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

Monitoring Times

A Publication of Grove Enterprises

Volume 22, No. 11
November 2003

U.S. $4.95
Can. $7.95
Printed in the United States

Winter Propagation:
Hot frequencies in the cold months

3-DIGIT 064
S50 P2
PERIODICALS
THOMAS SOKIRA
69 MANOR DR
CHESHIRE CT 06410-2615

Also in this issue:

- Monitoring the Army National Guard
- First Look at the Radio Shack PRO-96
- A Useful, Easy-to-Make Antenna

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AOR SDU5600 Spectrum Display Unit

Spectrum Display Just Got More Interesting!

With sampling at up to six times per second, you're quickly aware of new active frequencies. The "waterfall display" function is a new convenience, along with a host of menu driven selections and features.

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AOR SDU5600

- High resolution 5 inch color TFT display
- Built-in "waterfall" display function
- Now features FFT signal analysis
- DSP
- Uses 10.7 MHz IF input frequency
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- 10 MHz bandwidth (± 5 MHz from center frequency)
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- Menu driven operation
- Two RS-232C ports for receiver and computer control
- Easy to operate

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The Serious Choice in Advanced Technology Receivers™

WiNRADiO G303i

Shortwave receiver for the 21st century

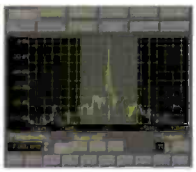
In today's dangerous world, attention is turning again to shortwaves; the only information medium which can quickly reach around the globe even if major infrastructure failures occur.

The innovative WiNRADiO G303i software-defined shortwave receiver has the performance and capability to bring shortwave monitoring to the higher level demanded by today's standards and to take advantage of new digital broadcasting technologies. A range of new options is now available to bring the most out of this exciting receiver, and to provide an integrated solution whose performance equals or surpasses that of conventional receivers costing many thousands of dollars more.

The G303i PCI-card receiver is designed with maximum reliability and performance in mind. Not a single tunable part has been used in its design. There are two high-performace DDS units, and thousands of ultra-miniature surface-mount components delivering a truly stunning performance.

The G303i control panel features no less than seven different methods to tune the receiver. There are additional features such as a real-time spectrum analyzer, three scanning options, a highly accurate S-meter displaying signal strength in absolutely calibrated user-selectable units, sweeping wide-band spectrum scope, powerful memory facilities, and many others.

Professional Demodulator Option



The Professional Demodulator introduces user-adjustable filter bandwidth and selectivity, additional demodulation modes, interactive demodulator structures, SINAD and distortion meters, bandwidth presets, user-definable audio AGC, and many other features.

Advanced AM Demodulator Option

The Advanced AM Demodulator offers passband tuning, notch filter, noise blanker, RIT and recording facilities. The ability to record at the IF level, and so "re-receive" a signal with different filter and demodulation parameters, is the world's first in a receiver of this class.

DRM Decoder Option

The DRM Decoder introduces one of the most exciting innovations in radio of our times: Digital broadcast on MW and SW radio. Hear FM-quality broadcasts on shortwaves, thousands of miles away!

Long-wire Antenna Kit Option

The WiNRADiO AX-05E Long Wire HF Antenna is a low-cost kit containing all the necessary components for a simple but effective shortwave antenna suitable for short wave, medium wave and long wave listening applications. An excellent accessory for the G303i receiver or any other shortwave receiver.

Long-Wire Antenna Adapter Option

The WiNRADiO LWA-0130 Long Wire Adapter employs a dual transformer design, making it more efficient than most conventional "longwire baluns". It is especially suitable for the AX-05E Antenna and the G303i receiver, but can be used with any third party HF radio to improve performance. A typical signal improvement using WiNRADiO Long Wire Adapter is 5dB, and in some cases up to 17dB.

Advanced Digital Suite Option

The WiNRADiO Advanced Digital Suite expands the power of the WiNRADiO G303i receiver with HF fax and NAVTEX decoders, a signal conditioner with numerous user-defined filters, audio spectrum analyzer and oscilloscope, audio recorder with pitch shift, and numerous others digital processing facilities.

Reviews

The G303I receiver has attracted numerous reviews world-wide.

On spurious signal rejection: "As far as I can remember I have never found any receiver, analogue or digital, which had such cleanliness, and the WR-G303i has set a new standard for others to emulate." *[Short Wave Magazine, SWM]*

On sensitivity: "... higher than necessary in a receiver of its type...". [SWM] • "Much of this sensitivity is contributed by the low phase noise of the oscillator, typically -148dBc/Hz @ 100 kHz. Clearly this radio meets or exceeds the competition head on..." • "In short, the performance is superb. The sensitivity and selectivity surpassed my expectation, and there was no sight of intermod even in the presence of strong stations at night time." *[Radio &Communications, R&C]*

On variable IF bandwidth: "... a very useful feature and allows you to exactly match the filter bandwidth to the incoming signal ... once experienced never to be forgotten." [SWM] • The experience of being able to finely tune selectivity to suit a particular signal you are listening to is truly incredible, especially if you have been used to having just a few fixed bandwidths on your old radio." *[R&C]*

On noise immunity: "Just in case you're curious, no, the location of the G303i inside the computer doesn't seem to result in a noise problem. I don't know how WiNRADiO did it..." *[Monitoring Times]*

The verdict: "If I had to choose between a Collins 95S-1 and the WR-G303i (ignoring the obvious fact that the 95S-1 tunes to 2 GHz), I would take the WR-G303i." *[SWM]* • "This receiver is a gadget-owner's dream! But it isn't fantasy; for the first time in consumer technology, the shortwave listener can tailor his receiver to his own requirements, independent of factory-set parameters." *[MT]* • "The WiNRADiO WR-G303 receiver, in addition to being an excellent receiver on its own right, has a certain exciting feeling about it. Perhaps this is because of the promise of a change of an entire paradigm which makes a difference between just another run-of-the-mill product and a truly innovative cult product, sparking an entirely new following." *[R&C]*

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www.winradio.com

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Monitoring Times

Vol. 22, No. 11 November 2003

Cover Story

Winter Propagation: A Welcome Relief

By Tomas Hood NW7US

Why is there only a hiss where a strong signal came in just a few days ago? Why was HF reception so poor last August and September? Is there better "weather" to come?

This article looks at radio wave propagation, how it relates to sun cycles, what that has meant in the current solar cycle, and what we can anticipate over the coming winter months.

On our cover: Instability in the Sun impacts radio propagation on Earth. This June 9, 2002, 'prominence' was caused by explosive instabilities in the Sun's magnetic field. Courtesy jpl.nasa.gov

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Army National Guard AH-64 Apache

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

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Editorial e-mail:	editor@monitoringtimes.com
Subscriptions:	order@grove-ent.com

Subscription Rates: $26.95 in US; $39.50 Canada; and $58.50 foreign elsewhere; US funds. Label indicates last issue of subscription. ***See page 91 for subscription information.***

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

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Reviews:

We have quite a selection of radios and accessories to suggest to you this month. After all, Christmas is around the corner! You'll find some suggestions for **Christmas gifts** on pages 27 (*Bright Ideas*) and 72 (*On the Ham Bands*).

Of course, a lot of scanner hobbyists have been waiting for the **Radio Shack PRO96** to be released, and it's now here! *MT* takes a quick peek before the full review next month (p.88). If you're looking for an inexpensive but reputable receiver for a shortwave fan, you might want to consider the **Sangean Travel Pro**, also reviewed on page 88.

Even non-hobbyists will appreciate the features available in the **Cobra PR4000WX** FRS/GMRS handi-talkies, which come as a pair and include weather radio and a compass (p.86)!

A good frequency counter is a flexible tool with myriad applications for hobbyists and hams. *MT* reviews the **Aceco FC2002** – a fairly sophisticated counter at a reasonable price (p.78).

If you're traveling to Grandma's house this Thanksgiving, don't ruin the trip by acquiring a speeding ticket on the way. Recent changes have rendered many radar detectors illegal or ineffective, but the **K40 RD850 Radar Detector** appears to be just as good as it claims... Bob Grove checks it out on page 82!

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Jorge Rodriguez
jorgerodriguez@monitoringtimes.com

Monitoring and the Law

Monitoring Michigan

Michigan is a state of many lures, from Detroit, the motor city, to the upper peninsula's natural outdoor beauty the state has something to offer everyone. When radio hobbyists visit they often travel with scanning radios, which may not be legal in a vehicle without a permit.

Since 1929, Michigan has had one law or another regulating the use of radios in vehicles which can tune in police communications. Although still carrying an antiquated title, Michigan's Penal Code, Act 328 of 1931 is the latest incarnation of that law as of March 2003. Section 750.508 states:

> (1) Any person who shall equip a vehicle with a radio receiving set that will receive signals sent on frequencies assigned by the federal communications commission of the United States of America for police purposes, or use the same in this state unless the vehicle is used or owned by a peace officer, or a bona fide amateur radio operator holding a technician class, general, advanced, or extra class amateur license issued by the federal communications commission, without first securing a permit so to do from the director of the department of state police upon application as he or she may prescribe, is guilty of a misdemeanor punishable by imprisonment for not more than 1 year or a fine of not more than $1,000.00, or both.

While the law is silent on the definition of what it means "to equip," some Michigan counties have been known to confiscate and charge anyone who has a scanner anywhere in their vehicle. This means tourists visiting the state to see the fall colors or attend a sporting event or auto race risk being charged for having the radio in a car without a permit.

Although the law in its recent form has made exception for licensed Amateur Radio operators, some police departments are unaware of that provision and a few licensed ham radio operators have had their radios taken by uniformed officers. Usually after many weeks or months of letter writing to the responsible prosecuting attorney these cases have been dropped and any responsible prosecuting attorney these cases have been dropped and any confiscated equipment returned.

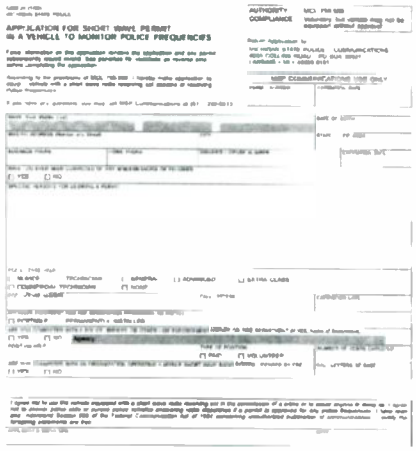
The Michigan law in its present form seems to track language originally sponsored by State Representative Mike Kowall of White Lake, Michigan, who sits on the Energy and Technology Committee. Several years ago Representative Kowall proposed a change to Michigan's scanner law in response to requests from the Oakland County Sheriff's Office which believed scanners were being used by burglars in their community to avoid being caught.

Groundswells mostly in the Amateur Radio community convinced Representative Kowall to withdraw the bill at the time. Michigan ARRL Section Manager Dick Mondro, W8FQT, writing to Strong Signals (**http://www.Strong Signals.com**) quoted Representative Kowall as saying "Rest assured that I have driven a stake through the heart of this bill, and it will never see the light of day and will die before it reaches the committee process."

Kowall went on to praise Amateur Radio operators who he said "play an integral role in emergency management agencies, and whose freedoms are guaranteed under the first amendment of the US Constitution and should never be challenged."

◆ Getting a Permit

Permits for mobile monitoring in Michigan can be obtained from the Michigan State Police by calling 517-336-6613 and are available to both residents and out-of-state non-residents. The application can also be found online at **http://www.mpscs.com/com-022.pdf**. The two-page application entitled "Application for Short Wave Permit in a Vehicle to Monitor Police Frequencies" collects certain information such as name, address, type of installation – permanent or portable, and then requires the applicant to promise that the monitoring is not for the purpose of committing any crime or helping others do so.



Specifically, applicants agree "... not to use the vehicle equipped with a short wave radio receiving set in the commission of a crime or to assist anyone in doing so. [They] further agree not to answer police calls or pursue police vehicles answering radio dispatched if a permit is approved for any police frequency." Lastly, applicants promise they have read and understand section 605 of the Federal Communications Act of 1934 concerning unauthorized publication of communications. Copies of the Michigan State law MCL 750.508 and Federal section 605 are provided on page two of the application for convenience.

Perhaps the sentiments of many Michigan Police at the thought of being listened to can be summed up in the words of the Holland Police Department which gives this answer on its Internet web site's frequently asked questions section. In response to a frequent request for their frequency (I have a scanner and wanted to enter your frequency. Can you give that to me?) they responded: "Although the great majority of people who monitor police and fire radio traffic are law-abiding citizens, some are not. Many techno-savvy criminal persons would use such information for illegal purposes. It is legal for a person with a Michigan State Police issued permit to monitor police frequencies in a vehicle. Please refer to the State Statute MCL 750.508. We are not too anxious to give out our radio frequencies, as you can understand. Public listings or Directories do exist, but you will have to find them yourself. Sorry, hope you understand"

◆ Free Subscription to *MT*

In addition to an honorable mention by name for those readers who submit stories to *Monitoring and Law*, beginning in 2004 if we use your story in the column, I will award the contributor with six months of *Monitoring Times* or a six month extension of your subscription.

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.

THE VERY BEST IN SHORTWAVE RADIOS

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

$99.95

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 poss 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

$99.95

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
- Built-in flashlight perfect for emergencies or camping
- Splash-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

On Scene at the "Big E"

Ken Windyka, author of September's article on monitoring the Eastern States Exposition, reported on the activity at this year's event. But first, he has a story to tell on himself:

"I again went 'On Scene' at the Big E 9/13/03. Had programmed all the frequencies into the Icom R2 along with the stubby SMA 501 antenna and ear phone. I went over half the day not hearing any transmission on the Big E internal security repeater (152.90) (and was saying to myself, wow there's going to be some terrible letters to the editor on this!).. Well, when I checked the programming, I had entered 152.92 in error... ALWAYS best to recheck what is programmed into the scanner. I might add, the frequency was quite active!"

Here was some other activity at the "Big E":

"1. The Big E has an outdoor stage where various musical/vocal groups perform. Just before the 1 p.m. show is about to start I hear the on stage coordinator/announcer calling the control center on 462.70 and advising them that the drummer had cut his finger so the show would be delayed a bit. Sure enough, [there was] a short announcement that the show would be starting a little late and when the band came out the lead singer specifically mentioned about the drummer injuring himself.... Now that's information!

"2. Later in the day a C5 aircraft was landing at Westover JARB, runway #05, and the approach path takes the aircraft right over the middle of the Big E grounds. Because of a light cloud cover you could not see the plane but could hear the whine of the engines. A significant number of people stopped in their tracks and stared up at the sky (not sure if it was curiosity or terror!); of course I had heard the aircraft talking with Westover Tower on 134.85 so knew there was an aircraft on approach.

"I didn't see anyone else with a scanner but FRS radios were being utilized.. Interestingly, most FRS radios actually had CTCSS enabled (getting multiple hits with different tones)."

– Ken Windyka

To his credit, Ken says he's been invited to tour the local NBC TV affiliate station since he's one of the top news tippers in the area – about 60% of his tips become a major story. Way to go, Ken!

Nevada Test Site

"Just got the Sept *MT* after returning from vacation in Las Vegas (and some Flag monitoring). Interesting story on Area 51. I made the same trip out to Rachel two years ago. What an 'odd' place, but also *great* for watching Red Flag action. Didn't get the chance this time out.

"While playing radio at the hotel I found the new (or not so new) DOE/NTS 400 MHz Astro system was alive and well. Could hear at least four control channels at any one time from the room with a stub antenna. (16th floor at Ballys facing west) Had to use a 'racing' stub antenna due to overload from the Ballys UHF LTR system.

"But, I could not get the system to track. Do you know if it happens to be a 9600 baud system? It would lock up on the control channel(s), but no talk group IDs. I had every voice freq I found active entered and would change out the control channel and also tried several base/offset combinations with no luck.

"I could hear Astro traffic fine on individual freqs, lots of encryption also. Just could not get it to track.

"And nice job on the Kennedy Space Center trunked article. The 407.7625 is confirmed at CCAFS. 410.7625 is confirmed at Patrick. All the others are 100%."

– Mike Comer, Titusville, Florida

Can any readers or columnists comment on Mike's query? - ed.

Support Needed for SpaceCam

The MAREX-MG team is pleased to announce a new educational Amateur Radio project scheduled to be used on board the International Space Station (ISS) in the year 2004. The new imaging project is called SpaceCam1. The SpaceCam1 Slow Scan Television (SSTV) project is a joint project between MAREX-MG and ARISS (Amateur Radio International Space Station). This system is an entry-level PC based SSTV imaging system which was designed to be used on board the International Space Station.

The SpaceCam1 system will support multiple common SSTV transmission modes. SpaceCam1 has been specifically designed to be accessible to as many Amateur Radio stations and shortwave listeners as possible, around the world. There are currently over a dozen software applications currently on the market which will decode the SSTV images coming down from the ISS.

This project is designed to allow school systems, satellite enthusiasts, shortwave listeners and Amateur Radio operators easy access to a new JPEG imaging project on board the International Space Station. The new SpaceCam1 Slow Scan TV imaging system will be using a common Amateur Radio channel to send and receive images from the International Space Station to and from Earth. Anyone with a simple UHF receiver and antenna system will be able to decode and display live still JPEG images coming from the International Space Station.

As an added bonus, if you are a licensed Amateur Radio station, you will also be allowed to transmit images from Earth to the SpaceCam1 system on board the ISS, and to use the image repeater, which will retransmit your picture over a 1500 mile radius.

We believe this project will help stimulate students' interest in the space program by putting part of the ISS project within reach of the common student or school system. And it will also increase the public's awareness of the things that can be done with Amateur Radio and Amateur Radio Satellite projects.

The MAREXMG club began in 1991 as a small club with the goal of educating people on how to use the Amateur Radio projects on board the Russian Space Station *Mir*. As the club grew, we then began building new educational projects, which were successfully flown and used on board *Mir*.

We have come a long way since those days and we are now a 501(c)(3) not-for-profit corporation. MAREXMG is looking to raise $50,000.00 USD this year to help pay for SpaceCam1.

The SpaceCam1 software project is 100% complete. Our final task is in finishing the approval process for Space Flight Certification. We even have a tentative Rocket Launch schedule for early 2004 on board a Russian Progress Cargo rocket.

We now need your support to help pay for the development of the Educational SpaceCam1 SSTV project. Your donations are needed to help us to continue bringing the world affordable and educational Amateur Radio experiments from ISS.

Please send donations to MAREX MG Headquarters. http://www.marexmg.org/fileshtml/donations.html

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marexmg@comcast.net

Print Screen

"While I found the short article interesting (Volume 22, No 8, *Computers & Radio - A Potpourri of Useful Programs*...Reviving the "Print Screen" Key), I was wondering why you would go through all that trouble when all you have to do is to hit Print Screen and then Ctrl and C at the same time. Go to your favorite application (Word, or some Graphic program) and then hit Ctrl and V at the same time. Then print it. Does the same thing and you can resize it to suit your needs.

"Just a Thought....(saves money too)."

– James Wells, Raytown, Missouri

Not everyone knows of that tip, James. I discovered it, too, by accident. However, I hadn't been using Control C: Shift plus Print Screen also copies it into memory for pasting into another application - ed.

Hooked on Radio

"The first magazine I ever read was *Playboy*. The second was *Monitoring Times*. I am now so old that I have given up on *Playboy*, but I still read *Monitoring Times*. (sigh)"

– John Jones, Ohio

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

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What Goes Around, Comes Around

With his bid to ease media ownership rules under assault from members of Congress and the courts, Michael K. Powell, chairman of the Federal Communications Commission, said he would create a task force to study the "localism" of radio and television stations.

Mr. Powell said that the panel would seek to answer such questions as how many hours stations already devote to local issues and "what was the nature and the quality of that local news," with a goal of increasing such coverage. Powell said that he remained skeptical of the notion that "the only way you can serve a local community is by having a small station in a local community owned by a local owner."

The day before they were to take effect, a federal appeals court issued a surprise order to block the FCC from imposing new rules that would make it easier for the nation's largest media conglomerates to add new markets and areas of business.

Here's the first irony: Mr. Powell has emphasized that it was a string of federal court decisions that compelled the Commission to rewrite the old regulations in the first place.

Powell also said the FCC would expedite the approval of hundreds of applications for low power FM stations from churches, community groups, schools and other nonprofit organizations. The Commission said it had already granted construction permits to 530 additional low-power stations, which is the first step in the licensing. It has yet to take action on the applications of more than 1,200 others.

"We have low-power FMs that have been waiting three years to hear from the FCC, without so much as a postcard," said Pete Tridish, technical director for the Prometheus Radio Project, a Philadelphia group that builds such stations and advocates on their behalf. "This is a very small step in the right direction."

Here's irony number two: Pete Tridish was co-founder of pirate station Radio Mutiny in West Philadelphia, shut down by the FCC five years ago. Subsequently he helped found Prometheus, a nonprofit group which helps set up legal low-power FM stations in "radio barn-raisings" around the country. It was Prometheus that successfully petitioned a federal court and got the order to block the new FCC regulations the day before they were to go into effect. Prometheus is to present arguments in November to show that the new regulations decrease the public's ability to get on the air. The FCC bid to move the case to more-sympathetic Washington courts from Philadelphia was unsuccessful.

Irony number three: Prometheus is bringing its suit in part because there are no public access radio or television stations in Philadelphia. The irony is that most urban areas do not qualify for the new low-power FM stations because of limitations imposed on the FCC by Congress after intense lobbying by the National Association of Broadcasters. The difference is that this time the NAB and community groups are on the same side, and both houses of Congress are listening.

Neighborly Interference

Public safety agencies are still wrestling with problems caused by the explosive growth of the mobile phone industry. A common problem arises when a police officer, for example, is close to a wireless phone company transmitter but far from a tower that carries the signals for emergency radios. In that situation, the wireless phone tower overpowers the officer's radio.

Emergency departments in at least 27 states have reported unsettling stories of officers who can't call for backup, dispatchers who can't relay suspect descriptions and firefighters who can't request ambulances because of radio "dead spots" believed to be caused by wireless phone interference.

The Federal Communications Commission has vowed to find a solution, even if it has to reshuffle channels in the 800 megahertz band to separate the wireless companies from the public safety departments, so they inhabit different ends of the band. It would be a massive and controversial task, potentially costing hundreds of millions of dollars and taking years to complete, industry officials said.

FCC Chairman Michael K. Powell warned that solving the problem "may be one of the most challenging spectrum policy proceedings" to come before the agency. However, many communication experts have said that a complete reorganization of the spectrum is unnecessary, too expensive and too time-consuming.

Meantime, many officers have concluded "if you can't beat 'em, join 'em": They carry cell phones in case their radios go dead.

In Miami Beach, dead zones are a problem, but a bigger concern for police officers are dead batteries. Their Motorola XTS-3000 two-way radios won't hold a charge for a full 10-hour shift, so most carry a second battery with them. Motorola claims that until recently, there wasn't a battery made that could hold a 10-hour charge.

Jamming with a Cuban Twist

When the Voice of America launched a daily, 30-minute, Persian-language television news program, American officials were convinced Cuba interfered with it and with several other Iran-bound broadcasts, using an old Soviet listening post "in the vicinity of Havana."

The jamming related to Telstar-12, a commercial communications satellite orbiting at 15 degrees west, which carries programs by the American government as well as by commercial Iranian radio and television stations based in the US aimed at mainland Iran. Though the regime has banned satellite dishes, it is estimated that more than 2 million households, using small and easily concealed equipment, receive more than a dozen such programs.

At first, it was believed that the Cuban government, acting on demands from Iran's ayatollahs, was jamming the US government and private Persian-language radio and TV broadcasts into Iran. However, in late August, a spokeswoman for the US State Department said that Havana had informed them that the jamming was made by the Iranians in Cuba, using a compound in a suburb of the capital belonging to the Iranian embassy, and that they had taken steps to stop it.

Marti by Satellite

TV Marti and Radio Marti will begin satellite transmissions to Cuba in an effort to break through the government jamming that has left the $11 million-a-year station largely unable to get its pro-democracy message to its intended audience, U.S. officials announced. The satellite TV broadcasts will begin with a three-month trial period and, if deemed successful, will be extended on an annual basis for up to seven years. The signal for Radio Marti, now broadcast on shortwave and AM frequencies, will also be broadcast on satellite. TV Marti also will nearly double its airtime to eight hours, from 6 p.m. to 2 a.m. daily, to include more news programs as well as Major League baseball games – Cuba's national sport. Its top programs will be copied on VHS tapes and given to travelers to the island for distribution to friends and relatives.

TV Marti currently relies primarily on a regular TV signal, broadcast from a balloon tethered 10,000 feet above Cudjoe Key in the Florida Keys. Those transmissions have been easily blocked by the Cuban government, and few Cubans have ever seen its programs.

With the experience of Cuba-based jamming of satellite signals to Iran (see above), it remains to be seen if Cuba will block the TV Marti signal. It will be broadcast from the Hispasat satellite, which orbits above the Atlantic and close to the Brazilian coast. It will allow Cubans with any satellite dish and receiver, such as those used by Direct TV subscribers, to obtain the free-of-charge transmissions.

Radio Drop Blocked

South Korean police thwarted a group of activists trying to launch balloons carrying transistor radios into North Korea in a bid to undermine the communist government. The group of mainly South Korean activists had gathered 48 miles northeast of the South Korean capital, to try to fly more than 20 balloons, each 18 ft tall and carrying about 30 small radios, into North Korea.

COMMUNICATIONS

The "Give the Ear to a North Korean" campaign was aimed at overcoming North Korea's strict ban on its people receiving outside broadcasts. North Korean radios and televisions are built so they can only tune in to government channels, which run mostly martial music or praise of reclusive leader Kim Jong-il.

The Voice of America and South Korea's KBS air programs aimed at North Korea, but they are frequently jammed.

Steve Anderson Sentenced

Steve Anderson, a former militia member who shot a deputy sheriff's cruiser and eluded capture for more than a year, was sentenced to 15 years in prison. Anderson operated Patriot Radio, an unlicensed shortwave station in Kentucky promoting white supremacist views (see April 2002 *MT*).

Anderson was apprehended in Cherokee County, NC, in November 2002 following a tip called in to the television show "America's Most Wanted."

David Tapp, Anderson's attorney, said that Anderson was remorseful. "He is sorry for the things he said on his shortwave radio program, which caused a great deal of alarm, and he is very sorry for his actions in Bell County which led to his imprisonment."

NHP System to be Scrapped

In July we covered the story of the Nevada Highway Patrol which operated its $16 million radio communications system for three years without having obtained Federal Communications Commission approval to use the frequencies.

Col. David S. Hosmer, commander of the state highway patrol, said "We've used 10 consultants, our frequency vendors, NDOT, our own communications staff and three outside attorneys that specialize in the FCC, and no one has been able to provide us with a viable frequency plan that is legal." The FCC refused to grant retroactive approval to operate on the existing 150 MHz frequencies. Therefore, to avoid nearly $1 billion in possible fines, the NHP will move its radio communications to the system now operated by the Nevada Department of Transportation.

To transition to NDOT's 800 MHz system, the state will have to build 11 mountain-top transmitters to get statewide coverage, and buy equipment for dispatchers and patrol troopers. The highway patrol will be able to use some radios and dispatch equipment. What it can't use, it hopes to sell at heavily discounted prices, Hosmer said.

Ghosts No Competition

Tony Cornell, a British expert who has spent years researching the occult, told the *Sunday Express* newspaper that reports of ghost sightings started to decline when mobile phones were introduced 15 years ago.

"Ghost sightings have remained consistent for centuries. Until three years ago we'd receive reports of two new ghosts every week," said Cornell, of Cambridge in Eastern England. "But with the introduction of mobile phones 15 years ago, ghost sightings began to decline to the point where now we are receiving none."

Apparently paranormal events, which some scientists put down to unusual electrical activity, could be drowned out by the electronic noise produced by phone calls and text messages.

"Communications" is compiled by Rachel Baughn (editor@monitoringtimes.com or c/o Monitoring Times) from news clippings and emails from our readers. Many thanks to this month's fine reporters, Anonymous, NY; Harry Baughn, NC; Sterling Marcher, CA; Ira Paul, MI; Doug Robertson, CA; Brian Rogers, MI; Via email – Maryanne Kehoe, GA; Rick Kissell; Ed Muro, NY; Jerry None, OH; D Prabakaran, India; Richard Schultz, KY; Larry Van Horn, NC; Barry Williams; Robert Wyman, FL; Dave Zantow, WI.

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Winter Propagation: A Welcome Relief

By Tomas Hood, NW7US

There it is: a signal in the hiss can be heard. A whisper of a signal captures your attention, and then it fades, only to tease you with its elusive presence on the shortwave radio. Only last week, this same shortwave station came in loud and clear.

It seems that the vast majority of days through the summer and early fall of 2003 was filled with poor propagation on the High Frequencies (HF). Wouldn't the signals on HF be reliably strong and readily present? Why were conditions so poor?

To better understand what's been happening in 2003 and where we stand in the current cycle, consult the sidebar story (on page 12) on Solar Cycle 23 – a story which could start out, "It was a rough and stormy night..." However, a welcome change takes place as the winter season arrives in the Northern Hemisphere. A change in propagation conditions can be observed as we move away from the long sunlit days of summer into the longer hours of winter's darkness.

But the change in the length of daily darkness is not the only influence on the propagation of radio waves through the atmosphere. The amount and strength of radiation arriving and passing through our atmosphere varies from season to season, as well as from the solar cycle minimum to the solar cycle maximum.

During the Northern Hemisphere's winter months, the Earth is closer to the sun than during any other time of its travel around the sun. This makes the daytime ionization more intense than that of summer daytimes. To understand the significance of this, think of a wood stove. When you open the front door to add more fuel to the fire, and get very close to the fire, you feel intense heat. When you close the door and back away from the fire, the heat decreases.

This is much like the position of the Earth in the winter – closer to the sun than during the summer. But the "door" is only open during the short period of daylight. With the more intense ionization during winter's daylight hours the radio waves refracted off of the ionosphere are relatively higher in frequency than those of summer. During the longer winter hours of darkness, the ionosphere has more time to lose its electrical charge. These conditions cause a wide daily variation in the maximum frequency that can be refracted by the wintertime ionosphere.

At any given time during the day, a fairly wide range of frequencies will be refracted from the ionosphere. The ionosphere is made up of ionized particles and electrons in the uppermost portion of the earth's atmosphere that is formed by the interaction of the solar wind and solar radiation with the very thin air particles that have escaped the earth's gravity. These ions are responsible for the reflection or bending of radio waves occurring between certain critical frequencies. The highest frequency that will still be refracted by the ionosphere is called the *critical frequency*, or *Maximum Usable Frequency* (MUF). This critical frequency varies depending on the amount of ionization at the point where it enters the ionosphere and the angle by which it arrives.

In winter months, the noticeable rise in this critical frequency brings a steady parade of DX signals through the higher shortwave bands during the day. But the winter openings are short. Summer openings last much longer, since the ionization continues as long as the daylight lasts.

When ultraviolet radiation from the sun penetrates through the outer atmosphere, it ionizes the various gases found there. Ionization causes electrons of neutral gas atoms to become detached, leaving the originally neutral gas atoms unbalanced, with an excess of positive charge. Such unbalanced atoms are referred to as positive ions. Since it takes the radiation of the sun to charge up the ionosphere, a lack of radiation that occurs during hours of darkness causes the ionized gases to lose their charge. This allows the detached electrons to recombine with the positive ions, forming balanced, neutral gas atoms. This process, the opposite of ionization, is called

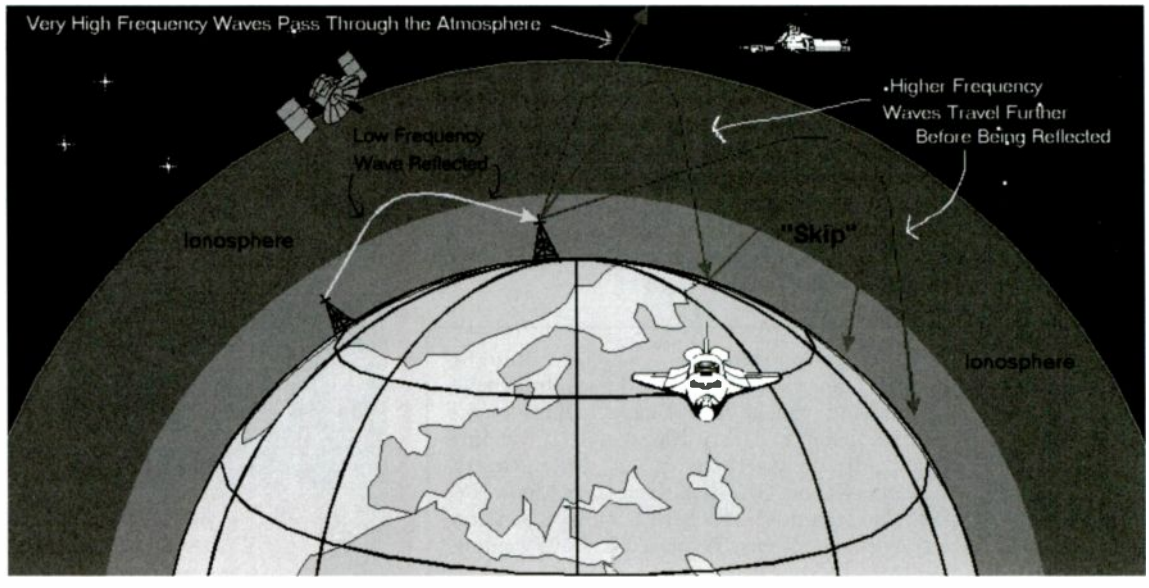


Image courtesy NASA and Elbate Engineering LTD

recombination.

In the summer, the long hours of sunlight keeps the ionosphere from recombining, but because the heating of the gases causes the layers to expand and thin out, the daytime critical frequency is generally lower than during the winter. But, the nighttime critical frequencies of summer are typically higher than nighttime critical frequencies during the winter. This gives us better nighttime DX in the summer, but better daytime DX in the winter over paths that propagate through sunlight regions. In addition, winter nights are far more quiet on lower shortwave bands due to the seasonal low in tropical storms, and because the lower critical frequencies won't propagate as much of the atmospheric and man-made noises.

It is the combination of these conditions that cause many radio enthusiasts to celebrate the arrival of the winter shortwave season. The winter of 2003 and early 2004 is promising, in part because of the seasonal relief we are having from the high geomagnetic storminess we've had this year, and because this geomagnetic peak is slowly declining now, as we move ever closer to the solar cycle minimum. With these improvements, we also experience a relief from the electrical storm and atmospheric noise of summer. This makes it much easier to DX those tropical band broadcasts, medium wave AM broadcast stations, and HF International broadcasters.

How to Read the Numbers

Take a look at the Solar Cycle Progression charts from the NOAA Space Environment Center site at **http://www.sec.noaa.gov/SolarCycle/** What do all the solar index numbers mean? What is the Ap index? What's the 10.7-cm Solar Flux? How do these numbers tell us what is going on with propagation?

The **Ap index**, or Planetary A index, is a twenty-four hour averaging of the Planetary K index (Kp). The Planetary K index is an averaging of worldwide readings of Earth's geomagnetic field. High indices (Kp over 4, or Ap over 20) means that the geomagnetic field is very active and that stormy conditions exist in the geomagnetic field.

The more active the geomagnetic field, the more unstable propagation is, with possible periods of total propagation fade-out. This is especially true at higher latitudes and especially at the Polar Regions, where the geomagnetic field is weak. At these high latitudes, propagation may disappear completely long before total degradation of signals over low- and mid-latitude paths. Extremely high indices may result in aurora propagation, with strongly degraded long-distance propagation at all latitudes.

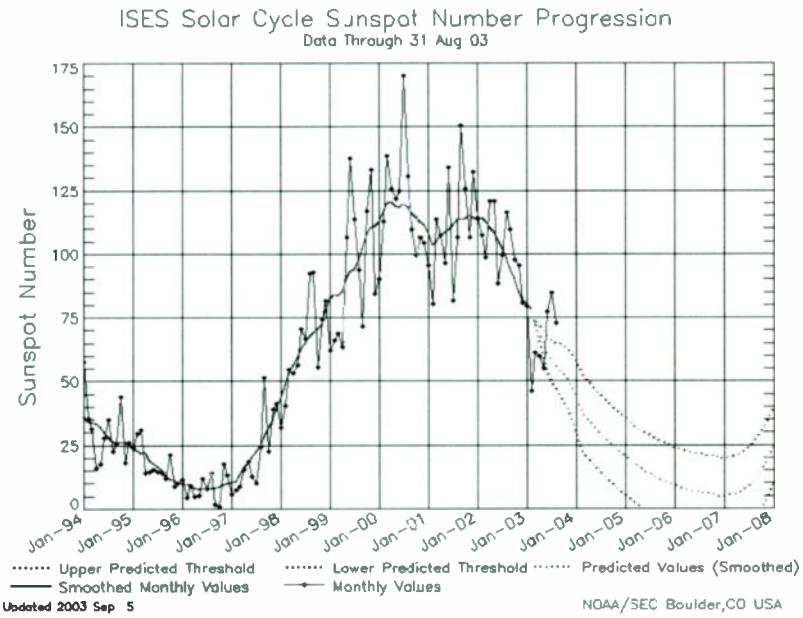
Low indices result in relatively good propagation, especially noticeable around the higher latitudes, when transpolar paths may open up.

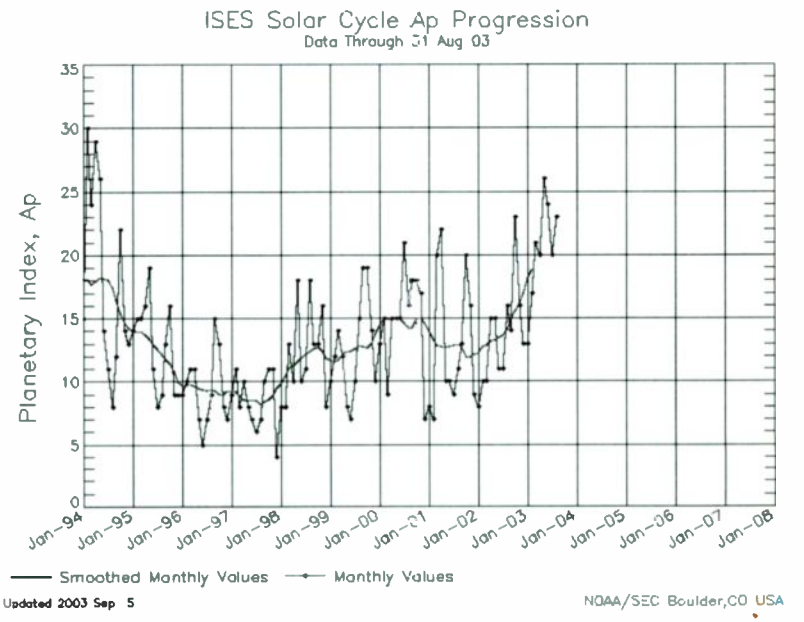
The maximum Kp index is 9. The Ap index can exceed well over 100 during very severe storm conditions. The classification of A-indices is as follows:

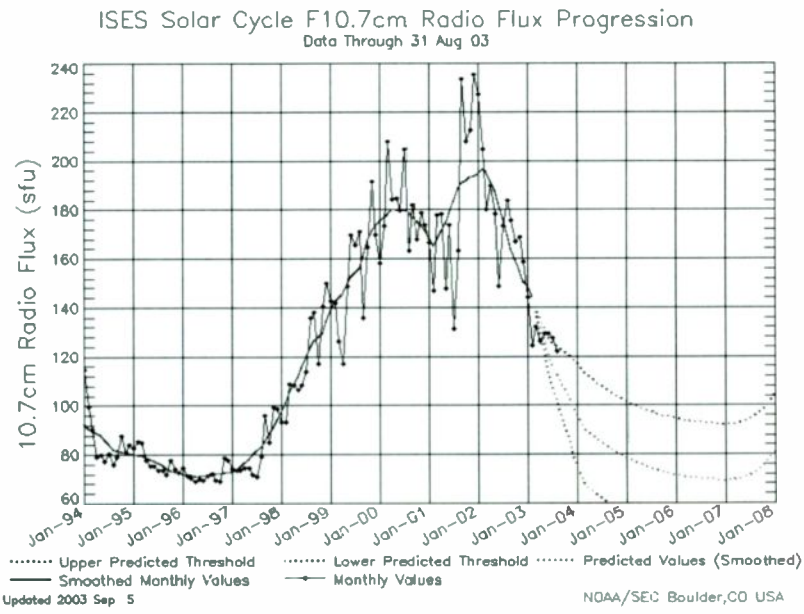
A0 - A7 = quiet
A8 - A15 = unsettled
A16 - A29 = active
A30 - A49 = minor storm
A50 - A99 = major storm
A100 - A400 = severe storm

The **10.7-cm Solar Flux index** (SFI) is a number obtained from the amount of radiation on the 10.7-cm band (2800 MHz). It is closely related to the amount of ultraviolet radiation, which is needed to create an ionosphere. Solar Flux readings are more descriptive of daily conditions than the Sunspot Number. The higher the Solar Flux, the stronger the ionosphere becomes, supporting refraction of higher frequencies.

The **Sunspot Number** (SSN) is a number related to the observable sunspots on the solar face. Sunspots are magnetic regions on the Sun with magnetic field strengths thou-





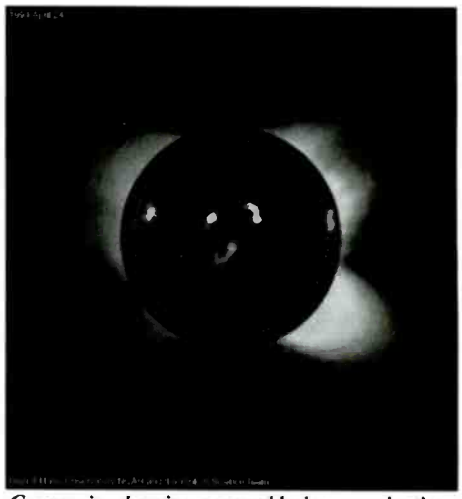


sands of times stronger than the Earth's magnetic field. Sunspots appear as dark spots on the surface of the Sun. Temperatures in the dark centers of sunspots drop to about 3700 K (compared to 5700 K for the surrounding photosphere). This difference in temperatures makes the spots appear darker than elsewhere. Sunspots typically last for several days, although very large ones may live for several weeks. They are seen to rotate around the sun, since they are on the surface, and the sun rotates fully every 27.5 days.

Sunspots usually occur in a group, with two sets of spots. One set will have positive or north magnetic field while the other set will have negative or south magnetic field. The field is strongest in the darker parts of the sunspots (called the "umbra"). The field is weaker and more horizontal in the lighter part (the "penumbra").

Galilea Galileo made the first European observations of Sunspots in 1610. The Chinese and many other early civilizations have also recorded sunspots. Daily observations were started at the Zurich Observatory in 1749. Continuous observations were obtained by the year 1849.

The sunspot number is calculated by first counting the number of sunspot groups and then the number of individual sunspots. The "sunspot number" is then given by the sum of the number of individual sunspots and ten times the number of groups. Since most sunspot groups have, on average, about ten spots, this formula for counting sunspots gives reliable numbers even when the observing conditions are less than ideal and small spots are hard to see. Monthly averages (updated monthly) of the sunspot numbers show



Composite showing coronal hole mass ejections (CME) and the solar corona

Cycle 23: Solar and Geomagnetic History

The current solar cycle, numbered 23, began statistically during May 1996, when the smoothed Royal Observatory of Brussels, Belgium, (RWC Belgium) Solar Influences Data analysis Center (SIDC) International Sunspot Number (ISN) was 8.0. The cycle has had two peaks; the first and strongest peak was during April 2000, with a smoothed ISN of 120.8, and the second and weaker peak was during November 2001, with a smoothed ISN of 115.5. Clearly, we are now in the decline of Solar Cycle 23. The cycle is expected to end sometime in 2007.

What is not easily seen by just looking at the monthly smoothed average sunspot numbers is what is happening with the geomagnetic field, as well as the general condition of propagation. Starting with Solar Cycle 11, scientists have seen that the Earth's geomagnetic activity has a cycle, too. Just as the solar cycle lasts for about eleven years, so, too, does the geomagnetic activity cycle.

Interestingly, there are typically two peaks in the geomagnetic activity cycle, just as there are two in the sunspot activity cycle. However, the geomagnetic activity cycle peaks at different times than the solar cycle smoothed sunspot peaks. The first geomagnetic activity peak usually occurs slightly before the solar maximum, while the second and more intense peak occurs in the declining phase of the cycle.

The first peak in the current cycle was during September and October of 1999, with another spike and peak during August of 2000. Then, in May of 2003, we had the highest peak so far recorded during this cycle. Take a look at the ISES Solar Cycle Planetary A index (Ap) Progression chart at **http://www.sec.noaa.gov/SolarCycle/** , which clearly shows the several peaks of the current cycle. What is most clear is how the geomagnetic activity (Ap index) greatly increased after the sunspot cycle peak years.

The second and more intense peak is caused by an increase of coronal holes that produce an unrestricted outward flow of solar plasma into interplanetary space. A coronal hole is a breakdown in the magnetic fields in the solar corona. When one of these coronal hole mass ejections (CME) impacts the Earth's Magnetosphere, or when the Earth passes through one of the solar streamers with a high solar wind speed caused by a coronal hole, a disturbance in the Earth's magnetic field results.

Coronal holes occur more often during the decline of a solar cycle because the sun starts to lose some energy and cannot continue to contain the solar plasma bubbles and complex magnetic structures. These breakdowns of the magnetic fields cause the plasma bubbles to burst, and are therefore a primary source of geomagnetic storms during the years of solar activity minimum. This increase in geomagnetic activity and storminess causes ionospheric recombination and degradation, which can wipe out most shortwave signals. At the same time, propagation on VHF and higher may and often are enhanced during these days of high geomagnetic storminess and ionospheric activity.

