to the list. The list has been compiled over a couple of months of listening.

AIR India has for some reason eluded me so far.

Refreshing Analog

After using a digital SW receiver for 15+ years, and tuning with buttons, the analog tuning of the Kaito (and Grundig) has been a nice change of pace. For bandscanning, there's nothing like an analog radio. Because of the bandscanning-friendly analog layouts of the radios, I tend to look for and find more stations with them than I do with a button-only digital.

Drift

The Kaito is subject to some drift, but not as much as the Grundig. When trying to separate stations 5 kHz apart, the radio will

naturally meander toward the stronger signal. Drift seems to lessen after the radio has "warmed up" for a little while. When on a reasonably strong signal like REE's, after some initial drift the Kaito settles down and holds the frequency well. Of course, on very strong signals such as RVI on 11635, drift is pretty much absent.

Like the Grundig, the Kaito is sensitive to hand and body position when receiving. Fingers placed on the back of the set will detune a frequency setting. Also, after tuning in a weakish station and putting the radio down, it wanders off the signal unless it's a strong one. Thankfully, this tendency is eliminated (on both radios) when a wire antenna is clipped on.

Shortwave Calibration

A flaw in most of the inexpensive Chinese analogs I've tried is eccentric SW dial calibration. On the Kaito, calibration on 25, 22, and 19 meters was substantially off, and I've since opened the radio and adjusted the SW oscillators for those bands so stations line up more accurately on the dial. (The jury is still out on whether or not my tweaking of some of the SW oscillators affected the RF, so that the RF trimmers would need to be re-peaked. The radio seems to be just as sensitive as before.)

Calibration on all the other bands was very good.

Poor calibration isn't disastrous unless the radio is actually missing a desired portion of frequencies above or below the band, i.e., part of the desired band is off the scale at top or bottom. Otherwise, once I know my way around the dial, mental corrections/adaptations of frequencies become almost automatic.

It would be a big boost if the Tecsun factory would tighten quality control of SW calibration of their analog radios. They're of course easier and more pleasurable to use when the needle and dial read reasonably accurately. After all, frequency guessing on an analog is hard enough as it is without complicating it further.

AM/FM

The Kaito is good on FM, pulling in the weaker university stations fine. On MW, it's better than the Grundig, probably because, due to its horizontal orientation, the Kaito's ferrite bar antenna is twice as wide, or long, as the Grundig's. (The clip-on wire assists MW on both sets.) The Kaito's MW sensitivity isn't quite as good as the Sony's. There's a station on 1330 less than a mile away, and a weak one 40 or so miles away on 1300. The Sony is able to pull the weak 1300 out from under the huge 1330 signal, but 1330 makes too wide a footprint on the Kaito for it to find the weak 1300.

Audio

Because of the larger cabinet, with more hollow space, the speaker is a little more resonant on the Kaito than the Grundig, giving it a slight edge in volume.

Both sets have a nice, solid, bigger radio sound via the headphones.

Power

Like the Grundig and most true mini or micro SW radios, the Kaito runs on two AA batteries (or a 3V power supply with center negative, not included). A nice feature is that analog radios are much more forgiving on battery life than a digital. You don't have all the programming options and digital readout, but a set of AA cells will last and last.

Good Together

The Kaito and Grundig complement each other:

The Kaito includes 60, 22, and 13 meters, which the Grundig doesn't.

The Grundig tunes lower on 41 meters, reaching stations the Kaito misses.

The Kaito has wider coverage on 49 meters, and can handle the clip-on wire antenna on 49 meters, whereas the Grundig cannot.

The Grundig receives in FM stereo (true, two-channel in-phase stereo), while the Kaito does not receive in FM stereo.

The more compact Grundig is a true pocket radio, so travels better, and its vertical layout makes it superior as a handheld set.

The Kaito, with its flip out stand and rotating antenna, is better as a mini tabletop unit. The Grundig, with its non-swivel antenna and no feature for sitting or leaning on a table (falls easily), makes it mostly a handheld radio. (But, with the whip extended just 3" and attached to a clip-on wire, the Grundig works splendidly lying on its back on the bed, for example.)