Stormy Weather

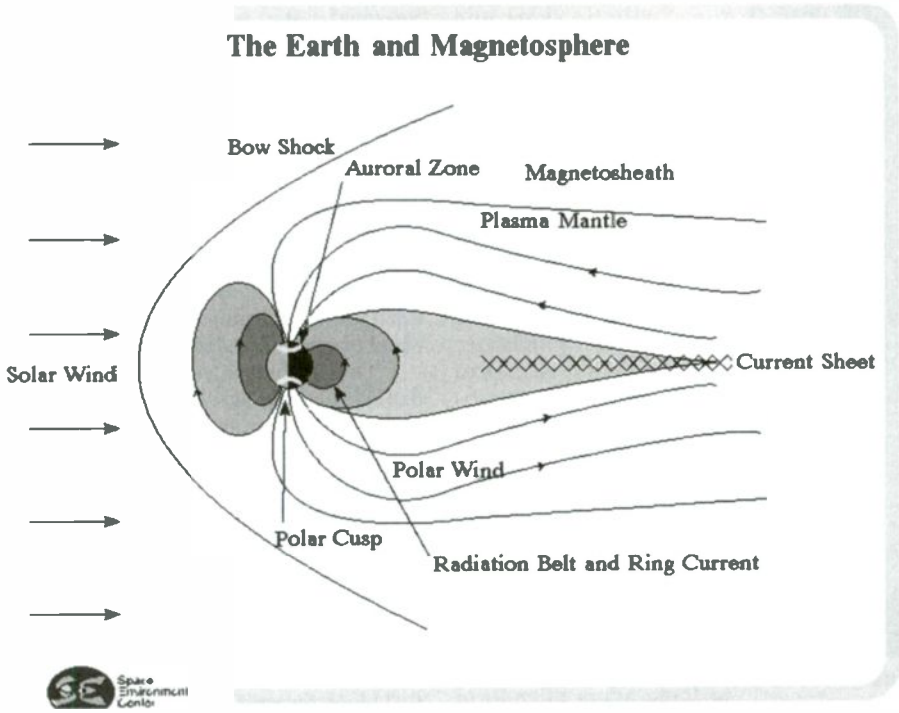
The summer and early fall shortwave season was very rough because of the great number, strength, and duration of geomagnetic storms. Mixed in with these periods of storminess were a fair number of moderate and strong solar flares. Solar flares can instantly shut down the High Frequencies, because the X-ray energy from these flares will ionize the D layer of the ionosphere, causing radio signals to be absorbed. Solar flare disturbances, called, "radio blackouts," last anywhere from a few minutes to several hours, because they are directly caused by the X-ray radiation from a flare. When the flare subsides, the ionosphere recovers.

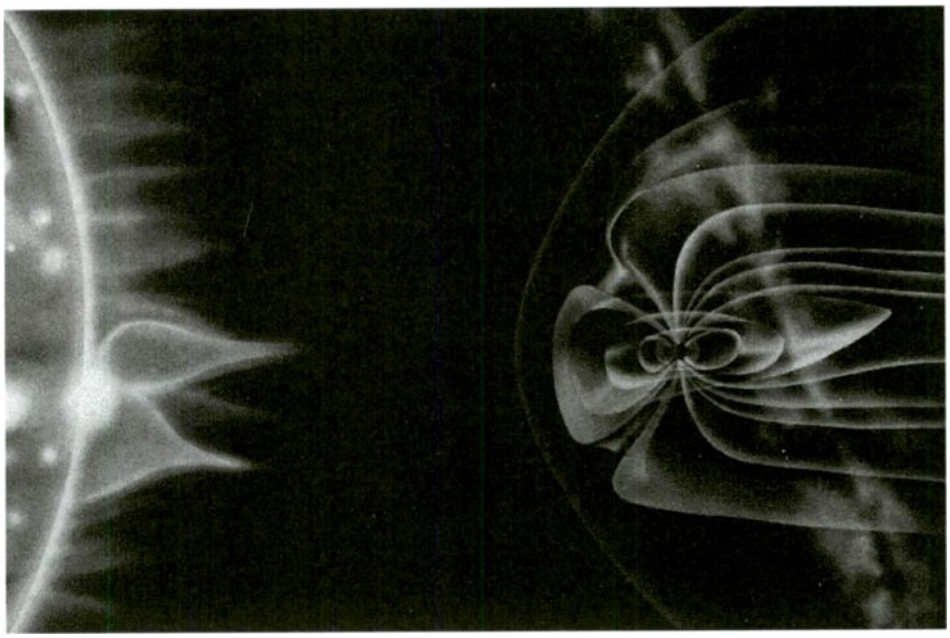
Flares will not directly degrade propagation on the dark side of the Earth. On the other hand, geomagnetic storms can cause severe degradation of propagation worldwide, for many days.

Geomagnetic storms do not directly disrupt HF propagation, however. Geomagnetic field disturbances during a storm cause the chemistry of the atmosphere to change, especially in the high-latitude regions. This change is a recombination of ions with the gas atoms of the ionosphere, much like the recombination that occurs at night after the influence of sunlight ends. The higher in latitude that this disturbance occurs, the more recombination that results. This is called an "ionospheric storm" or "radio storm" and is the real cause of degraded HF propagation during the day. It is possible, however, to have a geomagnetic storm without experiencing an ionospheric storm. But, you will always have a geomagnetic storm associated with an ionospheric storm.

Ionospheric storms produce many effects, all of which degrade HF propagation. During an ionospheric storm, the Maximum Usable Frequency (MUF - see text) may drop as much as fifty percent below normal. Severe storms may even cause the same behavior in the E layer. The obvious effect is the loss of signals that are too high in frequency. Rapid fading and echoes might be observed. Under extreme conditions the combination of a weaker ionosphere and increased absorption results in a radio blackout, especially on signal paths that cross through the high latitudes of the polar regions, where the concentration of charged particles is greatest.

This past summer and early fall was a period of high geomagnetic storminess and activity, along with the moderate number of solar flares. Conditions were pretty rough, even though the sunspot activity was generally good. Solar activity was high enough in fact to support great DX on most active shortwave bands, if only the signals could get through. Typically, summer propagation supports higher frequencies than winter propagation. But, with the degradation of the ionosphere and the lowering of the effective Maximum Usable Frequencies, these bands were shut down.





that the number of sunspots visible on the sun waxes and wanes with an approximate 11-year cycle.

We look at the Planetary A (Ap) index to get a picture of how conditions have been and to discover a trend. The Planetary K (Kp) index, on the other hand, indicates the overall current state of the geomagnetic field. When the Ap has been rising, or has been high over several days, we expect that the ionospheric propagation will be degraded. If we see the Ap falling, or remaining low for a number of days, we can expect that shortwave propagation will be good to excellent, even possibly over the high latitude and transpolar paths. On the other hand, if we see a quick rise in the Kp index, we might be alert for sudden fading and loss of signals, and even possible Aurora.

If the Kp index rises above 5, it is quite possible to have visual sighting of Aurora in mid- and even low-latitude locations. Some recent aurora events in the last several years have been viewable as far south as Mexico. Propagation was shut down on the high frequencies during these periods, but aurora-mode propagation on VHF and above was quite active. When we see the Kp index rapidly falling, or staying low for a period of time, we expect great conditions on the high frequencies.

We look at the sunspot and 10.7-cm activity because these numbers have a direct correlation to the level of ionization during the period in question. Over many years of careful observation and exploration, scientists have been able to model the way the ionosphere works, and how it is influenced by the solar activity. Using software tools, even radio hobbyists may now take the sunspot and flux numbers and make an analysis of propagation over various paths through the ionosphere.

The general rule of thumb is that the higher the solar activity, as shown by higher solar sunspot numbers and higher solar flux numbers, the higher the frequencies that will propagate via the ionosphere. So, when we see a trend of rising flux levels over several days, we can expect openings on higher frequencies, while a dive in flux levels warn of the closing of higher frequencies.

Since the sun rotates once every approximately 27 days, we can also watch all of these numbers, and discover what might occur 27 days from now. If the sunspot activity is currently high, and the Ap is low (say, a sunspot number of 95, and an Ap index of 12), we can reasonably expect the same overall condition 27 days from today. If, on the other hand, the Ap index is 30, and the sunspots are 60, we can expect poor conditions again in 27 days. Keeping a record of daily index readings will clearly give you a way to estimate the best

Shortwave Bands Quick Reference

Courtesy Larry Van Horn
http://www.monitoringtimes.com/html/mtSW.html

SHORTWAVE BROADCAST BANDS (AM)

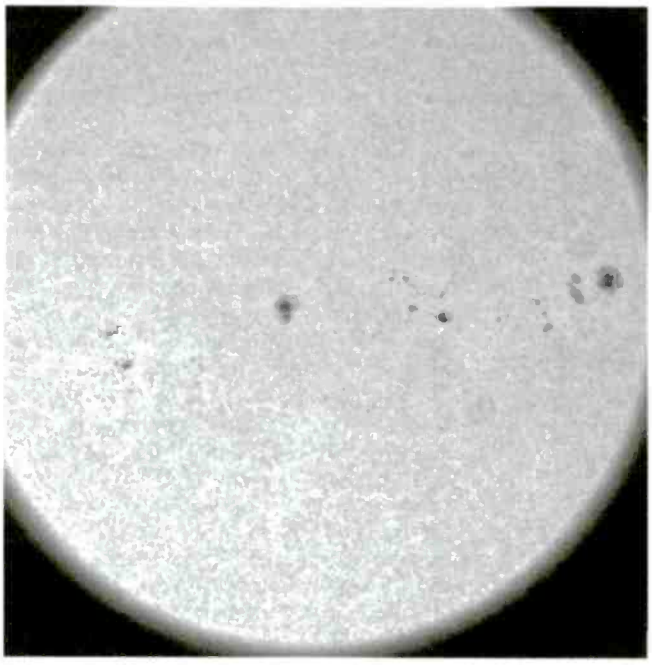
2300-2495 kHz	120 Meters
3200-3400 kHz	90 Meters
3900-4000 kHz	75 Meters
4750-5060 kHz	60 Meters
5850-6200 kHz	49 Meters
7100-7350 kHz	41 Meters
9400-9900 kHz	31 Meters
11600-12050 kHz	25 Meters
13570-13800 kHz	22 Meters
15100-15800 kHz	19 Meters
17480-17900 kHz	16 Meters
18900-19020 kHz	15 Meters
21450-21850 kHz	13 Meters
25600-26100 kHz	11 Meters

AMATEUR CW BANDS

1800-2000 kHz	160 Meters
3500-3750 kHz	80 Meters
7000-7150 kHz	40 Meters
10100-10150 kHz	30 Meters
14000-14150 kHz	20 Meters
18068-18110 kHz	17 Meters
21000-21200 kHz	15 Meters
24890-24930 kHz	12 Meters
28000-28300 kHz	10 Meters

AMATEUR PHONE BANDS

1800-2000 kHz	160 Meters (LSB)
3750-4000 kHz	75 Meters (LSB)
7150-7300 kHz	40 Meters (USB)
14150-14350 kHz	20 Meters (USB)
18110-18168 kHz	17 Meters (USB)
21200-21450 kHz	15 Meters (USB)
24930-24990 kHz	12 Meters (USB)
28300-29700 kHz	10 Meters (USB)



Observing the sunspot cycles can help you schedule your radio listening (Credit Stanford University archives)

days to schedule your radio listening or amateur radio activities.

Good resources on the Internet where these records are kept include:

http://www.sec.noaa.gov/ftpdir/weekly/RecentIndices.txt
http://www.sec.noaa.gov/ftpdir/weekly/Predict.txt
http://www.sec.noaa.gov/ftpdir/latest/45DF.txt
http://www.sec.noaa.gov/ftpdir/indices/DSD.txt

I have also created a comprehensive radio propagation resource center at **http://prop.hfradio.org**

A Look at the Winter DX Season

With short daylight days, the openings on many paths are short, though possibly strong, on the higher HF frequencies. In general, paths on 31 through 19 meters (see chart for frequency equivalents) are now in their seasonal peak, especially between North America and Europe in the morning, and between North America and Asia during the late afternoon hours. Nineteen and 22 meters are probably the best daytime DX band, opening for DX just before sunrise and remaining open from all directions throughout the day, with a peak in the afternoon. Nighttime conditions will be short and weak, and mostly north/south in orientation since the Southern Hemisphere has long daylight hours.

The best bands for around the clock DX will be 31 and 25 meters. Twenty-five meters continues to be an excellent band for medium distance (500 to 1500 miles) reception during the daylight hours, with longer distance reception (up to 2000 to 3000 miles) possible for an hour or two after local sunrise, and again during the late afternoon and early evening. Thirty-one and 41 meters provides medium distance daytime reception ranging between 400 and 1200 miles, and beyond 3000 miles during the hours of darkness until two to three hours after local sunrise.

Seventy-five through 120 meters are stable now, so you can expect great nighttime DX conditions, especially with the decrease in seasonal noise, and the longer hours. Look for Europe and Africa around sunset until the middle of the night, and then Asia, the Pacific, and the South Pacific as morning approaches.

Signals below 120 meters are also greatly improved. Tropical and regional stations are easier to hear, with stronger openings late into night and through early morning hours. Seasonal static, which makes it difficult to hear weak DX signals, is still decreasing as we move into the depth of winter.

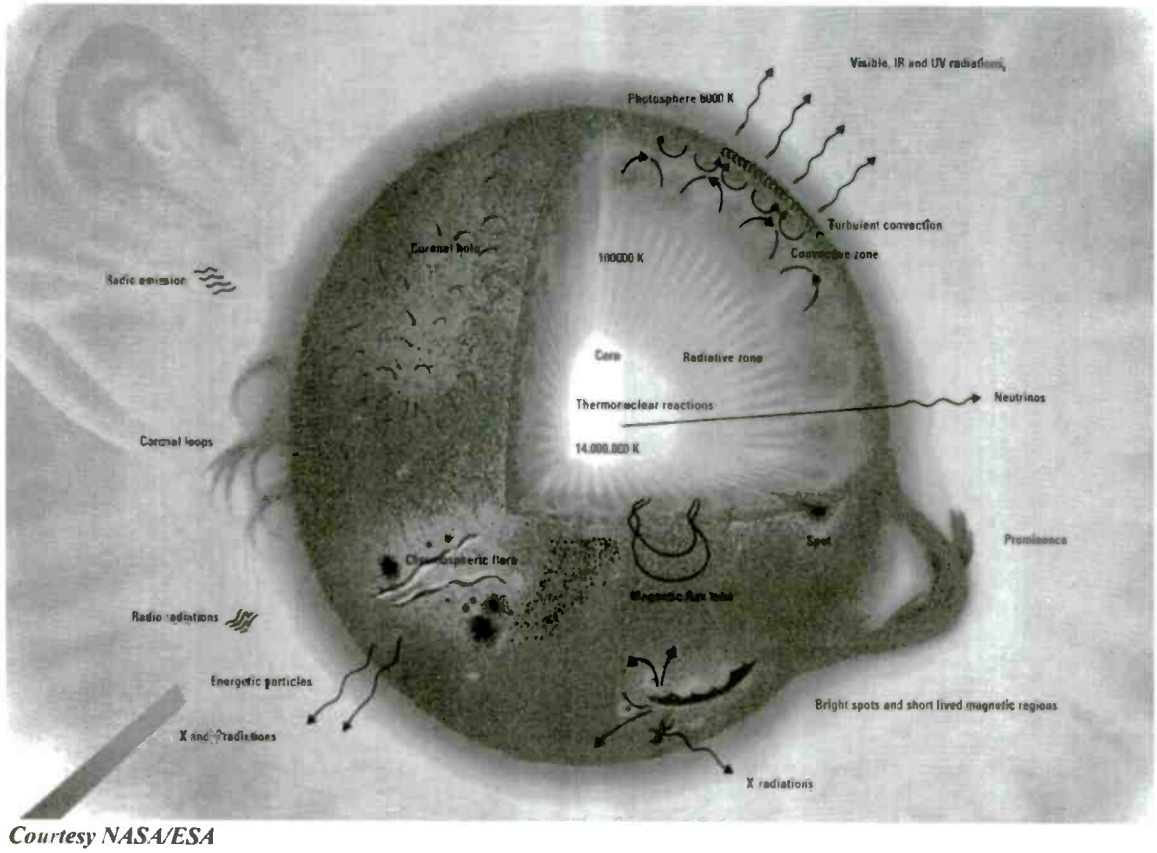
Conditions on medium wave (MW) are generally excellent, now. Normally, most MW signals never make it past 800 to 1000 miles, first because of ground wave signal loss, and second because of the *D*-layer absorption. Occasionally, however, exciting but often short-lived openings of over 3000 miles occur. During the late fall, winter, and early spring months these openings increase. Shorter paths also become more stable and last longer.

Overall, Solar Cycle 23 continues to have enough activity to support daytime propagation on higher shortwave frequencies. At the same time, the winter season is more geomagnetically quiet than this last summer. This is the recipe for some exciting DX opportunities for all radio hobbyists.

Write Me

I'd like to hear from you about this article. Please write me an e-mail message or a letter. Is the information I am presenting helpful? I look forward to hearing from you. Don't forget to check out my propagation resource center on the Internet at **http://prop.hfradio.org**. If you have a cellphone or other handheld device capable of reading WML, I have a WAP version of this resource center at **http://wap.hfradio.org**. You can even sign up for my propagation eAlert service for free. These propagation eAlerts keep you informed of the various index numbers, in real-time. Happy hunting those signals!

73 de NW7US, Tomas Hood (AAM0EWA), prop-man@hfradio.org (P.O. Box 213, Brinnon, WA 98320-0213)



Courtesy NASA/ESA

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BC895XLT	SCN 9	$194.95
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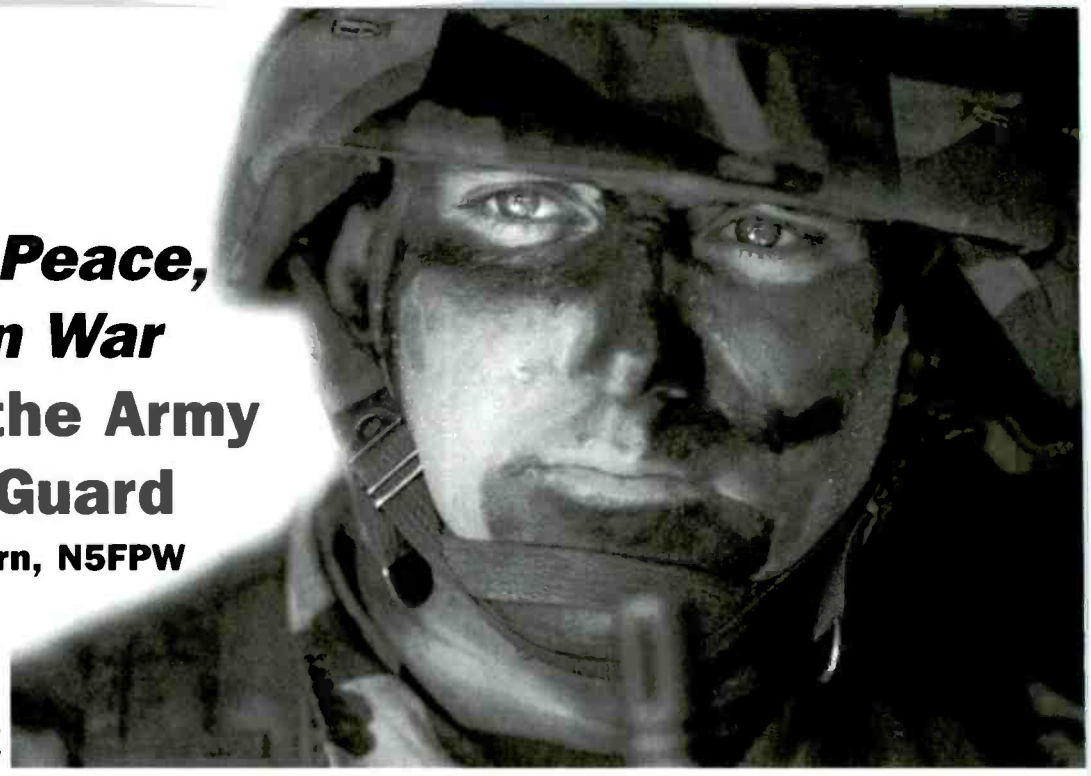
Civilian in Peace, Soldier in War
Monitoring the Army National Guard

By Larry Van Horn, N5FPW



All photos courtesy Army National Guard

Rooted in the English tradition of militia service and firmly established by the U.S. Constitution, the composition and service of the Army National Guard – the Citizen Soldiers – has evolved from early beginnings. Today the Army National Guard (ARNG) is one of the seven reserve components of the United States armed forces that augments the active components in the performance of their missions.

Administered by the National Guard Bureau (a joint bureau of the departments of the Army and Air Force), the ARNG has both a federal and state mission. The dual mission, a provision of the U.S. Constitution and the U.S. Code of laws, results in each soldier holding membership in the National Guard of his/her state and in the National Guard of the United States.

History and Constitutional Basis

The Army National Guard predates the founding of the nation and a standing national military by almost 150 years. America's first permanent militia regiments, among the oldest continuing units in history, were organized by the Massachusetts Bay Colony in 1636. Since that time, the Guard has participated in every U.S. conflict from the Pequot War of 1637 to Operation Iraqi Freedom in 2003.

A subject of extensive debate and compromise during the Constitutional Convention of 1787, the National Guard finds its formal origins in provisions of the United States Constitution. This language reads, in part, "to provide trained units and qualified persons available for active duty in the armed forces, in time of war or national emergency and at such other times as the national security requires, to fill the needs of the armed forces whenever, during, and after the period needed to procure and train additional units and qualified persons to achieve the planned mobilization, more units and persons are needed than are in the regular components."

In addition to the constitutional charter, a variety of statutes have been enacted over the years to better define the Guard's role in the affairs of our nation. Detailed federal guidelines, both statutory and regulatory, govern the organization and operation of the National Guard. While federal regulations dictate much of the Guard's organization and function, control of Guard personnel and units is divided between state and national levels.

For example, the federal government determines the number of authorized National Guard personnel and the unit mix available across the country. However, the states reserve the authority to locate units and their headquarters and federal officials may not change any branch, organization, or allotment located entirely within a state without the approval of the governor. This state-federal relationship in Guard management and control continues to evolve today.

Where the colonial period saw Guard activities largely confined within the nation's borders, later 19th century conflicts found the Guard contributing to the nation's defense both at home and abroad. The first half of this century witnessed the foundation of the modern Army National Guard, as Guard soldiers contributed greatly to U.S. participation in both World Wars. The Guard's evolution continued in the years following the Second World War with participation in Korea and in several Cold War mobilizations. Finally, the Guard has found a dramatically increasing role at home and throughout the world during the 1990s.

The Army National Guard of today fulfills a national defense role. Strategic planning integrates Guard units into crucial combat, combat support, and combat service support elements of our nation's military forces. These elements provide a trained, capable, and cost effective military force, able to provide rapid augmentation, reinforcement, and expansion in time of call-up or mobilization such as we have now during Operation Iraqi Freedom.

Federal Mission

The Guard's Federal mission is to maintain well-trained, well-equipped units available for prompt mobilization during war and provide assistance during national emergencies (such as natural disasters or civil disturbances). Guard units (or any Reserve component forces) may be activated in a number of ways as prescribed by public law. Most of the laws are found in Title 10 of the U.S. Code.

In addition to the categories listed above, Guard units may be mobilized to perform missions that include promoting democratic ideals. These are performed through programs such as Partnership for Peace; humanitarian missions such as Operation Provide Comfort (Kurdish refugees in Iraq/Turkey); counter-drug operations, and peacekeeping/peace enforcement missions such as Operation Joint Force (formerly known as Joint Endeavor and Joint Guard) in Bosnia-Herzegovina.

The National Guard Bureau (NGB), located in Crystal Springs, Virginia, is both a staff and operating agency that administers the federal functions of the Army and the Air National Guard (ANG). As a staff agency, the NGB participates with the Army and Air staffs in developing and coordinating programs that directly affect the National Guard. As an operating agency, the NGB formulates and administers the programs for training, development and maintenance of the ARNG and ANG and acts as the channel of communication between the Army, Air Force and the 50 states, three territories and the District of Columbia where National Guard units are located.

State Mission

When ARNG units are not mobilized or under federal control, they report to the governor of their respective state, territory (Puerto Rico, Guam, Virgin Islands), or the Commanding General of the District of Columbia National Guard. Each of the 54 National Guard organizations is supervised by the Adjutant General of the state or territory.

Under state law, the ARNG provides protection of life, property and preserves peace, order and public safety. These missions are accomplished through emergency relief support during natural disasters such as floods, earthquakes and forest fires; search and rescue operations; support to civil de-

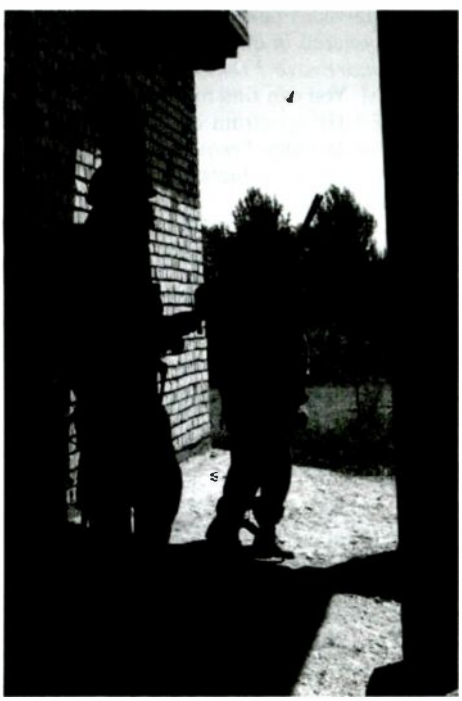


Table One: Army National Guard Callsigns and ALE Addresses

NG Callsign	ALE Address	NGB ##	Location
AAB1NGB	HQ1NGB	NGB01	Arlington, VA
	HQ2NGB	NGB02	Andrews AFB, MD ANG Readiness Center
	HQ3NGB	NGB03	Crystal City, VA NG Readiness Center
AAC2AL	MMANGB	NGB10	Montgomery, AL
ABJ7AK		NGB11	Anchorage (Fort Richardson), AK
AAZ6AZ		NGB12	Phoenix, AZ
AAF5AR	LITNGB	NGB13	North Little Rock, AR
	AR61CSTNGB		Little Rock, AR WMD-CST 61 Weapons of Mass Destruction -Civil Support Team
AAG6CA	MHRNGB	NGB14	Sacramento, CA STARC HQ California National Guard (Mather Airport)
AAG6CO	ECONGB	NGB15	Englewood (Golden), CO
	CO08CSTNGB		Buckley AFB, CO WMD-CST 08 Weapons of Mass Destruction - Civil Support Team
AAB1CT	HARNGB	NGB16	Hartford, CT
AAB1DE	WDENGB	NGB17	Wilmington, DE STARC HQ Delaware National Guard
	HFSNGB		Bethany Beach, DE 193RTI
AAB1DC	WDCNGB	NGB18	Washington, DC
AAC2FL	STANGB	NGB19	St. Augustine, FL
AAC2GA		NGB20	Atlanta, GA
ABJ7GU		NGB21	Tamuning, Guam
ABJ7HI		NGB22	Honolulu, HI
AAG6ID	BOINGB	NGB23	Boise, ID
AAB1IL	SPRNGB	NGB24	Springfield, IL
AAB1IN	INDNGB	NGB25	Indianapolis, IN
	GUSNGB		Grissom ARB, IN
AAB1IA	JONNGB	NGB26	Johnston (Camp Dodge), IA
AAF5KS	TOPNGB/FOENGB	NGB27	Topeka (Forbes Field), KS
AAC2KY	FFTNGB	NGB28	Frankfort, KY
	KYAASF		Frankfort, KY Army Aviation Support Facility (AASF)
	KYEOC		Frankfort, KY Emergency Operations Center
AAF5LA		NGB29	New Orleans, LA
AAB1MA	MFDNGB	NGB32	Milford (Reading), MA
AAB1MD	NTMNGB	NGB31	Baltimore, MD
	BWINGB		Baltimore-Washington Intl, MD
AAB1ME		NGB30	Augusta, ME
AAB1MI	LANNGB	NGB33	Lansing, MI
AAB1MN		NGB34	St. Paul (Holman Field), MN
AAC2MS	JMSNGB	NGB35	Jackson, MS
AAF5MO	JMONGB	NGB36	Jefferson City, MO
AAG6MT	HLNNGB	NGB37	Helena, MT
AAF5NE		NGB38	Lincoln, NE
AAG6NV		NGB39	Carson City, NV
AAB1NH		NGB40	Concord, NH
AAB1NJ		NGB41	Trenton, NJ
AAW5NM		NGB42	Santa Fe, NM
AAB1NY	LATNGB	NGB43	Latham, NY
	ALB		Albany, NY
	BNG		Binghamton, NY
	BUF		Buffalo, NY
	JTN		Jamestown, NY
	ROH		Rochester, NY
	RNK		Ronkonkoma, NY & AASF
	RVK		Riverhead, NY
	SLK		Saranac Lake, NY
	STI		Staten Island, NY
	SYR		Syracuse, NY
	TRY		Troy, NY
	VAL		Valhalla, NY
AAC2NC	RDUNGB/NCRNGB	NGB44	Raleigh, NC
AAG6ND	BISNGB	NGB45	Bismarck, ND
AAB1OH		NGB46	Port Columbus, OH
	SPRINGFIELD		Springfield, OH
	ANGSPRINGFIELD		Springfield, OH
	BEIGHTLER		Beightler Armory, OH State ANG HQ
AAF5OK	OKCNGB	NGB47	Oklahoma City, OK
AAG6OR	SORNGB	NGB48	Salem, OR
AAB1PA	ANNNGB	NGB49	Annville, PA
AAC2PR		NGB50	San Juan (Luis Munoz Martin ANGB), PR
AAB1RI	RINGB	NGB51	Cranston, RI
	KOQUNG		Quonset State Airport, RI
AAC2SC	CUBNGB	NGB52	Columbia, SC
	KMMTNG		McEntire ANGB, SC
AAG6SD	RAPNGB	NGB53	Rapid City, SD
AAC2TN	BNANGB	NGB54	Nashville, TN
AAF5TX		NGB55	Austin, TX
AAG6UT	SLCNGB	NGB56	Draper, UT
	SLCNGB		Salt Lake City, UT
	UTCPWILLIAMSNGB		Camp W.G. Williams, UT
AAB1VT		NGB57	Winooski (Colchester), VT
AAB1VA		NGB58	Richmond, VA
AAC2VI		NGB59	St. Croix, VI
AAH6WA	TIWNGB	NGB60	Tacoma, WA
AAB1WV	CRWNGB	NGB61	Charleston (Yeager Airport), WV
AAB1WI	MWINGB	NGB62	Madison, WI
AAG6WY		NGB63	Cheyenne, WY

Unknown and Tentative ALE Idents

AFRNGB	Unknown
JIGNGB	Unknown
PKBNGB	Unknown (California?)

fense authorities; maintenance of vital public services, and counter-drug operations.

Domestic Mission Support

In addition to Guard deployments in support of federal missions, here and overseas, the Guard plays an extensive and highly visible domestic role. As part of its unique "dual-mission" responsibilities, the Guard routinely responds to domestic requirements within each state. As an example, local governments in 48 states requested emergency support through their state Governments 267 times in fiscal year 1999 alone. The Army National Guard provided 261,276 soldier man-days in response to these requirements in reducing suffering and meeting critical support needs in local communities.

Services provided by the Guard in support of state requirements included security, electrical power, heat, water, transportation services, food, and shelter. In addition, the Guard provided emergency engineering support to victims of numerous natural disasters, including floods, drought, ice storms, and tornadoes.

Another important Guard program in support of domestic needs involves counter-drug activities. In a program dubbed "the war on drugs," Guard soldiers provided in excess of 411,336 soldier man-days in support of local law enforcement and the Drug Enforcement Agency (DEA). Through these efforts, the Guard plays a significant supporting role in the battle to stem the flow of illegal narcotics into and across the United States.

Table Two: National Guard HF Frequencies by State

Note: Frequencies in kHz.

Nationwide/Common	4924.5 5023.5 5877.0 7648.5 8047.0 9119.5 13722.0 14653.0 16338.5 20906.0
Headquarters	4924.5 5215.5 5770.0 8047.0 10816.5 12087.0 16338.5 20906.0
Alaska	5167.5* 13722.0 14653.0 20906.0
Alabama	4724.5 4924.5 8047.0 8622.0 9141.5 10233.5 12087.0 13722.0 14653.0 16338.5 20906.0
Arkansas	4867.0 4924.5 5847.0 5878.5 7648.5 8047.0 9121.0 10816.5 12057.0 12087.0 13568.0 13722.0 14350.0 14653.0 16338.5 17458.5 20906.0
Arizona	6992.0 13722.0 14653.0 20906.0
California	4924.5 8047.0 10816.5 13722.0 14653.0 20906.0
Colorado	5205.0 5217.0 7648.5 8047.0 8093.0 13722.0 14653.0 20906.0
Connecticut	4924.5 13722.0 14653.0 20906.0
District of Columbia	4780.0 5817.0 6766.0 13722.0 17458.5
Delaware	5817.0 6766.0 8038.5 13722.0 14653.0 20906.0
Florida	4745.0 4924.5 5205.0 5847.0 6766.0 8037.0 8047.0 8093.0 9141.0 10233.5 12057.0 12087.0 13722.0 14653.0 16338.5 20906.0
Georgia	4250.0 8037.0 13722.0 14653.0 20906.0
Guam	13722.0 14653.0 20906.0
Hawaii	9357.0 13722.0 14653.0 20906.0
Iowa	4296.0 4776.0 9143.5 13722.0 14653.0 20906.0
Idaho	4860.0 13722.0 14653.0 20906.0
Illinois	4610.0 5848.5 8093.0 9121.0 10691.5 12058.5 13722.0 14653.0 20906.0
Indiana	4607.0 4780.0 4924.5 5299.5 7648.5 8047.0 8093.0 9017.0 9121.0 12087.0 13722.0 14653.0 20906.0
Kansas	8047.0 9143.0 9143.5 12087.0 13722.0 14653.0 20906.0
Kentucky	2237.0 2317.0 4517.0 4745.0 4790.0 4827.0 5061.0 5232.0 5777.0 5778.5 5847.0 5848.5 6010.0 6766.0 8037.0 8047.0 8056.0 9141.0 9141.5 10233.5 12087.0 13722.0 14653.0 20906.0
Louisiana	4035.0 13722.0 14653.0 20906.0
Massachusetts	4517.0 4577.0 7648.5 13722.0 14653.0 20906.0
Maryland	4536.0 4837.0 4867.0 4924.5 5817.0 6760.0 13722.0 14653.0 20906.0
Maine	4517.0 7648.5 13722.0 14653.0 20906.0
Michigan	4445.0 6910.0 8093.0 9121.0 13722.0 14653.0 20906.0
Minnesota	5299.5 8093.0 9017.0 9121.0 13722.0 14653.0 20906.0
Missouri	4001.5 4776.0 4950.0 5282.0 8168.5 9143.0 13722.0 14653.0 20906.0
Mississippi	4960.0 5847.0 9121.0 9141.5 10796.0 10816.5 12087.0 13722.0 14653.0 20906.0
Montana	5045.0 5217.0 7648.5 8093.0 9141.5 13722.0 14653.0 20906.0
North Carolina	3032.0 4745.0 4924.5 5203.5 5777.0 8037.0 8038.5 8047.0 9121.0 9141.0 9141.5 10796.0 10816.5 13722.0 14653.0 16338.5 20906.0
North Dakota	8056.0 8093.0 13722.0 14653.0 20906.0
Nebraska	4607.0 4776.0 5282.0 9143.5 13722.0 14653.0 14653.0 20906.0
New Hampshire	4490.0 4577.0 4607.0 4608.5 5232.0 7648.5 9106.0 13722.0 14653.0 20906.0
New Jersey	2312.0 3175.0 4520.0 4680.0 5432.5 8047.0 8093.0 12087.0 13722.0 14395.0 14653.0 20906.0
New Mexico	4555.0 7648.5 9121.0 13722.0 14653.0 20906.0
Nevada	8047.0 13722.0 14653.0 20906.0
New York	4562.0 4924.5 4924.5 5429.0 5432.5 5817.0 5847.0 8037.0 8047.0 8093.0 10690.0 10816.5 12087.0 13568.0 13722.0 14396.5 14653.0 16338.5 20906.0
Ohio	4000.0 4926.0 4927.5 5209.5 5211.0 5299.5 5396.0 7361.0 8037.0 8047.0 8057.0 8058.5 8093.0 13722.0 14653.0 20906.0
Oklahoma	4927.5 4972.5 9121.0 13722.0 14653.0 20906.0
Oregon	7648.5 8047.0 8180.0 13722.0 14653.0 20906.0
Pennsylvania	4536.0 4840.0 5817.0 5847.0 6089.0 6766.0 8047.0 10816.5 13722.0 14653.0 20906.0
Puerto Rico	5062.0 8093.0 9141.5 13722.0 14653.0 20906.0
Rhode Island	4517.0 5878.5 6910.5 7648.5 13722.0 14395.0 14653.0 20906.0
South Carolina	4240.0 6910.0 8047.0 8093.0 9141.0 9141.5 10233.5 13722.0 14653.0 20906.0
South Dakota	4520.0 9141.5 13722.0 14653.0 20906.0
Tennessee	3032.0 3255.5 4244.5 5063.5 5088.5 5126.0 5203.5 5233.5 5283.5 5301.0 5430.5 5431.0 5778.5 5818.5 5878.5 5848.5 6766.0 8056.0 8058.5 8093.0 9121.0 9141.5 9145.0 12057.0 13722.0 14653.0 20906.0
Texas	4441.5 5821.5 6907.0 7648.5 8047.0 8158.5 8161.5 8171.5 9121.0 10690.0 13722.0 14653.0 20906.0
Utah	4924.5 13722.0 14350.5 14653.0 17458.5 20906.0
Virginia	4536.0 5125.0 5215.5 6766.0 8047.0 13722.0 14653.0 20906.0
Virgin Islands	13722.0 14653.0 20906.0
Vermont	6910.0 8057.5 13722.0 14653.0 20906.0
Washington	4520.0 4580.0 6906.5 13722.0 14653.0 20906.0
Wisconsin	4607.0 5087.0 8056.0 8093.0 13722.0 14653.0 2090.60
West Virginia	4536.0 4837.0 5817.0 6766.0 13722.0 14653.0 20906.0
Wyoming	5108.5 8056.0 8057.5 8093.0 8178.5 13722.0 14653.0 20906.0

Note: asterisk (*) indicates a statewide emergency HF frequency

Radio Communications

The Army National Guard makes extensive use of the HF and VHF/UHF spectrums. And while our records are nowhere complete in this regard, we will present some of the information we have on these communications systems. Additional coverage on National Guard frequencies can be found in two of our Grove CD-ROM publications. The HF spectrum is covered in our new 9th edition of the *Grove Shortwave Frequency Directory* on CD-ROM. You can find more information on the VHF/UHF spectrum in the 1st edition of the *Grove Military Frequency Directory* on CD-ROM. Both products are available from Grove Enterprises.

The HF Radio Spectrum

Over the last few years the Guard has increased its presence in the HF radio spectrum. With the advent of ALE (Automatic Link Establishment), the Guard's use of the HF spectrum has become better understood.

Table One presents a current list of known HF ALE addresses and callsigns for the Guard nationwide.

HF Radio Nets

Over the last several years we have seen the National Guard become a major player in the HF radio spectrum. We have also seen the Guard incorporate some of the newer communications technologies such as ALE. This

Newsbyte: Telstar 4 Failure

At 8:56am Eastern Time on September 19, 2003, Loral Skynet's Telstar 4 suffered a short circuit of its primary power bus, cutting off communications to and from the satellite. Loral Skynet spent the day trying to regain communication and restore service on Telstar 4 before eventually declaring the satellite a total loss. All Telstar 4 services have been relocated to other satellites.

Telstar 4, a hybrid C- and Ku-band satellite that was insured for $141 million, was launched in September 1995. It served the continental United States, Alaska, Hawaii, Canada, and Puerto Rico.

Users with capacity on Telstar 4 were the following: ABC television network, CBS television network, The Erotic Networks/New Frontier Media, Public Broadcasting Service (PBS), Georgia Public Television, The Florida Channel, South Carolina Educational Television, Montana PBS, DMX for Business, private business network users, Muslim TV Ahmadiyya, and U.S. Government training services. Check page 70 for some reassigned channels.

Telstar 8 is scheduled to be launched in 2004 to replace Telstar 4 at the orbital location of 89 degrees West longitude.

– *Robert Smathers*

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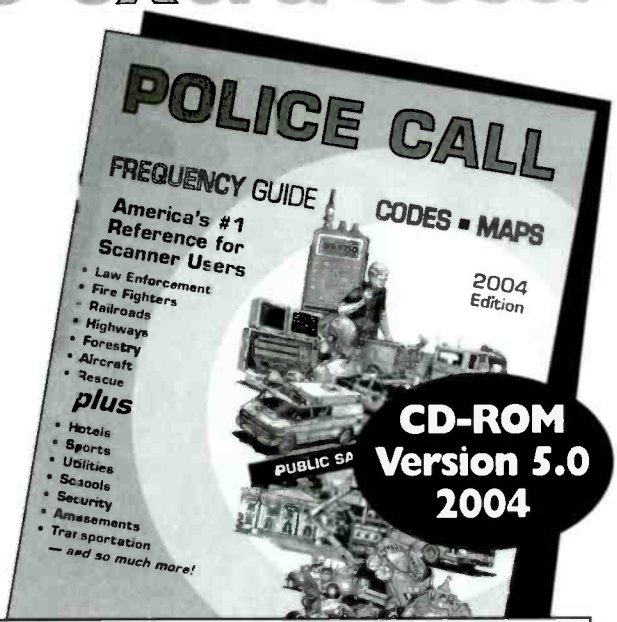

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Table Three VHF/UHF National Guard Frequencies

All frequencies in MHz. Land Mobile modes are wideband and narrowband FM, Aero frequency mode is AM.

National Guard Common	
Nationwide	38.400
Alabama	38.200 38.700 41.050 139.150 141.225 149.775 125.525 226.350 242.400
Arizona	244.300 261.600
Arkansas	41.500 139.150 139.200 139.350 141.200 141.500 142.400 148.575 148.725 148.875 148.925 150.750 126.200 244.000 261.300 265.500 265.700 280.900
California	34.100 40.950 49.000 139.400 141.400 142.950 149.950 132.000 134.100 233.800 255.800 340.100 356.900 396.450 396.500 396.550 396.600 399.600 399.650 399.700 399.750
Colorado	41.750 139.2625 141.100 142.400 227.300 230.800
Connecticut	40.900 41.900 139.000 139.1375 139.1875 139.200 139.2375 139.2875 139.3125 139.3375 139.3625 139.3875 139.400 141.150 143.250 148.600 148.775 149.600 150.750 123.450 126.200 230.000 231.600 242.400 243.900 265.600 304.600 393.700 397.600
Delaware	46.900
Florida	40.050 40.100 40.900 41.500 139.225 139.2625 139.300 142.425 142.875 148.725 148.800 149.775 241.000 248.200 249.500 367.500 368.500
Georgia	44.000 47.000 139.400 126.250
Hawaii	141.1500 121.650 399.500
Idaho	41.500 139.000 142.200 143.225 244.700 244.900 246.700 247.700 248.100 266.200
Illinois	32.300 47.000 139.000 141.150 123.050 246.800 280.900
Indiana	41.500 139.000 139.100 139.1375 139.1875 139.2125 139.2375 139.250 139.2625 139.2875 139.300 139.3125 139.3375 139.350 139.3625 139.3875 139.400 139.450 141.050 141.100 141.200 141.300 141.350 143.100 143.200 143.300 143.350 143.400 143.975 148.250 148.575 148.600 148.700 149.625 150.450 150.550 150.600 150.625 150.650 150.725 150.750 124.100 226.300 226.600 226.700 241.100 241.300 241.500 241.700 299.050 299.150 304.300 304.500 304.700 340.000 347.500 347.700 357.400 364.900 365.000 367.000 368.000
Iowa	36.100 36.700 148.625 148.700 148.825 148.875 148.900 149.600 150.450 150.650 123.025 123.450 280.800 299.100 302.200 340.000
Kansas	41.700 49.950 139.2625 143.400 304.600
Kentucky	41.150 139.350 142.350 143.000 226.600
Louisiana	40.900 141.300 141.350 141.375 141.450 141.475 142.475 143.025 143.200 143.225 150.500 150.550 229.350 230.775 237.200 237.400 239.450 241.000 242.750 243.800 248.150 304.400 304.500
Maine	139.050 139.100 139.1375 139.1875 139.2125 139.2375 139.250 139.2625 139.2875 139.3125 139.3375 139.3625 139.3875 139.400 139.450 141.100 141.150 141.300 141.450 142.3050 142.335 142.350 142.365 142.450 142.905 142.950 143.025 143.150 143.200 143.400 148.275 148.700 148.725 148.750 149.575 149.875 227.200 231.700 234.350 240.900 245.100 248.450 267.250 280.850 299.800 304.750 321.600 356.400 356.850 365.200 367.850 368.400 395.200
Maryland	226.800 232.600 234.100 347.700 389.300
Massachusetts	38.700 46.690 46.750 49.690 49.710 49.790 49.930 51.150 52.050 139.2625 139.275 122.850 123.050 226.350 226.500 227.000 229.500 231.000 232.500 234.800 237.500 242.000 243.500 244.000 245.500 247.500 261.300 265.500 277.500 304.500 340.000 345.400 347.500 356.300 356.500 367.000 368.500 374.500 388.000 394.000
Michigan	41.850 143.100 143.400 148.025 148.625 227.750 229.300 229.350 241.000 261.250 321.450 321.600 339.850
Minnesota	41.400 49.650 139.2625 139.300 143.100 143.350 143.400 148.025 148.600 148.700 148.800 149.600 149.700 149.775 149.850 126.200 347.700
Missouri	38.450 41.000 41.650 41.900 46.700 46.800 49.700 49.800 49.900 138.025 139.100 139.1375 139.1875 139.2125 139.2375 139.250 139.2625 139.2875 139.3125 139.3375 139.3625 139.3875 141.025 141.050 141.150 141.200 141.300 141.4625 142.325 142.400 142.450 142.950 143.025 148.600 148.625 148.700 148.775 148.800 149.700 149.800 149.825 150.425 150.700 118.550 134.950 232.500 239.500 241.800 242.400 244.500 302.300 347.600 370.100 395.200

increase in activity has also resulted in an increase number of frequencies being utilized by the Guard in the HF spectrum. Table Two is our exclusive state by state breakdown of the known HF frequencies used by the Guard. A variety of sideband based modes will be monitored on Guard HF frequencies. Be sure to check both upper and lower sideband for activity.

National High Frequency (HF) Communications Exercise (COMEX)

The objective of this biannual exercise is for state units to communicate with the National Guard Bureau (NGB) in Arlington, Virginia, via the National Guard High Frequency Operating Net (NGHFON). This exercise allows NGB to assess the operation of their HF Email program now being integrated into their HF radio network. During these 28 hour operations all Regional Net Control Stations (RNCS) and Alternate RNCS make contact with NGB via the NGHFON. This exercise also provides command with information regarding address problems, issues within each region, and planning for any necessary corrective measures.

I want to remind our readers that additional information on National Guard HF aviation communications was published in my *Milcom* column in the April 2003 issue of *Monitoring Times*.

VHF/UHF Spectrum

Not only will you hear the National Guard in the HF spectrum, but they are also heavy users of the VHF and UHF (primarily the military aircraft band). Unfortunately, our list is nowhere near complete. So if you want to discover some new frequencies being used by the National Guard in your area, here are some places in the radio spectrum to start your search.

30.00-30.55 32.00-33.00 34.00-34.99
36.00-36.99 38.00-38.99 40.00-41.99
46.58-47.00 49.61-49.99 138.0-144.0
148.0-150.8 MHz.

You will find a wide variety of transmission modes in used by the Guard in the spec-

Mississippi	33.500 34.900 36.250 40.050 41.600 41.800 139.050 139.075 139.1375 139.150 139.1875 139.200 139.2125 139.225 139.2375 139.2625 139.2875 139.3125 139.3375 139.350 139.3625 139.3875 139.400 139.425 141.050 150.550 150.750 124.525 126.200 229.700 232.350 241.000 243.500
Montana	40.650 139.2625 126.200 227.600 231.250 234.400 237.500 241.650 244.800 321.450 367.900
North Carolina	42.000 49.150 139.1375 139.1875 139.2125 139.2375 139.2625 139.275 139.2875 139.3125 139.3375 139.3625 139.3875 126.100 242.400
North Dakota	49.800 134.100 340.100
Nebraska	38.800 123.075 226.700 229.400 239.500 242.400 265.500 280.800 302.200 304.300 347.500 356.400 367.400
Nevada	32.350 139.200 141.200 118.050 122.800 277.500 302.200
New Hampshire	32.100 139.325 123.050 226.400 255.800
New Jersey	40.100 41.050 138.600 121.950 242.400
New Mexico	34.900
New York	41.000 45.000 122.775 242.400 255.800
Ohio	40.900 41.000 46.750 46.800 143.100 143.400 123.075 240.900 242.400 242.500
Oklahoma	36.500 46.900 139.1375 139.1875 139.2125 139.2375 139.250 139.2625 139.2875 139.3125 139.325 139.3375 139.3625 139.3875 139.450 140.100 140.150 140.350 140.450 140.600 140.700 141.200 141.450 142.350 142.400 142.450 142.875 143.200 148.625 148.775 150.425 150.450 150.500 150.700 165.0875 165.1875 173.4625 173.4875 226.600 226.700 229.300 229.400 231.100 234.500 242.500 261.300 267.100 267.200 267.300 277.500 321.600 367.400 368.800 387.900
Oregan	40.900 139.1375 139.150 139.1875 139.2125 139.2375 139.2625 139.2875 139.3125 139.3375 139.3625 139.3875 141.050 141.100 141.150 141.200 141.300 141.350 141.400 141.450 141.500 142.875 142.925 143.400 148.575 150.625 135.000 241.600 244.800
Pennsylvania	30.500 36.900 38.450 38.700 38.850 38.900 40.100 40.450 40.800 41.500 41.800 49.950 139.150 139.2625 143.125 143.300 407.225 412.825 413.350 413.475 413.550 122.850 241.350 242.400 245.600 356.900
Puerto Rico	139.100 226.400 227.000 229.300 230.500 240.500 345.500 364.500 372.500 387.500 392.500 394.500
Rhode Island	38.950 47.000 49.700 139.0125 139.0375 139.0500 139.0625 139.0875 139.100 139.1125 139.1375 139.1625 139.1875 139.200 139.2125 139.2375 139.2625 139.2875 139.300 139.3125 139.3375 139.350 139.3625 139.3875 139.450 139.625 141.200 141.250 141.350 141.400 141.450 142.350 142.450 142.900 143.050 143.325 143.975 148.250 231.250 233.150 237.650 241.850 242.700 244.100 244.300 244.500 246.700 247.800 247.900 248.400 249.100 252.400 267.200 300.050 304.350 321.750 347.450 356.400 356.550 356.700 365.950
South Carolina	41.300 139.2625 141.450 142.950 143.150 148.750 150.500 150.550 150.600 150.650 150.700 226.600 233.100 244.600 245.800 246.700 267.300 267.350 280.950 339.850 340.150
South Dakota	41.500 139.1375 139.1875 139.2125 139.2375 139.2625 139.2875 139.3125 139.3375 139.3625 139.3875 148.850 150.500 123.050 226.700 231.200
Tennessee	41.500 49.800 54.000 55.000 56.000 57.000 58.000 59.000 60.000 66.000 67.000 68.000 69.000 70.000 149.650 149.800 120.950 226.700 227.300 229.300 229.900 230.800 233.100 233.800 242.000 261.300 267.100 280.800 299.100 300.500 302.300 304.400 313.000 339.900 356.900 357.400 364.900 365.300 368.700 369.850 373.900
Texas	30.100 32.100 32.850 34.350 34.500 34.700 34.900 36.300 41.000 139.000 139.025 139.100 139.150 139.200 139.350 141.100 141.300 142.450 143.100 143.400 165.0875 135.000 226.600 237.200 237.400 240.800 241.000 242.600 242.900 243.200 243.900 261.250 280.800 304.400 304.500 304.750 347.500 347.700 356.900 367.400 374.200 395.350
Utah	49.650 139.2625 143.200 226.550 227.150 227.350 229.300 233.250 237.450 241.650 243.800 244.400 248.700 249.200 261.300 267.100 280.900 302.200 304.300 304.500 356.300 356.900 395.300 397.350 399.350
Virginia	40.200 52.750 148.650 150.550 231.200 275.700 275.850
Vermont	41.200 123.050 234.300 241.500 245.900
Washington	36.550 38.750 123.050 123.075
Wisconsin	40.800 40.900 41.600 46.700 141.100 123.050 123.400 241.000 299.900
West Virginia	34.700 36.700 139.050 141.050 234.000 300.000
Wyoming	141.300 141.400 141.425 150.500 150.600 165.0875 173.4125 173.4875 126.200 242.400 356.600

trum above, so expect the unexpected.

Table Three is our list of known state VHF/UHF National Guard frequencies. A couple of caveats need to be made at this point. Not all frequencies listed there are used statewide in the respective states. Some of these frequencies are for specific locations only within the state. And most of the land mobile assignments listed there are not repeater output frequencies. Most are low powered simplex frequencies and you will have to be within line of sight range in order to hear transmissions. The same also applies to convoy frequencies and any of the aeronautical ground communications.

Monitoring the Citizen Soldiers of the National Guard can be a challenging monitoring experience, but listening to their frequencies can be very rewarding during times of crisis and could provide you with the inside track to the events of the day. The next time events warrant, be sure to put in your state's National Guard frequencies in your radio to stay informed.

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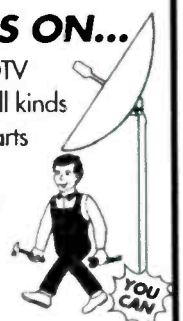

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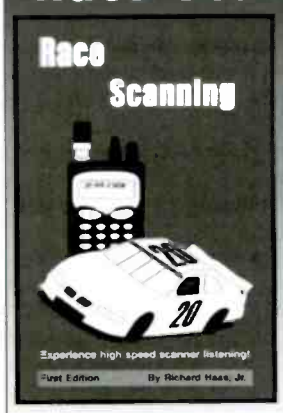

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Life as a News Junkie

By Brian Rogers

My name is Brian, and I'm a news junkie.

It all started when I was seven years old and my mother sent me down the street to retrieve my five-year-old sister from a birthday party.

The birthday girl's father was crouched on the floor in front of an enormous radio-phonograph console that took up most of one wall of their living room.

"Do you want to hear General Ike on the shortwave?" the dad asked. "Our army landed in France today."

If you're a history buff and you guessed that "General Ike" was General Dwight Eisenhower and that the date was June 6, 1944, go to the head of the class! You're right!

"He's talking on the BBC from London, England," said my sister's friend's father. I knew London was across the ocean; and the thought of a radio wave traveling from there all the way to Detroit, USA, gave me a thrill I still experience daily.

I was surprised the man was nice enough to ask me if I wanted to listen to his radio, because he frequently yelled at me for riding my bike across his lawn.

I only vaguely remember running home with my sister, because I was so eager to find out if we could listen to London, too. That evening my father helped me make an antenna for our living room Sears Silvertone console, which had a seldom used shortwave band, by attaching a length of doorbell wire and running it under the rug so it wouldn't show.

The wire was insulated with red and white waxed fabric and reminded me of a long skinny candy cane.

It seemed such fun, even at age seven or eight, to listen to news stories on the radio coming directly from the countries I was learning about in school.

Growing Up with Shortwave

During the Cold War in the 1950s, I took money I earned at a part time grocery store job and bought my first real shortwave receiver, a Hallicrafters S-38C, whose story appeared in these pages in September 1999.

I remember how angry I became listening to Radio Moscow's portrayal of life in the United States during that time. Sometimes they devoted over half a newscast to a story about a race riot and described with infinite detail dogs snapping at rioters and authorities swinging nightsticks and spraying people with fire hoses. Ignored were the "good news" stories from the US, such as Jonas Salk's development of a vaccine for

Friendly Voices From Holland

polio and the thriving US auto industry.

But despite Cold War Radio Moscow's programs, I continue to believe, after more than a half century of listening to reports of the world's current events on shortwave radio, there's no better way of knowing what's happening on our planet.

Tuning In

With most good shortwave radios today displaying the frequency to which they are tuned and using tools such as this magazine's monthly "Shortwave Guide." and annual publications like *Passport to World Band Radio*, and the *World Radio-TV Handbook*, finding news programs on shortwave is easier than ever.

I'll share with you a few of my favorite shortwave news sources that are easily heard at my listening post in eastern Michigan. But remember, what you hear and what I hear can vary because of where you live, the time of day, and the time of year. And, of course, stations often change frequencies. That's why an aid such as the "Shortwave Guide" is so valuable.

I begin my shortwave day about 1200 UTC (7 am EST). Even though the BBC World Service has abandoned its shortwave service directed specifically to North America, its English language service to the Caribbean is heard then at usually good strength on 6,195 kHz and 15,190 kHz.

Another strong station at 1200 UTC is Radio Australia on 9,580 kHz. Besides a thorough report of world news, there is a concentration on Pacific Rim events.

An hour later, at 1300 UTC, Radio Canada International has a transmission on 9,515 kHz. This station is a major player in the shortwave news game, and opens each transmission with a comprehensive report. The program begins an hour later on weekends.

If you're an old retired guy like me and can listen to shortwave during the day, you can hear Radio Nederland's transmission on 15,220 kHz at 1430 UTC. A nearly 30-minute sequence of news and in-depth reports called *Newsline*, from the station's studios in Hilversum, Holland, is as informative as anything on the air. The transmission is relayed over Radio Canada International's facilities at Sackville, New Brunswick, and aimed at the West Coast of the USA; but I hear it well.

On Saturdays, a feature called *Wide Angle* starts at 1435 UTC. A recent *Wide Angle* segment that really taught me something I didn't know discussed the Russian enclave of Kaliningrad.

In the afternoon, at 1830 UTC, RTE in Dublin, Ireland, relays a half-hour domestic program through Sackville on 13,640 kHz. Where else can you hear weather and traffic reports from the Emerald Isle as well as international news?

Later in the day, at 2000 UTC, Radio Canada's transmission to Europe is heard well here most days. Try 15,325 kHz or 17,870 kHz.

In the evening, after about 0000 UTC, (7 pm EST) you can take your pick of several stations. Your problem may not be whether you can hear anything, but which one to choose. There's the BBC World Service on 5,975 kHz, and Radio Canada International has a transmission to the Americas on 9,590 kHz or 13,670 kHz. Right after the news at 2300 UTC, RCI has a great newsmaker telephone-interview program called *As it Happens*.

Radio Nederland has a transmission at 2330 UTC on 6,165 kHz and 9,845 kHz similar to the one at 1430 UTC.

At 0000 UTC, you can listen for Radio Japan on 6,145 kHz and Radio Exterior España from Madrid on 15,385 kHz, although this frequency will probably change in the winter.

An hour later, at 0100 UTC, Radio Canada International has another transmission to the Americas. Tune to 9,755 kHz.

Don't forget, when standard time is in effect, most shortwave programs show up an hour earlier local time wherever you live. Frequencies, programming, and times can all change with the new broadcast season. Some of the higher summertime frequencies listed here will be changed for lower ones during the winter season.

This is, of course, only a partial listing of what's out there. I've chosen stations that are "armchair copy," at my location and whose news programming I've found to be comprehensive and thorough. You'll probably find the same qualities in other stations easily heard where you live.

But, if you become a news junkie, beware. After nearly 60 years, I haven't found a cure. I must confess, however, I haven't tried very hard.

Additional Frequencies

MT frequency manager Gayle Van Horn suggests some additional frequencies for the referenced broadcasters, always bearing in mind that winter schedules had not been released at presstime.

RTE	1800-1830	5585
	1830-1900	13640, 21630
RCI	0100	9755
	0000-0100	9640, 15205
RN	1430	9860, 11835, 12075, 15220

Ken Reitz, KS4ZR
kenreitz@monitoringtimes.com

Countering the Beginner's Lament

I'm always amazed at how easily people can become discouraged in the radio monitoring hobby. Here are the top three lamentations I've heard recently: "Everything's going digital or encrypted or both!" or "They've priced the ordinary person right out of the hobby!" And, finally, "You've got to have an engineering degree to do anything in this hobby nowadays."

Let's just take a look at how unfounded these excuses really are.

❖ The Digital Divide

Anyone who believes technology won't change is living on another planet. We're right in the middle of a transition period between analog and digital modes of transmission on all segments of the frequency spectrum, a period which will likely take a decade to complete. But, that's not a bad place to be. Despite the wailing and gnashing of teeth we can still enjoy shortwave listening on radios costing less that $50. We can even build simple crystal radio sets which still work the same way they did 80 years ago. We can listen in on police and fire action on scanners which have more features and cost less than they did 10 years ago.

And then there's the Internet. With cheaper, more powerful computers, laborious research on hundreds of radio related topics is just a click away. Anyone who doesn't think they're getting their money's worth from their ISP just isn't spending enough time on line. Thanks to the Net we can tune into hundreds of signals we'd never dream of hearing any other way.

While technology will surely change, it won't happen overnight. Don't let the digital future scare you into inactivity. Remember that most of the hype about digital TV and radio is coming from various industry trade groups and representatives of companies who are eager to sell a new generation of equipment to help offset the enormous losses they more than likely incurred with the collapse of the hi-tech sector. The company PR teams are always years ahead of reality.

The fact is that a very small percentage of people in this country have digital TV set top tuners and there's a good reason: prices are still too high and standards still aren't set. But, even if they were there's little point to it if you don't have a high-definition TV set which are still so expensive and the technology so poorly developed that most viewers are still left watching decades old designed analog TV sets.

The Yaesu FT1000D: More radio and price tag than beginners need.

❖ The Price Is Right

It's easy to become hysterical at the prices of new amateur radio gear. Sure, a brand new Yaesu FT1000D will set you back $4,000, but what's a beginner doing with this kind of radio anyway? Start out with something cheap, such as any of the 10 year old solid state, digital read-out, HF rigs typically priced at one-tenth the FT1000D, and which, by the way, make dandy SWL radios into the bargain! With this radio and a Grove Tunerless All-band antenna (which you can make yourself for less than $60), you can work the world.

Now check out the scanners. For $250 you can get a brand new trunk tracking, triple conversion, 500 channel memory, clonable, text message reading scanner. What more do you want, a toaster/blender option?! Most people will spend that much at the video rental store this year on bad movies alone. But, before you plunk down the cash, ask yourself if you need a hand-held scanner or a base model. Do you do most of your listening on the go or at home? Keep in mind that hand-helds have limited reception compared to base models using roof-mounted beam antennas on rotators. Then again, if you're in the city, you won't be able to use an external antenna because it will likely overload your scanner's front end.

Twenty years ago when C-band satellite TV first became available, folks spent thousands of dollars just to watch cable TV for free. Now, thanks to the DBS revolution, everything you need to watch DISH or DirecTV is free; all you pay for is the annual subscription or as little as $34/month (still cheaper than most cable-TV systems).

But, whatever happened to C-band satellite TV? It's still there. And, again thanks to the DBS revolution, those systems can be had for free. With many still in-the-clear channels, hundreds of free-to-air MPEGII channels and many more satellites than ever before, there are great video and audio monitoring opportunities. People are waiting to give you satellite systems to play with. Tens of thousands of dishes, receivers and related gear are waiting to be carted off to your house or the land fill. Which will it be? Information on broadcast satellite transmissions, thanks again to the Web, is plentiful. You can find out what's on nearly every transponder of every satellite around the world and it's free (see chart). A better chart for MPEGII viewing

Radio Shack PRO-2067 Scanner: What, you wanted the toaster/blender option?

and listening is Global Communications (see chart).

Don't be afraid to buy refurbished electronics. Here's a great way to get far more for your buck than you'd imagined. Check out what's available from Big Blue. I recently needed a new computer and found a reconditioned IBM NetVista with a 1.8 GHz processor, more memory than I'll use in a lifetime, tons of extras, Microsoft XP, a set of Infinity speakers, a second set of speakers just in case and free shipping for $500. You have to check in regularly for the latest deals as they change constantly.

I also saved hundreds of dollars on my Motorola 4DTV digital C/Ku-band satellite receiver buying a refurbished unit. These receivers are hard to find (see chart) and not always available. As you might imagine, they're sold quickly. Unlike used equipment, refurbished gear has been thoroughly checked out by the manufacturer and everything has been brought up to spec. These products usually have a very limited warranty. The point here is that you shouldn't have to pay full price for anything unless you want to. Do some research and save a bundle.

◆ Educate Yourself

When was the last time you curled up in your armchair and read every line of a gripping owner's manual? (Me neither.) The reason that most people's VCRs are continuously flashing 12:00 is that few of us bother to read even the most basic owner's manual. I know this is true because most home electronics products now include a one sheet "quick start" owner's manual which attempts to get the basics of operation onto one page.

If you can just overcome your aversion to reading the manual you may be surprised at what you can learn.

Lost your owner's manual? There are several web sites which can supply either a text or PDF format copy of your owner's manual. Radio Shack is particularly good about that. You can find manuals for nearly everything the Shack has made in the last several decades (see chart).

It's never been easier to study for your amateur radio license. Practice exams and code practice software are widely available on the web. There's simply no excuse for not getting an amateur radio license. But, it's the rest of your radio hobby which will benefit from your study. Everything you need to know about the technical side of SWL and scanning you'll learn about while studying for your ham ticket. What's more, you'll find more and more opportunities to expand your interests in radio when you're a ham. Remember, getting your ticket doesn't mean you know everything; it means you know enough to really start learning. Now you can spend the rest of your life in serious hands-on study of the radio arts.

Just when you think everything's already been invented something happens to prove you're wrong. Here's an example. This past summer the FCC saw fit to give hams the 60 meter band. The restrictions for operating on this band are numerous (see chart) and present hams with some interesting opportunities. It's made to order for experimenting and radio design. I foresee a company coming out with a stand-alone 60 meter transceiver. Since there are only 5 "channelized" frequencies, USB only, and limited to 50 watts PEP, a designer could have a lot of fun making such a 60 meter transceiver. Thousands of hams whose rigs can't be configured to work 60 meters would snap them up.

On top of that, 60 meter antennas are critical. The FCC mandates that only transmitting antennas equal to the design of a half-wave dipole can be used. High gain antennas for transmitting aren't allowed. But, it says nothing about receive antennas. Hams using a combination receive and transmit antennas *a la* 160 meters will clearly have the upper hand in pursuing Worked All States or DX on the one DX frequency available.

There are dozens of similar opportunities in the radio hobby for you to learn more and exploit what you know. Look at all the add-on devices which are the result of people studying the issues and applying what they know: Digital Signal Processing on receivers; all the new digital modes of transmitting, including packet, APRS, etc.; audio processing on microphones used in transmitting for higher fidelity on the ham bands and DX pile-up breakthroughs; software for modeling antenna design; and amateur radio over Internet are just a few examples of some of the hot things happening on the bands right now.

None of these things require a degree in electrical engineering. What they do require is for you to spend more time studying and digging a little deeper into everything you already know something about. It also requires getting out your tools and doing some hands-on experimenting.

Don't forget that the history of science is peppered with the work of dedicated amateurs, and that goes for today as well. Many comets and other celestial discoveries are made by amateur astronomers toiling in their backyards, using their own funds, studying on their own and at their own pace. Professional astronomers rely on them. Some aspects of today's hot technology; micro-satellites, packet e-mail, and other digital discoveries have their roots in amateur radio. So, go ahead, crack the books, venture out of your familiar surroundings. You'll amaze yourself!

Resource Chart

Here are some sources for further information. Note that refurbished equipment is not always available: check sources regularly:

International Satellite Charts:
http://www.lyngsat.com

MPEGII Satellite Charts:
http://www.global-cm.net

Refurbished IBM Computers:
http://www-132.ibm.com/webapp/wcs/stores/servlet/HelpDisplay?storeId=1&catalogId=-840&langId=-1&subject=2576395

Reburbished Motorola 4DTV:
http://www.skyvision.com

Ham Radio Study:
http://www.qrz.com/p/testing.pl

Code Practice:
http://www.aa9pw.com/radio/morse.html

Radio Shack manuals:
http://www.radioshack.com/ProdSupport/ProductSupport.asp?hm=top%5Fnow%5Fproduct%5Fsupport

60 Meter Operating:
http://www.arrl.org/FandES/field/regulations/faq.html

Javiation
www.javiation.co.uk

Continuous Coverage Receivers
Alinco, AOR, ICOM, Uniden, Yupiteru & others

Alinco DJ-X3Z
£155.00 (Approx US$250)
Continuous 0.1 to 1299.995 MHz
Supplied accessories:
SMA Antenna
Belt Clip & CarryStrap
3 x AA Dry Cell Case
EBP-52NS Ni-MH Pack
EDC-105 Ni-MH Charger
EDC-93 or EDC-94 PSU

Alinco DJ-X2000W
£350.00 (Approx US$560)
Continuous 0.1 to 2150 MHz
Supplied accessories:
BNC Flexible Antenna
EBP-37N Ni-Cd Pack
EDH-16 Dry Cell Case
Universal120/220 Charger
Belt Clip & Carry Strap

AR8200Mk3
£350.00 (Approx US$560)
Continuous 0.1 to 3GHz

AR8600Mk2
£495.00 (Approx US$795)
Continuous 0.1 to 3 GHz

AR7030+ HF Receiver
£775.00 (approx US$1240)

Yupiteru MVT-7100
£200.00 (Approx US$320)
Continuous 0.1 to 1650 MHz
Supplied accessories:
BNC Antenna
4 x AA Nicads
Belt Clip & Carry Strap
12v DC Cigar Lead

Telephone: 01274 639503 International +44 1274 639503
Telephone from USA: 00 44 1274 639503
info@javiation.co.uk
PO Box 708. BRADFORD, BD2 3XA, U.K.
Prices above include Express worldwide delivery from the UK to outside the EU and exclude any local import duty/tax. Approx US$ prices based on 1GBP=US$1.60

Ask Bob

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Q. *We have just installed mercury-vapor lighting at our clubhouse for better visibility, but the bug attraction is awful. What lighting would be better to reduce the flying insect pests? (Mark Burns, Terre Haute, IN)*

A. Yellow is the least attractive wavelength for bugs; fortunately, it is also the most brilliant part of the visual spectrum to humans, so that choice is win-win! The lower wattages, of course, will work best, and are inexpensive. Such incandescent bulbs are available everywhere. For greater visibility, yellow sodium lights should work, but they may have more bug attraction due to their overall higher light output.

Stay away from mercury-vapor bulbs – they are the most attractive to bugs since they generate a great deal of ultraviolet light.

For disposal, there are insect vacuum systems that work better than bug zappers, and you can also try burning citronella candles and applying bug sprays as well if it is still an annoyance, but the choice of yellow incandescent bulbs is still your best bet.

Q. *Most of my mobile scanner listening is in the 856-861 MHz trunking band. I've tried several 1/2 wave whips that I've cut to about 6-1/2" inches. My reception is poor, even within the city limits. What could be the problem? (Steve Palmer, email)*

A. The proper length of a simple mobile whip on a car roof is 1/4 wavelength, not 1/2 wavelength; this might be one of your problems since a 1/2 wave antenna under these conditions is likely to be a very poor impedance match. If I were you, I'd suggest trying to find a gain-type cellular mobile antenna (the kind with the squiggly coil); these work well throughout the 800-900 MHz range, and because it's extra long, it works well for your occasional listening on lower bands as well.

The proper place for a mobile antenna is in the center of the roof, although at these UHF wavelengths it will work just fine a foot or so from an edge if you can't put it in the center.

Just to be sure the antenna is the problem and not the scanner, substitute another scanner to see if you have the same problem before you switch antennas.

Q. *Since a cell phone is essentially a transceiver, does every cell phone really transmit and receive with the same efficiency as every other? (Truman Harris, email)*

A. There are just a few a leading chip makers, so cell phones are peas in a pod with a few variances such as accessory ports (data, antenna, etc.) and functions. Choose one based upon cost, functional requirements, and ease of operation. A pull-out whip adds a minor improvement in reliable range versus an internal antenna.

Q. *Do I have to install a grounded pipe to get an electrical ground for my radio? (Numerous inquiries)*

A. No. Generally speaking, signals are not made stronger by a ground. In the case of scanners, they definitely are not, and in the case of shortwave receivers and even medium-wave AM radios, the only effects of a good earth ground are reduction of the likelihood of electrical shock when touching grounded objects and the radio, and reduction of background electrical interference in some cases.

There are some alternatives if you want the electrical ground, including a cold-water pipe if you have metal plumbing, and the third (ground) wire of an electrical outlet (the round pin and the mounting screw).

Reader John Norberg, a retired telephone-company veteran, suggests another possibility. He says that in a properly-installed phone system, the yellow wire is a ground wire. But it's best to test it first before relying on it.

Using a conventional multimeter, first make sure there is no AC or DC voltage measured between the yellow wire and a known ground. If there is not, then test for resistance (which should be only a few ohms at most) between the yellow wire and the known ground. If both tests pass, you have a ground.

Q. *Does the disruption of the northern lights and radio communications by solar activity also affect the accuracy of magnetic compasses? (Mark Burns, Terre Haute, IN)*

A. Yes, indeed – a solar eruption with the equivalent energy of 40 billion atomic bombs can have quite an effect! Immense plasma clouds of protons and electrons are blasted outwards as a "solar wind," traveling at some 1000 miles per second. Five days later the electrically charged field strikes earth's upper atmosphere, the magnetosphere; the earth's magnetic field repels most of it, but some lingers to produce the spectacular aurora borealis in the northern hemisphere and the aurora australis in the southern latitudes

High altitude power surges on the order of 1 trillion watts at 100,000 volts can produce quite a jolt, inducing lower-level currents into telephone and electrical power lines and pipelines, affecting earth satellites, disorienting birds' navigational systems, and deflecting compass bearings.

Q. *As more and more communications on shortwave are being digitized and sent as text, does that mean that eventually we aren't going to be able to monitor any messages? (Martin Franko, Yorkton, Saskatchewan)*

A. Just as a voice message may be sent in plain analog for anyone's reception, or scrambled for privacy, there is a difference between digitizing and encrypting (scrambling) text messages. So long as the voice or digital message is not encrypted there will be demodulators and software programs available to read them. This has been true for decades since Morse code, amplitude modulation and the earliest teletype machines.

Q. *Is there a book club that specializes in the shortwave industry? (Terrynce Ondola, Norwood, OH)*

A. There are publishers who specialize in books about the radio industry, books about shortwave listening, radio retailers who sell books about shortwave radio, and shortwave listening clubs that have their own publications occasionally including books, but there are no book clubs that specialize in the shortwave radio industry.

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

Getting Started

Bright Ideas

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Last month, I listed several "must have" items from the office supply house. To thoroughly enjoy the radio hobby, you need to have information at your finger tips. I find the only way to accomplish this is to be organized with the necessary lists and reference materials.

88 If you followed last month's bright ideas, you went to the office supply store and stocked up. The use for most of these items is obvious, but I thought I would remind you of the best ideas. I use the plastic sheet protectors for lists of what frequencies are in which bank of which radio. I also have lists of police number codes, and penal code numbers used by the various agencies.

I tear out or make photocopies of interesting maps and other information, such as the city maps in the front of the phone directory. From the local fire department website, I printed out the map of station locations and copied the apparatus at each station.

I have made a cheat-sheet on how to operate every radio, so I don't always need to pull out the Owner's Manual. (Remember I have about 50 different radios.) All these references in sheet protectors are inserted into three-ring binders.

I also custom cut a plastic sheet protector to be used as the cover protector for all soft cover books, such as *Police Call*. In a pinch, these plastic sheets also serve as emergency beverage coasters or meal tablemats to protect the desktop/tabletop. (My rule about no food or beverage in the radio room was overruled long ago.) I replace the sheet protectors every year as they tend to get dirty and stained. Hey, they're cheap, keep'em looking new.

The Post-It flags are used as book marks in my reference materials to find things quickly. I also use the colored highlight pens for important instructions such as how to program the radios. I also mark on the edge of the page for special groups of pages.

89 The new 2004 *Police Call* frequency books should be out by the time you read this. I need both the Volume 9 (CA, OR, and WA) plus the combined Volume 5 and 8 for the western mountain region. I end up with two identical CD-ROMS. The second CD will make great Christmas gift for a friend, especially with a customized dust cover. (Keep reading.)

90 Anyone with a mailbox has probably received CDs for beginning service with an internet provider. I used to throw these away, but now I just discard the CD. The plastic dust covers are great for protecting CDs that don't arrive in their own protective shell. I remove the paper advertising insert to get an empty, generic CD holder. I can protect any CD that came without a case (i.e. the *Police Call Frequency Database*) or use it to mail or transport the disk to anther party. If you have trouble removing the original mailing label, use a "goo" remover.

I even made my own custom cover inserts. It is easy. In your word processor, set your document for landscape rather than portrait orientation. Use pictures, large graphics, or colorful fonts, whatever you wish. Print it out, and compare it to the plastic CD holder. From a standard 8x11 inch sheet, you need to cut about 1/4 inch off the width, and about 1/2 inch off the bottom or top, depending on your design.

Hint: if you really get interested in this project, ask your friends and neighbors to contribute. These CD cases propagate quickly and lay around everywhere.

91 Ah, it's time for you to make up your Christmas wish list. You know the routine: Tear out the pages with the items you need, and leaving them laying around the house. A yellow highlight marker will prioritize the list.

92 Coffee mugs. No radio shack is complete without a couple of these. I use one for the pens and markers, another for the rubber duck antennas. Really cool ones are available from Sovietski Collections at **http://www.sovietski.com**. A matched set of CIA and KGB mugs are only $16.90 plus S&H. Ask for #200491-Set, or call 1-800-442-0002 and ask for their "best price."

93 I often visit truck stops along the interstate. Recently, I found two useful items. First was a mini power center by "Road Pro." This gel cell can be recharged from AC or DC plugs (furnished). The battery is encased in a very nice custom cloth bag, and comes with a fused, 12 volt female cigarette lighter plug for whatever you need to power.

I also bought a "T" cigarette lighter receptacle which has two female outlets. The key feature? It also has a voltage readout. The display is a little hard to read in the daylight, but excellent under low light conditions. Warning: it does draw a continuous load, so don't leave it plugged in for long periods of use; it will drain your battery.

94 Here in the northwest, winter means heavy snow and ice which can cause power outages. I have previously reviewed the new technology LED flashlights. Well, I may have found a better stationary light source at Wal-Mart. It is an old fashioned fluorescent tube model. Real cheap! About five dollars. The lamp mates up nicely with the aforementioned mini-power supply.

95 The Ultimate Christmas Gift might be that new scanner or ham transceiver, but consider a frequency counter, specially the Opto Scout™. It has four memory banks that will log up to 400 different frequencies and record the number of hits on each one. Hooked to a rooftop or gain antenna, this will really suck 'em in. I love to drive through a new city area and see what I can catch. I also use the available filters to eliminate unwanted signals such as FM radio stations and powerful paging transmitters.

I do not recommend any other frequency counters as they only record one frequency at a time. The 400 memories makes the Scout the best counter available for the intended use of snagging new radio signals. Look them up at **http://www.optoelectronics.com/** or 1-800-327-5912. About $349, but worth every penny.

Next month we will feature more bright ideas that make good holiday gifts. Whether it is from this column, or a large ad from a magazine, you can tear the page out, highlight the item you want and leave it laying around. Hopefully, Santa will spot it, and you will be rewarded on December 25th.

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The NFL Football Report

Our unofficial Field Correspondent, Chris Parris, continues to supply us with a wealth of information from his travels around the country. Thanks, Chris, for always finding time to send in these frequency updates.

❖ Kansas City

"Robert, I can confirm activity...at the San Diego / Kansas City NFL game...[CBS Sports] Game Day frequency coordination at NFL games is on 467.8375." Chris reports this frequency is used nationwide at CBS-covered NFL games. Other frequencies use for CBS-televised games include:

450.0125	Data 1
450.9000	Data 2
450.9125	Data 3
450.9875	Data 4
455.9000	Data 5
451.8000	Data 6
451.8125	Data 7
456.8000	Data 8
464.5000	Talk 1
464.5500	Talk 2
457.5250	Talk 3
457.5750	Talk 4

According to Chris, "The *data* frequencies are used for remote control of the RF hand-held cameras. The *talk* channels are used for the comms to the RF camera. Also, I can pass along 464.775 as the game security operations repeater at Arrowhead Stadium, Kansas City, Missouri."

❖ Philadelphia

And even some more: "Hey, Robert...Time for Chris' weekly report from the CBS NFL tour. This past weekend we were in Philadelphia. They have a new stadium, so operating frequencies were unknown. I started searching and found..."

451.8000	Security repeater - During the game it was Command Post, very busy
460.4250	Repeater, unknown location but seemed to be close to stadium
461.0750	Repeater, stadium operations of some sort, mostly [in] Spanish
461.4875	Repeater, Coach-to-Quarterback comms - scrambled
461.9875	Repeater, Coach-to-Quarterback comms - scrambled
463.8000	Repeater, stadium game operations.
464.7625	Simplex at stadium.

"Some of these frequencies were found to be licensed to Eagles Stadium Operator LLC."

❖ Miami

Jan Fine, moderator of the SEFLORIDA Yahoo! Group, sends these along for Miami Dolphins games at Pro Player Stadium:

Identified Channels in use at stadium:

151.6250	Goodyear Blimp air/ground
161.7300	WIOD-Miami
450.4875	ESPN
450.8750	ESPN
453.1500	Miami-Dade Fire Rescue units working stadium detail
461.1375	Stadium CP
461.2000	Stadium Security F2
461.4375	Stadium CP
462.5500	Referee Coordination
462.6000	Referee Coordination
462.8375	Coaches Suite
462.8625	Concessions
463.2000	Stadium Security F1
464.0000	Referee Coordination
464.0625	Facilities
464.3250	Possible concessions use
464.5000	Concessions
464.5250	Concessions
467.0125	Coaches Suite
467.0375	Coaches Suite
467.1125	Parking
468.1125	Coaches Suite
468.3125	Coaches Suite
469.0750	Maintenance
469.1750	Parking
469.3750	Catering F1
469.7250	Catering F2

Plus, Miami-Dade Police using their trunked radio system for traffic control and law enforcement at the stadium, and various VHF and UHF aircraft band channels for local air traffic control of news media aircraft, banner-towing aircraft, blimps, and military fly-by aircraft.

Unidentified Channels in use at stadium:

151.2350	152.8500
154.6000	461.0375
461.3125	461.3250
461.3625	461.4625
461.7125	462.0125
462.1250	462.5625
462.6125	462.8125
463.2500	463.5875
463.6250	463.9625
464.0375	464.3875
464.4250	464.6125
464.9000	464.9375
464.9750	466.6875
466.9125	467.1250
467.9125	467.9250
468.2500	468.6375
469.1250	469.7500

❖ Special Event Update: Arena and Concert Events

And for something different...an anonymous reader found these at September's Latin Grammy Awards at American Airlines Arena in Miami, Florida. Although the individual frequencies are not identified, our contributor reports that radios were used for media coordination, VIP transportation, and facility operations. Miami Police provided traffic control and security using their trunked radio system.

461.1500
461.5500
462.1250

Now over to Los Angeles, here's some media info for Staples Center:

72.025	Assisted Listening System
184.2700 / 206.0250	RF intercom
185.7750 / 206.7750	RF intercom
204.0050 / 207.7750	RF intercom
205.2000 / 208.2000	RF intercom
420.0000 - 450.0000	RF cameras (various channels)
452.1375 - 465.8625	Local site radios (various channels)
465.0000 – 480.0000	RF cameras (various channels)
656.0250 / 207.4000	RF intercom
656.7500 / 207.4000	RF intercom
657.8500 / 207.4000	RF intercom
661.2500 / 207.4000	RF intercom
788.5000	RF microphones
790.8750	RF microphones
793.0000	RF microphones
2.4 GHz	Lighting Control System

As seen in these lists, business-band channels are extremely active during special events. Don't forget to search the business frequencies when monitoring an event ... there's much more "behind the scenes" communications to be heard other than local police and fire agencies.

❖ Scanning Equipment Update: Icom PCR-1000

Regarding *MT*'s recent review of the

Icom PCR-1000 receiver, Chris Parris sends in this usability report and request:

"I have one and have been very happy with the sensitivity and quality of the unit, but the Icom software was awful. It would only scan 50 channels at a time and was very s-l-o-w. At last, the fine folks at DataFile, who write the PROBE software package for the Opto receivers, have come out with a version of PROBE that speaks Icom. I ordered it this past week and just installed it today, and it's outstanding! The operation is almost identical to the PROBE for Opto radios and I'm scanning at 45 channels per second! The existing PROBE files I have are all compatible with the PROBE1K program, so importing stuff has been a snap. It's certainly made the PCR box much more useful as a scanner to me!" (See *MT*'s review of PROBE 1k in the September *Computers & Radio* column.)

Chris also added the following request: "I'm going to ask DataFile if they plan on coming up with anything that will speak Uniden next!" Keep us posted on DataFile's response, and...if the DataFile team is reading this column...please consider Chris to be a Beta Tester for all new products!

◆ Homeland Security Update: Patient Tracking Systems

Emergency planning for mass casualty incidents has been the subject of many government and private forums. A component topic within the realm of emergency planning is "patient tracking," the ability to identify and locate victims of incidents using high-technology devices.

As envisioned by planners, first-response personnel should have the ability to immediately "tag" all victims and prioritize ("triage") their medical condition. While paper tags, color-coded ribbons, hospital-style ID bracelets and other methods have been used for many years, current planning discussions include the adaptation of barcoded IDs, portable transponders or RFID tags to not only identify victims and categorize their condition, but also track them as they move around the incident scene or are transported to local hospitals.

An ideal scenario is one in which a first-responder can rapidly deploy a small, lightweight tag on each victim encountered at a catastrophic scene. Once the patient is evaluated and perhaps stabilized, a PDA or similar device is used to record the tag's electronic address and present a brief electronic form so that vital signs and symptoms can be documented.

Each time the patient is treated or moved, the tag is scanned or otherwise recorded and the patient's record is updated. The individual PDA units, carried by each healthcare worker on-site, are subsequently uploaded to a main computer system where all entries concerning a patient are consolidated and stored.

If an RFID tag system is used in coordination with a local (on-scene) wireless network, patient IDs can be remotely logged. The addition of GPS or RDF equipment can add geographic information and tracking to the remote ID screen, and wireless physiological sensors can even add a patient's vital signs to the data stream.

With such a program in place, emergency medical personnel can monitor all incident victims within an entire scene, whether through handheld terminals or a van-mounted remote display. Triage information, current vitals, on-site location and disposition (patient released at scene or transported elsewhere) can all be viewed in real-time and permanently recorded. If a patient's medical condition deteriorates, an immediate response can be sent no matter how many other victims are collocated nearby.

Credt: Ideo RFID

This highly informative data stream, essential to wireless technologies, is also the main point of concern from privacy advocates and "watchdog" groups. There is no question as to the need for a more efficient on-scene medical evaluation system; these groups just worry about how secure such data will be from prying eyes and nearby computers. Specifically, the ability to identify an individual patient and tap into the patient's "syndromic surveillance" data stream is something that must be blocked from unauthorized people. In light of the extremely popular WiFi system and its well-publicized security issues, some type of encryption will surely be required.

In next month's column, we'll look at voice and data radio equipment that's been tested so far and discuss the portions of a mass casualty incident that may be monitored by radio hobbyists.

◆ Wireless Data Update: The Connected Courtroom

Pretend it's 2004 or 2005 and you're in a legal proceeding. Perhaps it's a personal injury or product liability case, or maybe some other civil or criminal matter. You're "lucky" enough to have the case heard in a brand new courtroom...beautiful in its architectural design but also functional in its technology...because hidden behind the ornate desks and wall coverings is a spiderweb of wires, antennas, infrared tranceivers, Bluetooth hubs, WiFi "hotspots" and universal battery chargers/AC adapters for computers and other devices.

An attorney strolls in with a small folder

Credit: Courtroom Connect

of papers instead of huge file baskets and boxes. A courtroom worker is handed a memory card, then the attorney proceeds to "beam" something from a PDA.

In addition to workspaces and seating areas provided for the Judge, Clerk, Bailiff, Witnesses, Jury, Attorneys and spectators, there is another desk and console installed...for the Litigation Communications Specialist. Welcome to the connected courtroom, where wired and wireless technologies merge into a digital suite of voice and data communications.

Armed with only a PDA and small notebook computer, attorneys will soon be able to conduct trials with a minimum amount of paper files. New courtrooms are being designed with technology in mind, and old courtrooms are being refurbished in those jurisdictions that have embraced such technological advances.

With WiFi, Bluetooth, Infrared and proprietary RF systems in place, combined with flat-panel monitors and projection systems, a courtroom can support all types of document, video, and physical evidence presentations. Digital audio and video recordings of the trial will occur, and juries may be able to replay key testimony and evidence files during their deliberations.

For an attorney or expert witness, a memory card containing documents, photos, videos, and other materials may be all that is needed to illustrate a point or assist in testimony. The Litigation Communications Specialist, sitting behind a console of audio, video, and data connectivity controls, acts like a television director by calling up the required documents and photos at the proper time, and remotely connecting the various input and output devices needed for trial presentation.

For a glimpse of this emerging technology, check out **http://www.courtroomconnect.com** to see how one company is wiring courtrooms for secure Internet access. It may take a decade or more to wire all courtrooms, but we're "witnessing" the start right now.

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Emergency Management Radio Services

September 11 is a date that marks a historic milestone in the development of Canada's emergency preparedness. On this day, while the ravages of war were tearing the world apart, our country took a major step forward in putting together the pieces of a giant communications puzzle that is still being assembled today. I am not referring to the events of September 11, 2001, in New York City and Washington DC. I am referring to an event that took place on September 11, 1944, in Ottawa, Canada.

While the second world war was raging in Europe, Canada's Minister of Industry, C.D. Howe, was presented with a proposal to create a body that would act as an advisor to the federal government in matters concerning radio technology. The sponsors of the idea proposed that the war-driven development of radio technology in Canada would result in the country having a significant influence in the fields of broadcasting and the design and production of radio equipment after the war.

On September 11 of that year, with the blessing of minister Howe, a meeting of several interested parties was convened. As a result of that meeting an "association of associations" called the "the Canadian Radio Technical Planning Board" was born. Government was not allowed to be directly represented on the board, but would instead accept advice from the board in matters related to radio technology.

The eight founding members of the board included the Canadian section of the ARRL (American Radio Relay League) as well the railways, manufacturers and broadcasters. Within a year the Canadian Army, Royal Canadian Navy and the Royal Canadian Air Force were also participating in the board's activities. As the war ended, Canada had a body in place that would develop into what is now known as the Radio Advisory Board of Canada (RABC).

Today, RABC has a broad-based membership (including Radio Amateurs of Canada) and has many functions, including broadcasting issues and frequency allocations. It is also a key player in the formulation of public safety issues through the participation of the military, police and members such as APCO Canada (Association of Public Safety Communications Officials). RABC is also a stakeholder in the Canadian Public Safety Radiocommunications Project, whose mandate is to resolve communications interoperability issues between public service agencies in Canada. That mandate also includes coordination with the United States.

On that other September 11 the world will never forget, Canada and the United States were pulled together in an act of cooperation that involved multiple public service agencies on both sides of the border. In an amazingly well-coordinated act of unplanned international cooperation, the skies over the entire continent of North America were cleared of civilian air traffic within a couple of hours of the first attack on New York. Inbound planes to the United States were diverted to airports in Canada, and in the aftermath of the attack, Canadian firefighters joined their American colleagues in memorials to those who lost their lives in the attack.

The big blackout affecting 50 million people in the USA and Canada in August this year was another call to action.

Emergency services stand by for action.

❖ Closer Cooperation

While Canada and the United States live as friendly, but separate neighbors, we are often called upon to cooperate in the handling of emergency events and in preparation for future emergencies. With this mind, the Government of Canada sponsored a National Public Safety Conference in Ottawa in March last year to come up with a set of solutions. Following the conference, an RABC paper was published calling for cooperation between Canada and the United States to create common radio channels to aid in coordinating multiple public service agencies in both countries. I am very grateful to *MT* reader Jerry None for bringing this publication to *Scanning Canada*'s attention.

The paper discusses channel allocations and the need for radio equipment that integrates access to specific frequencies for interoperability during emergencies.