Other than the image problem on 49 and 60 meters, the Kaito has been a joy to use. For a tiny radio this cheap (on sale for \$27.95 at radios4you.com) to even approach the Sony SW1 in sensitivity is impressive and, like the Grundig 100PE, it's a bargain.

My reception results with the Kaito and Grundig show that these little sets are up to the challenge of pulling in more than just the usual handful of major broadcasters. The Kaito WRX911 and Grundig Mini World 100PE do appear to have proven themselves to be the cream of the mini SW analogs in the \$30 price bracket.



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WR-3500 (External)	RCV 49-E	\$2395.95
WR-3500 (Internal)	RCV 49-I	\$2395.95
WR-3700 (External)	RCV 50-E	\$2895.95
WR-3700 (Internal)	RCV 50-I	\$2895.95

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What's NEW

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Uniden BC-246T Coming Soon

The new Uniden BC-246T Trunk Tracker III has been FCC typed accepted (FCC ID No. AMWUB326). Assuming all goes smoothly, expect the new units to appear on the market in October or early November. Dealers are pricing the new unit at around \$230, so place your orders now! See our July column for details on this radically redesigned handheld or visit <http://www.grove-ent.com> and click on New Products.



Radio Shack Pro-83

A new scanner from Radio Shack, made for them by Uniden, has recently been type accepted (FCC ID No. AMWUB327). There are no details on the Pro-83 from RS yet, but according to the FCC site, the Pro-83 appears to be a 200 channel cut down version of the BC-246T above, but with no trunking and no alpha characters. (Possibly the Radio Shack version of the new Uniden BC-92XLT coming out soon.) It does include Uniden's new Close Call™ RF capture technology (Radio Shack calls it their Signal Stalker™ feature).

The Pro-83 has a special "Skywarn" feature that jumps to channel 200, expecting you to have your local Skywarn freq programmed there. Frequency Coverage is as follows:

25.0000-54.0000 MHz (in 5 kHz steps)
108.0000-136.9875 MHz (in

12.5 kHz steps)
137.0000-174.0000 MHz (in 5 kHz steps)
406.0000-512.0000 MHz (in 6.25 kHz steps)
806.0000-868.9875 MHz (in 12.5 kHz steps)
894.0125-956.0000 MHz (in 12.5 kHz steps)

Radio Shack Pro-96 "In Warranty" CPU Upgrade.

Radio Shack has issued a hardware upgrade for the Pro-96 Scanner. This is an "In Warranty" upgrade to CPU version V1.3. NOTE: This is NOT related to the "Flash" upgrade known as 1.2 that is downloadable from the RS site and other locations.

You can see your CPU version by hitting button "3" while the scanner is initializing on startup.

The upgrade corrects the known problem with addressing 4xxxx Talk Groups. It does not do anything further to improve the CQPSK system signals beyond the 1.2 "Flash" upgrade.

If you need the upgrade you must take the scanner to a RS Company Store. You MUST tell them to send it to the Fort Worth, Texas, Repair Center and that they should write "In-Warranty Upgrade to CPU version 1.3" on the repair ticket. Local repair centers currently do not have the capacity to do this upgrade. (My Local Dealer needed *extended* instruction on this point.) Turn-around time is estimated at about two weeks.

At this point I have heard of no problems related to the new CPU version and software packages such as Win96. Before sending your unit out, you will want to back up anything you have stored in it, as I expect the memory will be wiped and reset to defaults at Fort Worth.

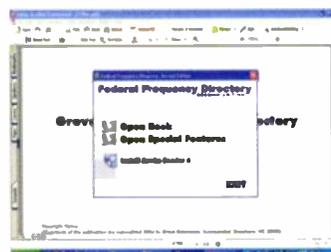
If you haven't bought a Pro-96 yet, you may want to wait a bit. The V1.3 units have not yet shipped. At the very least, you will want to test the unit as described above before buying it.

- T.J. "Skip" Arey N2EI

2nd Edition Federal Frequency Directory

The latest edition of the *Grove/Monitoring Times Federal Frequency Directory*, by Larry Van Horn, is now available on CD-ROM. This is the second edition of the directory and contains a number of improvements.

The directory can be run directly from the CD without any special installation, as long as you have the Adobe Acrobat reader on your computer. All of the data files are in the .PDF format, so they can be opened using Adobe Acrobat version 5, but I would recommend upgrading to the newest version, in order to take advantage of features that may be used in this latest edition. The CD-ROM does include version 6 of the Acrobat reader.



The preface contains an overview of nationwide federal and military frequencies, an updated list of federal interoperability channels, and some common nationwide federal channels, not only in the VHF and UHF bands, but also HF frequencies as well. The data consists of over 780 pages packed full of frequencies and agencies.

The scope of the data is federal frequencies between 27.575 MHz and 420 MHz. Directory information is sorted by frequency along with the federal agencies that may use that channel. In this edition, the data includes not only federal agencies, but also military allocations. If the frequency can be tied to a specific federal or military installation, that information is included, too.

The format of the pages has been changed from the previous edition and is much easier to read. The pages have been formatted into

a horizontal or "landscape" configuration, making the pages cleaner looking and less cluttered. Searching for a specific agency is simple matter of clicking on the search function in the Acrobat reader and entering the agency name or any text that you wish to search for.

Also included on this CD-ROM is a copy of the NTIA the *Red Book*, which is the federal communications "bible". It lays out all the federal procedures and regulations that apply to federal agencies and their radio systems. While it doesn't provide official lists of frequencies, it does provide many insights into how agencies are allocated specific frequencies and bands for their communications.

The CD-ROM is an extremely valuable tool to any federal scanner listener. I have had the first edition of the directory on my laptop and have often referred to it while traveling and searching the federal bands. It provides not only a searchable reference to federal frequencies, but the NTIA *Red Book* provides lots of fascinating reading and information.

The *Grove/Monitoring Times Federal Frequency Directory 2nd Edition* is \$39.95, plus shipping from Grove Enterprises, 7540 Hwy 64 West, Brasstown, NC 28902, 800-438-8155 or <http://www.grove-ent.com>

- Chris Parris, *Fed Files Columnist*

Book reviews by Larry Van Horn, N5FPW

ARRL 2003-2004 Repeater Directory

Good things come in small packages and the 32nd edition of this ARRL publication is no exception. If you travel and carry your VHF/UHF gear along for the trip or want a detailed listing of repeaters operations in your area, state or nationwide, nothing comes even close for the price than the pocket sized *ARRL Repeater Directory*.

In this latest League missive you will find updated listings for thousands of repeaters across the United States, its insular territories,

What's NEW

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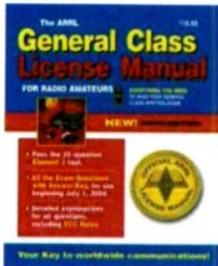
and Canada. There are repeater listings for the following frequency ranges: 29.5-29.7 MHz, 51-54 MHz, 144-148 MHz, 222-225 MHz, 420-450 MHz, 902-928 MHz, and 1240 MHz and above. You will also find listings for ATV (Amateur Television) repeaters and the new IRLP (Internet Linked nodes) repeaters.

In addition to the repeater listings this publication also includes: operating tips for newly licensed amateurs, frequency coordinator contact information, CTCSS and Digital Coded Squelch (DC'S) information, VHF/UHF bandplan listings, and a 2-meter channel-spacing map.

Large on information and small in size, this publication also carries a small price tag – \$9.95 plus shipping and handling. You can order this new repeater directory (#8918) or any other League publication online at <http://www.arrl.org>, or on their toll free order line at 1-800-277-5289. The snail mail address is ARRL, 225 Main Street, Newington, CT 06111-1494.

ARRL General Class License Manual

Earning a General class amateur radio license is your key to the world of HF Ham communications. Pass the 35-question General class written exam and you earn high-power voice, Morse code and digital modes privileges on HF.