Five VHF high band frequencies were suggested:
151.1375 154.4525 155.7525 158.7375 159.4725

In addition, the following frequency pairs from the VHF marine band were selected:
157.250/161.850
157.225/161.825
157.275/161.875

Four channel pairs in the UHF-Low band were designated:
453.2125/458.2125
453.4625/458.4625
453.7125/458.7125
453.8625/458.8625

The following frequencies are identified for inter-agency law enforcement:

Mobile Transmit (VHF) 167.0875 (Simplex) 162.2625 162.8375 163.2875 163.4250 167.2500 167.7500 168.1125 168.4625

Mobile Receive (VHF) 167.0875 167.2500 167.7500 168.1125 168.4625 167.2500 167.7500 168.1125 168.4625

Mobile Transmit (UHF) 414.0375 (Simplex) 418.9875 419.1875 419.6125 414.0625 (Simplex) 414.3125 (Simplex) 414.3375 (Simplex) 409.9875 (Simplex) 410.1875 (Simplex) 410.6125 (Simplex)

Mobile Receive (UHF) 414.0375 409.9875 410.1875 410.6125 414.0625 414.3125 414.3375 409.9875 410.1875 410.6125

It is interesting to note that these are analog FM channels. Don't throw those old scanners out yet!

Another set of frequencies is reserved for incident response:

Mobile Transmit (VHF) 164.7125 165.2500 165.9625 166.5750 167.3250 169.5357 (Simplex) 170.0125 (Simplex) 173.4125 (Simplex)

Mobile Receive (VHF) 169.5375 170.0125 170.4125 170.6875 173.0375 169.5375 170.0125

Mobile Transmit (UHF) 419.2375 419.4375 419.6375 419.8375 413.1875 (Simplex) 413.2125 (Simplex) 410.2375 (Simplex)

Mobile Receive (UHF) 410.2375 410.4375 410.6375 410.8375 413.1875 413.2125

Note that these frequencies are recommendations for discussion purposes. Interference to existing bandplan users may arise, so a migration strategy is also discussed. Don't expect inter-agency traffic on these frequencies right away, but they do hold out hope for scanner owners to participate in, or at least monitor, inter-agency and cross-border emergency management – despite the intrusion of new digital technology.

❖ Calgary Completes Move to Digital

ScanCan thanks another reader for a contribution sent in to the column. Brian Jagger, VE6TAJ of Calgary, Alberta, wrote that his city's police have been using digital radios for some time. However, he notes that EMS and Fire Services have only just recently made the move. Brian reports that his BC895XLT can no longer find the control channel and only 13 out of a previous 29 frequencies are still in use. A thank you card has gone out in the mail to Brian for his contribution.

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Trunk Lockout • Trunk Delay • Cloning Capability
10 Priority Channels • Programmed Service Search
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29.000-54.000 MHz., 108-174 MHz., 406-512 MHz., 806-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

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Bearcat BCI25D APCO Project 25 digital software card	$299.95
Bearcat 278CLT 100 ch. AM/FM/SAME WX alert scanner	$139.95
Bearcat 250D 1,000 ch. Trunktracker III handheld scanner	$339.95
Bearcat 245XLT 300 ch. Trunktracker II handheld scanner	$189.95
Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner	$84.95
Bearcat Sportcat 200 alpha handheld sports scanner	$159.95
Bearcat Sportcat 180B handheld sports scanner	$139.95
Bearcat 80XLT 50 channel handheld scanner	$99.95
Bearcat 60XLT 30 channel handheld scanner	$74.95
Bearcat BCT7 information mobile scanner	$139.95
AOR AR16BO Wide Band scanner with quick charger	$199.95
Sangean ATS909 306 memory shortwave receiver	$209.95
Sangean ATS818 45 memory shortwave receiver	$139.95
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Long Distance Operational Control

As October comes to an end, so does the Concorde, doomed by a variety of business factors. Air France stopped flights of this supersonic airliner in May, and British Airways is about to follow suit.

One place listeners used to hear the Concordes was on the British Airways LDOC radio system. LDOC stands for Long Distance Operational Control. The defined purpose of this international aero mobile service is "to provide communications between aeronautical enroute stations and aircraft stations anywhere in the world for control of the regularity and efficiency of flight and safety of aircraft."

LDOC can be extremely interesting listening, with phone patches to company dispatchers or medical services. On international oceanic flights beyond the range of very-high-frequency (VHF) aeronautical radios, high-frequency (HF) takes over. To keep down the chatter, HF ground stations use a two-tone selcal (selective calling) system to call specific aircraft.

British Airways is heard daily from its London base, also known as "Speedbird Radio." It uses these HF frequencies, all in kilohertz (kHz) and upper sideband (USB): 3497.0, 5535.0, 8921, 10072.0, 11333.0, 13333.0, 17922.0, and 21946.0. Files also show a frequency for Amsterdam, Holland, on 8960.0.

However, this company is in a dwindling minority of those investing in their own radios and staff. In keeping with the modern corporate trend to "outsource" everything, most airlines contract for radio service. The giant here, of course, is the American ARINC, Aeronautical Radio, Incorporated. It's a huge corporation with global reach, offering integrated voice and data services on all bands. We've written previously about its High-Frequency Data Link (HFDL). LDOC, though, is always plain old USB voice.

ARINC's two LDOC facilities are New York Radio (KEA 5), and San Francisco Radio (KMA 7/ WBO 6). New York has transmitters at two sites out on Long Island. San Francisco is at the "HF Supersite" in Dixon, California, right next to Globe Wireless of maritime fame. It also has access to ARINC's powerful remotes in southern California, Alaska, and Hawaii. The Alaska station is the only LDOC available to aircraft on the polar route.

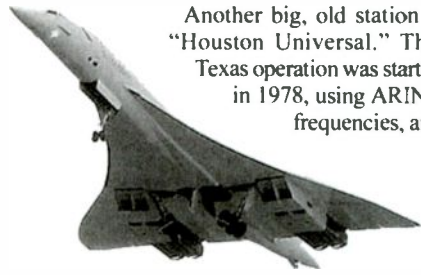
ARINC also does frequency coordination for all US LDOC stations. Busiest are the "watch" channels, which are monitored at different times depending on propagation. The highest ones are guarded in day time, the lowest are used at night, and everything else is 24/7. Many of these are shared. The complete list of these watch frequencies appears in Table One.

◆ ARINC Contract Stations

ARINC has business arrangements with other traditional operators of US commercial HF ground-to-air stations.

Most famous is the Cedar Rapids, Iowa, communication center run by Rockwell/Collins. This is a big operation. Along with the LDOC "Cedar Rapids Radio," it includes "Atlas" for the Drug Enforcement Agency, KHT/KHR for maritime, and "Rockwell Flight Test" for experimental aircraft.

Cedar Rapids Radio has four LDOC consoles, which are capable of injecting traffic into ARINC's global networks. Remotes are in Texas and southern California.



Another big, old station is "Houston Universal." This Texas operation was started in 1978, using ARINC frequencies, and operated by Universal Weather and Aviation, Incorporated. Universal offers a wide range of other services such as weather and propagation forecasts, data networking, and refueling.

Finally, there's the Miami contract station, known as "Sylvair," but just as likely to be heard identifying as "Connie Ops." "Connie" is thought to refer to Kalitta Air, a freight carrier started by champion drag racer Connie Kalitta. Other calls have been heard, such as "Big A." These are apparently for Kalitta planes on US Government charters.

◆ Other Major LDOCs

In Canada, Tors Cove still operates "Rainbow Radio" out of Newfoundland on frequencies 3458, 5604 8819 13285 17910 kHz USB, aimed at Europe. The "Atlantic Sector" uses the same frequencies plus 13420 kHz USB. Over in Toronto, Ontario's "Elite Ops" is on 5475 and 8900.

In Sweden, Stockholm Radio ("STORadio") operates ten high-power transmitters, and at least that many receivers. It's on 3494, 5541, 8930, 11345, 13342, 17916, and 23210 kHz. "Berna," Berne Radio in Switzerland, guards 5395, 6643, 8936, 10069, 13205, 15048, 18023, 21988, and 23285. In Russia, Aviakompaniya Vostok is on 4770 kHz.

◆ Echo Charlie?

The nature of civil aero HF frequency selection deliberately minimizes multiple-hop skip to keep interference down. As a result, these bands often sound unused, making them tempting places to start up other, far less authorized, activities.

"Echo Charlie" is one of these. It's phonetic for "EC," but no two people will agree on the name's origin. It refers to a very old, unlicensed, hobby radio scene that started after World War II in Europe, on and around 6670 kHz in the aero mobile band. Early operation used amplitude modulation (AM) on surplus military radios. Today, it's usually lower sideband (LSB) on out-of-band ham transceivers.

Echo Charlie has added calling frequencies of 3475, 13970, 18030, and 20930 kHz LSB to the original 6670. In each case, there's a band going up or down around 25 kHz from these. New modes are being explored, sometimes with noisy results. Growing in popularity around 6650 kHz LSB is slow-scan TV, really more like a form of color facsimile. Some pictures are reputed to be rather on the "adults only" side.

There's a lot of this kind of thing happening on our planet. Australian utilities face a severe problem with interference from the nightly Pacific activity. Much of this is from high-powered equipment on Indonesian islands barely reached by the government, let alone international radio enforcement. Even in the US, it can be quite remarkable in winter to hear propagation reveal a layer of chatter all the way from 6520 to maybe 6800 kHz.

It appears as if most of the world remains unconvinced that HF is dead.

Table One

ARINC US LDOC Watch Frequencies

New York	3494	6640	8933	11342	13330	17925
San Francisco	3013	6640	11342	13348	17925	21964
Cedar Rapids	6637	8933	10075	13348	17940	21964
Houston Universal	3013	6637	10075	13330	17940	21964
Sylvair, Miami	6637	8095	8939	10033	11470	21964

Utility World

Utility Logs

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

ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	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
Coq-8	Coquelet; French/Algerian 8-tone printing mode
CW	Morse code telegraphy ("Continuous Wave")
DEA	US Drug Enforcement Administration
E6	Russian intelligence numbers, English, ends "00000"
E7	Russian intelligence numbers, English, ends "000 000"
E10a	Israeli phonetic numbers, callup-only or abnormal
EAM	Emergency Action Message
EOC	Emergency Operations Center
FAX	Radiofacsimile
FBI	US Federal Bureau of Investigation
FEC	Forward Error Correction teleprinting system
FEMA	US Federal Emergency Management Agency
HF-GCS	High-Frequency Global Communications System
JSTARS	Joint Surveillance Target Attack Radar System
LDOC	Long Distance Operational Control
LSB	Lower Sideband
M22	Israeli Navy 4XZ, "VVV" markers and numbers
MARS	Military Affiliate Radio System
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
NIPRNET	Non-Secret Internet Protocol Routing Network
PACTOR	Packet Teleprinting Over Radio
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
Selcal	Selective Calling
SHARES	Shared Resources, US interagency net
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	Simplex Teleprinting Over Radio, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United States
VOLMET	Aviation weather broadcasts ("Flying Weather")

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

3155.0 ERCC-Unknown agency, possibly US government, sounding in ALE at 0236. (Ron Perron-MD)

3167.5 "1-U-H"-US Navy, tactical data Link-11 coordination with "8-Z-M," at 0153. (Mark Cleary-SC)

4028.0 Cuban AM "Atencion" station (V2), 5-number groups in progress at 0310. (Barry Williams-AL)

4127.0 Unid-Fishing boats, with the usual chatter at 0355. (Williams-AL)

4146.0 Unid-Jacksonville, FL, station taking reports from boats at 0512. (Williams-AL)

4241.0 4XZ-Israeli Navy (M22), with CW marker and coded messages, simulkeyed on 4331, 5159, 6379, 8103, 10046, 12984, and 13966, at 2130. (Ary Boender-Netherlands)

4271.0 CFH-Canadian Forces, Halifax, NS, RTTY weather forecasts at 2350. (Bob Hall-RSA)

4372.0 "Y-1-P"-US Navy, Link-11 coordination with "R-4-V," "D-6-T," and "W-9-D," at 0024. (Cleary-SC)

4490.0 AAT3BFMARS-US Army MARS/ SHARES, DE, sounding in ALE at 2130. (Perron-MD) *[SHARES was at Level 2 for the power outage. -Hugh]*

4521.7 L2C-Prefectura Naval Argentina (Argentine Navy), Buenos Aires, with SITOR-B marine bulletins at 0117. (Hall-RSA)

4924.5 HQ1NGB2-National Guard Bureau, Arlington, VA, calling LANNGB (Lansing, MI), in ALE at 2322. (Perron-MD)

5327.5 LRD1-US Army Corps of Engineers, Great Lakes, sounding in ALE at 0918. (Perron-MD)

5711.0 AFA1PUMARS-US Air Force MARS, MD, sounding in ALE at 1333. KGD34NCC-SHARES Master Station, VA, calling KNY83 in ALE, also heard on 11217 and 17487, at 1733. (Perron-MD)

5732.0 25C-US Coast Guard helicopter on possible drug interdiction, reporting position to CAMSPAC, CA, at 0030. (Cleary-SC)

6491.5 LOR-Argentine Navy, RTTY 5-letter code groups and very strong signal, at 0514. (Hall-RSA)

6501.0 Honolulu-US Coast Guard, HI, broadcasting marine weather using the "Perfect Paul" synthesized voice, at 0615. (Williams-AL) *[Received on an HP 3586B selective level meter! -Hugh]*

6535.0 Dakar-South Atlantic oceanic route control, Senegal, working aircraft, heavy interference from scrambled voice *[probably Mexican Army -Hugh]*, at 0145 and 0350. (Williams-AL)

6586.0 New York-Caribbean oceanic route control, NY, working aircraft at 0355. (Williams-AL)

6604.0 New York Radio-VOLMET, possibly on backup during the power blackout, transmitter in New Jersey, at 0147. (Williams-AL)

6628.0 New York-North Atlantic oceanic route control, NY, working aircraft at 0358. (Williams-AL)

6697.0 Unwanted-US military, with EAM simulcast on 8992 and 11244, at 1655. (Jeff Haverlah-TX)

6754.0 Trenton Military-Canadian Forces, male reading VOLMET very fast as if to finish on time, at 0120. (Williams-AL)

6912.0 SYN2-Israeli intelligence, repeated AM callup (E10a) at 0350. SYN2, AM callup (E10a) at 0445, gone at 0450. (Williams-AL)

6930.0 MIW2-Israeli intelligence, AM callup only (E10a), at 0115. (Williams-AL)

7300.0 ERCC-Unknown agency, possibly US government, sounding in ALE at 0227. (Perron-MD)

7527.0 Panther-US DEA, Bahamas, position check with Juliet 13, at 1635. (Cleary-SC)

7777.0 RAYO-Mexican Army "Animals" net, in ALE link analysis with LEON at 0146. Unid-ALE initiated voice contact (missed data exchange) at 0200, went scrambled at 0202. COCA, LQA link analysis with ALFIL, at 0340. (Hugh Stegman-CA)

7778.6 WF1-FBI, Washington, DC Field Office, sounding in ALE at 0144. (Perron-MD)

7810.0 CIO2-Israeli intelligence, AM callup only (E10a), same time SYN2 was on 6912, at 0350. (Williams-AL)

7903.5 QT2-FBI, Quantico, VA, calling AL1 (Atlanta), in ALE at 0126. ME1, Memphis, TN, calling QT2 in ALE at 0743. BS1, Boston, calling QT2 in ALE at 1357. (Perron-MD)

8012.0 062NHQCAP-Civil Air Patrol headquarters, Washington, DC, sounding in ALE at 0714 and 0859. (Perron-MD)

8047.0 F2Z224-Virginia Air National Guard, sounding in ALE at 2257. (Perron-MD)

8050.0 FR5FEM-FEMA Region 5, sounding in ALE hourly, at 0133, 0233, 0333, and 0433. (Stegman-CA)

8141.0 The English Man-Russian intelligence (E6), with weird English synthesized AM voice, began with "527," ended "00000," at 2100. (Patrice Privat-France)

8161.5 R26601-Georgia Air National Guard, calling OPS171, GA, in ALE at 2309. (Perron-MD)

8181.5 ASF1IL-Aviation Support Facility 1, Illinois National Guard, sounding in ALE at 0237. (Perron-MD)

8337.6 Shark 10-Possible US joint task force, directing Dolphin 45 in a surveillance near "Bat Cave," at 2113. Stingray 02, working Shark 10 at 2323. (Cleary-SC)

8418.2 L2C-Argentine Navy, Buenos Aires, with SITOR-B navigation warnings, simulkeyed on 12580.7, at 2118. (Day Watson-UK)

8422.0 Unid-Unknown CW station, sending dit and long dah, then "DESUO," at 0336. (Williams-AL) *[Same as 12601, 16828, and 22387. OK — I'm going to take a stab, and guess this is sending "DE SVO," from Olympia Radio, Greece. If you go by assigned centers, SVO is near all four of these freqs. What's one dit among friends? -Hugh]*

8764.0 CAMSLANT-US Coast Guard, VA, setting radio guard with Cutter *Cypress*, at 2019. (Cleary-SC)
8912.0 Service Center-US Customs Service, working helicopter 33C, probably US Coast Guard, and Predator, unknown, at 2231. (Cleary-SC)
8921.0 London-British Airways LDOC, UK, working a company aircraft *[presumably a Concorde -Hugh]*, reducing speed to subsonic due to engine problems, at 2200. (Williams-AL)
8971.0 Trident 43-US Navy, with Spare Group 8 report for Goldenhawk, Brunswick, ME, at 1818. Red Talon 711, passing Spare Group 6 report to Fiddle, Jacksonville, FL, at 2207. (Cleary-SC)
8983.0 "J-3-F"-US Coast Guard, declaring inflight emergency to CAMSLANT for #1 engine shutdown, and returning to Clearwater, at 2222. (Cleary-SC) "F-2-C"-US Coast Guard, reporting departure to CAMSLANT Chesapeake, at 1802. (Stern-FL)
8992.0 Andrews-US Air Force HF-GCS control station, MD, with two 22-character EAMs, signal had two echoes instead of the usual single one, at 0457. (Haverlah-TX) Turbo 22-US Air Force tanker, arranging fuel for Razor 66, a JSTARS, at 1859. Goose 72-US Air Force, patch via Offutt HF-GCS to check into an exercise, at 2235. (Cleary-SC)
9007.0 Canforce 4447-Canadian Forces, patch via Trenton to Operations at 0044. Canforce 4443, arrival weather for European locations from Trenton at 2221. (Cleary-SC)
9016.0 Ruby Red-US military, working Barn Roof at 2230. (Cleary-SC)
9025.0 Reach 9060-US Air Force, in an ALE-initiated patch to Hilda Dispatch, checking on refueling arrangements, at 1953. Reach 6151-ALE initiated patch to Hilda Global, at 0020. Falcon 33-ALE-initiated patch to Coast Guard Air Station Cape Cod, enroute to plane crash aid, at 1954. (Cleary-SC)
10046.0 4XZ-Israeli Navy (M22), with CW marker and coded messages, at 1721. (Hall-RSA)
10051.0 New York-New York VOLMET, aviation weather at 1230. (Jeff Seale-KY)
10135.0 123-Mexican Army base station, possibly a headquarters, in ALE link analysis with Puma, at 0404. (Stegman-CA)
10780.0 Cape Radio-US Air Force, Eastern Test Range, FL, working King 46, NY Air National Guard, at 1450. Cape Radio, patching Razor 35 (E-8C JSTARS aircraft) to Peachtree Ops (Warner-Robins AFB, GA) for formatted traffic, at 1715. (Stern-FL)
11175.0 Reach 6957-US Air Force Air Mobility Command, patching Hilda Global via Puerto Rico HF-GCS, at 0349. King 22, patch to Metro via Andrews, at 1647. (Stern-FL) Navy 515-US Navy aircraft, calling Offutt and Mainsail (general call), finally raised Puerto Rico for a signal check, at 1624. (Haverlah-TX)
11181.0 Strikestar-US military, probably a JSTARS, working Stargate at 2146. (Cleary-SC)
11205.0 Smasher-US Joint Task Force, FL, working "H-1-X," at 1830. (Stern-FL)
11217.0 NNN0ELA-US Navy/Marine Corps MARS, calling KNR33, SHARES Coordination Station, VA, in ALE at 1435. (Perron-MD)
11232.0 Rescue 305-Canadian Forces aircraft on a search, patch to Rescue Coordination Center via Trenton Military, at 0019. Sentry 62-US Air Force AWACS, patch via Trenton to "Tape Library," at 2324. (Cleary-SC)
11244.0 Blackout-US military, no connection to power outage, called Mainsail (general call) with no joy, at 1820. (Haverlah-TX)
11396.0 Qantas 83-Australian flight working Ujung Pandang (Southeast Asia air route control), at 1710. (Patrice Privat-France)
11486.0 ERMBEL-Brazilian Navy, Belem, calling NEBRSL (Sailing training ship *Brasil*), in ALE at 0218. (Perron-MD)
11494.0 Service Center-US Customs, relaying position of "33" to Predator, at 2124. CAMSPAC working Juliet 33, at 2346. (Cleary-SC)
12562.5 UHEL-Russian vessel *Kazanx*, calling UIW, Kaliningrad, in RTTY, at 1630. (Privat-France)
12579.0 NRV-US Coast Guard, Guam, SITOR-B warnings for the Great Australian Bight, at 1601. (Hall-RSA)
12580.7 L2C-Buenos Aires, Argentina, with SITOR-B navigation warnings, simulkeyed on 8418.2, at 2118. (Watson-UK)
12666.3 FUG-French Navy, La Regine, running an RTTY test loop at 1728. (Hall-RSA)
12790.2 NMG-US Coast Guard, New Orleans, LA, with FAX tropical weather charts at 1225. (Hall-RSA)
13155.0 Unknown-US military, too weak to copy call, with a 28-character EAM simulcast on 8992 and 11244, at 1837. (Haverlah-TX)
13200.0 Titan 19-US Marine Corps tanker, patch via Puerto Rico HF-GCS to Cherry Point, at 2151. (Cleary-SC) Postulate-US military, patch via Andrews HF-GCS, at 2237. (Haverlah-TX)
13242.0 ADWNPR-US Air Force NIPRNET gateway, Andrews AFB, MD, sounding in ALE at 1748. (Perron-MD)
13257.0 Titan 20-US Marine Corps tanker, patch via Trenton to Cherry Point, NC, came from 11232, at 1851. (Cleary-SC)
13444.0 RFMGXX-unknown routing indicator and station, with a long ARQ-E3 message for several warships at 1725. RHVAKS-unknown US military, 5-letter-group ARQ-E3 message to Bahrain and several ships, at 1739. RFFLADL-French Navy vessel *Dupleix*, very long 5-letter-group ARQ-E3 message to many ships, at 1830. (Hall-RSA)
13500.0 PNME1-Venezuelan military, calling COFFRI1 in LSB ALE at 0227. (Perron-MD)
13530.0 1901-Colombian phone patch net, calling PRF321, in LSB ALE, at 2157. (Perron-MD)
13927.0 Razor 33-US Air Force E-8C JSTARS, getting status of Razor 66 in a patch via MARS AFA2HF to Peachtree, Robins AFB, GA, at 1628. (Cleary-SC)
14408.0 AFA2CU-US Air Force MARS, handling morale patches from Reach 329Y, at 2045. (Stern-FL)
14569.0 PCRC5-Venezuelan Army, calling CLC51, in ALE at 1947. (Perron-MD)
14686.0 Flint 453-US DEA, working Atlas (Rockwell/Collins contract facility, IA) while enroute to Panther (DEA, Bahamas), at 1804. (Cleary-SC)
14731.7 RFFTD-French Air Force, Villacoublay, with ARQ-E3 traffic to RFVITT, Mayotte, at 1516. (Hall-RSA)
14757.0 AMTIF1-US Army, calling LBA291, in ALE at 1520. (Perron-MD)
14776.0 FC6-FEMA Region 6, TX, calling MO7, Missouri state emergency center, in ALE at 1530. (Perron-MD)
14867.7 kdakrfr-Egyptian MFA, Cairo, ARQ messages in Arabic to six embassies, at 1610. (Hall-RSA)
14937.0 The English Lady-Russian AM "female" synthesized voice in English (E7), brief callup and then "000," at 0620. (Privat-France)
16321.0 CENTR8-Romanian military, working OCP in ALE, at 0859. (Privat-France)
16798.0 UCTK-Russian vessel *Ordynskyi*, calling Murmansk in RTTY, at 1650. (Privat-France)
16801.0 UYDV-Russian vessel *More Sodroujestwa*, RTTY traffic for URL, Sevastopol, at 1610. (Privat-France)
16802.0 UAUD-Russian vessel *Marshal Krylov*, calling UIW, Kaliningrad, in RTTY at 1520. (Privat-France)
17147.0 URL-Sevastopol Radio, Russia, relaying RTTY traffic to vessel *Sanfi Panovarov*, at 1709. (Hall-RSA)
17487.0 KSZ78-Unknown station on SHARES ALE net, calling NNN0ELA at 1817. (Perron-MD)
17519.0 FC8FEM-FEMA Region 8, CO, sounding in ALE at 0248. (Perron-MD)
18529.5 Unid-Algerian embassy, Abidjan, Ivory Coast, with a Coq-8 message to Algiers, in French, at 1610. (Hall-RSA)
19048.7 RFFKC-French Navy, Brest, 5-letter ARQ-E3 code groups to RFTJCF, vessel *Cap Vert*, at 1621. (Hall-RSA)
19145.7 RFVIC-French Navy, La Reunion, with ARQ-E3 weather at 1533. (Hall-RSA)
20633.6 RFVI-French Navy, Le Port, with offline encrypted traffic, then weather in English and French, in ARQ-E3 at 1550. (Watson-UK)
20992.5 AFA2CU-US Air Force MARS, FL, patch with Reach 6145, at 1737. (Stern-FL)

Utility World

Digital Digest

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Listening to Low Frequency Utilities

This month we take a look at some of the utility stations that live below 100 kHz, in the Very Low Frequency (VLF) region of the radio spectrum. Interesting stations have lived here for years and often remain undiscovered by many listeners.

One of the principal reasons for not frequenting this part of the spectrum is that many receivers only begin their coverage at 100 kHz, neglecting a very interesting part of the utility world. If you find yourself with just such a receiver, there are various solutions available, including the venerable frequency converter.

These simple devices generally connect between the antenna input of your receiver and a suitable antenna for the VLF range. The frequency converter mixes the incoming signal with a fixed signal at a higher frequency – one that is in the normal tuning range of the receiver. For example, I used to own a converter which covered 10-100 kHz and placed this range at 5010 to 5100 kHz on my receiver's dial.

Converters are often a simple and inexpensive way to gain access to new parts of the radio spectrum without spending money on a purpose-designed radio. For example, Ramsey Electronics' $39 VLF1 device (see Resources) covers 0-400 kHz and sends the signals to 4 MHz. So, to hear a station that is actually transmitting on 77.5 kHz, one tunes the receiver to 4.0775 MHz. Easy! Doubtless, past *Below 500 kHz* columns in *MT* will have covered more of these devices as well as more specialized equipment.

◆ Tuning the Low Frequencies

Radio wave propagation at low frequencies is rather different from that of HF and doesn't rely on the ionosphere. Simply put, because of extremely long wavelengths (10 kHz is 3km and 100 kHz is 300km) the majority of VLF signals effectively travel around the globe using the earth and the lowest layers of the ionosphere as a huge waveguide.

VLF signals follow the curvature of the earth and also penetrate substantial depths of the earth's crust and ocean. They also tend to travel many thousands of kilometers without much day/night signal variation. These last two facts are the main reason why this range of frequencies has been popular for communications with submarines over long distances.

So what utility signals can we find below 100 kHz? A casual check of the International Telecommunications Union (ITU) website shows us that the officially agreed band plan for this region of the spectrum is roughly as follows:

110 to 90 kHz	Radio Navigation
90 to 70 kHz	Fixed, Maritime Mobile, Radio Navigation
70 to 60.05 kHz	Fixed, Maritime Mobile
60.05 to 59.95 kHz	Standard Frequency and Time signals
59.95 to 20.05 kHz	Fixed and Maritime Mobile
20.05 to 19.95 kHz	Time Signals
19.95 to 14 kHz	Fixed and Maritime Mobile
14 to 9 kHz	Radio Navigation
9 to 3 kHz	ULF (Ultra Low Frequency) Not Allocated

In reality, this band plan turns into a lot of interesting signals that can be heard over long distances.

◆ Time Signals

Germany, Great Britain, Russia, and Japan, in addition to the US all still operate super-accurate time signal stations on VLF. These are the stations that control the "radio watches" and "atomic clocks" you see advertised as never needing to be set. Many electricity and home automation controls also use these signals for timing purposes.

Besides a highly accurate carrier frequency that can be used for all sorts of timing and calibration purposes, one can recognize these signals by a regular tick each second, often with a voice announcement of the time at certain minute or hour intervals. Many also send a burst of data that carries the time information in some standard format. The Hoka decoder software, for example, is able to decode the data stream from the German station DCF77 on 77.5 kHz and use it to set the computer's real-time clock very precisely.

◆ Fixed and Maritime Mobile

As one might expect, very long transmission distances and penetration of water are just two features that have made VLF a popular choice for military communications, and especially with navies. In practice, the majority of these military signals are encrypted streams of low-speed data, usually 50, 75, 100 or perhaps 200bd with narrow shifts of 75 or 100Hz. Traditional FSK (Frequency Shift Keying) is sometimes used, but most signals now tend to be MSK (Minimum Shift Keying) which spectrally looks (and sounds) very much like FSK-type RTTY, but, in fact, is a special form of PSK that is very efficient in its use of bandwidth.

Making the most of bandwidth is of course very important at VLF. With only 100 kHz in this whole allocation, using say a MIL-188-110A high-speed modem that occupies 2.4 kHz (or nearly 3% of the whole band to carry one signal) would cause quite a stir!

Although the end of the Cold War reduced transmissions markedly, the US Navy TACAMO ("TAke Charge And Move Out") airborne system for nuclear submarine communications also uses VLF. TACAMO transmissions come in various flavors of FSK and MSK.

◆ Radio Navigation

Probably the most common VLF navigation systems is the venerable LORAN which occupies most of the space between roughly 90 and 110 kHz. LORAN is a worldwide system and can provide navigation accuracies of up to 50m or better. The LORAN-C chain or 24 US-based transmitters provides complete coverage of continental US and Alaska and cooperating Russian stations cover the Bering Sea. The strong pulses of the LORAN system in most parts of the world are easy to hear.

A typical LORAN transmitter

Here at Digital Towers we often find that early morning is a great time to listen, especially shortly after sunrise when the higher HF bands have yet to open for business during the day.

Here are the results of a typical morning's VLF listening over the past couple of years:

19.60	GQR/GBZ	Royal Navy, Anthorn	50bps MSK
21.40	???	US Navy, ???	200bps MSK
21.75	???	???, ???	200bps MSK
23.40	NPM	US Navy, Lualualei HI	200bps MSK
24.00	NAA	US Navy, Cutler ME	200bps MSK
24.80	NLK	USN, Jim Creek WA	200bps MSK
25.20	NML4	USN, La Moure ND	200bd MSK
37.50	NRK	US Navy, Keflavik Iceland	200bps MSK
40.76	NAU	US Navy, Aguada PR	200bps MSK
45.90	NSY	US Navy, Niscemi Italy	200bps MSK
55.50	???	Unidentified	Time signal
60.00	WWVB	Fort Collins, CO	Time signal
77.50	DCF77	Mainflingen, Germany	Time signal

Until next time, enjoy your digital listening.

Resources

Ramsey Electronics VLF Converter - **http://www.ramseyelectronics.com**
ITU - **http://www.itu.int**
International LORAN Association - **http://www.loran.org**
US Coast Guard LORAN-C Site - **http://www.navcen.uscg.gov/loran/default.htm**

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Radio Free Cascadia International

RFCI notified us in advance that they would broadcast Sept. 10-14 in opposition to globalization as exemplified by the World Trade Organization meeting in Cancún. *World Of Radio* listeners and *DX Listening Digest* readers were ready and waiting to hear it. Schedule was approximately 1700-0500 on 15045; signal here was typically 20 over 9, peaking in the afternoon but fading out before 0500; it had lots of anti-establishment coverage in English and accented Spanish, claiming power of 8 kW, from an organic farm "in northern America," powered by organic diesel. It had reports from as far away as China and Argentina, acknowledged on a mailbag the final day. One listener, David Hodgson in TN, also heard it with a spur on 14960 at 2300, reported to the harmonics yahoogroup.

From their website **http://www.efn.org/~radio985/RFCI/index.htm**: "We broadcast in solidarity with the thousands of people who are protesting the World Trade Organization in Cancún, México, and around the world ... RFCI will relay streaming audio sources from Cancún, and will originate programming in Spanish and English ... directed at México and may also be heard in other nations of Latin America, and in the U.S.

"Radio Free Cascadia International is a direct action of resistance and solidarity. We modulate the air as freely as we breathe it, as a challenge to those who would claim ownership and control of the natural elements, peoples, and creatures of the Earth." Address: RFCI, P O Box 703, Eugene OR 97440; rfci@riseup.net

"Solid signal, 100% copy with very good audio, anti-establishment song, talk on situations in Central/South America. Great programming!" says Joe Talbot, Alberta. "Very good signal with deep fades. Hopefully this isn't the last we've heard from them on SW" – Mark Mohrmann, VT.

We heard them say they do have plans for future transmissions, but can't divulge them yet. For a couple of hours on their final day, they dropped carrier because an aerial vehicle was checking them out. After that, big news was that the "Cancún talks collapsed," causing great celebration.

Robert Ross, Ontario DX Association, noted angry punk rock protest music, anti-government slogans like "Go to Hell, you Materialistic Oppressors" and "Protest to the United Nations." Are we calling this clandestine?

Rich D'Angelo, PA, in the NASWA Flashsheet: Seems very political in nature and presumably illegal so is "clandestine" the appropriate home or is "pirate' the correct classification? GH noted that they referred to themselves on air as "clandestine." But *Clandestine Radio Watch* decided RFCI was merely an "interesting political pirate" and did not qualify for coverage there.

RFCI wondered if being non-violent kept them from being called clandestine as they preferred. Anyhow, a group of people evidently had a great time pulling this off, and gave us, however briefly, a much-needed alternative to corporate media.

AUSTRALIA *Keys to Music* is a new educational program, on RA at 0005 UT Sun, repeat at 1005, designed to demystify fine music (John Figliozzi, *DX Listening Digest*) Detailed SW frequency information now at: **http://www.abc.net.au/ra/hear/** 73 (Glenn, VK4DU, *EDXP*) Still no comprehensive schedule in UT (gh)

Dale Chesson at ARDS requests further reports on 5050. Power increase delayed, as they are not yet happy with reception in the target area; reports to: dale@ards.com.au (Rob Wagner, VK3BVW, *EDXP*)

BELARUS' R. Minsk, fair in English at 0200 [not on every night] on 7210; // 5970 generally covered by other stations (Tom Sliva, NYC, *DX Listening Digest*) Enjoyed QRM free, SIO 444 reception on 7210 at 0200 UT Mon; hams must turn in early Sunday night (Ben Loveless, WB9FJO, MI, *DX Listening Digest*)

BOLIVIA R. Pio XII, 5952.5, 0000, almost boomed in when I fixed my beverage where the cows had eaten up meters of it. Gorgeous ID in Aymara, Spanish ad for a machine shop in Oruro (Hermod Pedersen, Sweden, *SW Bulletin*) Great signal and audio in Quechua near Moscow (Artyom Prokhorov, Cumbre *DX*) Nice strong signal on 5952.47, at 0918, drama in Aymara? (Mark Mohrmann, VT, *DX Listening Digest*)

R. San Miguel, Riberalta, reported last month on 4930 and 4724, then jumped to 4905 in mid-August, 0215, *Show de los Sábados* to 0300*, also Mass at 1035 (Rogildo F. Aragão, Quillacollo, Bolivia, *DX Listening Digest*) ID and tango at 2355 (Dave Valko, PA, *Cumbre DX*) 4905.16, at 1000, "Cu-Cu" sound, TC and ID (Arnaldo Slaen, Argentina, Cumbre DX) Varying from 4905.4 to 4906.4; has jumped frequency 33 times since Sept. 1992, more this year than ever, even more than R. Huanta 2000 (Emilio Pedro Povrzenic (pronounced *Povéryenich*), Argentina, *DX Listening Digest*) Then in Sept varied down to 4903, at 2312 with campo music, 0004 political program, 0030 *Su Frontera*, 0132 ID, gradually drifting downwards (Dave Valko, PA, *Cumbredx*)

New station on 4781.5, R. Tacana, in Tumupasa, Provincia Iturralde, Departamento de La Paz, región de Ixiamas y San Buenaventura, at 0202 ID, música latina, 0305-0328* Brazilian music (Rogildo Fontenelle Aragão, Quillacollo, Bolivia, *World Of Radio*)

After Mali cleared frequency, 0010-0110 on 4780.96 music occasionally interrupted by Radio Tacana IDs (Hermod Pedersen, *hard-core-dx*) Then announced new schedule due to electricity cuts, 1000-1700 and 2100-2200, but not at night (Aragão, *DXLD*)

Gonzalo Espinoza Cortés verified my follow-up report of Radio Eco San Borja, 4702. Said it is not operating due to the death of his brother Freddy Espinoza Cortes in a power plant accident on the 6th of August (Jyrki Hytönen, Finland, *dxing.info*)

BRAZIL Rádio Nacional do Brasil on 9665 around 0600 with very good strength (Noel Green, England, *DX Listening Digest*) It's the new external service to Africa, started Aug 1, scheduled M-F 1900-2100 UT, repeated at 0500-0700; Sat & Sun 1800-2200 with futebol, 0500-0800 with music (Lia Rangel, RNB, via Célio Romais, DX Clube do Brasil) R. Marumby still on 9665.04, at other times, heard at 2342-0003 (Dave Valko, Dunlo PA, *Cumbre DX*)

Rádio Guarujá Paulista, now on 3235 and 5045, has QSLed for José Moacir Portera de Melo; rampazo@radioguarujaam.com.br (Celio Romais, *@tividade DX*)

R. Primero de Marzo, Asunción, Paraguay, heard on 6105 at 0300-0330* with sports; another night stayed on until 0503* with Paraná FM 98.5. 6105 is not registered for any Paraguayan station (Daniel Camporini, Argentina, *Conexión Digital*) Also at 1003 with Catholic mass in Spanish, Guarani; 1030 abrupt switch to R. Cultura Filadélfia (Arnaldo Slaen, Argentina, *Cumbre DX*) So Brazilian apparently relayed Paraguayan (gh) Subsequently on 6105.02v, R. Cultura Filadelfia, Foz do Iguaçu, Brazil, ID at 0100, religious music, only in Portuguese (Björn Malm, Quito, Ecuador, *Conexión Digital*) Same at 2303-0020, religious program in Portuguese mentioning Paraguay; full ID at 2359 (Dave Valko, PA, *Cumbredx*)

CAMBODIA On 11939.4-11940.1, National Radio active again, maybe testing equipment, *1200, and *2355 only in local language, modulation problems (Roland Schulze, Philippines, *BC-DX and DSWCI DX Window*)

COLOMBIA Harmonic of Radio Mundial, Bogotá, is getting stronger and stronger, on 2740 = 2 x 1370, best after 0400 (Adán González, Catia La Mar, Venezuela, *DX Listening Digest*)

La Voz de Yopal, 5040, at 1030 Colombian national anthem in progress, ID, clearly heard "Yopal" twice, fade out by 1045 (Roger Chambers, Utica, NY, *DX Listening Digest*) Reactivation after long absence (gh)

COSTA RICA A third webpage with more news of RFPI developments: **http://copyexchange.com/_wsn/page3.html** (Franklin Seiberling {sigh' burling} KC0ISV, Iowa City, *DX Listening Digest*) Outcome of talks with University for Peace TBA around Oct. 31; in late September resumed 15115-USB around 1800-0800, as well 7445-AM (gh)

CUBA RHC has three new 100 kW transmitters on

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

the air replacing the more than 40-year-old Brown Boveris, at first testing 0000-0500 in Spanish on 9550, 9600, 11760 and 1100-1500 on 9550, 11705, 11760. They use pulse step modulation, much more energy-efficient than conventional AM plate modulation (Arnie Coro, RHC *DXers Unlimited* via Bob Chandler, ODXA)

DENMARK The World Music Radio tests planned for August were never reported heard into late September (gh) 5815 and 15810 first testing with 400 Watts from Ilskov near Karup in Central Jutland; regular 10 kW transmissions probably from late November, 24/7 with chart music, oldies from the 1970s, 1980s and 1990s, pop tunes from all over the world; also on Internet, FM, MW, satellite, and later a third DRM SW frequency. Reports welcome to WMR, PO Box 112, DK-8900 Randers, Denmark (Stig Hartvig Nielsen, *DX Listening Digest*)

ECUADOR HCJB extended English on 15115 to 1100-1330, revived *Morning in the Mountains*, but only a quarter hour instead of a sesquihour, M-F 1200, with news, sparts scores and music (Jeff Ingram, HCJB *DX Partyline*)

Via WINB, *DXPL* changed to Sat 1730 on 13570 (Hans Johnson, via Allen Graham, DX Partyline) 1830 in winter? WWCR shifts presumably include: Thu 2100 15685, Sat 1430 12160, Sun 0300 5070 (gh)

GHANA GBC is on 4915 only, following breakdown of the Radio 1 transmitter (on 4915) because of a burnt-out valve. Transferred Radio 2 transmitter to 4915, thus stopping all broadcasts on 3366 and 6130. Programming of Radio 1 ond Radio 2 subsequently merged into a single service in English and local languages on 4915. Would like to repair broken-down transmitter, but depends on getting funds (confirmed by Chris Greenway BDXC-UK Communication)

GOA All India Radio, Panoji, English news at 1530-1545 on 11740 often starts some seconds lote. CNR China also on 1530 past 1545 (Steve Lore, MI, *DX Listening Digest*)

GUATEMALA R. Amistad may have reactivated, strong carrier at 1100 on 4698.71, almost no modulation (Hans Johnson, WY, *Cumbre DX*) Fair at 1015-1030, Latin programming, also 0030-0045 (Bob Wilkner, FL, *ibid.*) 4698.75, very weak and poor quality but had a program *Mañanitas de Amistad*, so think this is the station in San Pedro de La Laguna (Björn Malm, Ecuador, *Conexión Digital*) Had been off for more than a year (Anker Petersen, DSWCI DX Window) Was back on briefly after a couple of hams from Chattanooga repaired storm-damaged antenna, replaced defective rectifiers in the power supply. But then a surge wiped out the power supply again. Same volunteers going back to Lake Atitlán and should have rig back up and running (Larry Boysinger, Kentucky, *Cumbre DX*)

GUIANA FRENCH Leônidas dos Santos Nascimento discovered that RFI could be QSLed direct from here if sent to: TDF Outre-Mer, Boîte Postale 7024, 97307 Cayenne Cedex, Guyane. E-mail: fabrice.esnay@tdf.fr (Célio Romais, Panorama, *@tividade DX*)

HONDURAS R. Misiones Internacional[es], Comayagüela, reactivated on 3340, ID at 0400 (Björn Malm, Ecuador, *SW Bulletin*) Theory: they prefer 5010, but sometimes peak the transmitter on 2/3 of that, 3340 instead, because of all the co-channel on 5010 (gh)

INDIA AIR Bangalore HS, excellent on 10330 in Hindi, delightful music from 0035 until fade 0130 or so (Bernie O'Shea, Ottawa, Ontario, *DX Listening Digest*) Also good on 13620 after 0300 (Tom Sliva, NYC, *ibid.*)

INDONESIA RSPK Ngada, 1202-1305, relay of Dinamika Indonesia at 1202 with 8 second delay compored to 9680, on new 3516.7v, heard as late as 1430. Strong signal which should be heard widely, ex-2899 where it was known as RPDT2 (David Foster, Australia, DSWCI *DX Window*)

Two Indonesians are unnecessarily on almost the same frequency: 4869.96, RRI Wamena, 1029-1110 as strong as a local, ID on the hour; 4870.90, RRI Sorong, 0938-1015 (Bolland, Chuck, Clewiston, Florida, *DX Listening Digest*) 4870.9, RRI Sarong, 0924-1005* Crazy frequency choice as RRI Wamena not far away on 4870 at similar strength. However, Sarong may have no choice but to use their very old 10 kW transmitter (David Foster, Australia, *BC DX*)

ISRAEL Staffers at Israel Radio say, that in mid-October, the Kol Israel domestic English broadcasts will be moved to the REQA network instead of Reshet Alef. The English radio news would broadcast at 0430-0445, 1045-1100, 1700-1715 UT. This would impact shortwave ond web broadcasts as well (Doni Rosenzweig, *DX Listening Digest*)

KOREA NORTH Lost patience since South Korea did not stop their propaganda broadcasts to North in return for the close of V. of National Salvation on August 1. Korean National Democratic Front, parent organization of VONS announced they would relay Korean Central Broadcasting Service for 12 hours a day from August 15: heard at 2200-0400 and 0800-1400 on 1053 (Haeju), 3480 (Wonsan), 4557 (Haeju), 4450 (P'yongyang) with the name of "P'yongyang branch of Korean National Democratic Front." This is not a clandestine, but a formal one from North Korea now (Toru Yamashita, ABI via Takahito Akabayashi, *BC-DX*)

KURDISTAN [non?] Clandestine, V. of Iraqi Kurdistan has harmonic on 8170 (2 x 4085) at 1740, stronger at 1800 (Jari Savolainen, Finland, *DX Listening Digest*) V. of People of Kurdistan, 8170, 1705 in Arabic (Luca Botto Fiora, Italy, World DX Club Contact) Voix of Kurdistan, 1700-1714 on 8170, news in Arabic, Kurdish music (Mohamed Kallel, Sfax, Tunisia, *DX Listening Digest*) Can't agree on name

LATVIA Laser Radio UK resumed transmissions via Ulbroka, 100 kW on Saturday 20 September, 1800-2200 on 9290, sub-renting to "free radio scene" stotions, starting with the Dutch-based Internet station Radio Seagull ("The home of Progressive Rock and Alternative Music") (Bernd Trutenau, Lithuania, *DX Listening Digest*) not weekly?

LIBYA [non] New schedule for LJB service in Arabic to Iraq: 1202-1302 new 11890 LSB, ex-17600 USB \\ 11660 USB; 1800-1900 new 7425 LSB, ex-7245 USB \\ 11660 USB; 11890 is co-channel VOA in Spanish till 1230 and NHK in Hindi from 1230, bath in AM; however, the 1800 broadcast Sept. 14 was also on 11890 LSB, co-channel Radia Taiwan International also in Arabic but in AM (*Observer*, Bulgaria)

MÉXICO R. Tapachula from Tapachula, Chiapas, has obtained permission to broadcast on 6120 with call XETS-OC. Hope to begin in Nov or Dec. R. Tapachula used this frequency back in the 1940s (Héctor Garcia Bojorge via Jeff White, *Cumbredx*)

XERMX seems to be in a real state of flux. Portuguese program was cancelled, producers of English and French programs are gone (Jeff White, FL, *DX Listening Digest*) Ana Cristina del Razo, ex-directora of XERMX says serious financial problems caused departure of the translators and announcers for English, French and Portuguese; Spanish programs were cut to 15 minutes each. There remains a long-standing future plan to transmit via Internet (Jeff White, RN *Radio Enlace*) At the end of August, instead of 9705, XERMX was again putting out strong and distorted spurs from 9277 to 9300, less strong but equally distorted on 10110-10133 (Julian Santiago and Héctor Garcia Bojorge, DF, *Conexión Digital*)

R. Mil, 6010, duplicates MW 1000 except for times on weekends when *Encuentro DX* is aired: for contradictory info see **http://www.nrm.com.mx/estaciones/radiomil/DX.html** Radio Mil was about to move its studios to a new location on the outskirts of Mexico City, and it was unknown if *Encuentro DX* would be able to continue.

XEPPM, R. Educación, 6185, has a half-hour media program *Sintonia Libre* first airing UT Thu 0430, with repeats: Sat 0030, Sun 0230, Mon 0430, Tue 0030, Wed 0230 [expected times after DST ends] (Jeff White, IX Mexican DX Encuentro report, *NASB Newsletter*)

In mid-Sept at 0845, powerful signal, bad audio on 4810 with Spanish pop music (Steve Waldee, CA, *DX Listening Digest*) ID two hours later at 1036 as "XERTA, transmitting to the United States from Mexico" (Chuck Bolland, FL, *ibid.*) Also IDs as La Voz Comercial de México (Robert Wilkner, FL, *ibid.*) At other times big carrier but no audio (Hans Johnson, Dave Valko, *Cumbre DX*) Local strength even on the least sensitive rodio with a whip antenna, better now than all the other Mexico City SW stations, at 2130 giving website **http://www.xertaradio.com** (Héctor Garcia Bojorge, DF, *Conexión Digital*) New transmitter and antenna; seems Robert Najera has sold it to a religious group (Julián Santiago, DF, *Noticias DX*) Sometimes has ute QRM, and XERTA sound is simply hideous (Steve Waldee, CA, *DXLD*)

Contact details from website: Geoline Communications, S.A. de C.V., Joseph Berardi icampos@geoline.net Telephone 525-683-5055; Orizaba #32, San Jerónimo Aculco, Mexico City, NA 10400 Mexico (Hans Johnson, *Cumbre DX*) Nice signal but audio sounds as though an open mic is placed next to the speaker of an old cassette player! English ID claims 50,000 watts (Dave Valko, PA, *ibid.*) XERTA does not have an official license from the Ministry of Communications and Transportation to broadcast on 4810 (Héctor Garcia Bojorge, via Jeff White, *Cumbre DX*)

MONGOLIA The website of Voice of Mongolia **http://mongol.net/vom** has been reconstructed. A new English section was created containing an updated presentation of Mongolian Radio & TV, **http://mongol.net/vom/mnr2.htm** – refers to installation of new SW transmitters in 2003, with Japanese aid, 50 kW in Ulaanbaatar, and 10 kW in Altai and Murun (Bernd Trutenau, Lithuania, *DXLD*)

NAMIBIA NBC is on SW using daytime frequencies 24 h – 6175 and 6060, breaking in new tubes. Planned to resume night channels 3270 and 3290. Farmers remain the big audience for SW even though they don't really respond when NBC ask for feedback. Presumably this, heard at 1920-1937 in English on 6060 via Javaradio in Australia (Hans Johnson, *Cumbre DX*)

NEW ZEALAND RNZI disappeared Aug 30; web site confirmed their SW transmitter was off due to a major technical fault (Chuck Albertson, Seattle, *DX Listening Digest*) [non] RNZI back on SW thanks to Radio Australia but with reduced service from Sept 8: Sun 1900-2115, Mon-Thu 1700-2115 UT, Fri 1700-2015 on 9580. Internet streaming uninterrupted (Adrian Sainsbury, Technical Manager, RNZI via Wolfgang Bueschel, John Figliozzi, Alan Pennington, *DX Listening Digest*) And its own SW still missing Sept 21

NIGERIA V. of Nigeria heard in English 2200-2300* Aug 27 on new 17800. Signal good but audio low, female with ID, into news (Ron Trotto, IL, *DX Listening Digest*) Turned out to replace 15120 part of the day, but still no mention of 17800 on **http://www.voiceofnigeria.org/frequency.html** as of Sept 21! (gh) Also on 17800 at 0845 (Dave Kenny, UK, *DX Listening Digest*) Heard switchover from 15120 to 17800 at 1958 (Jari Savolainen, Finland, *DXLD*)

PERÚ R. Los Andes, Huamachuco, reactivated on 5030 after 2513 days of absence, heard at 1000 in Aug with slogan "la radio total," E-mail radiolosandes@starmedia.com (Emilio Pedro Povrzenic, Argentina, *DX Listening Digest*) Previous reactivation in 1997 lasted only a couple of weeks after four years' absence. Hope this one lasts longer (Henrik Klemetz, *ibid.*)

Another one back after a long absence: R. Naylamp, on new 4335 at 0930-1300, 2200-0330, good here in Chimbate; offers to QSL with letter, reports sent to Av. Andrés Avelino Cáceres # 800, Lambayeque (César Pérez Dioses, Perú, *DX Listening Digest*)

Radio Virgen del Carmen, Huoncavelico, 4886, reduced schedule to mornings only: weekdays 1100-1500, weekends 1100-1400. The first hour is an agricultural show (Rubén Contreras Espinoza, Peru, via Arnaldo Slaen, *Conexión Digital*)

Reactivated with new name: 6895.57, Radio La Voz de San Miguel, San Miguel del Faique, provincia Huancabamba, departamento Piura at 0100; ID heard in April was "La Nueva Radio Superior" (Björn Malm, Ecuador, *SW Bulletin*)

Proud of some of your QSLs? Those must pale in comparison to the *Certificados De Visita* that Takayuki Inoue Nozaki displays, issued by stations such as Radio Nor Andina, Celendín, which attests to his visit to the station, "heroically traveling to different places in Perú to study the media," etc. Next time I drop in

on a radio station, I think I shall ask for just such a certificate. The wording could hardly be improved upon (Glenn Hauser, DX Listening Digest) I think that these "certificados de visita" that TIN collects are more than souvenirs! They well could be useful as a sort of safe-conduct in case of eventual trouble ... That kind of research could be useful to guerrillas and spies, too; or at least, may awake some kind of suspicion: a stranger so interested in radio technical issues, collecting and annotating addresses, transmitter and even cassette recorders and deck data (Horacio A. Nigro, Uruguay)

PORTUGAL RDP transmitter on 15525 put out very strong spurs on approx. 15358.5 and 15691.5 at 1600-1800 (Wolfgang Büschel) And 1950-2005, FMy spur on 13554.1 (Mark Hattam, England) Same transmitter I guess, spurs 166 kHz away from both sides of fundamental 13720, also on 13886. Furthermore, 13640, Sat and Sun only at 0700-1345, puts spurs on 13473.5 and 13806.5 (Wolfgang Büschel, Germany, *DX Listening Digest*)

ROMANIA Of RRI's 12 SW transmitters, only 5 are functioning, according to their French mailbag show, and those are to be replaced by four new Harris units now awaiting installatian. So many of RRI's scheduled frequencies are missing (Jean-Michel Aubier, http://perso.wanadoo.fr/jm.aubier) Nov 1 is RRI's 75th anniversary, being celebrated with a Listeners' Day on Sun Nov 2. (Raymond Aupetit, Union des Ecouteurs Français via Bill Westenhaver)

RUSSIA Boris Belitzky died on September 3rd. He was 82. A man of high integrity, outgoing heart and sparkling sense of humour, he never complained of ill health despite his advanced age. His death came as a shock to all of us. Boris Belitzky stayed with the English Service for 57 years and from the very beginning until the very end his brilliancy in the profession was beyond doubt. A remarkable translator, radio announcer and observer, he never approached his work with anything but a creative urge. For many years Boris Belitzky was the author and host of *Science and Engineering* -- one of the most popular programs on the Voice of Russia. His enticingly intriguing voice, immaculate command of English and profound knowledge in the subject he covered earned him the respect of millions of listeners (Voice of Russia via Maryanne Kehoe, *swprograms*) I met Boris on a number of occasions – he was a class act (Kehoe)

SA'UDI ARABIA [non] R. Al-Islah (presumed), 15705, 1800-2000*, weak with quick QSB. Heavily jammed but some audio still getting through (Dave Valko, Dunlo PA, *Cumbre DX*)

SLOVENIA Aug 21 was a great night for MW hormonics! Such as on 1854 kHz, Slovensko R, (2 x 927), at 2017 (Tim Bucknall, UK, harmonics yahoogroup)

SOMALIA Try to hear our new 7335 [ex-6980], 800 Watts at 0415-0730, 100 Watts 1000-1230 UT because our generator is faulty and there is no town electricity in our afternoon. Back to 800 Watts 1600-1755. Need a 16 to 20 KVA 220 Volt AC diesel generator, and various items of studio equipment (Sam Voron at Radio Galkayo, 700 km north of Mogadishu, via M. Watts, *CRW*) Audible on 7335v at 1730-1758, and Sam, who was DJ at the time, rapidly e-QSLed. Thrilling! Said they would run 100 watts at all times until he returns Nov 1, resuming 800 watts. More at: **http://www.radiogalkayo.com** (Björn Fransson, Gotland, Sweden, *DX Listening Digest*) Poor here, at 1730, drifting to 7333 (Mahmud Fathi, Hurghada, Egypt, *Cumbre DX*) Clash with CHU over here (gh)

SPAIN REE Noblejas at 0600 on 11890 and 12035 produces annoying distorted spur on 12180, not 11745, but there are four distorted small FM signals 89.5 and 179 kHz away, symmetrically on 11711, 11802, 11978, 12069 kHz. 11890 closes at 06.55:33 UT, when the five unwanted signals disappear (Wolfgang Büschel, Germany, *DX Listening Digest*)

SWEDEN [and non] B-03 Teracom tentative schedule shows new exchange between R. Netherlands, Madagascar and R. Sweden, Hörby: 5955, 0600-0700 RN via Sweden, 350 kW, 230° log periodic to Canary Islands; 12160, 0100-0130 R. Sweden via Madagascar to India, 50 kW, 50° (Wolfgang Büschel, *BC-DX*)

SWITZERLAND. swissinfo/Swiss Radio International is looking at losing all its government funding by 2006. It would then be left to the Swiss Broadcasting Corporation to guarantee future financing of the news organization (*Neue Zürcher Zeitung* via via Jilly Dybka)

What's left of English from SRI B03, with sites, azimuths: Near East-Africa: 0730 9885 Germany 160°, 13790 Germany 200°, 17665 Switzerland 165°; 0830 21770 Switzerland 165°; 1730 9755 Germany 115°, 11810 Germany 115°, 15555 Switzerland 140°; 1930 9820 Germany 200°, 11920 Switzerland 165°, 13660 Germany 145°, 17660 French Guiana 115°; South America: 2330 9885 Switzerland 230°, 11660 French Guiana 175° (via Roberto Scaglione **http://www.bclnews.it**)

SYRIA R. Damascus, 13610, heard at 1330 with a very strong broadcast for the Syrian papulation in the Jordan Valley occupied by the Israelis.

[non] Arab radio, excellent at 1500-1530 on 12120 starting with Kor'an; then, The People Speak, and Arab music with a preference for the singer Abd Halim (Mohamed Kallel, Sfax, Tunisia, *World Of Radio*)

TAIWAN The ITU does not recognize "Taiwan" as an official entity for radiocommunications' planning purposes. HF planning is managed by the Broadcasting Corporation of China ... generally in isolation from the rest of the world, and the authorities in Taipei decline to recognize Beijing as the parent regulatory body. Entries will be found in the HFCC data for "Taiwan," but these are limited to the use of relays, such as arranged by Merlin, and other international brokers.

Operational dates for HF transmission plans for the CBS are not aligned or coordinated in advance with those in use by the majority of other broadcasters, which is the reason for the activation of the schedules at unusual times during the year... That is the reason for the many frequency collisions for the CBS national and international transmissions, where CBS services are on top of established broadcasters (Bab Padula, *World Broadcast Magazine* http://edxp.org)

TIBET 9490, China Tibet PBS, English talk at 1104-1114, then Chinese (George Maroti, NY, *Cumbre DX*) Another date, English until 1130, inviting letters (Scott R Barbour Jr, NH, *World Of Radio*)

UGANDA [non] A revised T-Systems = DTK schedule of relays from Germany showed something new starting Sept 3: *Allerweltshaus* on 17555, Tue-Fri 1500-1530, Sat & Sun 1500-1559, 145°. This is some kind of inter-cultural organization in Cologne, **http://www.allerweltshaus.de/** (gh) Among the groups involved are Ethiopian, Ugandan and Kenyan, fitting the CIRAF zone 48 target area (Kai Ludwig, Germany, *DX Listening Digest*) It is R. Rhino International Africa, oppasition broadcasts for Uganda (Michiel Schaay, Netherlands, *ibid.*) Times on website **http://www.rhinoradio.org/material/about_rria.htm** are confused; UT may stay same for B-03. Only trace of signal here; must be in a null. Farmer Pres. Milton Obate said to be involved (gh, OK)

Trial broadcasts at first, fair here (Alan Pennington, UK, *DX Listening Digest*) Excellent signals here, in English (Chris Greenway, Kenya, *ibid.*) Official launch delayed until September 23 (Hans Johnson, Cody WY, *Cumbre DX*) B-03 moves to 17870 (Alan Pennington, BDXC-UK) Also slogan "Voice of Freedom and Democracy" (Nicolás Eramo, Argentina, *DX Listening Digest*) Godfrey Ayoo verified by E-mail sent to mail@radiorhino.org and suggests checking out **http://www.upcparty.net** and **http://www.dpuganda.org** (Jerry Berg, MA, *BC-DX*)

UKRAINE RUI unexpectedly moved from 12040 to 9810, very good during Sept and Oct including English at 0000, 0300. Alexander Egorov of RUI said they would move again, to 5905 for B-03 (Kraig Krist, VA, *DX Listening Digest*)

UNITED ARAB EMIRATES Dubai in English heard at 0300 [ex 0330] on 13675, 12025 (Tom Sliva, NYC, *DX Listening Digest*)

U K Fans of BBC's comedy show *Just A Minute* should check out **http://www.geocities.com/deanbedford/jam.html** – history of the show, statistics, and even transcripts of more than 400 episodes and growing (Bill Westenhaver, *DX Listening Digest*)

U S A Andrew Jonitschek, Ops Manager of R. Free Asia in Washington has inaugurated their first QSL cards. Reports to RFA, Attn: Ms. Iwanciw, 2025 M. Street, NW, Suite 300, Washington; iwanciwt@rfa.org (Anker Petersen, DSWCI *SW News*)

VOA's now daily *Ventana a Cuba* at 0100 hit by jamming on 9885, 9560 and 9735, while R. Marti was clear on 15330 (Adán González, Venezuela, *DX Listening Digest*) Didn't use to jam VOA when Spanish was to Latin America in general. WJIE planned to return to SW in late Sept, Spanish 155° to SAm on 7490 2200-1000; English 55° (mostly Genesis Christian/patriot programs) and a few evangelists on 13595 to North America 1000-2200 (Larry Baysinger and Hans Johnson, Cumbre DX) QSLs may have the old WJCR call and may ID as such. Paperwork to switch to WJIE had never been completed (Johnson) So only one transmitter (gh)

WBCQ added *Firesign Theatre* comedy during *Area 51*, on 5105, UT Mons 0000 (presumably 0100 after DST). For latest WBCQ program schedule on all frequencies, send blank e-mail to schedule@wbcq.us (Michael Ketter, WBCQ, *World Of Radio*) Earlier on *Area 51*, Sun 2200/2300 *Jean Shepherd*, 2300/2400 an astronomy or science show. Would like to program WBCQ like *Area 51* all the time, and would do so if a million dollar grant were forthcoming (*Allan Weiner Worldwide*, WBCQ)

World Of Radio scheduling from Oct 26, barring unforeseen changes: WBCQ: Wed 2300 7415, 17495-CUSB, Mon 0515 7415. WWCR: Thu 2130 15685 (9475 from Dec), Sat 1130 5070, Sun 0330 5070, 0730 3210, Wed 1030 9475. WRMI: Sat & Sun 1900+ 15725; WINB: Thu 0230 9320 (gh)

WYFR's B03 schedule shows a new far out-of-band channel, 6855, 355° toward E Canada, 0304-0500 Spanish, 0500-0600 English (via Evelyn Marcy, WYFR)

United Patriot Radio's Steve Anderson was sentenced Sept. 15 to 15 years on weapons charges; will have to serve at least 85% of that federal time. Said he is "sorry for the things he said on his shortwave radio program, which caused a great deal of alarm." Is remorseful and appears to have become religious while in custody; wants to minister while in prison. Requested a prison in Talladega, AL, where he could further woodworking skills (AP via *Herald Tribune* via Mike Terry, David Zantow; *Lexington Herald-Leader*, WKYT via gh)

KAAY, Little Rock, AR heard on 2180, 2 x 1090 at 0800 ID in Spanish and English (David Hodgson, TN, harmonics yahoogroup) The 2nd harmonic has got to be a byproduct of wacky output tuning on the old 50 kW RCA rig running 13 kW until they get a new one (Jerry Kiefer, FL, *DX Listening Digest*)

WPAD, 1560, Poducah KY, heard on 2340 at 0820 ID (Ron Trotto, Waggoner IL, *DX Listening Digest*) A rare sesqui-harmonic (1.5 times 1560), probably because transmitter originally generates 780 which is supposed only to be daubled for radiation but also got radiated at triple (gh)

VIETNAM [non] Degar Voice scheduled Tue, Thu, Sat 1300-1330 via Atamanovka, near Chita, Russia, on 7380 ex-7115 in Vietnamese, targeted at the Degar people (also called Montagnards) in the Highlands. More info about them at **http://www.montagnard-foundation.org** (Bernd Trutenau, Lithuania, *DX Listening Digest*) Only ID I heard was at 1320 "Degar, Degar." Ended with a very rustic, string viola selection and off without any fanfare (Edward Kusalik, Alberta, *Cumbre DX*) As usual, crash-started at 1301 with program already in progress. The very last word of a 15-minute talk in Degar was "Amen," so appears this is religious. Clip at **http://www.intervalsignals.net** (Dave Kernick, *DX Listening Digest*)

WESTERN SAHARA [non] Polisario radio via Algeria measured on 7460.31 in Arabic, some French phrases, at 2100-2130 but thin, very weak, also after 0700 (Wolfgang Büschel, Stuttgart, Germany, *BC-DX*)

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

Global Forum

Broadcast Logs

Gayle Van Horn
gaylevanhorn@monitoringtimes.com

0015 UTC on 15150
THAILAND: VOA relay. Multilingual service including bits of English. News bulletins with Chinese music in background, possibly Chinese music jammer? **Radio Thailand** 15395, 0035 with IDs, program info and regional Asian music. Noted same jammer on 9355 at 1836. (Stewart MacKenzie, Huntington Beach, CA) **BBC Thailand relay** 11955, 0030-0037. (Rich D'Angelo, NASWA Flash Sheet)

0102 UTC on 6134.81
BOLIVIA: Radio Santa Cruz. Mix in Spanish and Aymara with regional mentions. Bolivian style music mixing with Brazil's **Radio Aparecida**. (GVH, Brasstown, NC) Bolivia's **Em Pio XII** 5952.39 with discussion on democracy to mentions of **Radio Fides** twice to "Em Pio XII" identification. **Radio Dif Tropico** 6037.5, 2330-2355 (Robert Wilkner, FL/HCDX) **Radio Santa Ana** 4650.35, 2242-2246; **Radio Yura** 4716.79,0106-0130 **Radio San Gabriel** 6080.06, 0858-0906.(Nicholas Eramo, Buenos Aires, ARG/HCDX) **Radio Paititi** 4681.08, 2356-0037. Bolivian's audible between 0015-0020; **Radio Perla del Acre** 4600.32; **Radio Nor Andina** 4460.84; **Radio Bambamarca** 4426.79. (Dave Valko, PA/Cumbre DX)

0103 UTC on 6925 USB
PIRATE: Sunshine Radio. '60s and '70s classic tunes with 33333 SINPO. **Oxycontin Radio** 6926, 0212-0226*. ID as, "80 mg Surround Sound-this is Oxycontin Radio." Mentions of this the last show for awhile. 0222* with ragtime piano music. Unid pirate on 6950 USB, 0214-0240 with segments on Marcell Ledbetter, and biscuits. No ID. **Big Thunder Radio** 6950 USB, 012-0157*; **KROW** 6950 USB, *0200-0230. (Joe Wood, Gray, TN)

0240 UTC on 3359
COSTA RICA: Radio Exterior Espana relay. Latin vocals to four time pips and lady's ID and news. Good signal on this unusual frequency. (D'Angelo, PA/NASWA) Relay noted 3350, 0450-0455 with IDs and flamenco music. (Wood, TN) Relay noted 17850, 1755. (MacKenzie, CA)

0505 UTC on 11820
NEW ZEALAND: Radio NZ Intl. Local news and weather to item on gun control in Marshall Islands. Rugby commentary at 0523 and talk of lady high jumper. (Wood, TN)

0526 UTC on 9600
UAE: AWR. African style music to AWR identification, abruptly off the air at 0528. (MacKenzie, CA)

0737 UTC on 7260
VANUATU: Radio Vanuatu. News mix of Bislama and English. News on Papua New Guinea and other Pacific areas. Station identification 0738 into pop style music. (Patrick Martin, Seaside, OR) Observed 0810-0820 with pops and freq announcement for SW, MW and FM. (Van Horn, NC)

0845 UTC on 3291
GUYANA: Voice of. Hindu/subcontinental music at tune-in. Pop and hip hop vocals to "good morning from Georgetown." Station ID and morning time check. Greetings and personal messages of birthdays and anniversaries. (Sam Wright, Biloxi, MS)

1040 UTC on 4781.4
ECUADOR: Radio Oriental. Spanish music program to lady's local time check and identification. Ecuador's **La Voz del Upano** 5040, 1048+; **Radio Federacion** 4960, 2329. (Arnaldo Slaen, Buenos Aires, ARG) **HCJB** 15115, 1100 with two hours monitored to 1300*. (Bob Fraser, Cohasset, MA) **Radio El Buen Pastor** 4815, 1020-1045. Quechua programming with IDs and camposina music and messages. Station ID with freq mention. (Van Horn, NC) **Radio Quito** 4919, 0843-0845. (Eramo, ARG/Cumbre)

1045 UTC on 4869.97
INDONESIA: RRI Wamena. Nonstop soft Indo Lagu to time ticks at 1100. "Canned" ID at 1122 and back to music. Interference from RRI Sorong. Indo's logged; **RRI Sorong** 4870.93, 1058; **RRI Fak Fak** (tent.) 4789.98, 1104-1120. (Dave Valko, PA/Cumbre DX) **Voice of Indonesia** 9525, 1016-1037; 15150, 2028-2106* (D'Angelo, PA/NASWA)

1051 UTC on 6105
BOLIVIA: Radio Panamericana. Spanish national news to regional time check. Interview to beautiful station jingle and more news as "Panamericana presenta...las noticias junto con CNN." SINPO 43443. Radio Fides 9625, 1110-1125. (Slaen, ARG)

1056 UTC on 3335
PAPUA NEW GUINEA: Radio East Sepik. Possible religious service at tune-in. English news at 1100 recheck. All programming // with 3290 **Radio Central**. Other PNGs audible this hour; **Radio Simbu** 3275; **Radio Western Highlands** 3275; **Radio Madang** 3260; **Radio West New Britain** 3235; **Radio Sandaun** 3205; **Radio Enga** 2410. (Valko, PA/Cumbre)

1636 UTC on 15680
GERMANY: Voice of Hope. Christian programming with interference from co-channel oriental music. Fair signal. **Radio Africa Int'l** via Germany 15715, 1720-1740 with text on AIDS in southern Africa. (Wood, TN) **Russian Radio Intl** via Germany 17705, 1428-1500*. (D'Angelo, PA/NASWA) **Voice of Croatia** via Germany 9925, 2258-2307. (Wood, TN)

1740 UTC on 15209
SAUDI ARABIA: BSKSA. Koran recitations at tune in, extending to 1758. Arabic identification with frequency quote. // 13710 (SINPO 23222) Both frequencies off at 1759.BSKSA audible 11820 // 15230 with Arabic news text and speech (or commentary) at 1810. (Van Horn, NC) Logged 11820, 1958-2005 with fair-good Arabic service. (Wood, TN)

1925 UTC on 15476
ANTARCTICA: Radio Nacional Arcangel San Gabriel, Base Antarctica Esperanza. Very nice Argentina folk music to talks about the Rio Negro region. IDs with frequency quote. SINPO 44444. (Slaen, ARG) 15476, 0100-0205. including pop music and IDs from male/female announcers. Fair-poor quality for Spanish announcements. (Frank Hillton, Charleston, SC)

1958 UTC on 17860
RWANDA: Deutsche Welle relay. German service with conversations to ID at 1954. Musical interlude and feature. Parallel programming on 11795, 9735, via Germany. (MacKenzie, CA)

2005 UTC on 13700
MADAGASCAR: R. Netherlands relay. World to African newscast, // 17605, 21590. (MacKenzie, CA)

2020 UTC on 13615
USA: WEWN. Station identification into pop religious music. (Fraser, MA) Station 13615, 2150-2200 ID as, "WEWN Global Catholic Radio" into rosary. (Wood, TN)

2230 UTC on 12000
TURKEY: Voice of. Pop music program for Turkish service. Station ID with freq quote and email address at 2246. Sign off 2250 with English ID and greeting, to piano interval signal. (Wood, TN) 9830, 2245 Turkish classical music. (Fraser, MA) Spanish VOT 15150, 1627-1735. (Slaen, ARG)

2235 UTC on 6250.34
EQUATORIAL GUINEA: Radio Nacional. Spanish text to Spanish ballads. "Radio Malabo" identification to national anthem and 2302*. Fair signal quality SIO 322. (Banks, TX)

2250 UTC on 12050
EGYPT: Egyptian Radio. Announcer duo's Arabic/English mix and mentions of Islam teachings. (Wood, TN) **Radio Cairo** 9990, 2234-2245. Surprisingly excellent audio with no fading to ID, anthem to 2241*. (Robert, Montgomery, PA/NASWA)

2334 UTC on 5030
BURKINA FASO: Radio Burkina. French pop and rap tunes. Classic '50s music to 2356 as host closes program. Station identification to closing announcements and orchestral anthem. Fair signal. (D'Angelo, PA/NASWA)

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

The QSL Report

Gayle Van Horn
gaylevanhorn@monitoringtimes.com

Is it time for a follow-up?

Last evening while checking my QSL records, I found a few stations that have yet to answer my reception reports. Like many collectors, I, too, have stations that no matter my plea (or ploy) have ignored me! In fact, my local postal clerk continues to ask, "heard from Zanzibar yet"? National Radio of Cambodia never picked up my registered letter at the Phnom Penh post office, so it was returned....and yet I've attempted twice since then!

When the waiting game has extended over three to six months, a follow-up report should be considered. A follow-up report consists of the original report with a new cover letter. The new letter should point out politely that no reply was received to your first communication. Mention the dates of the original letter(s) if you like, and a paragraph or two requesting an answer to verify your monitoring.

I always send my letters to the attention of a QSL Manager, Chief Engineer, or the language service department for the program language I monitored. Many DXers send their reports to a Veri Signer, the person reported as verifying reports in the hobby press. While that method is successful much of the time, remember that staff personnel can change. A envelope addressed to Mr. Wylie Coyote may be disregarded if Mr. Coyote has left the station. You should not have a problem sending letters to those signers who have been reported regularly.

Once that sought-after QSL arrives, a thank you postcard to the station is a great idea, and could persuade the staff to rethink their return rate to listeners. Keep your letter upbeat....and be patient!Is it time for a follow-up?

AMATEUR RADIO

Belgium-OQ5CD, 10 meters. Full data commemorative celebration card of Princess Elizabeth's birth. Received in nine months via ARRL QSL Bureau. (Larry VH, NC)

Burkino Faso-XT2TI, 10 meters. Full data photo card via EA4YK. Received in 46 days for a Euro self-addressed-envelope and two US dollars. QSL address: (Larry VH, NC) DXCC Country # 163.

CUBA

China Radio Int'l relay 5990 kHz. Full data *Jinggang Mountains* scenery card, signed by "Yinglian," noted as Cuban site. Station souvenirs including handmade Chinese art papercuts. Received in twelve days for an English report, souvenir postcard and personal business card. Station address: 16A Shijingshan Street, Beijing 100040, China. Station website: **http//www.cri.com.cn.** (Gayle VH, NC)

EL SALVADOR

Radio Imperial, 17833.5 kHz. No data verification on station letterhead signed by Pedro Mendoza-Pastor. Received in 26 days for a Spanish/English report and mint stamps. Station address: Apartado 56, Sonsonate, El Salvador. (Brian Bagwell, St. Louis, MO)

GERMANY

Deutschelandradio-Berlin, 6005 kHz. Full data unsigned logo card. Received in 18 days for an English report. Station address: Hans-Rosenthal-Platz, D-10825 Berlin Schönberg, Germany. Station website: **http://www.dradio.de/drib/index.html**. (Arnaldo Slaen, Buenos Aires, Argentina)

Swiss Radio Int'l via Juelich, Germany relay, 13795 kHz. Full date color photo montage card unsigned, noted as "Juelich" site. Received in 20 days for an English report, souvenir postcard and personal business card. Station address: Giacomettistrasse 1, CH-3000 Berne 15, Switzerland . Email: **english@sri.ch**. Station website: **http://www.swissinfo.org**. (Gayle VH, NC)

LIBYA

Radio Jamahiriya, 17880 kHz. Full data colored rainbow/logo card unsigned. Received in 65 days for an English report and souvenir postcards. Report sent to P.O. Box 333, Tripoli, Libya, postmarked from P.O. Box 17, Hamrun, Malta. (Masato Ishii, Japan/DSWCI DX Window/DXLD) 15220 kHz verified with full data card unsigned in 130 days. Sent to Malta address. (Patrick Martin, Seaside, OR) letters to Malta address recommended over Libyan address. -ed.

MEDIUM WAVE

KDZR, 1640 kHz AM. Personal note on Disney letterhead from Tom White-Chief Engineer. Received in 13 days for an AM report. Station address: 3030 SW Moody Avenue, Portland, OR 97201 USA. (Martin, OR)

KUTI, 1460 kHz AM. Verification form letter signed by Operations Manager (name illegible). Received in 20 days for an AM report. Station address: 4010 Summitview Ave., Yakima, WA 98908. (Martin, OR)

WDSR, Fernandina Beach, FL, 1570 kHz AM. Full data QSL letter signed by Ron Gitschier-Tech Asst. Received in 54 days for DX Test. Not a new station, but always log their DX tests. Station address: c/o Ron Gitschier, 68 Roxboro Drive, Palm Coast, FL 32164. (Martin, OR)

PARAGUAY

Radio America, 7370 kHz. Full data QSL folder card signed by Adan Mur-Asesor Tecnico. Received in four days for Spanish reception report via email to; **radioamerica@lycos.com**. Station address: Casilla No. 2220 Asuncion, Paraguay. (Slaen, ARG)

PIRATE

Radio Alfa Lima Int'l, 15070 kHz. Full data card signed by "Alfred" plus station sticker. Veri signer states the station currently having legal problems and is off the air, with plans to return shortly. Received in one year. QSL maildrop: P.O. Box 663, 7900 AR, Hoogeveen, Netherlands. (Cesar Perez Dioses, Chimbote, Peru)

Voodoo Radio, 6925 USB kHz. Full data card signed by "Rev. V.B.", plus inspirational literature. Received in 20 days for three mint stamps and an applause card. QSL maildrop: P.O. Box 69, Elkhorn, NE 68022 USA. (Joe Wood, Gray, TN)

ROMANIA

Radio Romania Int'l. 11775, 11940 kHz. Full data cards *The Village Museum Peasant House*, unsigned. Received in 37/57 days. *Loyalty Diploma* enclosed for two years of station monitoring, plus program/frequency schedules and station sticker. Reports sent via email to; **engl@rri.ro.** (Kraig Krist, Annandale, VA) Station address: 60-62 Berthelot St., RO-70747 Bucharest, Romania (or) P.O. Box 111, RO-70756 Bucharest, Romania.

UNITED ARAB EMIRATES

Gospel for Asia via Al Dhabayya. Full data GRA Radio card signed by Rhonda Penland-Co-ordinator, confirming Hindu and Malayam services. Business card, schedule and apology note for six months delay in reply. My report was forwarded to India after receiving initial reply from Stony Creek, Ontario. QSL address: GFA Radio, West Coast Office, P.O. Box 1210 Somis, CA 93066 USA. USA email: **gfaradio@mygfa.org**. (Edward Kusalik VE6EFK, Canada/Cumbre DX)

ZAMBIA

Radio Zambia 6265 kHz. Full data card unsigned. Received in 79 days for an English report and Zambian mint stamps. Station address: Mass Media Complex, Alick Nkhata Road, P.O. Box 50015, Lusaka, 10101, Zambia. (Ross Comeau, Andover, MA) Station website: **http://www.znbc.co.zm**.

John Figliozzi
johnfigliozzi@monitoringtimes.com

DX PROGRAMS; The VOA and YOU

◆ Semi-Annual SWL/DX Program List

The listing this time has been tightened: strictly programs on shortwave about shortwave and DXing. Get frequency information and abbreviations from *MT's SWG*. Times approximate; everything subject to change; corrections welcomed.

Ask WWCR - *WWCR (fortnightly)* - W 1815 (15825); F 1045, 2130 (9475); A 0945 (5070); S 0045 (9475), 1115 (15825), 1830 (12160).

CIDX Report - ***R. Canada Int.*** - S 2107; M 0207; W 2135; H 0235 (fortnightly within *The Maple Leaf Mailbag*).

Continent of Media - ***R. for Peace Intl.*** - H 2000; F 0200, 0800, 1400; A 2130, S 0330, 0930, 1530.

DX Corner* - ***R. Budapest*** - F 2120, 2250; A 0220, 0350.

DX Corner* - ***Voice of Turkey*** (fortnightly) - A 1245, 1845, 2045, 2215; S 0315.

[*Not the same program, although they share the same title.]

DXers' Corner - ***All India Radio***, fortnightly - M 1840, 2130; T 2340.

DX Partyline - ***HCJB Ecuador*** - A 1230. ***WWCR Tennessee*** - A 1530 (12160); S 0300 (5070); T 1030 (9475); W 0930 (3210); H 2100 (15825). ***WINB Pennsylvania*** - A 1830.

DXers Unlimited - ***R. Habana Cuba*** (in two weekly editions) - First edition - A 2110, 2310; S 0140, 0340, 0540. Second edition - T 2105, 2305; W 0140, 0340, 0540.

DXing with Cumbre - ***WHRI Indiana*** - A 0600 (5745 & 7315), 0730 (5745 & 7315), 1330 (9495), 1600 (13760), 2030 (9495), 2330 (9495); S 0730 (5745), 2200 (5745); M 0330 (5745), 0430 (7315). ***KWHR Hawaii*** - A 0600 (17780), 1000 (11565); S 0430 (17780), 1600 (9930). ***WHRA Maine*** - F 2100 (17650); A 0430 (7580), 1000 (11565), 2130 (17650); S 0230 (7580), 0730 (11730).

Feedback - ***R. Australia*** - F 2105; A 0605; S 0305.

Kim Elliot (segment within ***Main Street***) - ***VOA*** - S 0237, 0437, 0637, 1037.

Mailbox/RNZI Talk - ***R. New Zealand Intl.*** (programs alternate) - M 0830, 1130, 1330, 1530; T 0330.

R. Bulgaria Calling - ***R. Bulgaria*** - F 2045; A 0045, 1245, 2245; S 0345.

Radio Waves - ***R. Exterior de Espana*** - A 2140; S 0040.

Radio World - ***R. Vlaanderen Intl.*** - S 0700, 1130, 1730, 1930, 2230; M 0400.

The Real Amateur Radio Show - ***WBCQ Maine*** - S 0000 (7415).

The Whole World on the Radio Dial - *R. Ukraine Int.* - A 2218; S 0118, 0418, 1218.

Viva Miami - ***WRMI Florida*** - S 0330 (7385), 1030 (9955), 1330 (15725).

Wavescan - ***Adventist World R., Austria*** - S 0200, 0300, 0730, 0830, 2100. *AWR., Slovakia* - S 1930. *AWR., South Africa* - S 0500, 0530, 0600, 1800. *AWR., UAE* - S 0030, 0330, 1300, 1330. *AWR, England* - S 2000. ***KSDA Guam*** - S 1000, 1300, 1330, 1600, 2000, 2130.***WRMI Florida*** - S 0300 (7385), 1400 (15725). 2130 (15725); M 0330 (7385). *WINB Pennsylvania* - S 0200.

World of Radio - ***WBCQ Maine*** - W 2300 (7415/17495), M 0515 (7415). ***WWCR Tennessee*** - H 2130 (9475); A 1130 (5070); S 0330 (5070), 0730 (3210); W 1030 (9475). ***R. for Peace Intl.*** - F 1930; A 0130, 0730, 1330, 1730, 2330; S 0530, 1130, 1830; M 0030, 0630, 1230; T 1900; W 0100, 0700, 1300. ***WINB Pennsylvania*** - H 0230. ***WRMI Florida*** A/S 1900.

Worldwide Friendship - ***R. Korea Intl.*** - A 0810, 1140, 1310, 1610, 1910, 2110; S 0210.

Special thanks to Bill Brady, Glenn Hauser, Marie Lamb, and Harold Sellers whose valuable work has been included in the compilation of this list.

◆ The VOA, Public Diplomacy & SWLs

Alan Heil, author of *Voice of America, A History* (see October's column and September's *What's New* section), wrote in to clarify some information presented here last month. He writes that although **Radio Sawa** and **Radio Farda** were initially billed as being part of VOA, they really aren't. Neither uses the VOA name or VOA central news, instead principally rely on formats of local and Western pop music, interrupted by brief headline-style news summaries. Both have little U.S-related content.

Farda actually replaced **Radio Free Europe's Radio Azadi** Persian Service. Consequently, VOA retains its Persian Service; but VOA Arabic – initially eliminated but partially restored in 2003 – lacks transmitter time. A web site, *voaarabic.com*, contains in-depth material and U.S.-related fare, in-depth reports, a text service and audio updated at 1900 or 1930 weekdays.

This circumstance illustrates a most disconcerting feature of US international broadcasting. It's confusing, both organizationally and in its public presentation. Why so many, often competing services? In a word: politics. Many decisions seem have been made on a congressional whim or by political appointees with little background in public service broadcasting or international cultural affairs. Consequently, there are too many "voices of America" (to draw an apt description from a Winter 1989-90 article in *Foreign Policy* of the same name by Kim Elliott). Available resources – quite thin already – inevitably get used inefficiently.

U.S. international broadcasting also takes place almost entirely out of view of the people footing the bill – you and me. This is largely due to the Smith-Mundt Act, an almost paranoic legacy from the '40s which – in essence – forbids the VOA and its siblings from communicating with us. In today's multi-platform multichannel universe, is there any basis at all for this law to exist? Yet, largely because of it, significant issues are debated and decisions are made about public diplomacy without public knowledge or input.

Ongoing conflicts over fundamental matters also transpire in near secrecy, such as that between those who emphasize the need for the VOA to be journalistically sound and others who want it to reflect official thinking above all else. In his book, Heil chronicles these battles that seem to flare up in times of crisis and threaten to strip the VOA at the blink of an eye of its painstakingly hardwon reputation for trust and accuracy. Not that there aren't also valid arguments for the VOA to reflect a national consensus of sorts overseas.

My preference is for one, journalistically sound **Voice of America** that eschews the shading of information or (worse yet) blatant propagandizing, in favor of reflecting the true diversity of this society on all its levels. Others may have an alternate view. The essential point, though, is that this is far too important a discussion to be had without informed public participation. We – SWLs, that is – need to get ourselves into that conversation. More ideas on this to come.

Until December, good listening!

Longwave Resources

✓ **Sounds of Longwave** 60-minute Audio Cassette featuring WWVB, Omega, Whistlers, Beacons, European Broadcasters, and more! **$13.95** postpaid

✓ **The BeaconFinder** A 65-page guide listing Frequency, ID and Location for hundreds of LF beacons and utility stations. Covers 0-530 kHz. **$13.95** postpaid

Kevin Carey
P.O. Box 56, W. Bloomfield, NY 14585

How to Use the Shortwave Guide

0000-0100 twhfa / USA, Volce 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 page.

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

Find the station you want to hear.

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

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

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

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

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

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

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

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

Target Areas	
af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica 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

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John Figliozzi, Program Manager — johnfigliozzi@monitoringtimes.com
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Program Highlights

John Figliozzi

❖ Changes at R. Netherlands

Despite its consistently excellent programming, even **R. Netherlands** is not immune to budget cutting. Consequently, there are some changes and reductions taking place to the station's schedule effective October 26, though **RN** has done a commendable job minimizing the effects on its listening audience.

All transmissions now start on the hour, instead of the half-hour. Other than this time shift, the two hour transmission to eastern and central North America (now at 0000-0200 UT) and hour to western North America (now 0400-0500 UT) remain intact. However, the four-hour morning transmissions (two to the east and two to the west) instituted after the BBC reductions in July 2001 have themselves been reduced to a single one hour transmission to eastern North America at 1200 UT. On the plus side, a two-hour afternoon transmission to North America (1900-2100 UT) has been added to the schedule on weekends.

There are programming changes as well. A new arts series called *Vox Humana* premieres. The program is a merging of *Aural Tapestry* and *The Sound Fountain*, both of which will no longer air. *Music 52-15* and *Sincerely Yours*, the listener feedback program, have both been cancelled.

❖ ...And At R. Australia

RA also took a budget hit recently and this has resulted in some schedule changes there, as well. Programs dropped include *Blacktracker*, *The Australian Music Show*, *Fine Music Australia*, *Oz Sounds*, *Australian Express* and *Go Zone*. Replacement titles include ***Hit Mix*** (hosted by RA's Brendon Telfer), ***The Lounge*** (with RA's Heather Jarvis) and ***Keys to Music*** (a two hour music appreciation program originating from ABC Classic FM). The series *Australia Now* is also being repeated and now has its own web site **http://www.abc.net.au/ra/australia**, which is entitled *Understanding Australia*. It stores the audio and transcripts of the series, available on-demand; but has much more information as well.

Revised schedules for these and many others are in this month's Guide.