The General class license is the second of three US Amateur Radio licenses. To upgrade to General class, you must already hold a Technician class license (Element 2) or have recently passed the Technician license exam. You must also pass a 5 words-per-minute Morse code test (Element 1).

The General class (Element 3) question pool was recently updated and all exams given from July 1, 2004, will use the material and questions covered in this new 5th edition.

Some of the features of this new 5th edition include: easy-to-understand theory and rules; the latest General class question pool with answer key; and detailed explanations for all questions, including FCC rules.

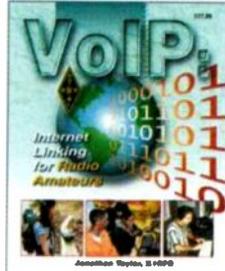
There is even a "Setting Up Your Station" chapter which will help you get on the air with your new General class license privileges.

This new 2004 5th edition is 400 pages and is published by The American Radio Relay League, Inc. (ISBN: 0-87259-920-5) #9205. The book retails for \$16.95 plus shipping and handling and is available from the ARRL and ham dealers nationwide.

VoIP: Internet Linking for Radio Amateurs

by Jonathan Taylor, K1RFD

When the internet burst on the public stage in the early 1990s, some amateur radio operators were fearful that their hobby would somehow be replaced by the net. It didn't take long, however, for the ham community to embrace the net and to also realize that it could be used as a "pipeline" to link distant locations not always available on satellite or HF. Thanks to the net, hams now have new communications systems that unite radio with the Internet to allow any licensed ham worldwide communications via the net.



A growing number of hams are using VoIP, or Voice Over Internet Protocol, in combination with their radios for long-distance communication spanning hundreds or thousands of miles. They're using the Internet as the relay between their base stations, handhelds and mobile transceivers.

VoIP: Internet Linking for Radio Amateurs is a guide to the four primary VoIP systems used by hams: EchoLink, IRLP, eQSO and WIRES-II. The book is designed for beginners who need information on how to set up and use these systems, but it also provides plenty of technical "meat" for those who want to dig deeper and explore how the systems actually work.

The ten chapters in this book address everything from how to get started, to addressing if VoIP is legal under current FCC regulations.

This is the first book ever written about ham radio applications of VoIP! Author Jonathan Taylor, K1RFD, is the creator of EchoLink and one of the top experts in Amateur Radio Voice Over Internet Protocol.

This 144 page first edition is published by the The American Radio Relay League, Inc., (ISBN: 0-87259-926-4) #9264 and retails for \$17.95.

The NRC AM Radio Log, 25th Edition

This 25th annual edition of the National Radio Club's AM Radio Log contains 294 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 operat-

ing 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 from current pricing on this publication.

You can also get addition information or send orders via mail to: National Radio Club Publications, Box 164, Dept W, Mannsville, NY 13661-0164.



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

Video Piracy

By David Lawson

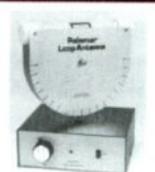
The volume contains information about current security technology used by cable and satellite providers. This information is not available elsewhere.

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NOAA-12 Power Problems

Our weather satellites (WXSATs) are not immortal! NOAA-12 entered 'Safe State' when hit by a significant power problem. NOAA-12 has been the oldest of the NOAA weather satellites to provide continuous high and low resolution imagery. Entry into Safe State meant that all instruments were automatically powered off pending an analysis by NOAA operations staff to identify the cause of the malfunction.

The first report that I saw of the anomaly was from **Chuck Vaughn** who reported missing HRPT on Sunday 25 July. **Brian Stauffer** reported that the 2348UTC pass on 25 July had neither HRPT nor APT, and a few hours later, monitors in Britain confirmed missing telemetry.

The **Office of Satellite Operations (OSO)** reported that NOAA-12 had experienced a power system anomaly and entered Power Survival Safe State. The Spacecraft Operations Control Center continued to monitor housekeeping telemetry from NOAA-12 at every pass and noted: "We have not observed a reoccurrence of the power problems observed on Monday."

The satellite thermal control electronics were turned back on early Tuesday 27 July morning, and the solar array moved to the correct offset angle during the afternoon. Analysis of the data shows the electrical loads currently taken from the power system were being maintained, with voltages and currents more than adequate to operate the satellite. "Recovery operations of AVHRR operations are planned to begin mid afternoon Wednesday."

That same day, NOAA-12 resumed transmissions. Well done, NOAA!

◆ Wallops Command and Data Acquisition Station

There are several ground stations used for controlling the various WXSATs. When a satellite fails, the stations are ready for the rapid analysis. Wallops is one such station – responsible for ensuring data flow from NOAA satellites to users. The station transmits spacecraft commands, and acquires and distributes a continuous flow of meteorological satellite data. Records of station performance are analyzed to identify failure trends so that corrective action can be taken.

Wallops prepares and reports on system anomalies, and ensures operator and maintenance crew proficiency. Emergency procedures to safeguard spacecraft health and safety are developed – everything necessary to ensure that the constellation of NOAA WXSATs is maintained.

◆ More Time with APTI

I continued to monitor APT long after I installed my HRPT system. When the latter failed a few weeks back due to the tracking system's elevation motor developing the problem mentioned last month, I have monitored more APT. The monitoring system now consists of the roof-mounted crossed-dipole antenna feeding the WXSAT receiver – a PROscan – and a portable computer running WXtoImg. The (de-modulated audio) signal from the receiver is cabled to the line-input of the sound-card and this is analyzed in realtime for live display.



Fig 1: Decoding WXSAT APT on a portable computer.

◆ Significant Weather Events

If we did not have jobs to do all day, it would be very easy to spend far more hours than are healthy just looking at the WXSAT views provided by the various satellites. No sooner is a new hurricane or wild fire mentioned on the news that we have a view of it quickly, if not more quickly than the official forecasters.

Patrick Prokop recorded a "very interesting view from NOAA-16" during the period in July when Alaskan fires were raging. He noted, "Looks like a tremendous amount of smoke in Manitoba and Ontario Canada, and into North and South Dakota and Minnesota." Thunderstorms can be seen developing over the western Great Lakes area and in Michigan.

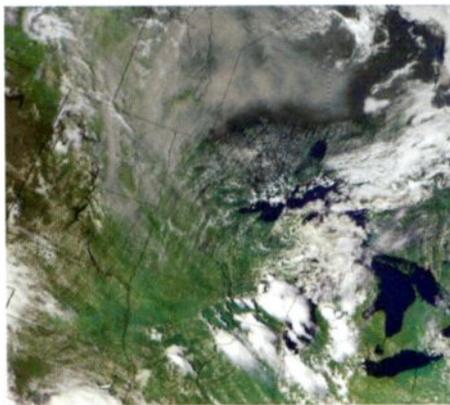


Fig 2: NOAA-16 July 16, 2004 HRPT

A careful look at the western view of the image shows the "wavy effect," due to an anomaly in the satellite's scan mirror. My thanks to Patrick for figure 2.

◆ WXSAT Site Updates

A number of monitors, both professional and amateur, have kindly provided images from time to time. Here are some of their sites, often providing recent images.

Hendricus Lulofs provides the latest APT images of North America on his web site: <http://users.adelphia.net/~hlulofs/>
Milan Konecny provides daily APT images of North America

<http://www3.sympatico.ca/konecny/weather.htm>

Patrick Prokop's site includes HRPT images from all NOAA WXSATs.

<http://www.savannah-weather.com/>
David Oesch of the Remote Sensing Research Group, Department of Geography at the University of Bern, Switzerland, provides quick-look images from all NOAA satellites.

<http://saturn.unibe.ch/rsbern>
<http://saturn.unibe.ch/rsbern/noaa/dw/realtime/n1b/>

If you have such a site, please let me know about it.