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

0000	0007		Sierra Leone, SLBS	3316do		
0000	0015	vl	Cambodia, National Radio Of		11940as	
0000	0015		Japan, Radio	6145na	13650as	17810as
0000	0027		Czech Rep, Radio Prague Intl		7345na	9440na
0000	0028	mtwhfa	Serbia & Montenegro, RSCG		9580na	
0000	0030		Egypt, Radio Cairo	11725na		
0000	0030	DRM	Netherlands, Radio	15525na		
0000	0030		Thailand, Radio	9570af		
0000	0030		UK, BBC World Service 17615as		3915as	11945as
0000	0030		USA, Voice of America 7215as 15185as 15290as		9770as 17740as	11760as 17820as
0000	0045		India, All India Radio 9705as 13605as		9950as	11620as
0000	0100		Anguilla, Caribbean Beacon		6090am	
0000	0100		Australia, ABC NT Alice Springs		2310irr	4835do
0000	0100		Australia, ABC NT Katherine		5025do	
0000	0100		Australia, ABC NT Tennant Creek		4910do	
0000	0100		Australia, Radio 15415as 17580pa 17750as 21725as	9660pa	12080va 17775as	15240po 17795va
0000	0100	vl	Botswana, Radio	3356do	4820do	7255do
0000	0100		Canada, CBC Northern Service		9625do	
0000	0100		Canada, CFRX Toronto ON		6070do	
0000	0100		Canada, CFVP Calgary AB		6030do	
0000	0100		Canada, CKZN St John's NF		6160do	
0000	0100		Canada, CKZU Vancouver BC		6160do	
0000	0100		Canada, Radio Canada Intl		9640as	15205as
0000	0100		Costa Rica, Radio for Peace Intl		7445am	15038va
0000	0100		Costa Rica, University Network 7375am 9725sa		5030am 11870am	6150am 13750na
0000	0100	1st a	Finland, Scandinavian Weekend Radio 11690eu			5990eu
0000	0100		Germany, Deutsche Welle 9825as		7130as	9505as
0000	0100		Guyana, Voice of	3291do	5950do	
0000	0100		Malaysia, Radio	7295do		
0000	0100		Namibia, Nomibion BC Corp 6060af 6175al		3270af	3290af
0000	0100		Netherlands, Radio	6165na	9845na	
0000	0100		New Zealand, Radio NZ Intl		17675pa	
0000	0100		Sierra Leone, Radio UNAMSIL		6139af	
0000	0100		Singapore, Mediacorp Radio		6150do	
0000	0100	vl	Solomon Islands, SIBC	5020do	9545do	
0000	0100		Spain, Radio Exterior Espana		15385am	
0000	0100		UK, BBC World Service 6195as 9410as 12095as 15280as	9740as 15310as	5970as 9825sa 15360as	5975va 11955as 17790as
0000	0100		Ukraine, Radio Ukraine Intl		9810na	
0000	0100		USA, Armed Forces Radio 5765usb 6350usb 12579usb	7507usb 13362usb	4319usb 10320usb 13855usb	5446usb 12335usb
0000	0100		USA, KAIJ Dallas TX	13815va		
0000	0100		USA, KTBN Salt Lake City UT		15590na	
0000	0100		USA, KWHR Naalehu HI		17510as	
0000	0100	twhfa	USA, Voice of America 6130am 9775am 11695am 13790am		7405am	9455am
0000	0100		USA, WBCQ Kennebunk ME 9330na		5105na	7415na
0000	0100		USA, WBOH Newport NC		5920am	
0000	0100		USA, WEWN Birmingham AL		5825na	
0000	0100		USA, WHRA Greenbush ME		7580va	
0000	0100		USA, WHRI Noblesville IN		5745va	7315am
0000	0100		USA, WINB Red Lion PA		12160am	
0000	0100	sm	USA, WRMI Miami FL	9955am		
0000	0100	twhfa	USA, WRMI Miami FL	7385na		
0000	0100	vl	USA, WSHB Cypress Creek SC		7535am	9430sa
0000	0100		USA, WTJC Newport NC		9370na	
0000	0100	sm	USA, WWBS Macon GA		11910na	
0000	0100		USA, WWCR Nashville TN 7465na 13845na		3210na	5070na
0000	0100		USA, WWRB Manchester TN 6890na		5050na	5085na
0000	0100		USA, WYFR Okeechobee FL 11720sa		6085na	9505na
0000	0100	vl	Vanuatu, Radio	3945al	7260do	
0015	0100		Japan, Radio	6145na		
0030	0100		Iran, Voice of the Islamic Rep		9590na	11920na
0030	0100		Lithuania, Radio Vilnius		9855al	11690na
0030	0100		Sri Lanka, SLBC	6005as	9770as	15745as
0030	0100		Thailand, Radio	15395na		
0030	0100		UAE, AWR Africa	9720as	9810as	
0030	0100		UAE, Bible Voice	7180as		
0030	0100		USA, Voice of America 7215as 15185as 15290as	17740as	9770as	11760as 17820as
0038	0050		Croatia, Voice of	9925sa		
0045	0100		Pakistan, Radio	11650as	15625as	
0055	0100		Italy, RAI Intl	9675am	11800am	

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

0100	0115		Italy, RAI Intl	9675na	11800am	
0100	0115		Pakistan, Radio	11650as	15625as	
0100	0120		Kyrghyz, Kyrghyz Radio		4010as	4795as
0100	0125		Netherlands, Radio	6165na	9845na	
0100	0127		Czech Rep, Radio Prague Intl		6200na	7345na
0100	0127		Slovakia, Radio Slovakia Intl 9440sa		5930na	6190ca
0100	0127		Vietnam, Voice of	6175na		
0100	0128		Hungary, Radio Budapest		9590na	
0100	0130	s	Germany, Universal Life		9435as	
0100	0130		Uzbekistan, Radio Tashkent Intl		7190as	9715as
0100	0156		China, China Radio Intl		9580na	9790na
0100	0156		North Korea, Voice of 11580am 13760am	3560as	6195as 11735am	7140am 15180am
0100	0200		Anguilla, Caribbean Beacon		6090am	
0100	0200		Australia, ABC NT Katherine		5025do	
0100	0200		Australia, ABC NT Tennant Creek		4910do	
0100	0200		Australia, Radio 15415as 17580pa 17750as 21725as	9660pa	12080va 17775as	15240pa 17795va
0100	0200	vl	Botswana, Radio	3356do	4820do	7255do
0100	0200		Canada, CBC Northern Service		9625do	
0100	0200		Canada, CFRX Toronto ON		6070do	
0100	0200		Canada, CFVP Calgary AB		6030do	
0100	0200		Canada, CKZN St John's NF		6160do	
0100	0200		Canada, CKZU Vancouver BC		6160do	
0100	0200		Canada, Radio Canada Intl 15305am		9755am	15170am
0100	0200		Costa Rica, Radio for Peace Intl		7445am	15038va
0100	0200		Costa Rica, University Network 7375am 9725sa		5030am 11870am	6150am 13750na
0100	0200		Cuba, Radio Havana	6000na	9820na	11705na
0100	0200	1st a	Finland, Scandinavian Weekend Radio 11690eu			5990eu
0100	0200		Guyana, Voice of	3291do	5950do	
0100	0200		Indonesia, Voice of	9525va	11785as	
0100	0200		Iran, Voice of the Islamic Rep		9590na	11920na
0100	0200		Japan, Radio 17560me 17685po	11860as	11880me 17810as	15325as 17835sa 17845as
0100	0200		Malaysia, Radio	7295do		
0100	0200		Namibia, Namibian BC Corp 6060af 6175al		3270af	3290af
0100	0200		New Zealand, Radio NZ Intl		17675pa	
0100	0200		Russia, Voice of 12000na 17595na		7180na	9725na 11825na
0100	0200		Sierra Leone, Radio UNAMSIL		6139af	
0100	0200		Singapore, Mediacorp Radio		6150do	
0100	0200	vl	Solomon Islands, SIBC	5020do	9545do	
0100	0200		Sri Lanka, SLBC	6005as	9770as	15745as
0100	0200		Taiwan, Radio Taiwan Intl		15600eu	
0100	0200		UK, BBC World Service 9410as 15280as	9525am 15310as	5975va 9825sa 15360as	6195as 11955as 15190sa 17790as
0100	0200		USA, Armed Forces Radio 5765usb 6350usb 12579usb	7507usb 13362usb	4319usb 10320usb 13855usb	5446usb 12335usb
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	twhfa	USA, Voice of America 9455am 9775am 13790am	5995af	6130af	7405am
0100	0200		USA, Voice of America 11725as 11820as	7115as 13650as	9635as 17740as	11705as 17820as
0100	0200		USA, WBCQ Kennebunk ME 9330na		5105na	7415na
0100	0200		USA, WBOH Newport NC		5920am	
0100	0200		USA, WEWN Birmingham AL		5825na	
0100	0200		USA, WHRA Greenbush ME		7580va	
0100	0200		USA, WHRI Noblesville IN		5745va	7315am
0100	0200		USA, WINB Red Lion PA		12160am	
0100	0200	sm	USA, WRMI Miami FL	9955am		
0100	0200	twhfa	USA, WRMI Miami FL	7385na		
0100	0200	vl	USA, WSHB Cypress Creek SC		7535am	9430sa
0100	0200		USA, WTJC Newport NC		9370na	
0100	0200		USA, WWCR Nashville TN 5935na 7465na		3210na	5070na
0100	0200		USA, WWRB Manchester TN 6890na		5050na	5085na
0100	0200		USA, WYFR Okeechobee FL 15060as		6065na	9505na
0100	0200	vl	Vanuatu, Radio	3945al	7260do	
0105	0112		Croatia, Voice of	9925na		
0130	0200		Australia, HCJB	15555as		
0130	0200		Australia, Voice Intl	17775as		
0130	0200	mtwhf	Austria, Radio Austria Intl		9870na	
0130	0200		Iraq, Radio Iraq Intl	6175irr	9687irr	11787irr
0130	0200		Sweden, Radio	9435va	9495na	
0130	0200		UK, RTE Radio	6155ca		

SELECTED PROGRAMMING BEGINS ON PAGE 55

0130	0200	twhfa	USA, Voice of America 7405am	9775am	13740am
0130	0200		USA, Voice of America 7115as 11725as 11820as 13650as	9635as 17740as	11705as 17820as
0140	0200		Vatican City, Vatican Radio	9650as	12055as
0145	0200	twhfa	Albania, Radio Tirana Intl	6115na	7160eu
0145	0200	mtwhf	Austria, Radio Austria Intl	9870na	

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

0200	0210		Bangladesh, Bangla Betar	4882as	
0200	0227		Iran, Voice of the Islamic Rep	9590no	11920na
0200	0230	sm w fa	Belarus, Radio Belarus Intl	5970eu	7210eu
0200	0230		UAE, Bible Voice 9610as		
0200	0230	a	UK, Wales Radio Intl 9795na		
0200	0230		USA, KJES Vado NM 7555na		
0200	0256		North Korea, Voice of 4405as	11845as	15230as
0200	0256		Romania, Radio Romania Intl 15105as 17720as	9510na	11940na
0200	0256		South Korea, Radio Korea Intl 15575na	9560am	11810as
0200	0257		Canada, Radio Canada Intl	15510as	17860as
0200	0300		Anguilla, Caribbean Beacon	6090am	
0200	0300	twhfa	Argentina, RAE 11710am		
0200	0300		Australia, ABC NT Alice Springs	2310irr	4835da
0200	0300		Australia, ABC NT Katherine	5025do	
0200	0300		Australia, ABC NT Tennant Creek	4910do	
0200	0300		Australia, HCJB 15555as		
0200	0300		Australia, Radio 9660pa 15415as 15515va 17580pa	12080va 17750as	15240pa 21725as
0200	0300		Austria, AWR Europe 9820as		
0200	0300	vl	Botswana, Radio 3356do	4820do	7255do
0200	0300		Bulgaria, Radio 9400na	11900na	
0200	0300		Canada, CBC Northern Service	9625do	
0200	0300		Canada, CFRX Toronto ON	6070do	
0200	0300		Canada, CFVP Calgary AB	6030do	
0200	0300		Canada, CKZN St John's NF	6160do	
0200	0300		Canada, CKZU Vancouver BC	6160do	
0200	0300		Costa Rica, Radio for Peace Intl	7445am	15038va
0200	0300		Costa Rica, University Network 7375am 9725sa 11870am	5030am 13750na	6150am
0200	0300		Cuba, Radio Havana 6000na	9820na	11705na
0200	0300		Egypt, Radio Cairo 11780na		
0200	0300	1st a	Finland, Scandinavian Weekend Radio 11720eu		5980eu
0200	0300	vl/as	Germany, Bible Voice BC Network	11805as	17540as
0200	0300		Guyana, Voice of 3291do	5950do	
0200	0300		Malaysia, Radio 7295do		
0200	0300		Myanmar, Radio 7185do		
0200	0300		Namibia, Namibian BC Corp 6090af 6175al	3270af	3290af
0200	0300		New Zealand, Radio NZ Intl	17675pa	
0200	0300	as	Philippines, Radio Pilipinas 15270me	11885me	15120me
0200	0300		Russia, Voice of 7180na 17595no	9725na	12000na
0200	0300		Sierra Leone, Radio UNAMSIL	6139af	
0200	0300		Singapore, Mediocorp Radio	6150do	
0200	0300	vl	Solomon Islands, SIBC 5020do	9545do	
0200	0300		Sri Lanka, SLBC 6005as	9770as	15745as
0200	0300		Taiwan, Radio Taiwan Intl 11875as 15320as	5950no	9680na
0200	0300		UK, BBC World Service 9525am 9750af 9825sa 15190so 15280as	5975vo 11760va 15310as	9410as 11955as 15360as 17790as
0200	0300		USA, Armed Forces Radio 5765usb 6350usb 7507usb 12579usb	4319usb 10320usb 13362usb	5446usb 12335usb 13855usb
0200	0300		USA, KAIJ Dallas TX 5755va		
0200	0300		USA, KTBN Salt Lake City UT	7505no	
0200	0300		USA, KWHR Naalehu HI	17510as	
0200	0300		USA, Voice of America 7115as 11725as 11820as 13650as	9635as 17740as	11705as 17820as
0200	0300		USA, WBCQ Kennebunk ME 9330na	5105na	7415na
0200	0300		USA, WBOH Newport NC	5920am	
0200	0300		USA, WEWN Birmingham AL	5825na	
0200	0300		USA, WHRA Greenbush ME	7580va	
0200	0300		USA, WHRI Noblesville IN	5745va	7315am
0200	0300		USA, WINB Red Lion PA	12160am	
0200	0300		USA, WRMI Miami FL 7385na		
0200	0300	vl	USA, WSHB Cypress Creek SC	7535na	9430am
0200	0300		USA, WTJC Newport NC	9370na	
0200	0300		USA, WWCR Nashville TN 5935na 7465na	3210na	5070na
0200	0300		USA, WWRB Manchester TN 6890na	5050na	5085na
0200	0300		USA, WYFR Okeechobee FL 9505na 9985so 11855ca	5985na	6065na
0205	0220		Croatia, Voice of 9925na		
0215	0220		Nepal, Radio 3230as	5005as	
0230	0257		Vietnam, Voice of 6175na		
0230	0258		Hungary, Radio Budapest	9570na	
0230	0300	twhfa	Albania, Radio Tirana Intl	6115na	7160eu
0230	0300		Sweden, Radio 9495na		
0250	0300		Vatican City, Vatican Radio	7305am	9605am
0250	0300		Zambia, Radio 4910do		

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

0300	0310		Vatican City, Vatican Radio 9660af	7305am	9605am
0300	0327		Czech Rep, Radio Prague Intl	7345na	9870na
0300	0329		Belgium, Radio Vlaanderen Intl	15565am	
0300	0330		Australia, HCJB 15555as		
0300	0330		Egypt, Radio Cairo 11780na		
0300	0330	stwhfa/v	Mexico, Radio Mexico Intl	9705am	11770am
0300	0330	as	Philippines, Radio Pilipinas 15270me	11885me	15120me
0300	0330		South Africa, Channel Africa	6035af	
0300	0330		Thailand, Radio 15395na		
0300	0330		USA, Voice of America 6080af 7340af 9575af 17895af	7105af 9885af	7290af 11835af 12080af
0300	0350		UAE, Radio Dubai 12025na 17890na	13675na	15400na
0300	0356		China, China Radio Intl	9690na	9790na
0300	0356		North Korea, Voice of 3560as 9345as	6195as	7140as
0300	0400		Anguilla, Caribbean Beacon	6090am	
0300	0400		Australia, ABC NT Alice Springs	2310irr	4835da
0300	0400		Australia, ABC NT Katherine	5025do	
0300	0400		Australia, ABC NT Tennant Creek	4910do	
0300	0400		Australia, Radio 9660pa 15415as 15515va 17580pa	12080va 17750as	15240pa 21725as
0300	0400	vl	Botswana, Radio 3356do	4820do	7255do
0300	0400		Canada, CBC Northern Service	9625do	
0300	0400		Canada, CFRX Toronto ON	6070do	
0300	0400		Canada, CFVP Calgary AB	6030do	
0300	0400		Canada, CKZN St John's NF	6160do	
0300	0400		Canada, CKZU Vancouver BC	6160do	
0300	0400		Costa Rica, Radio for Peace Intl	7445am	15038va
0300	0400		Costa Rica, University Network 7375am 9725sa 11870am	5030am 13750na	6150am 17645as
0300	0400		Cuba, Radio Havana 6000na	9820na	11705na
0300	0400	1st a	Finland, Scandinavian Weekend Radio 11720eu		5980eu
0300	0400	vl	Guatemala, Radio Cultural	3300do	
0300	0400		Guyana, Voice of 3291do	5950do	
0300	0400		Japan, Radio 17825ca	21610po	
0300	0400		Malaysia, Radio 7295do		
0300	0400		Malaysia, Voice of 6175as 15295au	9665as	9750as
0300	0400		Namibia, Namibian BC Corp 6090af 6175al	3270af	3290af
0300	0400		New Zealand, Radio NZ Intl	17675pa	
0300	0400		Oman, Radio 15355af		
0300	0400		Russia, Voice of 7180na 12000na 15455na 17650no	11720na 17660na	11750no 17690na
0300	0400		Sierra Leone, Radio UNAMSIL	6139af	
0300	0400		Singapore, Mediacorp Radio	6150do	
0300	0400	vl	Solomon Islands, SIBC 5020do	9545do	
0300	0400		Sri Lanka, SLBC 6005as	9770as	15745as
0300	0400		Taiwan, Radio Taiwan Intl 15215sa 15320as	5950no	9680na
0300	0400		Turkey, Voice of 7270va	9650eu	
0300	0400		Uganda, Radio 4976do	5026do	7196do
0300	0400	DRM	UK, BBC World Service	11955no	
0300	0400		UK, BBC World Service 6005af 6190af 6195eu 9525am 9750af 11760va 15310as 15360as 15575as 17790as 21660as	3255af 7160af 11765af 17760as	5975va 9410va 15280af 12035af
0300	0400		Ukraine, Radio Ukraine Intl	9810na	
0300	0400		USA, Armed Forces Radio 5765usb 6350usb 7507usb 12579usb	4319usb 10320usb 13362usb	5446usb 12335usb 13855usb
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		USA, WBCQ Kennebunk ME 9330na	5105na	7415na
0300	0400		USA, WBOH Newport NC	5920am	
0300	0400		USA, WEWN Birmingham AL	5825na	
0300	0400		USA, WHRA Greenbush ME	7580va	
0300	0400		USA, WHRI Noblesville IN	5745va	7315am
0300	0400		USA, WINB Red Lion PA	12160am	
0300	0400	smtwhf	USA, WMLK Bethel PA 9465eu		
0300	0400		USA, WRMI Miami FL 7385na		
0300	0400	vl	USA, WSHB Cypress Creek SC	7535eu	9450eu
0300	0400		USA, WTJC Newport NC	9370na	
0300	0400		USA, WWCR Nashville TN 5935na 7465na	3210na	5070na
0300	0400		USA, WWRB Manchester TN 6890na	5050na	5085na
0300	0400		USA, WYFR Okeechobee FL 11740sa	6065na	9505na
0300	0400		Zambia, Radio 4910do		
0300	0400	vl	Zimbabwe, ZBC Corp 5975do		
0305	0312		Croatia, Voice of 9925na		
0310	0330		Vatican City, Vatican Radio	9660af	
0330	0357		Czech Rep, Radio Prague Intl	11600va	15620va
0330	0357		Vietnam, Voice of 6175na		

Shortwave Guide

0330	0400		Malaysia, Radio Malaysia Kota Kinabalu			5979do
0330	0400		UAE, AWR Africa	15160as		
0330	0400		UK, BBC World Service		15420af	
0330	0400		USA, Voice of America	6080af	7105af	7290af
			9575af	9885af	11835af	12080af	17895af
0345	0400		Tajikistan, Tajik Radio	7245as		

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

0400	0415		Israel, Kol Israel	9435va	15640va	17600va
0400	0415		South Africa, TWR	11640af		
0400	0430		France, Radio France Intl		9550af	11700af
			11910af			
0400	0430	vl	Guatemala, Radio Cultural		3300do	
0400	0430	stwhfa/vl	Mexico, Radio Mexico Intl		9705am	11770am
0400	0430		South Africa, Channel Africa		5955af	
0400	0430		Sri Lanka, SLBC	6005as	9770as	15745as
0400	0430		UK, Project Airwaves	21510as		
0400	0445		USA, WYFR Okeechobee FL		6065no	9505na
0400	0456		China, China Radio Intl		9560na	9755na
0400	0456		Romania, Radio Romania Intl		9510na	11940na
			15335as 17735as			
0400	0458		New Zealand, Radio NZ Intl		17675pa	
0400	0500		Anguilla, Caribbean Beacon		6090am	
0400	0500		Australia, ABC NT Alice Springs		2310irr	4835do
0400	0500		Australia, ABC NT Katherine		5025do	
0400	0500		Australia, ABC NT Tennant Creek		4910do	
0400	0500		Australia, Radio	9660pa	12080va	15240pa
			15415as 15515va	17580pa	17750as	21725as
0400	0500	vl	Botswana, Radio	3356do	4820do	7255do
0400	0500		Canada, CBC Northern Service		9625do	
0400	0500		Canada, CFRX Toronto ON		6070do	
0400	0500		Canada, CKZN St John's NF		6160do	
0400	0500		Canada, CKZU Vancouver BC		6160do	
0400	0500		Costa Rica, Radio for Peace Intl		7445am	15038va
0400	0500		Costa Rica, University Network		5030am	6150am
			7375am 9725sa	11870am	13750na	17645as
0400	0500		Cuba, Radio Havana	6000na	9820na	11705na
0400	0500	1st a	Finland, Scandinavian Weekend Radio			5980eu
			11720eu			
0400	0500		Germany, Deutsche Welle		7225af	11945af
			15410af			
0400	0500		Germany, Overcomer Ministries		9770au	
0400	0500		Guyana, Voice of	3291do	5950do	
0400	0500		Malaysia, Radio	7295do		
0400	0500		Malaysia, Radio Malaysia Kota Kinabalu			5979do
0400	0500		Malaysia, Voice of	6175as	9665as	9750as
			15295as			
0400	0500		Namibia, Namibian BC Corp		3270af	3290af
			6090af 6175al			
0400	0500		Russia, Voice of	7180na	11720na	11750na
			12000na 15455na	17650na	17660na	17690na
0400	0500		Sierra Leone, Radio UNAMSIL		6139af	
0400	0500		Singapore, Mediacorp Radio		6150do	
0400	0500	vl	Solomon Islands, SIBC	5020do	9545do	
0400	0500		Uganda, Radio	4976do	5026do	7196do
0400	0500		UK, BBC World Service		3255af	5975va
			6005af 6135am	6190af	6195va	7160af
			9410va 11760va	11765af	12035af	15280as
			15310as 15360as	15420af	15575as	17790as
			21660as			
0400	0500		USA, Armed Forces Radio		4319usb	5446usb
			5765usb 6350usb	7507usb	10320usb	12335usb
			12579usb	13362usb	13855usb	
0400	0500		USA, KAIJ Dallas TX	5755va		
0400	0500		USA, KTBN Salt Lake City UT		7505na	
0400	0500		USA, KWHR Naalehu HI		17780as	
0400	0500		USA, Voice of America	4960af	6080af	7290af
			9530eu 9575af	9885af	11835af	11965eu
			12080af 15205eu	17895af		
0400	0500	m	USA, WBCQ Kennebunk ME		5105na	
0400	0500	twhfa	USA, WBCQ Kennebunk ME		9330na	
0400	0500		USA, WBOH Newport NC		5920am	
0400	0500		USA, WEWN Birmingham AL		5825na	
0400	0500		USA, WHRA Greenbush ME		7580va	
0400	0500		USA, WHRI Noblesville IN		5745va	7315am
0400	0500		USA, WINB Red Lion PA		12160am	
0400	0500	smtwhf	USA, WMLK Bethel PA	9465eu		
0400	0500		USA, WRMI Miami FL	7385na		
0400	0500		USA, WSHB Cypress Creek SC		9450eu	13720af
0400	0500		USA, WTJC Newport NC		9370na	
0400	0500		USA, WWCR Nashville TN		3210na	5070na
			5935na 7560na			
0400	0500		USA, WWRB Manchester TN		5050na	5085na
			6890na			
0400	0500		USA, WYFR Okeechobee FL		7355eu	
0400	0500		Zambia, Radio	4910do		
0400	0500		Zambia, Radio Christian Voice		6065do	
0400	0500	vl	Zimbabwe, ZBC Corp	5975do		
0405	0500		USA, WYFR Okeechobee FL		9715co	
0427	0500	smt a	Madagascar, AWR	12060af	15320af	
0430	0458		Serbia & Montenegro, RSCG		9580na	
0430	0500		Netherlands, Radio	6165na	9590na	
0430	0500	DRM/ as	Netherlands,Radio	15400pa		
0430	0500		Nigeria, Radio/Abuja	7275do		
0430	0500		Nigeria, Radio/Enugu	6025da		
0430	0500		Nigeria, Radio/Ibadan		6050do	
0430	0500		Nigeria, Radio/Kaduna		4770da	6090do
0430	0500		Nigeria, Radio/Lagos	3326do	4990do	
0430	0500		Swaziland, TWR	3200af	4775af	
0438	0450		Croatia, Voice of	9925na		
0445	0500		Italy, RAI Intl	6110af	7235af	9875af
0459	0500		New Zealand, Radio NZ Intl		15340pa	

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

0500	0520		Votican City, Vatican Rodio		4005eu	5890eu
			7250eu 9660af	11625af	15570af	
0500	0530		France, Radio France Intl		15155af	17800af
0500	0530	DRM/ os	Netherlands, Radio	15400pa		
0500	0530		Netherlands, Radio	6165na	9590no	
0500	0530		South Africa, AWR Africo		3215af	3345af
0500	0530		South Africa, Channel Africo		11710af	
0500	0530		UK, BBC World Service		15280as	
0500	0556		China, China Radio Intl		9560na	
0500	0600		Anguillo, Coribbean Beacon		6090am	
0500	0600		Australia, ABC NT Alice Springs		2310irr	4835do
0500	0600		Australia, ABC NT Katherine		5025do	
0500	0600		Australia, ABC NT Tennant Creek		4910do	
0500	0600		Australia, Radio	9660pa	12080va	15240po
			15415as 15515va	17580pa	17750as	21725as
0500	0600	mtwhf	Bhutan, Bhutan BC Service		5030al	6035do
0500	0600	vl	Botswana, Radio	3356do	4820do	7255do
0500	0600		Conoda, CFRX Toronto ON		6070do	
0500	0600		Canada, CKZN St John's NF		6160do	
0500	0600		Canada, CKZU Vancouver BC		6160do	
0500	0600		Costa Rica, Radio for Peace Intl		7445am	15038va
0500	0600		Costa Rico, University Network		5030am	6150am
			7375am 9725sa	11870am	13750na	17645as
0500	0600		Cuba, Radio Havana	9665usb	9820na	11760am
0500	0600	1st a	Finland, Scandinavian Weekend Radio			6170eu
			11720eu			
0500	0600	1st a	Finland, Scandinavian Weekend Radio			6170va
			11720eu			
0500	0600		Germany, Deutsche Welle		9700af	11925af
			12045af 13755af	15410af		
0500	0600		Germany, Overcomer Ministries		9770au	
0500	0600		Guyana, Voice of	3291do	5950do	
0500	0600		Japan, Rodio	5975eu	6110na	7230eu
			11715as 11760as	15195as	17810as	21755pa
0500	0600		Kuwait, Radio	15110as		
0500	0600		Malaysio, Radio	7295do		
0500	0600		Malaysia, Radio Malaysia Kota Kinabalu			5979do
0500	0600		Malaysio, Voice of	6175as	9665as	9750as
			15295as			
0500	0600		Namibia, Namibian BC Corp		6060af	6175al6175al
0500	0600		New Zealand, Radio NZ Intl		15340pa	
0500	0600		Nigeria, Rodio/Abuja	7275do		
0500	0600		Nigeria, Radio/Enugu	6025do		
0500	0600		Nigeria, Radio/Ibadan		6050do	
0500	0600		Nigeria, Radio/Kaduna		4770do	6090do
0500	0600		Nigeria, Radio/Logos	3326do	4990do	
0500	0600		Nigeria, Voice of		7255af	17800af
0500	0600		Russia, Voice of		17635au	21790au
0500	0600		Sierra Leone, Radio UNAMSIL		6139af	
0500	0600		Singapore, Mediacorp Radio		6150do	
0500	0600	vl	Solomon Islands, SIBC	5020do	9545do	
0500	0600		Swaziland, TWR		4775af	6120af	9500af
0500	0600		Uganda, Radio		4976do	5026do	7196do
0500	0600		UK, BBC World Service			6005af	6135am
			6190af 6195va	7160af	9410va	11760va
			11765af 11940af	11955as	15420af	15565va
			15575va 17640af	17885af		
0500	0600		USA, Armed Forces Radio		4319usb	5446usb
			5765usb 6350usb	7507usb	10320usb	12335usb
			12579usb	13362usb	13855usb	
0500	0600		USA, KAIJ Dallas TX	5755va		
0500	0600		USA, KTBN Salt Lake City UT		7505na	
0500	0600		USA, KWHR Naalehu HI		17780as	
0500	0600	mtwhf	USA, Voice of America	7195af		
0500	0600		USA, Voice of America	6035af	6080af	7290af
			9530eu 11835af	11965eu	12080af	15205eu
0500	0600		USA, WBCQ Kennebunk ME		5105na	7415na
0500	0600		USA, WBOH Newport NC		5920am	
0500	0600		USA, WEWN Birmingham AL		5825na	
0500	0600		USA, WHRA Greenbush ME		11730af	
0500	0600		USA, WHRI Noblesville IN		5745va	7315am
0500	0600		USA, WINB Red Lion PA		12160am	
0500	0600	smtwhf	USA, WMLK Bethel PA	9465eu		
0500	0600		USA, WRMI Miami FL	7385na		
0500	0600		USA, WSHB Cypress Creek SC		9450eu	9840af
0500	0600		USA, WTJC Newport NC		9370na	
0500	0600		USA, WWCR Nashville TN		3210na	5070na
			5935na 7560na			
0500	0600		USA, WWRB Manchester TN		5050na	5085na
			6890na			
0500	0600		USA, WYFR Okeechobee FL		6855eu	7520eu
0500	0600		Zambia, Radio Christian Voice		6065do	
0500	0600	vl	Zimbabwe, ZBC Corp	5975do		
0505	0512		Croatia, Voice of	9470pa		

0515	0525		Rwanda, Radio 6005do			
0520	0530		Vatican City, Vatican Radio 15570af	9660af	11625af	
0525	0600	vl	Ghana, Ghana BC Corp	4915do		
0530	0550		UAE, Radio Dubai 13675au 21700au	15435au	17830au	
0530	0600		Georgia, Radio Georgia	11805eu		
0530	0600	mtwhf/vl	Italy, IRRS 13840va			
0530	0600		South Africa, AWR Africa	15105af		
0530	0600		Thailand, Radio 21795eu			

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

0600	0630		France, Radio France Intl 21620af	11665af	17800af	
0600	0630		South Africa, Channel Africa	15215af		
0600	0630		Swaziland, TWR 4775af	6120af	9500af	
0600	0630	mtwhf	USA, Voice of America 7195af	7290af		
0600	0630		USA, Voice of America 6035af 9760eu 11805eu 11835af 12080af 15205eu	6080af	9530eu	11965eu 11995af
0600	0637		Romania, Radio Romania Intl	9530no	11830na	
0600	0658		New Zealand, Radio NZ Intl	15340pa		
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 15415as 15515va	12080va	15240pa	17580pa 17750as 21725as
0600	0700	vl	Botswana, Radio 3356do	4820do	7255do	
0600	0700		Canada, CFRX Toronto ON	6070do		
0600	0700		Canada, CFVP Calgary AB	6030do		
0600	0700		Canada, CKZN St John's NF	6160do		
0600	0700		Canada, CKZU Vancouver BC	6160do		
0600	0700		Costa Rica, Radio for Peace Intl	7445am	15038va	
0600	0700		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am	13750na 17645as
0600	0700		Cuba, Radio Havana 9665usb	9820na	11760am	
0600	0700	1st o	Finland, Scandinavian Weekend Radio 11720eu		6170eu	
0600	0700		Germany, Deutsche Welle 15275af 17860af	6140eu	9780af	
0600	0700	vl	Ghana, Ghana BC Corp	4915do		
0600	0700		Guyana, Voice of 3291do	5950do		
0600	0700		Japan, Radio 7230eu 13630na 15195as 17870pa	11740as	13630na	21755pa
0600	0700	DRM	Kuwait, Radio 15110as			
0600	0700		Kuwait, Radio 15110as			
0600	0700		Liberia, ELWA 4760do			
0600	0700		Malaysia, Radio 7295do			
0600	0700		Malaysia, Voice of 6175as 15295au	9665as	9750as	
0600	0700		Namibia, Namibian BC Corp	6060af	6175al	
0600	0700		Nigeria, Radio/Abuja 7275do			
0600	0700		Nigeria, Radio/Enugu 6025do			
0600	0700		Nigeria, Radio/Ibadan	6050do		
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do	
0600	0700		Nigeria, Radio/Lagos 3326do	4990do		
0600	0700		Nigeria, Voice of 7255af	17800af		
0600	0700		Russia, Voice of 15490au 21790au	17635au	17670me	
0600	0700		Sierra Leone, Radio UNAMSIL	6139af		
0600	0700		Singapore, Mediacorp Radio	6150do		
0600	0700	vl	Solomon Islands, SIBC 5020do	9545do		
0600	0700	as	UK, BBC World Service	17885af		
0600	0700		UK, BBC World Service 6195eu 7160af 9410va 11955as 12095va 15310as 15565va 15575va 17790as	6055af	6190af	11765af 11940af 15360as 15400af 17640af 21660as
0600	0700		USA, Armed Forces Radio 5765usb 6350usb 7507usb 12579usb 13362usb	4319usb	5446usb	10320usb 12335usb 13855usb
0600	0700		USA, KAIJ Dallas TX 5755va			
0600	0700		USA, KTBN Salt Lake City UT	7505no		
0600	0700		USA, KWHR Naalehu HI	17780as		
0600	0700	mtwhf	USA, WBCQ Kennebunk ME	5105na		
0600	0700		USA, WBOH Newport NC	5920am		
0600	0700		USA, WEWN Birmingham AL	5825na	9385eu	
0600	0700		USA, WHRA Greenbush ME	11730af		
0600	0700		USA, WHRI Noblesville IN	5745va	7315am	
0600	0700		USA, WINB Red Lion PA	12160am		
0600	0700		USA, WRMI Miami FL 7385na			
0600	0700		USA, WSHB Cypress Creek SC	9450af		
0600	0700		USA, WTJC Newport NC	9370na		
0600	0700		USA, WWCR Nashville TN 5935na 7560na	3210na	5070na	
0600	0700		USA, WYFR Okeechobee FL 11580eu	7355eu	11530eu	
0600	0700	vl	Vanuatu, Radio 3945al	4960do		
0600	0700		Yemen, Rep of Yemen Radio	9780me		
0600	0700		Zambia, Radio Christian Voice	9865do		
0600	0700	vl	Zimbabwe, ZBC Corp 5975do			
0630	0645	mtwhf	Vatican City, Vatican Radio 6185eu 7250eu 9645eu	4005eu	5890eu	11740eu 15595eu
0630	0700		Bulgaria, Radio 11600eu	13600eu		
0630	0700		Swaziland, TWR 6120af	9500af		
0630	0700	as	USA, Voice of America 6035af 11835af 11995af 12080af	6080af	7195af	
0630	0700	mtwhf	USA, Voice of America 9530eu 11965eu 15205eu	9760eu	11805eu	
0630	0700	as	Vatican City, Vatican Radio	11625af	15570af	
0637	0700		Romania, Radio Romania Intl 11830na 11840eu 11940eu	9530no	9690eu	15270eu
0638	0650		Croatia, Voice of 9470pa			
0645	0700	as	Germany, TWR 6045eu			
0645	0700	as	Monaco, TWR 9870eu			
0655	0700	mtwhf	Germany, TWR 6045eu			
0655	0700	mtwhf	Monaco, TWR 9870eu			
0659	0700		New Zealand, Radio NZ Intl	11675pa		

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

0700	0725		Belgium, Radio Vlaanderen Intl	5985eu		
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu	
0700	0727		Slovakia, Radio Slovakia Intl 17550au	9440au	15460au	
0700	0730	a	Tibet, Xizang PBS 9490as	9580as		
0700	0745		USA, WYFR Okeechobee FL	7355eu		
0700	0750		Germany, TWR 6045eu			
0700	0750		Monaco, TWR 9870eu			
0700	0756		Romania, Radio Romania Intl	17720af	21480af	
0700	0800		Anguilla, Caribbean Beacon	6090am		
0700	0800		Australia, ABC NT Alice Springs	2310irr	4835do	
0700	0800		Australia, ABC NT Katherine	5025do		
0700	0800		Australia, ABC NT Tennant Creek	4910do		
0700	0800		Australia, Radio 9660pa 15415as 17580pa	12080va	15240va	17750as 21725as
0700	0800	vl	Botswana, Radio 3356do	4820do	7255do	
0700	0800		Canada, CFRX Toronto ON	6070do		
0700	0800		Canada, CFVP Calgary AB	6030do		
0700	0800		Canada, CKZN St John's NF	6160do		
0700	0800		Canada, CKZU Vancouver BC	6160do		
0700	0800		Costa Rica, Radio for Peace Intl	7445am	15038va	
0700	0800		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am	13750na 17645as
0700	0800		Eqt Guinea, Radio Africa	15184af		
0700	0800	1st a	Finland, Scandinavian Weekend Radio 11720eu		6170eu	
0700	0800		France, Radio France Intl	15605af		
0700	0800		Germany, Deutsche Welle	6140eu		
0700	0800	vl	Ghana, Ghana BC Corp	4915do		
0700	0800		Guyana, Voice of 3291do	5950do		
0700	0800	DRM	Kuwait, Radio 15110as			
0700	0800		Kuwait, Radio 15110as			
0700	0800		Liberia, ELWA 4760do			
0700	0800		Malaysia, Radio 7295do			
0700	0800		Malaysia, Radio Malaysia Kota Kinabalu		5979do	
0700	0800		Malaysia, Voice of 6175as 15295au	9665as	9750as	
0700	0800		Myanmar, Radio 9730do			
0700	0800		New Zealand, Radio NZ Intl	11675pa		
0700	0800		Nigeria, Voice of 7255af	17800af		
0700	0800		Papua New Guinea, NBC	4890do	9675irr	
0700	0800		Russia, Voice of 15490au 17635au 17670au	17495au	17525au	
0700	0800		Sierra Leone, Radio UNAMSIL	6139af		
0700	0800		Singapore, Mediacorp Radio	6150do		
0700	0800	vl	Solomon Islands, SIBC 5020do	9545do		
0700	0800		Taiwan, Radio Taiwan Intl	5950na		
0700	0800	as	UK, BBC World Service	6005af		
0700	0800		UK, BBC World Service 11760va 11765af 11955as 15360as 15400af 15485va 17790as 21660as	6190af	9410eu	12095va 15310as 15565va 17640me
0700	0800		USA, Armed Forces Radio 5765usb 6350usb 7507usb 12579usb 13362usb	4319usb	5446usb	10320usb 12335usb 13855usb
0700	0800		USA, KAIJ Dallas TX 5755va			
0700	0800		USA, KTBN Salt Lake City UT	7505na		
0700	0800		USA, KWHR Naalehu HI	11565pa	17780as	
0700	0800		USA, Voice of America 13760as			
0700	0800		USA, WBCQ Kennebunk ME	7415na		
0700	0800		USA, WBOH Newport NC	5920am		
0700	0800		USA, WEWN Birmingham AL	5825na	9385eu	
0700	0800		USA, WHRA Greenbush ME	11730af		
0700	0800		USA, WHRI Noblesville IN	5745va	7315am	
0700	0800		USA, WINB Red Lion PA	12160am		
0700	0800	smtwhf	USA, WMLK Bethel PA 9465eu			
0700	0800		USA, WRMI Miami FL 7385na			
0700	0800		USA, WSHB Cypress Creek SC	9450af		
0700	0800		USA, WTJC Newport NC	9370na		
0700	0800		USA, WWCR Nashville TN 5935na 7560na	3210na	5070na	
0700	0800		USA, WYFR Okeechobee FL	9985eu		
0700	0800	vl	Vanuatu, Radio 3945al	4960do		
0700	0800		Zambia, Radio Christian Voice	9865do		
0705	0712		Croatia, Voice of 13820au			
0725	0800		Guam, AWR 15205as			
0730	0800		Austria, AWR Europe 9775eu			
0730	0800		Georgia, Radio Georgia	11910eu		

Shortwave Guide

0730	0800		Switzerland, Swiss Radio Intl 17665va	9885va	13790va	
0730	0800	as	UK, BBC World Service	15575va		
0745	0800	mtwhf	Guam, TWR/KTWR 15330as			
0750	0800	smtwhf	Germany, TWR 6045eu			
0750	0800	smtwhf	Monaco, TWR 9870eu			

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

0800	0804		Pakistan, Radio 17825eu	21465eu		
0800	0815	as	Guam, TWR/KTWR 15205as			
0800	0815	mtwhf	Guam, TWR/KTWR 15330as			
0800	0820	smtwhf	Germany, TWR 6045eu			
0800	0820	smtwhf	Monaco, TWR 9870eu			
0800	0825		Malaysia, Voice of 15295au	6175as	9665as	9750as
0800	0830		Australia, ABC NT Katherine	5025do		
0800	0830		Australia, ABC NT Tennant Creek	4910do		
0800	0830		Malaysia, Radio Malaysia Kota Kinabalu			5979da
0800	0830		Myanmar, Radio 9730do			
0800	0830	mtwhfa	Tajikistan, Tajik Radio 7245as			
0800	0900		Anguilla, Caribbean Beacon	6090am		
0800	0900		Australia, ABC NT Alice Springs	2310irr	4835do	
0800	0900		Australia, HCJB 11750pa			
0800	0900	as	Australia, Radio 17750as			
0800	0900		Australia, Radio 11880as 12080va 17415as 17750as	5995pa 15240va 21725as	9580va 15415as	9710pa 15240va
0800	0900	mtwhf	Bhutan, Bhutan BC Service	5030al	6035do	
0800	0900	vl	Botswana, Radio 3356do	4820do	7255do	
0800	0900		Canada, CFRX Toronto ON	6070do		
0800	0900		Canada, CFVP Calgary AB	6030do		
0800	0900		Canada, CKZN St John's NF	6160do		
0800	0900		Canada, CKZU Vancouver BC	6160do		
0800	0900		Costa Rica, Radio for Peace Intl	7445am	15038va	
0800	0900		Costa Rica, University Network 7375am 9725sa	5030am 11870am	6150am 13750na	17645as
0800	0900		Eqt Guinea, Radio Africa	15184af		
0800	0900	1st o	Finland, Scandinavian Weekend Radio 11690eu			6170eu
0800	0900		Germany, Deutsche Welle	6140eu		
0800	0900	vl	Ghana Ghana BC Corp	4915do		
0800	0900		Guyana, Voice of 3291do	5950do		
0800	0900		Indonesia, Voice of 9525va	11785as		
0800	0900	as/vl	Italy, IRRS 13840va			
0800	0900		Liberia, ELWA 4760do			
0800	0900	m-f/ DRM	Luxembourg, RTL Radio Lutzebuerg	6095eu		
0800	0900		Malaysia, Radio 7295do			
0800	0900		Malta, Voice of Mediterranean	9605eu		
0800	0900		New Zealand, Radio NZ Intl	11675pa		
0800	0900		Papua New Guinea, NBC	4890do	9675irr	
0800	0900		Russia, Voice of 17635au	15490as	17495au	17525au
0800	0900		Sierra Leone, Radio UNAMSIL	6139af		
0800	0900		Singapore, Mediacorp Radio	6150do		
0800	0900	vl	Solomon Islands, SIBC 5020do	9545do		
0800	0900	a	South Africa, Radio League	9750af	21560af	
0800	0900		South Korea, Radio Korea Intl	9570om	13670eu	
0800	0900		Swaziland, TWR 6120af	9500af		
0800	0900	as	UK, BBC World Service	15575va		
0800	0900		UK, BBC World Service 11760va 11955as 15400af 15485va 17830af 17885af	6190af 12095eu 15565va 21470af	9410eu 15310as 17640va 21660as	15360as 17790as
0800	0900		USA, Armed Forces Radio 5765usb 6350usb 12579usb	4319usb 7507usb 13362usb	5446usb 10320usb 13855usb	12335usb
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	11565pa	17780as	
0800	0900		USA, Voice of America 11930as 15150as	13620as	13760as	
0800	0900		USA, WBCQ Kennebunk ME	7415na		
0800	0900		USA, WBOH Newport NC	5920am		
0800	0900		USA, WEWN Birmingham AL	5825na	9385eu	
0800	0900		USA, WHRI Noblesville IN	5745va	7315am	
0800	0900		USA, WINB Red Lion PA	12160am		
0800	0900	smtwhf	USA, WMLK Bethel PA 9465eu			
0800	0900		USA, WRMI Miami FL 7385na			
0800	0900		USA, WSHB Cypress Creek SC	9860eu	9845pa	
0800	0900		USA, WTJC Newport NC	9370na		
0800	0900		USA, WWCR Nashville TN 5935na 7560na	3210na	5070na	
0800	0900		USA, WYFR Okeechobee FL	9985eu		
0800	0900	vl	Vanuatu, Radio 3945al	4960do		
0800	0900		Zambia, Radio Christian Voice	9865do		
0810	0830	s	Armenia, Voice of 4810eu	15270as		
0815	0900		Guam, TWR/KTWR 15205as	15330as		
0830	0900		Australia, ABC NT Katherine	2485do		
0830	0900		Australia, ABC NT Tennant Creek	2325do		
0830	0900		Austria, AWR Europe 17780af			
0830	0900		Georgia, Radio Georgia	11910me		
0830	0900		Lithuania, Radio Vilnius	9710eu		
0830	0900		Switzerland, Swiss Radio Intl	21770va		
0838	0850		Croatia, Voice of 13820au			
0840	0850		Turkmenistan, Turkmen Radio	4930as		

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

0900	0927		Czech Rep, Radio Prague Intl	21745va		
0900	0930	as	Australia, Radio 17750as			
0900	0930		Austria, AWR Europe 17780af			
0900	0930		Guam, TWR/KTWR 15330as			
0900	0956		China, China Radio Intl	17690pa	15210pa	
0900	1000		Anguilla, Caribbean Beacon	6090am		
0900	1000		Australia, ABC NT Alice Springs	2310da	4835irr	
0900	1000		Australia, ABC NT Katherine	2485do		
0900	1000		Australia, ABC NT Tennant Creek	2325da		
0900	1000		Australia, HCJB 11750pa			
0900	1000		Australia, Radio 17750as 21820as	9580va	11880as	15240as
0900	1000		Australia, Voice Intl	13685as		
0900	1000	vl	Botswana, Radio 3356do	4820do	7255do	
0900	1000		Canada, CFRX Toronto ON	6070do		
0900	1000		Canada, CFVP Calgary AB	6030do		
0900	1000		Canada, CKZN St John's NF	6160do		
0900	1000		Canada, CKZU Vancouver BC	6160do		
0900	1000		Costa Rica, Radio for Peace Intl	7445am	15038va	
0900	1000		Costa Rica, University Network 7375am 9725sa	5030am 11870am	6150am 13750na	17645as
0900	1000		Eqt Guinea, Radio Africa	15184af		
0900	1000	1st o	Finland, Scandinavian Weekend Radio 11690eu			6170eu
0900	1000	DRM	Germany, Deutsche Welle	15440eu		
0900	1000		Germany, Deutsche Welle	6140eu	15440eu	
0900	1000		Guyana, Voice of 3291do	5950do		
0900	1000	as/vl	Italy, IRRS 13840va			
0900	1000	m-f/ DRM	Luxembourg, RTL Radio Lutzebuerg	6095eu		
0900	1000		Malaysia, Radio 7295do			
0900	1000		New Zealand, Radio NZ Intl	11675pa		
0900	1000		Palau, Voice of Hope 15725as			
0900	1000		Papua New Guinea, NBC	4890do	9675irr	
0900	1000		Singapore, Mediacorp Radio	6150do		
0900	1000	vl	Solomon Islands, SIBC 5020do	9545do		
0900	1000	s	UAE, Radio UNMEE 21790af			
0900	1000	DRM	UK, BBC World Service	7370eu		
0900	1000		UK, BBC World Service 9605as 9740as 15310as 15360as 15575va 17640va 17885af 21470af	6190af 11760va 15400af 17760as 21660as	6195as 12095eu 15485va 17790as	15190sa 15565va 17830af
0900	1000		USA, Armed Forces Radio 5765usb 6350usb 12579usb	4319usb 7507usb 13362usb	5446usb 10320usb 13855usb	12335usb
0900	1000		USA, KAIJ Dallas TX 5755va			
0900	1000		USA, KTBN Salt Lake City UT	7505na		
0900	1000		USA, KWHR Naalehu HI	11565pa	17780as	
0900	1000		USA, Voice of America 11930as 15150as	13620as	13760as	
0900	1000		USA, WBCQ Kennebunk ME	7415na		
0900	1000		USA, WBOH Newport NC	5920am		
0900	1000		USA, WEWN Birmingham AL	5825na		
0900	1000		USA, WHRA Greenbush ME	11730af		
0900	1000		USA, WRMI Miami FL 9955am			
0900	1000		USA, WSHB Cypress Creek SC	9860eu	9455sa	
0900	1000		USA, WTJC Newport NC	9370na		
0900	1000		USA, WWCR Nashville TN 7560na 9475na	5070na	5935na	
0900	1000	vl	Vanuatu, Radio 3945al	4960do		
0900	1000	mt hfa	Vatican City, Vatican Radio	5890eu		
0900	1000		Zambia, Radio Christian Voice	9865do		
0930	1000	asmwhf	Greece, Voice of 12105eu	15630eu		
0930	1000		Netherlands, Radio	9785pa	12065as	13710as
0930	1000	DRM	Netherlands,Radio	9590eu		