◆ That Elevation Motor

Last month I mentioned that the rotator unit elevation motor that controls my HRPT receiving system had started to stick during slow upward movements. I had taken it apart (with a little help from the local garage), but found the inside to be fairly rust free although a little dirty. After some cleaning away of small amounts of debris, I reassembled it, remounted it and took a pass. It tracked perfectly. I took a high elevation pass and was delighted to see it again track perfectly. I posted a short message to that effect and took the next pass.

Okay – back to square 1! All subsequent passes failed the same way; the elevation motor was sticking during slow upward movements.

I have been unable to remove the connector screws due to a previous repair, so now it looks like it's back to the makers for checking.

◆ Frequencies

NOAA-12 and -15 transmit APT on 137.50 MHz

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Protecting an "Exclusive" Frequency

By Glenn Hauser

This came to *MT* from Sven Thorell, based in Bastad, Sweden: "For the last six summers I have worked as Radio Officer onboard *M/S Endeavour*, C6BE4, a small ship (maximum 120 passengers) owned by Lindblad Expeditions New York, operating in the Antarctic area (Ushuaia-Falkland Islands-S. Georgia-Antarctic peninsula).

"There are about 25 other passenger ships trafficking this area. We operate on two frequencies in the 6-MHz band, 6310 kHz for HF-Telephone and 6224 SSB for intership communications. 6310 is used 24 hours; on the SSB we have sched at 1930 Ushuaia time [presumably 2230 UT in southern summer].

"Last season (2003-2004), there was a broadcaster on 6225 which caused a lot of interference on 6224, Deutsche Welle. I contacted DW and they said they were not on this frequency, but it was a Russian transmitter rebroadcasting DW.

"As you know, the band 6200-6525 is exclusively for marine operation. You probably wonder why I write you about this. *MT*, Feb-2004, "Domestic SW Broadcasting in Russia" by Bernd Trutenau, has a frequency table of Russian stations, including C1 6235 kHz 200 kW 1800-2100 Krasnyy Bor, E.R. Studio. This is an illegal transmission according to ITU. I will be happy to hear your comments on this."

A Maritime Mess

As if DW had nothing to do with the relay via Russia, pass the buck! The A04 (April-October) DW schedule does not show 6225 in use currently; however, *Passport to Worldband Radio* "2004", which displays outdated B-03 info, showed four different DW transmissions via Russian/CIS sites on 6225, Armavir, Irkutsk, Kazakstan [sic], N'sibirsk. Three of them are in the (northern) winter season only, which means during Antarctic expedition season in the southern hemisphere.

At 2200-2400 there was a 500 kW German broadcast via Kazakhstan to East Asia which would also propagate to the South Atlantic over a darkness path, although far from the direction it was aimed. Another DW broadcast on 6225 until 2130 was from "Armavir," northeast of the Black Sea, with 500 kW aimed across the length of Africa and eventually hitting Antarctica.

It is really inexcusable that any major broadcast station, let alone scads of pirates, operate above 6200; but it's just too tempting for them, adjacent to the 49 meter band, packed with broadcast stations playing by the rules. R. Gardarika on 6235 relayed from St Petersburg is unrelated to this DW problem on 6225, just another violation.

This was discussed further in *DX Listening Digest*. Bernd Trutenau, Lithuania, observed: "All these B03 transmissions from Russia (with DW on 6225 and Radio Studio on 6235) were coordinated in advance with the High Frequency Coördinating Committee (HFCC). The A04 HFCC schedule shows various transmissions in the range 6200-6240 from transmitters in Albania (TWR), China, Czech Republic, Iran, Monaco (TWR), Pakistan (regional), Poland, Egypt, Russia (Vatican Radio).

"The HFCC has always coördinated frequencies in this range, with many 'prominent' stations as users; for example, ten years ago in the W-94 season there were 15 listings from 6200 to 6245 from Russia, Sweden, Czech Republic, Switzerland, Monaco, Vatican [although none on 6225]."