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

1000	1027		Vietnam, Voice of 9840au	12020au		
1000	1030		Germany, Deutsche Welle	17615as	17715as	
1000	1030		Guam, AWR 11560as	11930as		
1000	1030		Mongolia, Voice of 12085as			
1000	1030		Netherlands, Radio	9785pa	12065pa	13710as
1000	1030		UK, BBC World Service	9605as	15360as	
1000	1030		UK, RTE Radio 15280au			
1000	1045		USA, KWHR Naalehu HI	9930as	11565pa	
1000	1056		China, China Radio Intl	17690pa	15210pa	
1000	1056		North Korea, Voice of 3560as 11735as 13650as	9335am	11710am	
1000	1100		Anguilla, Caribbean Beacon	11775am		
1000	1100		Australia, ABC NT Alice Springs	2310do	4835irr	
1000	1100		Australia, ABC NT Katherine	2485do		
1000	1100		Australia, ABC NT Tennant Creek	2325do		
1000	1100		Australia, HCJB 11750pa			
1000	1100		Australia, Radio 17750as 21820as	9580va	11880as	15240as
1000	1100		Australia, Voice Intl	13685as		
1000	1100	as	Bhutan, Bhutan BC Service	5030al	6035do	
1000	1100		Canada, CFRX Toronto ON	6070do		
1000	1100		Canada, CFVP Calgary AB	6030do		

1000	1100		Canada, CKZN St John's NF	6160do		
1000	1100		Canada, CKZU Vancouver BC	6160do		
1000	1100		Costa Rica, Radio for Peace Intl	7445am	15038va	
1000	1100		Costa Rica, University Network 7375am 9725sa	5030am 11870am	6150am 13750na	17645as
1000	1100		Eqt Guinea, Radio Africa	15184af		
1000	1100	1st a	Finland, Scandinavian Weekend Radio 11690eu		6170eu	
1000	1100	DRM	Germany, Deutsche Welle	6140eu	15440eu	
1000	1100		Germany, Deutsche Welle	6140eu	15440eu	
1000	1100		Guyona, Voice of 3291do	5949do		
1000	1100		India, All India Radio 13695as 15410as 17510au	15020as 17800as	15260as 17895au	
1000	1100	os/vl	Italy, IRRS 13840va			
1000	1100		Japan, Radio 9695as 21755pa	15590as	17585eu	
1000	1100	m-f/ DRM	Luxembourg, RTL Rodio Lutzebuerg	6095eu		
1000	1100		Maloysia, Radio 7295do			
1000	1100		Malta, Voice of Mediterranean	9605eu		
1000	1100	DRM	Netherlands, Radio 9590eu			
1000	1100		New Zealand, Radio NZ Intl	11675pa		
1000	1100		Palau, Voice of Hope 15725as			
1000	1100		Papua New Guinea, NBC	4890do	9675irr	
1000	1100		Singapore, Mediacorp Radio	6150do		
1000	1100	vl	Solomon Islands, SIBC 5020do	9545do		
1000	1100		South Africo, Radio Veritas	7240af		
1000	1100	as	UK, BBC World Service	15190sa	15400af	
1000	1100		UK, BBC World Service 9740as 11760va 15565va 17885af	6190af 12095eu 15575va 21470af	6195va 15310eu 17640va 21660as	15485va 17790as
1000	1100	DRM	UK, BBC World Service	7320eu		
1000	1100	m/ DRM	UK, Christion Voice 9760eu			
1000	1100		USA, Armed Forces Radio 5765usb 6350usb 12579usb	4319usb 7507usb 13362usb	5446usb 10320usb 13855usb	12335usb
1000	1100		USA, KAIJ Dallas TX 5755vo			
1000	1100		USA, KTBN Salt Lake City UT	7505no		
1000	1100		USA, Voice of America 5745am 9770as 13620as	7370am 15240as	9590am 15425os	
1000	1100		USA, WBOH Newport NC	5920am		
1000	1100		USA, WEWN Birmingham AL	7520na		
1000	1100		USA, WHRI Noblesville IN	9495am	9850na	
1000	1100		USA, WINB Red Lion PA	13570om		
1000	1100		USA, WJIE Louisville KY	13595am		
1000	1100		USA, WRMI Miami FL 9955am			
1000	1100		USA, WSHB Cypress Creek SC	6095am	9455so	
1000	1100		USA, WTJC Newport NC	9370na		
1000	1100		USA, WWCR Nashville TN 7560na 15825no	5070na	5935na	
1000	1100		USA, WYFR Okeechobee FL	5950no		
1000	1100		Zambia, Radio Christian Voice	9865do		
1010	1020		Israel, Kol Israel 15640va	17525va	17545va	
1030	1045	mtwhf	Ethiopia, Radio 5990do	7110do	9704do	
1030	1057		Czech Rep, Radio Prague Intl	9880eu	11615eu	
1030	1100		Guam, AWR 11560as			
1030	1100		Iran, Voice of the Islamic Rep 15600as 21470as	15450as 21730as	15550as	
1030	1100		Netherlands, Radio 5965na 9860eu 12065as	6045eu 13710as	9785au	
1030	1100		UAE, Radio Dubai 13675eu 21605eu	15395eu	17865eu	
1030	1100	t	UAE, Radio UNMEE 21550af			
1045	1100	as	USA, KWHR Naalehu HI	11565pa		
1045	1100		USA, KWHR Naalehu HI	9930as		

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

1100	1104		Pakistan, Radio 17825eu	21465eu		
1100	1105		New Zeoland, Radio NZ Intl	11675pa		
1100	1125		Netherlands, Radio 5965na 9860eu 12065as	6045eu 13710as	9785au	
1100	1127		Iran, Voice of the Islamic Rep 15600as 21470as	15450as 21730as	15550as	
1100	1127		Vietnam, Voice of 11630as			
1100	1130	as	Bhutan, Bhutan BC Service	5030ol	6035do	
1100	1130		Tibet, Xizang PBS 4905as 7385as 9490as	4920os	6200as	
1100	1130	t	UAE, Radio UNMEE 21550af			
1100	1130	mtwhf	UK, BBC World Service	15400af	17790sa	
1100	1200		Anguilla, Caribbean Beacon	11775am		
1100	1200		Australia, ABC NT Alice Springs	2310do	4835irr	
1100	1200		Australia, ABC NT Katherine	2485do		
1100	1200		Australia, ABC NT Tennant Creek	2325do		
1100	1200		Australia, HCJB 11750pa			
1100	1200		Australia, Radio 5995pa 9580va 11650va 21820as	6020pa 11880as	9475as 12080va	15240va
1100	1200		Australia, Voice Intl 13685as			
1100	1200		Canada, CBC Northern Service	9625do		
1100	1200		Canada, CFRX Toronto ON	6070do		
1100	1200		Canado, CFVP Calgary AB	6030do		
1100	1200		Canada, CKZN St John's NF	6160do		
1100	1200		Canada, CKZU Vancouver BC	6160do		
1100	1200		Costa Rico, Radio for Peace Intl	7445am	15038va	
1100	1200		Costa Rica, University Network 7375am 9725sa	5030am 11870am	6150am 13750na	17645as
1100	1200		Ecuador, HCJB 15115am	21455pa		
1100	1200	1st a	Finland, Scandinavian Weekend Radio 11720eu		6170eu	
1100	1200	DRM	Germany, Deutsche Welle	15440eu		
1100	1200		Germany, Deutsche Welle 17820eu	6140eu	15110as	
1100	1200	as/vl	Italy, IRRS 13840va			
1100	1200		Japan, Radio 6120na	9695as	15590as	
1100	1200	m-f/ DRM	Luxembourg, RTL Radio Lutzebuerg	6095eu		
1100	1200		Malaysia, Radio 7295do			
1100	1200	DRM	Netherlands, Radio 9590eu			
1100	1200		Papua New Guinea, NBC	4890do	9675irr	
1100	1200		Singapore, Radio Singapore Intl	6150as	9600as	
1100	1200	DRM	UK, BBC World Service	7320eu	9410eu	
1100	1200		UK, BBC World Service 9740as 11760va 15310as 15485va 17830af 17885af	6190af 11940af 15565va 21470af	6195va 12095eu 15575va 21660as	15190va 17640va
1100	1200		Ukroine, Radio Ukraine Intl	15415eu		
1100	1200		USA, Armed Forces Radio 5765usb 6350usb 12579usb	4319usb 7507usb 13362usb	5446usb 10320usb 13855usb	12335usb
1100	1200		USA, KAIJ Dallas TX 5755va			
1100	1200		USA, KTBN Salt Lake City UT	7505na		
1100	1200	as	USA, KWHR Naalehu HI	11565pa		
1100	1200		USA, Voice of America 6160as 9770as 13610as	9645as 15240os	9760as 15425as	
1100	1200		USA, WBOH Newport NC	5920am		
1100	1200		USA, WEWN Birmingham AL	7520na		
1100	1200		USA, WHRI Noblesville IN	9495am	9850na	
1100	1200		USA, WINB Red Lion PA	13570am		
1100	1200		USA, WJIE Louisville KY	13595am		
1100	1200		USA, WRMI Miami FL 9955am			
1100	1200		USA, WSHB Cypress Creek SC	6095am	9455am	
1100	1200		USA, WTJC Newport NC	9370na		
1100	1200		USA, WWCR Nashville TN 7560na 15825na	5070na	5935na	
1100	1200		USA, WYFR Okeechobee FL 11725ca 11830na	5950na	9555so	
1100	1200		Zambia, Radio Christian Voice	9865do		
1106	1200		New Zealand, Radio NZ Intl	15175pa		
1115	1145		Nepol, Radio 3230as	5005as		
1125	1200		Netherlands, Radio 5965na	6045eu	9860eu	
1130	1159		Belgium, Radio Vlaanderen Intl	9865as		
1130	1200		Bulgaria, Radio 11700eu	15700eu		
1130	1200		South Korea, Radio Koreo Intl	9650na		
1130	1200		Sweden, Radio 17505va	17840na		
1130	1200	f	Vatican City, Vatican Radio	15595va	17515va	

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

1200	1230	vl	Somalia, Radio Galkayo	6980va		
1200	1215	vl	Cambodia, National Radio Of	11940as		
1200	1215		Ecuador, HCJB 15115am	21455pa		
1200	1225		Netherlands, Radio 5965no	6045eu	9860eu	
1200	1230		France, Radio France Intl 25820af	17815af	21620af	
1200	1230	DRM	Netherlands, Radio 9590eu			
1200	1230		South Korea, Radio Korea Intl	9650na		
1200	1230		Uzbekistan, Radio Tashkent Intl 15295as 17775as	7285as	9715as	
1200	1245		USA, WYFR Okeechobee FL	5950na		
1200	1256		China, China Radio Intl 11760pa 11980as	9730as 15415pa	9760pa	
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 9580va 11650va 11880os	6020pa 12080as	9475as 21820as	
1200	1300		Australia, Voice Intl 13685os			
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	mtwhf	Canada, Radio Canada Intl 17800na	9515na	13655na	
1200	1300		Canado, Radio Canado Intl	9660as	15190as	
1200	1300		China, Voice of Hope 13590as			
1200	1300		Costa Rica, Radio for Peace Intl	7445am	15038va	
1200	1300		Costa Rica, University Network 7375am 9725sa	5030am 11870am	6150am 13750na	17645as
1200	1300	1st a	Finlond, Scandinavian Weekend Radio 11690eu		6170eu	
1200	1300	DRM	Germony, Deutsche Welle	9655eu		
1200	1300		Germany, Deutsche Welle	6140eu	15440eu	
1200	1300		Germany, Overcomer Ministries	6110eu		
1200	1300		Jordan, Radio 11690eu			
1200	1300	m-f/ DRM	Luxembourg, RTL Radio Lutzebuerg	6095eu		
1200	1300		Malaysia, Radio 7295do			
1200	1300		New Zealand, Radio NZ Intl	15175pa		

1200	1300		Papua New Guinea, NBC	4890do	9675irr
1200	1300		Singapore, Radio Singapore Intl	6150as	9600as
1200	1300		Taiwan, Radio Taiwan Intl	7130as	9610au
1200	1300	DRM	UK, BBC World Service	7320eu	9410eu
1200	1300		UK, BBC World Service	6190af	6195va
			9740as 11760va 11940af	12095eu	15190va
			15310as 15485va 15565va	15575va	17640va
			17790as 17830af 17885af	21470af	21660as
1200	1300		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb 7507usb	10320usb	12335usb
			12579usb 13362usb	13855usb	
1200	1300		USA, KAIJ Dallos TX 5755va		
1200	1300		USA, KTBN Salt Lake City UT	7505na	
1200	1300	as	USA, KWHR Naalehu HI	11565pa	
1200	1300		USA, KWHR Naalehu HI	9930as	
1200	1300		USA, Voice of America 6160as	9645as	9760as
			13610as 15160as 15240as	15425as	
1200	1300	mtwhf	USA, WBCQ Kennebunk ME	17495na	
1200	1300		USA, WBOH Newport NC	5920am	
1200	1300		USA, WEWN Birmingham AL	7520na	
1200	1300		USA, WHRI Noblesville IN	9495am	9850na
1200	1300		USA, WINB Red Lion PA	13570am	
1200	1300		USA, WJIE Louisville KY	13595am	
1200	1300		USA, WRMI Miami FL 15725na		
1200	1300		USA, WSHB Cypress Creek SC	9430am	11670am
1200	1300		USA, WTJC Newport NC	9370na	
1200	1300		USA, WWCR Nashville TN	7560na	12160na
			13845na 15825na		
1200	1300		USA, WYFR Okeechobee FL	11830na	11970ca
			13695na		
1200	1300		Zambia, Radio Christian Voice	9865do	
1215	1230	mtwhf	Austria, Radio Austrio Intl	21780pa	
1215	1300		Egypt, Radio Cairo 17775as		
1230	1257		Vietnam, Voice of 9840as	12019as	
1230	1300		Australia, HCJB 15390as		
1230	1300		Bangladesh, Bangla Betar	7185as	9550as
1230	1300		Ecuador, HCJB 15115am	21455pa	
1230	1300		Sri Lanka, SLBC 6005as	9770as	15745as
1230	1300		Sweden, Radio 13580as	15750as	17840na
1230	1300		Thailand, Radio 9860as		
1230	1300		Turkey, Voice of 17595va	17830eu	
1230	1300		UAE, Gospel For Asia 15590as		
1230	1300	a	UK, Wales Radio Intl 17845au		
1240	1255	f	Greece, Voice of 11730na	12110eu	15630eu
			15650au		
1245	1300	mtwhf	Austria, Radio Austria Intl	6155eu	13730pa
			21780pa		

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

1300	1305		New Zealand, Radio NZ Intl	15175pa	
1300	1310	mtwhfa	Turkmenistan, Turkmen Radio	5015as	
1300	1327		Czech Rep, Radio Prague Intl	13580eu	21745as
1300	1330		Ecuador, HCJB 12005am	15115am	21455pa
1300	1330		Egypt, Radio Cairo 17775as		
1300	1330		Turkey, Voice of 17595as	17830eu	
1300	1330		UAE, AWR Africa 17740as		
1300	1330		UAE, Gospel For Asia 15590as		
1300	1345		USA, WYFR Okeechobee FL	11970na	
1300	1356		China, China Radio Intl	7405na	9570na
			11760pa 11900pa 11980as	15180as	17720na
1300	1356		North Korea, Voice of 4405as	9335na	11335eu
			11710am 13760eu 15245eu		
1300	1400		Anguilla, Caribbean Beacon	11775am	
1300	1400		Australia, HCJB 15390as		
1300	1400		Australia, Radio 5995pa	6020pa	9580va
			11650va 11660as 21820as		
1300	1400		Australia, Voice Intl 9880as	13665as	
1300	1400		Canada, CBC Northern Service	9625do	
1300	1400		Canada, CFRX Toronto ON	6070do	
1300	1400		Canada, CFVP Calgary AB	6030do	
1300	1400		Canada, CKZN St John's NF	6160do	
1300	1400		Canada, CKZU Vancouver BC	6160do	
1300	1400		Canada, Radio Canada Intl	9515na	13655na
			17800na		
1300	1400		China, Voice of Hope 13590as		
1300	1400		Costa Rica, Radio for Peace Intl	7445am	15038va
1300	1400		Costa Rica, University Network	5030am	6150am
			7375am 9725sa 11870am	13750na	17645as
1300	1400	1st a	Finland, Scandinavian Weekend Radio		6170eu
			11690eu		
1300	1400	DRM	Germany, Deutsche Welle	9655eu	
1300	1400		Germany, Deutsche Welle	6140eu	
1300	1400		Germany, Overcomer Ministries	6110eu	13810me
1300	1400		Jordan, Radio 11690eu		
1300	1400	m-f/ DRM	Luxembourg, RTL Radio Lutzebuerg	6095eu	
1300	1400		Malaysia, Radio 7295do		
1300	1400		Papua New Guinea, NBC	4890do	9675irr
1300	1400	DRM	Russia, Voice of 15780eu		
1300	1400		Singapore, Radio Singapore Intl	6150as	9600as
1300	1400	as	South Africa, Channel Africa	11780af	21620af
			21760af		
1300	1400		South Korea, Radio Korea Intl	9570am	13670am
1300	1400		Sri Lanka, SLBC 6005as	9770as	15745as
1300	1400	DRM	UK, BBC World Service	7320eu	

1300	1400		UK, BBC World Service	6190af	6195va
			9740as 11760va 11940af	12095eu	15190va
			15310as 15420af 15485va	15565va	15575va
			17640va 17790as 17830af	17885af	21470af
			21660as		
1300	1400		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb 7507usb	10320usb	12335usb
			12579usb 13362usb	13855usb	
1300	1400		USA, KAIJ Dallos TX 5755va		
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	
1300	1400		USA, Voice of America 5955as	9645as	9760as
			15160as 15425as		
1300	1400		USA, WBCQ Kennebunk ME	17495na	
1300	1400		USA, WBOH Newport NC	5920am	
1300	1400		USA, WEWN Birmingham AL	7520na	
1300	1400		USA, WHRA Greenbush ME	17560af	
1300	1400		USA, WHRI Noblesville IN	9850na	15105am
1300	1400		USA, WINB Red Lion PA	13570am	
1300	1400		USA, WJIE Louisville KY	13595am	
1300	1400		USA, WRMI Miami FL 15725na		
1300	1400	vl	USA, WSHB Cypress Creek SC	9430na	11670am
1300	1400		USA, WTJC Newport NC	9370na	
1300	1400		USA, WWCR Nashville TN	9475na	12160na
			13845na 15825na		
1300	1400		USA, WYFR Okeechobee FL	11560as	11740na
			11830na		
1300	1400		Zambia, Radio Christian Voice	9865do	
1306	1400	occasional	New Zealand, Radio NZ Intl	6095pa	
1330	1350		UAE, Radio Dubai 13630eu	13675eu	15395eu
			17865eu 21605eu		
1330	1357		Vietnam, Voice of 11630eu	13740eu	
1330	1400		Guam, AWR 11980as	15275as	
1330	1400		India, All India Radio 9690as	13710as	
1330	1400		Sweden, Radio 17505va	17840na	
1330	1400		UAE, AWR Africa 15320as		
1330	1400		Uzbekistan, Radio Tashkent Intl	7285as	9715as
			15295as 17775as		

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

1400	1430		Ecuador, HCJB 12005am	15115am	21455pa
1400	1430		Egypt, Radio Cairo 17775as		
1400	1430	vl	Mexico, Radio Mexico Intl	9705am	11770am
1400	1430		Thailand, Radio 9830as		
1400	1455	as	South Africa, Channel Africa	11780af	21620af
			21760af		
1400	1456		China, China Radio Intl	7405na	11675as
			11765as 11765as 13685af	15125af	17720na
1400	1456		Romania, Radio Romania Intl	15270eu	15365eu
			17790eu 17805eu		
1400	1500		Anguilla, Caribbean Beacon	11775am	
1400	1500		Australia, HCJB 15390as		
1400	1500		Australia, Radio 5995va	6080pa	9580va
			11650va 11660as		
1400	1500		Australia, Voice Intl 9880as	13655as	
1400	1500		Canada, CBC Northern Service	9625do	
1400	1500		Canada, CFRX Toronto ON	6070do	
1400	1500		Canada, CFVP Calgary AB	6030do	
1400	1500		Canada, CKZN St John's NF	6160do	
1400	1500		Canada, CKZU Vancouver BC	6160do	
1400	1500		Canada, Radio Canada Intl	9515na	13655na
			17800na		
1400	1500		China, Voice of Hope 13590as		
1400	1500		Costa Rica, Radio for Peace Intl	7445am	15038va
1400	1500		Costa Rica, University Network	5030am	6150am
			7375am 9725sa 11870am	13750na	17645as
1400	1500	1st a	Finland, Scandinavian Weekend Radio		6170eu
			11690eu		
1400	1500		France, Radio France Intl	11610as	17515as
1400	1500		Germany, Deutsche Welle	6140eu	
1400	1500	a	Germany, Overcomer Ministries	6110eu	13810me
1400	1500		India, All India Radio 9690as	13710as	
1400	1500		Japan, Radio 7200as	9505na	11730as
			11840pa 17870me		
1400	1500		Jordan, Radio 11690eu		
1400	1500	m-f/ DRM	Luxembourg, RTL Radio Lutzebuerg	6095eu	
1400	1500	occasional	New Zealand, Radio NZ Intl	6095pa	
1400	1500		Oman, Radio 6085eu		
1400	1500	DRM	Russia, Voice of 15780eu		
1400	1500		Russia, Voice of 7340as	9745as	12055as
			17645as		
1400	1500		Singapore, Mediacorp Radio	6150do	
1400	1500		Sri Lanka, SLBC 6005as	9770as	15745as
1400	1500		Taiwan, Radio Taiwan Intl	15265as	
1400	1500	DRM	UK, BBC World Service	7320eu	
1400	1500		UK, BBC World Service	6190af	6195as
			9740as 11940af 12095eu	15190va	15310as
			15485va 15565va 15575va	17640va	17790as
			17830af 21470af 21660af		
1400	1500		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb 7507usb	10320usb	12335usb
			12579usb 13362usb	13855usb	

1400	1500		USA, KAIJ Dallas TX 13B15va			
1400	1500		USA, KJES Vado NM 11715na			
1400	1500		USA, KTBN Salt Lake City UT	7505na		
1400	1500		USA, Voice of America 5955as 15160as 15255eu 15425as	7125as	9760as	
1400	1500		USA, WBCQ Kennebunk ME	17495na		
1400	1500		USA, WBOH Newport NC	5920am		
1400	1500		USA, WEWN Birmingham AL	9955na		
1400	1500		USA, WHRA Greenbush ME	17560af		
1400	1500		USA, WHRI Noblesville IN	9850am	15105am	
1400	1500		USA, WINB Red Lion PA	13570am		
1400	1500		USA, WJIE Louisville KY	13595am		
1400	1500		USA, WRMI Miami FL 15725na			
1400	1500		USA, WTJC Newport NC	9370na		
1400	1500		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na	
1400	1500		USA, WYFR Okeechobee FL 11830na 17760am	11560as	11740na	
1400	1500		Zambia, Radio Christian Voice	9865do		
1415	1420		Nepal, Radio 3230as	5005as		
1430	1500	s	Germany, Pan American BC	15650me		
1430	1500		Myanmar, Radio 5040do	5985do		
1430	1500		Netherlands, Radio 9860as 15220na	11835as	12075as	
1445	1500		Guam, TWR/KTWR 15330as			

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

1500	1500	as	Canada, Radio Canada Intl 17800na	9515na	13655na	
1500	1528	s	Hungary, Radio Budapest	6025eu	9715eu	
1500	1530	vl	Mexico, Radio Mexico Intl	9705am	11770am	
1500	1530		Mangolia, Voice of 12015eu			
1500	1530		South Africa, Channel Africa	17770af		
1500	1530		Sri Lanka, SLBC 6005as	9770as	15745as	
1500	1530		UK, BBC World Service	11860af	15420af	
1500	1545		Guam, TWR/KTWR 15330as			
1500	1556		China, China Radio Intl 13685af 15125af 17720af	7160as	9785as	
1500	1556		North Korea, Voice of 4405as 11710am 13760eu 15245eu	9335am	11335eu	
1500	1600		Anguilla, Caribbean Beacon	11775am		
1500	1600		Australia, HCJB 15390as			
1500	1600		Australia, Radio 5995va 9580va 11650va 11660as	6080pa	9475as	
1500	1600		Australia, Voice Intl 9880as	13655as		
1500	1600		Canada, CBC Northern Service	9625do		
1500	1600		Canada, CFRX Toronto ON	6070do		
1500	1600		Canada, CFVP Calgary AB	6030do		
1500	1600		Canada, CKZN St John's NF	6160do		
1500	1600		Canada, CKZU Vancouver BC	6160do		
1500	1600		Canada, Radio Canada Intl	15455as	17720as	
1500	1600		Costa Rica, Radio for Peace Intl	7445am	15038va	
1500	1600		Costa Rica, University Network 7375am 9725so 11870am	5030am	6150am 13750na 17645as	
1500	1600	1st a	Finland, Scandinavian Weekend Radio 11720eu			5990eu
1500	1600		Germany, Deutsche Welle	6140eu		
1500	1600	smtwhf	Germany, Overcomer Ministries	6110eu	13810me	
1500	1600	s	Germany, Pan American BC	15650me		
1500	1600	s	Ireland, Reflections Europe 12255eu	3910eu	6295eu	
1500	1600		Japan, Radio 7200as 11730as	9750as	11705na	
1500	1600		Jordan, Radio 11690na			
1500	1600	m-f/ DRM	Luxembourg, RTL Radio Lutzebuerg	6095eu		
1500	1600		Myanmar, Radio 5040do	5985do		
1500	1600		Netherlands, Radio 9890as 15220na	11835as	12075as	
1500	1600	occasional	New Zealand, Radio NZ Intl	6095po		
1500	1600	DRM	Russia, Voice of 15780eu			
1500	1600		Russia, Voice of 4940me 6005me 7315as 7340as	4965me 11500as	4975me 11985me	
1500	1600		Singapore, Mediacorp Radio	6150do		
1500	1600		UK, BBC World Service 6195as 9410eu 9740as 15190va 15310as 15400af 15575va 17790as 17830af 21660af	5975as 11940af 15485va	6190af 12095va 15565va 21470af	21490af
1500	1600		USA, Armed Forces Radio 5765usb 6350usb 7507usb 12579usb 13362usb	4319usb 10320usb	5446usb 12335usb 13855usb	
1500	1600		USA, KAIJ Dallas TX 13815va			
1500	1600		USA, KTBN Salt Lake City UT	15590na		
1500	1600		USA, KWHR Naalehu HI	9930as		
1500	1600		USA, Voice of America 6160as 9700eu 9760as 15255eu 15550as	7125as 9845as	9590as 12040as	15205as
1500	1600		USA, WBCQ Kennebunk ME	17495na		
1500	1600		USA, WBOH Newport NC	5920am		
1500	1600		USA, WEWN Birmingham AL	9955na		
1500	1600		USA, WHRA Greenbush ME	17650af		
1500	1600		USA, WHRI Noblesville IN	13760va	15105am	
1500	1600		USA, WINB Red Lion PA	13570am		
1500	1600		USA, WJIE Louisville KY	13595am		
1500	1600	smtwh:	USA, WMLK Bethel PA 9465eu			
1500	1600		USA, WRMI Miami FL 15725na			
1500	1600		USA, WTJC Newport NC	9370na		
1500	1600		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na	
1500	1600		USA, WYFR Okeechobee FL 17760am	6280as	11830na	
1500	1600		Zambia, Radio Christian Voice	4965do		
1510	1525	mtwhf	Austria, Radio Austria Intl	15515na		
1515	1600	as	Germany, Bible Voice BC Network	15680me		
1515	1600	a	Vatican City, Vatican Radio	13765as	15235as	
1530	1545		Bangladesh, Bangla Betar	4882as		
1530	1545		India, All India Radio 4910as	9910as	11740as	
1530	1600		Georgia, Radio Georgia	6180me		
1530	1600	mtwhf	Germany, Bible Voice BC Network	17655as		
1530	1600		Germany, IBRA Radio 15715me			
1530	1600		Iran, Voice of the Islamic Rep 11775as	7245eu	9635as	
1540	1550		Turkmenistan, Turkmen Radio	4930do		
1545	1600	s h	Bangladesh, Bangla Betar	4882as		

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

1600	1615		Pakistan, Radio 11570va 17720va	15065va	15725va	
1600	1625		Netherlands, Radio 9890as 15220na	11835as	12075as	
1600	1627		Czech Rep, Radio Prague Intl	5930eu	21745af	
1600	1627		Iran, Voice of the Islamic Rep 11775as	7245eu	9635as	
1600	1627		Vietnam, Voice of 11630eu	13740eu		
1600	1630		Guam, AWR 11560as	15215as	15235as	
1600	1630		Jordan, Radio 11690na			
1600	1630	w	Moldova, Radio Pridnestrovye	5960eu		
1600	1630		South Africa, Channel Africa	9525af		
1600	1630		UAE, Gospel For Asia 11695as			
1600	1635		UAE, Radio Dubai 13630eu 17865eu 21605eu	13675eu	15395eu	
1600	1645		USA, WYFR Okeechobee FL	17790na		
1600	1650	occasional	New Zealand, Radio NZ Intl	6095pa		
1600	1656		North Korea, Voice of 3560as	9975af	11710af	
1600	1657		China, China Radio Intl 13685af 11910af	9570as	9695af	
1600	1700		Anguilla, Caribbean Beacon	11775am		
1600	1700		Australia, HCJB 15390as			
1600	1700		Australia, Radio 5995va 9580va 11650va 11660as	6080pa	9475as	
1600	1700		Australia, Voice Intl 9880as	13655as		
1600	1700		Canada, CBC Northern Service	9625do		
1600	1700		Canada, CFRX Toronto ON	6070do		
1600	1700		Canada, CFVP Calgary AB	6030do		
1600	1700		Canada, CKZN St John's NF	6160do		
1600	1700		Canada, CKZU Vancouver BC	6160do		
1600	1700		Costa Rica, Radio for Peace Intl	7445am	15038va	
1600	1700		Costa Rica, University Network 7375am 9725so 11870am	5030am	6150am 13750na 17645as	
1600	1700		Ethiopia, Radio 5990af 9560af 9704af 11800af	7110af	7165af	
1600	1700	1st a	Finland, Scandinavian Weekend Radio 11720eu			5990eu
1600	1700		France, Radio France Intl 11995af 12015af 17850af	9730af 15160af	11615af 15605af	17605af
1600	1700		Germany, Bible Voice BC Network	15680me		
1600	1700	DRM	Germany, Deutsche Welle	6140eu	7125eu	
1600	1700		Germany, Deutsche Welle 7225as 17595as	6140eu	6170as	
1600	1700	a	Germany, Overcomer Ministries	6110eu		
1600	1700	a	Greece, Voice of 9420eu	15630eu	17705na	
1600	1700	s	Ireland, Reflections Europe 12255eu	3910eu	6295eu	
1600	1700	DRM	Russia, Voice of 15780eu			
1600	1700		Russia, Voice of 7315as 11985me 12055as	7350as	11720as 15540me	
1600	1700		South Africa, Radio Veritas	3230af		
1600	1700		South Korea, Radio Korea Intl 9870af	5975om	9515af	
1600	1700		Taiwan, Radio Taiwan Intl	11550as		
1600	1700		UK, BBC World Service 6190af 6195as 11940af 12095va 15485eu 15565va 21660af	3915as 7160as 15190sa	5975as 9410va 15310as	9510as 15400af 17830af 21470af
1600	1700	vl	UK, Sudan Radio Service	17630va		
1600	1700		USA, Armed Forces Radio 5765usb 6350usb 7507usb 12579usb 13362usb	4319usb 10320usb	5446usb 12335usb 13855usb	
1600	1700		USA, KAIJ Dallas TX 13815va			
1600	1700		USA, KTBN Salt Lake City UT	15590na		
1600	1700		USA, KWHR Naalehu HI	9930as		
1600	1700		USA, Voice of America 12080af	13600as	17895af	
1600	1700		USA, WBCQ Kennebunk ME	17495na		
1600	1700		USA, W8OH Newport NC	5920am		
1600	1700		USA, WEWN Birmingham AL	13615na		
1600	1700		USA, WHRA Greenbush ME	17650af		

1600	1700		USA, WHRI Noblesville IN	13760va	15105am
1600	1700		USA, WIN8 Red Lion PA	13570am	
1600	1700		USA, WJIE Louisville KY	13595am	
1600	1700	smtwhf	USA, WMLK Bethel PA 9465eu		
1600	1700		USA, WRMI Miami FL 15725na		
1600	1700	vl	USA, WSHB Cypress Creek SC	18910af	
1600	1700		USA, WTJC Newport NC	9370na	
1600	1700		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na
1600	1700		USA, WWRB Manchester TN	9320na	12172na
1600	1700		USA, WYFR Okeechobee FL 11865na 17760am 18980eu	6280eu	11830na 21455eu
1600	1700		Zambia, Radio Christian Voice	4965do	
1615	1630		Vatican City, Vatican Radio 7250eu 9645eu 15595eu	4005eu	5890eu
1615	1700		UK, BBC World Service	15420af	
1630	1657		Slovakia, Radio Slovakia Intl 7345eu	5920eu	6055eu
1630	1700		Egypt, Radio Cairo 15255af		
1630	1700		Guam, AWR 11560as 15235as	11975as	15215as
1630	1700		UAE, AWR Africa 17630me		
1630	1700	as	UK, BBC World Service	11860af	21490af
1645	1700		Tajikistan, Tajik Radio 7245as		
1650	1700	mtwhf	New Zealand, Radio NZ Intl	11725pa	

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

1700	1715		Israel, Kol Israel 15640va	17545va	
1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485af
1700	1727		Vietnam, Voice of 9725eu		
1700	1730		Azerbaijan, Voice of 6110eu	9155eu	
1700	1730		France, Radio France Intl	15605af	17605af
1700	1730	mtwhf	Germany, Bible Voice BC Network	15680me	
1700	1730	vl	Somalia, Radio Galkayo	6980va	
1700	1730		South Africa, Channel Africa	15265af	
1700	1730		UK, BBC World Service	6005af	9630af
1700	1750	mtwhf	New Zealand, Radio NZ Intl	11725pa	
1700	1756		China, China Radio Intl 11900af 11920af	9570af	9695af
1700	1756		Romania, Radio Romania Intl 11940eu 15380eu	9510eu	11820eu
1700	1759		Poland, Radio Polonia	5995eu	7285eu
1700	1800		Anguilla, Caribbean Beacon	11775am	
1700	1800		Australia, Radio 5995va 9580va 9815pa 11880va	6080pa	9475as
1700	1800		Australia, Voice Intl 11680as		
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 Voncouver BC	6160do	
1700	1800		Costa Rica, Radio for Peace Intl	7445am	15038va
1700	1800		Costa Rica, University Network 7375am 9725so 11870am	5030am	6150am 13750na 17645as
1700	1800		Egypt, Radio Cairo 15255af		
1700	1800		Eqt Guinea, Radio Africa	7189af	15184al
1700	1800	1st a	Finland, Scandinavian Weekend Radio 11720eu		5990eu
1700	1800	as	Germany, Bible Voice BC Network	15680me	
1700	1800	DRM	Germany, Deutsche Welle	7125eu	
1700	1800		Germany, Deutsche Welle	6140eu	
1700	1800		Germany, Radio Africa Intl	13820af	15715af
1700	1800		Japan, Radio 9505na	11970eu	15355af
1700	1800	as	Russia, Voice of 9480eu	11675eu	
1700	1800		Russia, Voice of 7310eu 9820eu 11510af 11985af	7315as	7360eu
1700	1800		South Africa, Radio Veritas	3230af	
1700	1800		UK, BBC World Service 5975as 6190af 6195va 9510as 11940af 12095va 15420af 15565va 17830af	3255af 7160as 15310as 21470af	3915as 9410va 15400af 21660as
1700	1800	vl	UK, Sudan Radio Service	17660va	
1700	1800		USA, Armed Forces Radio 5765usb 6350usb 7507usb 12579usb 13362usb	4319usb 10320usb 13855usb	5446usb 12335usb
1700	1800		USA, KAIJ Dallas TX 13815va		
1700	1800		USA, KTBN Salt Lake City UT	15590na	
1700	1800		USA, Voice of America 9770af 15255af 15580af	15255af	15410af
1700	1800		USA, WBCQ Kennebunk ME	17495na	
1700	1800		USA, WBOH Newport NC	5920am	
1700	1800		USA, WEWN Birmingham AL	13615na	17595eu
1700	1800		USA, WHRA Greenbush ME	17650af	
1700	1800		USA, WHRI Noblesville IN	9495am	13760va
1700	1800		USA, WINB Red Lion PA	13570am	
1700	1800		USA, WJIE Louisville KY	13595am	
1700	1800	smtwhf	USA, WMLK Bethel PA 9465eu		
1700	1800		USA, WRMI Miami FL 15725na		
1700	1800	vl	USA, WSHB Cypress Creek SC	18910af	
1700	1800		USA, WTJC Newport NC	9370na	
1700	1800		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na
1700	1800		USA, WWRB Manchester TN	9320na	12172na
1700	1800		USA, WYFR Okeechobee FL	18980eu	21455eu
1700	1800		Zambia, Radio Christian Voice	4965do	
1715	1730		Swaziland, TWR 3200af		
1730	1745		Libya, Voice of Africa 15660af	17880af	
1730	1745	mtwhf	UK, United Nations Radio 17810af	7150af	15495me
1730	1755		Belgium, Radio Vlaanderen Intl 13710me	9925eu	13690eu
1730	1800		Bulgaria, Radio 9400eu	11900eu	
1730	1800		Georgia, Radio Georgia	11910eu	
1730	1800		Guam, AWR 9385me	12015me	
1730	1800		Liberia, ELWA 4760do		
1730	1800	mtwhfa	Malta, Voice of Mediterranean	6185eu	
1730	1800		Netherlands, Radio 6020af	7120af	11655af
1730	1800		Philippines, Radio Pilipinas 17720me	11720me	15190me
1730	1800		Swaziland, TWR 3200af	9500af	
1730	1800	mtwhfa	Sweden, Radio 6065va		
1730	1800	s	Sweden, Radio 13580va		
1730	1800		Switzerland, Swiss Radio Intl 15555va	9755va	11810va
1730	1800		Vatican City, Vatican Radio 17515af	13765af	15570af
1735	1745	vl/th	Paraguay, Radio Nacional	9739sa	
1745	1800		Bangladesh, Bangla Betar 15520eu	7185eu	9550eu
1745	1800		India, All India Radio 7410eu 11620eu 11935af 13605af 17670af	9445af	9950eu 15075af 15155af
1751	1800		New Zealand, Radio NZ Intl	15160pa	

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

1800	1810		Zanzibar, Voice of Tanzania	11734do	
1800	1815		Germany, Bible Voice BC Network	13845me	
1800	1827		Slovakia, Radio Slovakia Intl 7345eu	5920eu	6055eu
1800	1827		Vietnam, Voice of 11630eu	13740eu	
1800	1830		Egypt, Radio Cairo 15255af		
1800	1830	s	Germany, Universal Life	15750af	
1800	1830		Netherlands, Radio 6020af	7120af	11655af
1800	1830		South Africa, AWR Africa 9520af	3215af	3345af
1800	1830		South Africa, Channel Africa	15265af	
1800	1830		UK, BBC World Service	5975as	
1800	1830		UK, RTE Radio 15585me		
1800	1900		Anguilla, Caribbean Beacon	11775am	
1800	1900	mtwhf	Argentina, RAE	9690eu	15345eu
1800	1900		Australia, HCJB	11765pa	
1800	1900		Australia, Radio 6080pa 9580va 9815pa 11880va	7240va	9475as
1800	1900		Australia, Voice Intl 11680as		
1800	1900		Bangladesh, Bangla Betar 15520eu	7185eu	9550eu
1800	1900		Canada, CBC Northern Service	9625do	
1800	1900		Canada, CFRX Toronto ON	6070do	
1800	1900		Canada, CFVP Calgary AB	6030do	
1800	1900		Canada, CKZN St John's NF	6160do	
1800	1900		Canada, CKZU Vancouver BC	6160do	
1800	1900		Costa Rica, Radio for Peace Intl	7445am	15038va
1800	1900		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am 13750na 17645as
1800	1900		Eqt Guinea, Radio Africa	7189af	15184al
1800	1900	1st a	Finland, Scandinavian Weekend Radio 11720eu		6170eu
1800	1900		Germany, Bible Voice BC Network	6010eu	
1800	1900	DRM	Germany, Deutsche Welle	6140eu	
1800	1900		Germany, Deutsche Welle	6140eu	
1800	1900		Germany, Radio Africa Intl	13820af	15715af
1800	1900	s	Greece, Voice of 9420eu	15630eu	17705na
1800	1900		India, All India Radio 7410eu 11620eu 11935af 13605af 17670af	9445af	9950eu 15075af 15155af
1800	1900	s	Ireland, Reflections Europe 12255eu	3910eu	6295eu
1800	1900		Kuwait, Radio 11990va		
1800	1900		Latvia, Laser Radio 9290eu		
1800	1900		Liberia, ELWA 4760do		
1800	1900		New Zealand, Radio NZ Intl	15160pa	
1800	1900		Nigeria, Voice of 7255af	17800af	
1800	1900		Philippines, Radio Pilipinas 17720me	11720me	15190me
1800	1900		Russia, Voice of 7310eu 9775eu 9820eu 11510af	7360eu 11675eu	9480eu 11870af
1800	1900		Sierra Leone, Radio UNAMSIL	6139af	
1800	1900	s	South Africa, Radio League	3215af	
1800	1900	as	South Africa, Radio Lusafonia	3345af	
1800	1900		South Africa, Radio Veritas	3230af	
1800	1900		Swaziland, TWR 3200af	9500af	
1800	1900		UK, BBC World Service 6195va 9410va 9510as 15400af 15420af 17830af	3255af 12095va 21470af	6190af 15310as
1800	1900		USA, Armed Forces Radio 5765usb 6350usb 7507usb 12579usb 13362usb	4319usb 10320usb 13855usb	5446usb 12335usb
1800	1900		USA, KAIJ Dallas TX 13815va		

1800	1900		USA, KJES Vado NM 15385na			
1800	1900		USA, KTBN Salt Lake City UT	15590na		
1800	1900		USA, Voice of America 15410af	15580af		
1800	1900	s	USA, WBCQ Kennebunk ME	7415na		
1800	1900		USA, WBCQ Kennebunk ME	17495na		
1800	1900		USA, WBOH Newport NC	5920am		
1800	1900		USA, WEWN Birmingham AL	13615na	17595eu	
1800	1900		USA, WHRA Greenbush ME	17650af		
1800	1900		USA, WHRI Noblesville IN	9495am	13760va	
1800	1900		USA, WINB Red Lion PA	13570am		
1800	1900		USA, WJIE Louisville KY	13595am		
1800	1900	smtwhf	USA, WMLK Bethel PA 9465eu			
1800	1900		USA, WRMI Miami FL 15725na			
1800	1900	vl	USA, WSHB Cypress Creek SC	15665eu	18910af	
1800	1900		USA, WTJC Newport NC	9370na		
1800	1900		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na	
1800	1900		USA, WWRB Manchester TN	9320na	12172na	
1800	1900		USA, WYFR Okeechobee FL	18980eu		
1800	1900		Yemen, Rep of Yemen Radio	9780me		
1800	1900		Zambia, Radio Christian Voice	4965do		
1830	1845		Germany, IBRA Radio 15695af			
1830	1845		Rwanda,Radio 6005do			
1830	1855		Greece, Voice of 12110eu			
1830	1858		Serbia & Montenegro, RSCG	6100eu		
1830	1900		Georgia, Radio Georgia	11760eu		
1830	1900		Netherlands, Radio 6020af 11655af 13700af 17605af	7120af	9895af 21590af	
1830	1900		South Africa, AWR Africa	9520af		
1830	1900		Turkey, Voice of 9785eu			
1830	1900		UK, BBC World Service	6005af	9630af	
1830	1900		UK, RTE Radio 13640na	21630af		
1845	1900	mtwhfa	Albania, Radio Tirana Intl	7210eu	9520eu	
1845	1900		Conga, RTV Congolaise	4765af	5985af	