HFCC's original B-03 (Oct-Mar) listings showed: "6225 2145-2400 43-45 A-A 500 94 KAZ DWL GFC". 43-45 means East Asia; A-A is Almaty, Kazakhstan; 500 kW; 94 degrees. GFC, the General Radio Frequency Centre in Moscow (<http://www.grfc.ru>) is the agency responsible for approving this marine-band usage by a broadcast service. Anatoli T. Titov is Head of the Division for SW, MW, LW broadcasting, in charge of frequency registrations at HFCC since Soviet days. He takes care of assignment and international coördination of Russian frequencies in these bands. Contact info: a_titov@vor.ru tel +70952983302, fax +70959567546, as we told Mr. Thorell.

The real question is whether 6225 will be used again this northern winter/southern summer by Deutsche Welle-via-Russia – or indeed by

any other broadcaster contrary to regulations – interfering with the *Endeavour*.

Wolfgang Büschel in Germany, a longtime observer of SW frequency management, predicts the B03 schedule will be copied by at least 80% in B04. A year ago, DW had this and four other registrations above 6200. The B03 list consisted of at least 28 registrations, among them Kol Israel, for decades on 6280 kHz.

Chris Greenway in Nairobi points out that there are a few African stations in this range too, on 6209.75, Radio Kahuzi in eastern DR Congo, separable from 6209.9, Radio Fana, Ethiopia. Voice of the Tigray Revolution, a clandestine for Ethiopia, is on 6350.0. We have another clandestine nearby, Voz de la Resistencia, Colombia, around 6239 (see *SWBC Global Forum*).

We can hardly expect clandestines to stay in the proper bands, but why not official stations? Does HFCC condone broadcasters encroaching on the "exclusive" marine band, also pioneered by Euro-pirates, which occupy just about every kHz from 6200 to 6400 at one time or another? (Fortunately, these are mostly low-powered, sporadic, and in the daytime.) Is HFCC not answerable to any higher international authority? Does the ITU care?

ITU Confirms Stance

Our fellow *MT* columnist Ron Walsh, VE3GO, wrote to the ITU directly about this: "Is there some exception to this rule, possibly from a WARC, which allows this station to broadcast here?"

A reply came from Nikolai Vassiliev, nikolai.vassiliev@itu.in, t at the ITU on behalf of Head of the Fixed and Mobile Services Division, quoting the pertinent regulations:

"1. According to the Table of Frequency Allocations in Article 5 of the Radio Regulations (RR), 6200-6525 kHz is allocated to the maritime mobile service. Pursuant to Part A of Appendix 17 to the RR, 6235 is designated for ship stations using wide-band telegraphy, facsimile and special transmission systems. So, this is a world-wide common working frequency for ship stations in the maritime mobile service.

"2. In addition, footnote RR5.137 allows using 6235 for fixed service stations but only on an exceptional basis, within national territory and with maximum mean power not exceeding 50 W. Recent World radiocommunication conferences have not modified the allocation of this band. Therefore, use of 6235 for any purpose other than described above is an infringement of the Radio Regulations and shall be avoided.

"3. If a ship station experiences harmful interference on this frequency from a broadcasting station, it shall report to the respective national telecommunication administration. The respective administration should resolve the problem either by contacting directly the administration responsible for the broadcasting station or by sending a Report of harmful interference in the form described in Appendix 10 to the RR to the Radiocommunication Bureau.

"4. If a non-compliant emission is detected but no harmful interference is caused, the case still has to be reported to the national telecommunication administration for appropriate actions according to Article 15 of the RR."

Doubtless there are a great many other ships around the world depending on 6235 kHz for communications who face the same problem. If it cares to follow bureaucratic procedures, the *Endeavour* ought to be able to prevent DW and the Russians from using that frequency for broadcasting. But, lacking proper complaints through channels, they may just keep doing it. An exclusive frequency still must be protected. We'll be monitoring ...

This page is open to thoughtful opinions on radio-related topics. Views expressed on this page do not necessarily reflect the opinion of Monitoring Times or Grove Enterprises.

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RSSI sensitivity	0.1 µV			
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Sensitivity	Mode	0.009-0.1 MHz	0.1-2 MHz	2-30 MHz
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(FM 12dB SINAD)	LSB, USB	1.0µV	0.7µV	0.15µV
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