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

1900	1925		Israel, Kol Israel 11605va 17545va	15615va	15640af	
1900	1927		Vietnam, Voice of 9725eu	11630eu	13740eu	
1900	1928		Hungary, Radio Budapest 11720eu	3975eu	6025eu	
1900	1930	s	Germany, Bible Voice BC Network	5970eu		
1900	1930	s	Germany, Universal Life	15565me		
1900	1930	mtwhf	Nigeria, Radio Jakada Intl	15170af		
1900	1930		Philippines, Radio Pilipinos 17720me	11720me	15190me	
1900	1930		Turkey, Voice of 9785eu			
1900	1945		India, All India Radio 7410eu 11620eu 11935af 13605af 17670af	9445af	9950eu 15075af 15155af	
1900	1945		Iraq, Radio Iraq Intl 6175irr	9687irr	11787irr	
1900	1945		USA, WYFR Okeechobee FL 18980eu	15115eu	15565eu	
1900	1956		China, China Radio Intl	9440af	13790af	
1900	1956		North Korea, Voice of 4405as 13760eu 15245eu	7505eu	11335eu	
1900	2000		Anguilla, Caribbean Beacon	11775am		
1900	2000		Australia, HCJB 11765pa			
1900	2000		Australia, Radio 6080pa 9580va 9815pa 11880va	7240va	9500as	
1900	2000		Australia, Voice Intl 11680as			
1900	2000	vl	Botswana, Radio 3356do	4820do	7255do	
1900	2000		Canada, CBC Northern Service	9625do		
1900	2000		Canada, CFRX Toronto ON	6070do		
1900	2000		Canada, CFVP Calgary AB	6030do		
1900	2000		Conada, CKZN St Jahn's NF	6160do		
1900	2000		Canada, CKZU Voncouver BC	6160do		
1900	2000		Costa Rica, Radio for Peace Intl	7445am	15038va	
1900	2000		Costa Rica, University Network 7375am 9725sa 11870am	5030am	6150am 13750na 17645as	
1900	2000		Eqt Guinea, Radio Africa	7189af	15184al	
1900	2000	1st a	Finland, Scandinavian Weekend Radio 11690eu		5990eu	
1900	2000	fas	Germany, Bible Voice BC Network	13710me	13725af	
1900	2000		Germany, Deutsche Welle 11965af 13590af	6180af	7225af	
1900	2000	vl	Ghana, Ghana BC Corp	4915do		
1900	2000	vl	Italy, IRRS 5775va			
1900	2000		Kuwait, Radio 11990va			
1900	2000		Latvia, Laser Radio 9290eu			
1900	2000		Liberia, ELWA 4760do			
1900	2000		Malaysia, Radio 7295do			
1900	2000	mtwhas	Malta, Voice of Mediterranean	12060eu		
1900	2000		Namibia, Namibian BC Corp 6060af 6175al	3270af	3290af	
1900	2000		Netherlands, Radio 6020af 11655af 13700af 17605af	7120af	9895af 21590af	
1900	2000		New Zealand, Radio NZ Intl	15160pa		
1900	2000		Nigeria, Radio/Abuja 7275do			
1900	2000		Nigeria, Radio/Enugu 6025do			
1900	2000		Nigeria, Radio/Ibadan	6050do		
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do	
1900	2000		Nigeria, Radio/Lagos 3326do	4990do		
1900	2000		Nigeria, Voice of 7255af	17800af		
1900	2000		Russia, Voice of 7310eu 7360eu 7440eu 15735am	7330eu 9775eu	7350eu 9820eu 11675eu	
1900	2000		Sierra Leone, Radio UNAMSIL	6139af		
1900	2000		Sierra Leone, SLBS 3316do			
1900	2000	vl	Solomon Islands, SIBC 5020do	9545do		
1900	2000		South Korea, Radio Korea Intl	5975am	7275eu	
1900	2000	a	Sri Lanka, SLBC 6010am			
1900	2000		Swaziland, TWR 3200af			
1900	2000		Thailand, Radio 7155eu			
1900	2000		Uganda, Radio 4976do	5026do	7196do	
1900	2000		UK, BBC World Service 6190af 6195va 15310me 15400af	3255af 9410va	6005af 9630af 12095af 17830af 21470af	
1900	2000		UK, Gospel For Asia	15590af		
1900	2000		USA, Armed Forces Radio 5765usb 6350usb 12579usb	4319usb 7507usb	5446usb 10320usb 12335usb 13362usb 13855usb	
1900	2000		USA, KAIJ Dallas TX 13815va			
1900	2000		USA, KTBN Salt Lake City UT	15590na		
1900	2000		USA, Voice of America 7260me 13635me	9680me	11925as	
1900	2000	s	USA, WBCQ Kennebunk ME	7415na	17495na	
1900	2000		USA, WBOH Newport NC	5920am		
1900	2000		USA, WEWN Birmingham AL	13615na	17595eu	
1900	2000		USA, WHRA Greenbush ME	17650af		
1900	2000		USA, WHRI Noblesville IN	9495am	13760va	
1900	2000		USA, WINB Red Lion PA	13570am		
1900	2000		USA, WJIE Louisville KY	13595am		
1900	2000	smtwhf	USA, WMLK Bethel PA 9465eu			
1900	2000		USA, WRMI Miami FL 15725na			
1900	2000	vl	USA, WSHB Cypress Creek SC	15665eu	18910af	
1900	2000		USA, WTJC Newport NC	9370na		
1900	2000		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na	
1900	2000		USA, WWRB Manchester TN	9320na	12172na	
1900	2000	vl	Vanuatu, Radio 3945al	7260da		
1900	2000	vl	Zimbabwe, ZBC Corp 5975do			
1915	1925		Rwanda, Radio 6005do			
1923	1930	vl	Libya, Voice of Africa 15105af	15315af		
1930	1959		Belgium, Radio Vlaanderen Intl	9925eu	13690eu	
1930	2000	t h	Belarus, Radio Belarus Intl	7105eu	7210eu	
1930	2000		Iran, Voice of the Islamic Rep 11750eu 11860eu	9800eu	11670eu	
1930	2000		Papua New Guinea, NBC	4890do	9675irr	
1930	2000		Slovakia, AWR Europe 7130eu			
1930	2000		Sweden, Radio 6065va			
1930	2000		Switzerland, Swiss Radio Intl 13660va 17660va	9820vo	11920va	
1935	1955		Italy, RAI Intl 5970eu	9745eu		
1940	1945		Turkmeniston, Turkmen Radio	4930as		
1940	2000	mtwhfa	Armenia, Voice of 4810eu	9960eu		
1950	2000		Vatican City, Vatican Radio 7350eu	4005eu	5890eu	

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

2000	2010		Vatican City, Vatican Radio 7250eu 9660af	4005eu 11625af	5890eu 13765af	
2000	2025		Netherlands, Radio 6020af 11655af 13700af 17605af	7120af	9895af 21590af	
2000	2027		Czech Rep, Radio Prague Intl	5930eu	11600as	
2000	2027		Iran, Voice of the Islamic Rep 11750eu 11860eu	9800eu	11670eu	
2000	2030		Australia, HCJB 11765pa			
2000	2030		Mongolia, Voice of 12015eu			
2000	2030		Swaziland, TWR 3200af			
2000	2030	DRM	Vatican City, Vatican Radio	9800eu		
2000	2056		China, China Radio Intl 13630af 15110eu 17790eu	9440af	11640af	
2000	2059	mtwhf	Spain, Radio Exterior Espana	9570af	15290eu	
2000	2100		Anguilla, Caribbean Beacon	11775am		
2000	2100	as	Australia, Radio 6080pa	7240va		
2000	2100		Australia, Radio 9500as 11880va 12080va	9580va	9815pa	
2000	2100		Australia, Voice Intl 11680as			
2000	2100	vl	Botswana, Radio 3356do	4820do	7255do	
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, Rodio Canada Intl 11690va 11965va 12015va 17870va	5850vo 15325va	5995va 15470va	
2000	2100		Costa Rica, Radio for Peace Intl	7445am	15038va	
2000	2100		Costa Rica, University Network 7375am 9725so 11870am	5030am	6150am 13750na 17645as	
2000	2100		Eqt Guinea, Radio Africa	7189af	15184al	
2000	2100	1st a	Finland, Scandinavian Weekend Radio 11690eu		5990eu	
2000	2100		Germany, Deutsche Welle 17810af	9780af	15205af	

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2000	2100		Germany, Overcomer Ministries	9595eu		
2000	2100	vl	Ghana, Ghana BC Corp	4915do		
2000	2100		Guam, AWR	11750as	11980as	
2000	2100		Indonesia, Voice of	11785eu	15150eu	
2000	2100	s	Ireland, Reflections Europe 12255eu	3910eu	6295eu	
2000	2100	vl	Italy, IRRS 5775va			
2000	2100		Kuwait, Radia	11990va		
2000	2100		Latvia, Laser Radio	9290eu		
2000	2100		Liberia, ELWA	4760do		
2000	2100		Malaysia, Radio	7295do		
2000	2100		Namibia, Namibian BC Corp 6060af 6175af	3270af	3290af	
2000	2100		Nigeria, Radio/Abuja	7275do		
2000	2100		Nigeria, Radio/Enugu	6025do		
2000	2100		Nigeria, Radio/Ibadan	6050do		
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do	
2000	2100		Nigeria, Radio/Lagos	3326do	4990do	
2000	2100		Nigeria, Voice of	7255af	17800af	
2000	2100		Papua New Guinea, NBC	4890do	9675irr	
2000	2100		Russia, Voice of 9775eu 9820eu	7330eu 11675eu	7350eu 11980eu	7360eu 15735am
2000	2100		Sierra Leone, Radio UNAMSIL	6139af		
2000	2100		Sierra Leone, SLBS	3316do		
2000	2100	vl	Solomon Islands, SIBC	5020do	9545do	
2000	2100		Syria, Radio Damascus		12085eu	13610eu
2000	2100		Uganda, Radio	4976do	5026do	7196do
2000	2100		UK, AWR Europe	15385af		
2000	2100		UK, BBC World Service 6190af 6195va 15400af 17830af	3255af 9410va	6005af 9630af	12095af
2000	2100		USA, Armed Forces Radio 5765usb 6350usb 12579usb	4319usb 7507usb 13362usb	5446usb 10320usb	12335usb 13855usb
2000	2100		USA, KAIJ Dallas TX	13815va		
2000	2100		USA, KTBN Salt Lake City UT	15590no		
2000	2100		USA, Voice of America 9770eu 9850af 15410af 15445af	4950af 11855af	6095eu 11975af	9760eu 13670af 17895af
2000	2100		USA, WBCQ Kennebunk ME 17495na	7415na	9330na	
2000	2100		USA, WBOH Newport NC	5920am		
2000	2100		USA, WEWN Birmingham AL	13615na	17595eu	
2000	2100		USA, WHRA Greenbush ME	17650as		
2000	2100		USA, WHRI Noblesville IN	5745va	9495am	
2000	2100		USA, WINB Red Lion PA	13570am		
2000	2100		USA, WJIE Louisville KY	13595am		
2000	2100		USA, WRMI Miami FL	15725na		
2000	2100		USA, WTJC Newport NC	9370na		
2000	2100		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na	
2000	2100		USA, WWRB Manchester TN	9320na	12172na	
2000	2100		USA, WYFR Okeechobee FL 15565af 17575sa	5810eu	7580eu	
2000	2100	vl	Vanuatu, Radio	3945al	7260do	
2000	2100	vl	Zimbabwe, ZBC Corp	5975do		
2000	2100	vl	USA, WSHB Cypress Creek SC	15665af	18910af	
2010	2030		Vatican City, Vatican Radio 13765af	9660af	11625af	
2025	2045		Italy, RAI Intl	6185va	9670va	11880af
2030	2045		Swaziland, TWR	3200af		
2030	2045		Thailand, Radio	9680eu		
2030	2056	vl	Burundi, Radio	6140af		
2030	2057		Uzbekistan, Radio Tashkent Intl 11905eu	5025eu	9545eu	
2030	2057		Vietnam, Voice of	11630eu	13740eu	
2030	2100	t h	Belarus, Radio Belarus Intl	7105eu	7210eu	
2030	2100		Cuba, Radio Havana	11760eu	13660na	
2030	2100		Egypt, Radio Cairo	15375af		
2030	2100	DRM	Netherlands, Radio	9800eu		
2030	2100		Turkey, Voice of	9525as		
2030	2100	f	UK, Wales Radio Intl	7325eu		
2030	2100	as	USA, Voice of America	4950af		
2045	2100		India, All India Radio 9910au 9950eu	7410eu 11620va	9445eu 11715au	9575au
2051	2100		New Zealand, Radio NZ Intl	17675pa		

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

2100	2128		Hungary, Radio Budapest	6025eu	11890af	
2100	2128		Serbia & Montenegro, RSCG	6100eu		
2100	2130		Canada, Radio Canada Intl 13690va 15325va 17870va	5850va	7235va	
2100	2130		China, China Radio Intl 15110eu 17790eu	11640af	13630af	
2100	2130		Cuba, Radio Havana	11760eu	13660na	
2100	2130	vl	Italy, IRRS 5775va			
2100	2130		South Korea, Radio Korea Intl	3955eu		
2100	2130		Turkey, Voice of	9525as		
2100	2130	mtwhf	UK, BBC World Service	15390am		
2100	2156		North Korea, Voice of 4405as 13760eu 15245eu	7505eu	11335eu	
2100	2156		Romania, Radio Romania Intl 9725eu 11775eu	7185eu	9510eu	
2100	2159	as	Spain, Radio Exterior Espana	9570af	9840eu	
2100	2200		Anguilla, Caribbean Beacon	11775am		
2100	2200		Australia, Radio 9660pa 11880va	7240va 12080va	9500as 17715va	9580va 21740va
2100	2200		Austria, AWR Europe	15130af		
2100	2200	vl	Botswana, Radio	3356do	4820da	7255do
2100	2200		Bulgaria, Radio	5800eu	7500eu	
2100	2200		Canada, CBC Northern Service	9625do		
2100	2200		Canada, CFRX Toronto ON	6070do		
2100	2200		Canada, CFVP Calgary AB	6030do		
2100	2200		Canada, CKZN St John's NF	6160do		
2100	2200		Canada, CKZU Vancouver BC	6160do		
2100	2200	vl/ DRM	Canada, Radio Canada Intl	9800eu		
2100	2200		Costa Rica, Radio for Peace Intl	7445am	15038va	
2100	2200		Costa Rica, University Network 7375am 9725sa	5030am 11870am	6150am 13750na	17645as
2100	2200		Egypt, Radio Cairo	15375af		
2100	2200		Eqt Guinea, Radio Africa	7189af	15184al	
2100	2200	1st o	Finland, Scandinavian Weekend Radio 11690eu		5990eu	
2100	2200		Germany, Deutsche Welle 15205af	9440af	11865af	
2100	2200	vl	Ghana, Ghana BC Corp	4915do		
2100	2200		Guyana, Voice of	5949do		
2100	2200		India, All India Radio 9910au 9950eu	7410eu 11620va	9445eu 11715au	9575au
2100	2200	s	Ireland, Reflections Europe 12255eu	3910eu	6295eu	
2100	2200		Japan, Radio 11855af 17825na	6035pa 21670pa	6055eu	6180eu
2100	2200		Latvia, Laser Radio	9290eu		
2100	2200		Liberia, ELWA	4760do		
2100	2200		Malaysia, Radio	7295do		
2100	2200		Malta, Voice of Mediterronean	12060eu		
2100	2200	vl	Mexico, Radio Mexico Intl	9705am	11770am	
2100	2200		Namibia, Namibian BC Corp 6060af 6175al	3270af	3290af	
2100	2200		New Zealand, Radio NZ Intl	17675pa		
2100	2200		Nigeria, Radio/Abuja	7275do		
2100	2200		Nigeria, Radio/Enugu	6025do		
2100	2200		Nigeria, Radio/Ibadan	6050do		
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do	
2100	2200		Nigeria, Radio/Logos	3326do	4990do	
2100	2200		Nigeria, Voice of	17800af		
2100	2200		Papua New Guinea, NBC	4890do	9675irr	
2100	2200		Sierra Leone, Radio UNAMSIL	6139af		
2100	2200		Sierra Leone, SLBS	3316do		
2100	2200		Syria, Radio Damascus	12085eu	13610eu	
2100	2200		UK, BBC World Service 5965os 5975sa 6190af 6195va 17830af	3255af 6005af 9410va	3915os 6110as 12095sa	6135am 15400af
2100	2200		USA, Armed Forces Radio 5765usb 6350usb 12579usb	4319usb 7507usb 13362usb	5446usb 10320usb	12335usb 13855usb
2100	2200		USA, KAIJ Dallas TX	13815va		
2100	2200		USA, KTBN Salt Lake City UT	15590na		
2100	2200		USA, Voice of Americo 9705as 9760eu 13670af 15185as 17740as 17820as	6040eu 9850af 15410af	9530eu 11870as 15445af	11975af 15580af 17895af
2100	2200		USA, WBCQ Kennebunk ME 17495na	7415na	9330na	
2100	2200		USA, WBOH Newport NC	5920am		
2100	2200		USA, WEWN Birmingham AL	13615na	17595eu	
2100	2200		USA, WHRA Greenbush ME	17650af		
2100	2200		USA, WHRI Noblesville IN	5745va	9495am	
2100	2200		USA, WINB Red Lion PA	13570am		
2100	2200		USA, WJIE Louisville KY	7490am		
2100	2200		USA, WRMI Miami FL	15725na		
2100	2200	vl	USA, WSHB Cypress Creek SC	15665af	18910af	
2100	2200		USA, WTJC Newport NC	9370na		
2100	2200		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na	
2100	2200		USA, WWRB Manchester TN	9320na	12172na	
2100	2200		USA, WYFR Okeechobee FL 11740na 15565af 17575sa	5810eu	7580eu	
2100	2200	vl	Vanuatu, Radio	3945al	7260do	
2100	2200	vl	Zimbabwe, ZBC Corp	5975do		
2115	2145	mtwhf	UK, BBC World Service	11675am		
2115	2200		Egypt, Radio Cairo	9990eu	15375af	
2123	2130	vl	Libya, Voice of Africa	15105af	15315af	
2130	2156		China, China Radio Intl	15110eu	17790eu	
2130	2157		Czech Rep, Radio Prague Intl	11600na	13580na	
2130	2158		Uzbekistan, Radio Tashkent Intl 11905eu	5025eu	9545eu	
2130	2200	twhfa	Albania, Radio Tirana Intl	7130eu	9540eu	
2130	2200		Australia, ABC NT Alice Springs	2310do	4835irr	
2130	2200		Australia, ABC NT Katherine	5025do		
2130	2200		Australia, ABC NT Tennant Creek	4910do		
2130	2200		Guam, AWR	11850as	11980as	
2130	2200		Iran, Voice of the Islamic Rep	9870au	13665au	
2130	2200		Sweden, Radio	6065va	11650as	
2130	2200	t f	UK, BBC World Service	11680sa		

Shortwave Guide

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

2200	2227		Iran, Voice of the Islamic Rep	9870au	13665au
2200	2228	smtwhf	Serbia & Montenegro, RSCG	7230au	
2200	2230		Canada, Radio Canada Intl	6140am	9590am
			11920am 15170am 15455am	17880am	
2200	2230	DRM	Germany, Deutsche Welle	9800eu	
2200	2230		India, All India Radio 7410eu	9445eu	9575au
			9910au 9950eu 11620va	11715au	
2200	2230	s	Ireland, Reflections Europe	3910eu	6295eu
			12255eu		
2200	2230	mtwhf/vl	Mexico, Radio Mexico Intl	9705am	11770am
2200	2230		Papua New Guinea, NBC	4890do	9675irr
2200	2230	mtwhf	USA, Voice of Americo 9850af	11975af	13670af
			15580af		
2200	2245		Egypt, Radio Cairo 9990eu		
2200	2245		USA, WYFR Okeechobee FL	7580eu	21525af
2200	2255		Turkey, Voice of 9830va	12000va	
2200	2256		China, China Radio Intl	9880eu	
2200	2300		Anguilla, Caribbean Beocon	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 9660va	12080va	13620va
			15230as 17715va 17795va	21740va	
2200	2300	vl	Botswana, Radio 3356do	4820do	7255do
2200	2300		Canada, CBC Northern Service	9625do	
2200	2300		Canada, CFRX Toronto ON	6070da	
2200	2300		Canada, CFVP Colgary AB	6030do	
2200	2300		Canada, CKZN St John's NF	6160do	
2200	2300		Canada, CKZU Vancouver BC	6160do	
2200	2300		Costa Rica, Radio for Peace Intl	7445am	15038va
2200	2300		Costa Rica, University Network	5030am	6150am
			7375am 9725sa 11870am	13750na	17645as
2200	2300		Eqt Guinea, Radio Africa	7189af	15184al
2200	2300	1st a	Finland, Scandinavian Weekend Radio		5990eu
			11690eu		
2200	2300		Germany, Deutsche Welle	9720os	15605as
2200	2300	vl	Ghana, Ghana BC Corp	4915do	
2200	2300		Guyana, Voice of 3291do	5949do	
2200	2300		Malaysia, Radio 7295do		
2200	2300		Namibia, Namibian BC Corp	3270af	3290af
			6060af 6175al		
2200	2300		New Zealand, Radio NZ Intl	17675po	
2200	2300		Nigeria, Radio/Abuja 7275do		
2200	2300		Nigeria, Radio/Enugu 6025do		
2200	2300		Nigeria, Radio/Ibadan	6050do	
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do
2200	2300		Nigeria, Radio/Lagos 3326do	4990do	
2200	2300		Nigeria, Voice of 17800af		
2200	2300		Sierra Leone, Radio UNAMSIL	6139af	
2200	2300		Sierra Leone, SLBS 3316do		
2200	2300	vl	Solomon Islands, SIBC 5020do	9545do	
2200	2300		Taiwan, Radio Taiwan Intl	15600eu	
2200	2300		UK, BBC World Service	5965as	5975sa
			6135am 6195va 9740as	11685os	12095sa
			15400af 17830af		
2200	2300		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb 7507usb	10320usb	12335usb
			12579usb 13362usb	13855usb	
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 7215as	9705as	9770as
			11760as 15185os 15290as	15305as	17740as
			17820as		
2200	2300		USA, WBCQ Kennebunk ME	5105na	7415no
			9330na		
2200	2300		USA, WBOH Newport NC	5920om	
2200	2300		USA, WEWN Birmingham AL	9975na	17595eu
2200	2300		USA, WHRA Greenbush ME	17650af	
2200	2300	vl	USA, WHRI Noblesville IN	5745va	9495am
2200	2300		USA, WIN8 Red Lion PA	13570am	
2200	2300		USA, WRMI Miami FL 15725na		
2200	2300	vl	USA, WSHB Cypress Creek SC	13770eu	15285sa
2200	2300		USA, WTJC Newport NC	9370na	
2200	2300		USA, WWCR Nashville TN	7465na	9475na
			12160na 13845na		
2200	2300		USA, WWRB Manchester TN	9320na	12172na
2200	2300		USA, WYFR Okeechobee FL	11740na	
2200	2300	vl	Vanuatu, Radio 3945al	7260do	
2205	2230		Italy, RAI Intl 11895vo		
2230	2257		Czech Rep, Radio Prague Intl	11600na	13580no
2230	2259		Belgium, Radio Vloanderen Intl	15565am	
2230	2300		Canada, Radio Canado Intl	6140na	9590na
			13670na 15455na		
2230	2300		Cuba, Radio Havano 6195am	9550na	
2230	2300		Papua New Guinea, NBC	4890do	9675irr
2230	2300	DRM	Sweden, Radio 9800eu		
2245	2300		India, All India Radio 9705as	9950as	11620as
			13605as		

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

2300	0000		Anguilla, Caribbean Beacon	6090am	
2300	0000		Australia, ABC NT Alice Springs	2310do	4835irr
2300	0000		Australia, ABC NT Katherine	5025do	
2300	0000		Australia, ABC NT Tennant Creek	4910da	
2300	0000		Australia, Radio 9660pa	11695as	12080va
			13620as 15230as 15415as	17715va	17795va
			21740va		
2300	0000	vl	Batswana, Radio 3356do	4820do	7255do
2300	0000		Bulgario, Radio 9400na	11900na	
2300	0000		Canada, CBC Northern Service	9625do	
2300	0000		Canada, CFRX Toronto ON	6070do	
2300	0000		Canada, CFVP Calgary AB	6030do	
2300	0000		Canada, CKZN St John's NF	6160do	
2300	0000		Canada, CKZU Vancouver BC	6160do	
2300	0000		Canada, Radio Canada Intl	6140na	9590na
			13670na 15455na		
2300	0000		Costa Rica, Radio for Peace Intl	7445am	15038am
2300	0000		Costa Rica, University Network	5030am	6150am
			7375am 9725sa 11870am	13750na	17645as
2300	0000		Egypt, Radio Cairo 11725na		
2300	0000	1st a	Finland, Scandinavian Weekend Radio		5990eu
			11690eu		
2300	0000		Germany, Deutsche Welle	9890as	17860as
2300	0000	vl	Ghana, Ghana BC Corp	4915do	
2300	0000		Guyana, Voice of 3291do	5949do	
2300	0000		India, All India Radio 9705as	9950as	11620as
			13605as		
2300	0000		Malaysia, Radio 7295do		
2300	0000		Namibia, Namibian BC Carp	3270af	3290af
			6060af 6175al		
2300	0000	DRM	Netherlands, Radio 15525na		
2300	0000		New Zealand, Radio NZ Intl	17675pa	
2300	0000		Papua New Guinea, NBC	4890do	9675irr
2300	0000		Sierra Leone, Radio UNAMSIL	6139af	
2300	0000		Sierra Leone, SLBS 3316do		
2300	0000		Singopore, Mediacorp Radio	6150do	
2300	0000	vl	Solomon Islands, SIBC 5020do	9545do	
2300	0000	DRM	UK, BBC World Service	9800eu	
2300	0000		UK, BBC World Service	3915as	5965as
			6135am 6195va 9740as	11685as	11945as
			11955as 12095sa 15280as		
2300	0000		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb 7507usb	10320usb	12335usb
			12579usb 13362usb	13855usb	
2300	0000		USA, KAIJ Dallas TX 13815va		
2300	0000		USA, KTBN Salt Lake City UT	15590na	
2300	0000		USA, KWHR Naalehu HI	17510os	
2300	0000		USA, Voice of America 7215os	7200as	7225as
			7260as 9545as 11760as	11805as	11925as
			13725as 13775as 15185as	15205as	15290as
			15305as 17740as 17820as		
2300	0000		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
2300	0000		USA, WBOH Newport NC	5920am	
2300	0000		USA, WEWN Birminghom AL	9975no	17595eu
2300	0000		USA, WHRA Greenbush ME	7580va	
2300	0000	vl	USA, WHRI Noblesville IN	5745va	9495am
2300	0000		USA, WINB Red Lion PA	12160am	
2300	0000	as	USA, WRMI Miami FL 9955am		
2300	0000	mtwhf	USA, WRMI Miami FL 7385no		
2300	0000		USA, WTJC Newport NC	9370na	
2300	0000	as	USA, WWBS Macon GA	11910na	
2300	0000		USA, WWCR Nashville TN	5070na	7465na
			9475na 13845na		
2300	0000		USA, WWRB Manchester TN	5050na	5085na
			6890na 12172na		
2300	0000		USA, WYFR Okeechobee FL	5985ca	11855co
			15170af		
2300	0000	vl	Vanuatu, Radio 3945al	7260do	
2300	2305		Nigeria, Radio/Abuja 7275do		
2300	2305		Nigeria, Radio/Enugu 6025do		
2300	2305		Nigeria, Radio/Ibadan	6050do	
2300	2305		Nigeria, Radio/Kaduna	4770do	6090do
2300	2305		Nigeria, Radio/Lagos 3326do	4990do	
2300	2330		Cuba, Radio Havana 6195am	9550na	
2300	2345		USA, WYFR Okeechobee FL	11740na	
2300	2356		China, China Radio Intl	5990na	13680na
2300	2356		Romania, Radio Romania Intl	9570eu	11740na
			11775eu 15105na		
2304	0000		USA, WYFR Okeechobee FL	15400sa	
2305	2312		Croatia, Voice of 9925sa		
2315	2330	mtwhf	Austria, Radio Austria Intl	9870sa	13730sa
2320	2330		Kyrghyz, Kyrghyz Radio	4010as	4795as
2330	0000		Lithuania, Radio Vilnius	9875na	
2330	0000	DRM	Netherlands, Radio 15525eu		
2330	0000		Netherlands, Radio 6165na	9845na	
2330	0000		Switzerland, Swiss Radio Intl	9885sa	11660sa
2330	0000		UK, BBC World Service	6035as	17830af
2330	2345		Iraq, Radio Iraq Intl 11787irr		
2330	2357		Vietnam, Voice of 9840as	12019as	
2345	0000	mtwhf	Austria, Radio Austria Intl	9870so	13730sa

Headnotes:

1. **Deutsche Welle program listings** for transmissions to other regions that have provided credible reception in at least parts of North America are included herein. These are, in order of reliability, 2100, 0400, 1900 and 2000. Consult the frequency section of the SWG for where to tune.
2. **Listings for the US-based independent shortwove broadcasters are limited to general interest programming** that departs from their primary formats of religious and political fare.
3. **BBCWS stream abbreviations: (am)**=Americas; **(eas)**=East Asia. These are the streams recommended by Bush House for North American listeners. Please note that, in recent years, the BBC has made significont seasonal changes to its program schedules that have not necessarily been consistent season to season. **Because details of any changes planned for this season were unavailable from the BBC at press time, the schedules this month represent our best guess as to the changes that will be implemented.** Any required corrections will have been made by December.
4. **Finally, we've also scrambled the order in which our vorious formats appear during the winter listening season.** For this, the first full month of that season, we are starting with the "station by hour" format because it provides the most complete snopshot of the new and revised seasonal schedules.

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

BBC WORLD SERVICE (am)
0000 D News; 0006 S Pick of the World (BBC's best), M One Planet (ecology), T-A Outlook (magazine); 0032 M I'm Sorry I Haven't a Clue (panel game); 0045 S Write On (letters), T-A Off the Shelf (book readings).

RADIO AUSTRALIA
0000 D News; 0005 S Keys to Music (enjoying the classics), A Business Report; 0010 M AWAYE! (Aboriginol culture), T The Science Show, W The National Interest (Australian politics), H Background Briefing (documentary), F Hindsight (Australian history); 0030 A Ockham's Razor (science opinion); 0045 A Lingua Franco (about language).

RADIO CANADA INTERNATIONAL
0000 D CBC News; 0005 S Quirks & Quarks (science), M Global Village (world music), T-A As It Happens (interviews with newsmakers)[began ot 2330]; 0030 H Dispatches (world events in Canadion perspective).

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

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

RADIO NETHERLANDS
0000 S/M News; T-A Newsline; 0005 S Wide Angle (in-depth), M Europe Unzipped; 0025 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 Cadenza (light classics), A Digital Life; 0030 S Bookmarks, A Saturday Comedy Zone.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0000 S Mailbag, M Spiritual Awakening, T Middle Eost Project, W CounterSpin (media analysis), H Making Contact, F Peace Watch (cont'd.), A WINGS; 0030 S Making Contact, M World of Radio, T-A Hightower Radio (commentary); 0035 T-A Earthwatch (ecology); 0040 T-A Earth & Sky (astronomy); 0045 T Neumaier Report, W-A UN programs.

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

WBCQ, Maine
7415 kHz.: 0000 S The Real Amateur Radio Show, M Le Show (humor/entertainment), H Off the Hook (public telecommunications issues), F Uncle Ed's Musical Memories (cont'd from 2130), A The Lost Discs Radio Show; 0030 S Fred Flintstone Music Show.
9330 kHz.: 0000 S Split Secs (free form).

0100 UTC / 8pm E / 5pm P - Page 43 Freqs

BBC WORLD SERVICE (am)
0100 D News; 0106 S The Ticket (arts performances), M Everywoman, T/H Documentaries, W Masterpiece (artistic ideas), F Assignment, A Sports International; 0132 M Westway Omnibus, T Music Feature, W Top of the Pops, H Charlie Gillett (world music), F Music Biz, A John Peel (eclectic).

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

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

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

RADIO NETHERLANDS
0100 S/M News; T-A Newsline; 0105 S Wide Angle (in-depth), M Europe Unzipped; 0125 S The Week Ahead (on RN), M Insight (commentary); 0130 S Amsterdom 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
0100 D RNZ News; 0105 S Feature, M-F In Touch with New Zealand (music, interviews, voriety), A Eureka! (science)*; 0130 A Health Matters [or] Environment Matters.
[*may be preempted by live sport]

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0100 S Between the Lines, M Radio Nation ("The Nation" magazine), T This Way Out, W World of Radio, H A Public Affair, F Living Enrichment Center, A Middle East Project; 0130 S Peace Watch, T University Forum, W Mailbag, F Progressive Radio, A Wor d of Radio.

RADIO PRAGUE
0100 D News; 0105 S Insight Central Europe, M Mailbox, T-A Current Affairs; 0110 M ABC of Czech; 0115 M Czech Books (fortnightly) or Encore (classical music monthly) or Magic Carpet (world music monthly), T Talking Point (Czech issues), W Witness (oral history), H ABC of Czech (language), F Economics Report, A The Arts; 0120 W One on One (interview), H Czechs in History or Spotlight (travelogue).

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

RADIO UKRAINE INTERNATIONAL
0100 D News; 0110 S Ukrainian Diary (weekly review), M Music from Ukroine, T-A Ukraine Today (magazine); 0115 S The Whole World on the Radio Dial (DX program); 0130 S Hello From Kiev (listener letters/music), M Roots (culture & educotion); 0145 T-A Closeup (current issues).

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

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

WBCQ, Maine
7415 kHz.: 0100 S Different Kind of Oldies Show, M Radio New York International, W/A Allan Weiner Worldwide.

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

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

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

BBC WORLD SERVICE (am)
0200 D News; 0206 S Play of the Week, M Wright Around the World (musical variety), T Health Matters, W Go Digital, H Discovery (science), F One Planet (ecology), A Science in Action; 0232 T I'm Sorry I Haven't a Clue (panel gome), W Music Review, H/A Westwoy, F The Word (writing & writers) [exc. last F, World Book Club (discussion)]; 0245 H Heart & Soul (beliefs & values), A What's the Problem (advice).

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 Grondstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO AUSTRIA INTERNATIONAL
0205 S/M Insight Central Europe; 0215 T-A Report from Austria; 0225 S/M Listener Letters; 0235 S/M Insight Central Europe; 0245 T-A Report from Austria; 0255 S/M Listener Letters.

RADIO BUDAPEST
0200 D News; 0205 S Insight Central Europe; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gatepost (letters), T-A Hungary Today (current events magazine); 0220 A DX Corner.

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RADIO CANADA INTERNATIONAL
0200 D News; 0205 S Business Sense, M Maple Leaf Mailbag (w/CIDX report bimanthly); 0210 T-A Canada Today (current events magazine); 0235 S/A Sci-Tech File, M/H Spotlight (arts & culture), T Media Zone (journalists discuss), W Maple Leaf Mailbag (w/CIDX report bimonthly), F Business Sense.

RADIO HABANA CUBA
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 Tap Tens, T-S News Bulletin; 0235 S World of Stamps, T-A Reports and music; 0250 S Cuban music.

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

RADIO NEW ZEALAND INTERNATIONAL
0200 D RNZ News; 0205 S Feature*, A Home Grown (NZ music)*; 0208 M-F In Touch w/NZ; 0230 A Musical Chairs (artist spotlight)*.
[*may be preempted by live sport]

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0200 S Peace Watch (cont'd.), M New Dimensians ("progressive" ideas), T Honoring Mother Earth: Indigenous Voices, W WINGS (women's news), H Global Community Forum, F Continent of Media, A Mailbag; 0230 S Daily Reading, W A World of Possibilities, F Steppin' Out of Babylon, A Disability Radio Worldwide.

RADIO PRAGUE
0200 D News; 0205 S Magazine, M Mailbox, T-A Current Affairs; 0210 M ABC of Czech; 0215 S Letter from Prague (local life), M Czech Books (fortnightly) or Encare (classical music monthly) or Magic Carpet (world music monthly), T Talking Point (Czech issues), W Witness (oral history), H ABC of Czech (language), F Economics Report, A The Arts; 0220 S/W One on One (interview), H Czechs in History or Spotlight (travelogue).

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

RADIO TAIWAN INTERNATIONAL
0200 D News; 0215 S Hakka World (Hakka culture), M Jade Bells & Bamboo Pipes (traditional music), T Culture Express, W Taiwan Today, H Discover Taiwan, F Taipei Magazine, A Groove Zone; 0230 S Mailbag Time, T Trends, W Instant Noodles (the wacky), H New Music Lounge, F People; 0245 M-F Let's Learn Chinese (M/W/F elementary, T/H intermediate), A Kaleidoscope (life in Taiwan).
[This schedule also airs at 0700 for western North America.]

VOICE OF RUSSIA
0200 D News; 0211 S Moscow Mailbag/M, T-A Commonwealth Update; 0230 D News in Brief; 0232 S Moscow Yesterday & Today, M Timelines, T Falk Box, W Jazz Show, H Musical Portraits, F Music Around Us, A Christian Message from Moscow; 0246 F Music At Your Request; 0254 H Russia: People & Events.

WBCQ, Maine
7415 kHz.: 0200 S Marion's Attic (vintage recordings), M Radio New York Internatianal (cont'd), A Tasha Takes Control.

WINB, Pennsylvania
0200 S Wavescan; 0230 H World of Radio.

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

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 Nardic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); 0245 T Sports Scan, W Close Up (profiles af Swedes-1st/3rd), F Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

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

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

BBC WORLD SERVICE (am)
0300 D The World Today; 0332 S Global Business, M World Business Review, T-A World Business Report; 0345 M Instant Guide (background), T/W/F/A Analysis, H From Our Own Correspondent.

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

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

RADIO BULGARIA
0300 D News; 0310 S Views Behind the News, M Folk Studio (Bulgarian folk music), T-A Events and Developments; 0320 T Sports; 0325 W-S Timeout for Music; 0330 T Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places); 0335 T Answering Your Letters, W-M Keyword Bulgaria (Bulgaria and things Bulgarian); 0345 S Radio Bulgaria Calling (for radio hobbyists), W Magazine Economy, H Arts and Artists, F History Club, A The Way We Live.

RADIO HABANA CUBA
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), A Home Grown (cant'd fram 0205); 0308 M-F Dateline Pacific; 0330 M New Music Releases, T Mailbox (letters & DX news) ar RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.
[*may be preempted by live sport]

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0300 S Daily Reading (cont'd), M Voices of Our World (Maryknoll program), T-A Daily Reading; 0315 T Disability Radio Worldwide, W-A Freespeech Radio News; 0330 S Continent af Media, M UN program; 0345 M Sneak Peaks, T-A UN Daily News.

RADIO TAIWAN INTERNATIONAL
0300 D News; 0315 S Hakka World (Hakka culture), M Taiwan Economic Journal, T Jade Bells & Bamboa Pipes (traditional music), W New Music Lounge, H News Talk, F Formosa Outlook, A Kaleidoscope (life in Taiwan); 0330 S Asia Pacific (from Radio Australia), M Stage, Screen & Studio, W Confucius & Inspiration Beyond, H Life Unusual, F Taiwan Gaurmet, A Mailbag Time; 0345 M-F Let's Learn Chinese (M/W/F elementary, T/H intermediate).

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

VOICE OF RUSSIA
0300 D News; 0311 M Sunday Panarama, T-S News & Views; 0330 D News in Brief; 0332 S Songs from Russia, M This is Russia, T Kaleidoscape (Russian events), W Musical Portraits, H Moscow Yesterday & Today, F Russian by Radia, A Audia Book Club (Russian lit.); 0346 S You Write to Moscow; 0354 W Russia: People & Events.

WBCQ, Maine
7415 kHz.: 0300 S Alan Sane ("pirate" radio), M Radia New York International (cont'd).

WHRI, Indiana
5745 kHz.: 0330 M DXing with Cumbre.

WRMI, Florida
7385 kHz: 0300 S Wavescan; 0330 S Viva Miami, M Wavescan.

WWCR, Tennessee
5070 kHz.: 0300 S DX Partyline; 0330 S World of Radio.

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

RADIO BUDAPEST
0330 D News; 0335 S Insight Central Europe; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gatepost (letters), T-A Hungary Today (current events magazine); 0350 A DX Corner.

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

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

Shortwave Guide

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

BBC WORLD SERVICE (am)
0400 D News; 0406 S From Our Own Correspondent, M Talking Point (phone-in), T-F Outlook (magazine), A Pick of the World (BBC's best); 0432 S People & Politics; 0445 M-F Off the Shelf (book readings), A Write On (letters).

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

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

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

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

RADIO NETHERLANDS
0400 S/M News; T-A Newsline; 0405 S Wide Angle (in-depth), M Europe Unzipped; 0425 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 (major domestic evening news magazine); 0410 S Religion feature or series, A Tagata O Te Moana (Pacific magazine); 0440 S Jazz Spotlight.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0400 S CounterSpin (media analysis), M Honoring Mother Earth: Indigenous Voices, T-A Democracy Now!; 0430 S Freespeech Radio News (repeat of Fri. newscast).

RADIO PRAGUE
0400 D News; 0405 S Magazine, M Mailbox, T-A Current Affairs; 0410 M ABC of Czech; 0315 S Letter from Prague (local life), M Czech Books (fortnightly) or Encore (classical music monthly) or Magic Carpet (world music monthly), T Talking Point (Czech issues), W Witness (orol history), H ABC of Czech (language), F Economics Report, A The Arts; 0420 S/W One on One (interview), H Czechs in History or Spotlight (travelogue).

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

RADIO UKRAINE INTERNATIONAL
0400 D News; 0410 S Ukrainian Diary (weekly review), M Music from Ukraine, T-A Ukraine Today (magazine); 0415 S The Whole World on the Radio Dial (DX program); 0430 S Hello From Kiev (listener letters/music), M Roots (culture & education); 0445 T-A Closeup (current issues).

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

VOICE OF RUSSIA
0400 D News; 0411 S Music & Musicians, M/H Science & Engineering, T Musical Portraits, W/A Moscow Mailbag, F Newmorket; 0430 D News in Brief; 0432 M Audio Book Club (Russian lit.), T/H/A 20th Century, W/F Russian history/culture.

VOICE OF TURKEY
0400 D News; 0410 D Press Review; 0415 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; 0420 S The Stream of Love or DX Corner, T Hues & Colors of Anatolia, H Letterbox; 0425 M/A Music, F In the Wake of a Contest; 0430 S/T Music; 0435 S Turkish Arts, M Turks in the Mirror of Centuries, T From Past to Present, H Turkey's Off the Beaten Track Sites, F The Culture Parade, A The Travel Itinerary of Anatolia.

KWHR, Hawaii
17780 kHz.: 0430 S DXing with Cumbre.

WBCQ, Maine
7415 kHz.: 0400 S You Are What You Think (satire), M Radio New York International (cont'd).

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

WHRI, Indiana
7315 kHz.: 0430 M DXing with Cumbre.

WRMI, Florida
7385 kHz.: 0400 S IBC Radio Network, M Old Time Radio.

WWCR Tennessee
5070 kHz.: 0400 S Spectrum (communications discussion).

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

BBC WORLD SERVICE (am)
0500 D World Briefing; 0532 S Letter from America, M-F The World Today, A Reporting Religion; 0545 S The Instant Guide.

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

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

RADIO AUSTRALIA
0500 D News; 0505 S The Europeans, A The Music Show (cont'd); 0510 M-F Pacific Beat (Pacific islands magazine with regional sports report @ 0530); 0530 S The Ark (religious history); 0549 S The Pulse (Aussie music now).
[Special service: 0505 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

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

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

RADIO NEW ZEALAND INTERNATIONAL
0500 D RNZ News; 0507 S Whenua (Maori magazine), M-F What's Going On? (arts & entertainment), A The Mix ('live' music acts); 0530 M-F Worldwatch (international news); 0545 M-F Storytime.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0500 S/F TUC Radio, M Living Enrichment Center, T Making Contact, W/H/A Peace Watch; 0530 S World of Radio, T Steppin' Out of Babylon, F Peace Watch.

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

VOICE OF NIGERIA
0500 S/A News Summary, M-F VON Scope (news magazine); 0505 S This Week on VON, A VON Link-up (music requests); 0530 D Moving On (voriety magazine).

VOICE OF RUSSIA
0500 D News; 0511 S/M Musical Portraits, T/F Moscow Mailbag, W/A Science ond Engineering, H Newmarket (business); 0530 D News in Brief; 0532 S Kaleidoscope, M Jazz Show, T Music Around Us, W Moscow Yesterday & Today, H Folk Box, F Audio Book Club (Russion lit.) A Timelines; 0547 T Music At Your Request.

WBCQ, Maine
7415 kHz.: 0500 S Tom & Darryl (electronic media), M-A Amos 'n Andy; 0515 T-F Planet World News Tonight; 0545 M World of Radio.

WRMI, Florida
7385 kHz.: 0500 S Twilight Zone (science fiction), M Old Time Radio (cont'd.)

WWCR, Tennessee
5070 kHz.: 0500 S Cyber Line (digital communications).

0600 UTC / 1am E / 10pm P - Page 46 Freqs

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

RADIO AUSTRALIA
0600 D News; 0605 S The Arts on RA, A Feedback (letters/station news/on communications); 0610 M-F Regional Sports Report; 0620 M Ockham's Razor (science opinion), T In Conversation, W Lingua Franca (about

language), H The Ark (religious history), F The Makers (artists); 0630 S/A Music; 0635 M Hit Mix (pop/rack), T Music Deli (diverse world/folk),W Jazz Nates, H Australian Country Style, F The Launge.
[Special service: 0605 S/A Grandstand (live sports action) an 9660, 12080, 17580, 21725 kHz. anly.]

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 ar Tap Tens, T-S News Bulletin; 0635 S World of Stamps, T-A Reparts and music; 0650 S Cuban music.

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

RADIO NEW ZEALAND INTERNATIONAL
0600 S/A RNZ News, M-F Checkpoint (repeat of 0400); 0604 S One in Five (disability issues), A Saturday Night with Peter Fry (variety); 0635 S This Week in Parliament.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
0600 S Mailbag, M Spiritual Awakening, T Middle East Project, W CounterSpin (media analysis), H Making Contact, F Peace Watch (cont'd.), A WINGS; 0630 S Making Contact, M World of Radia, T-A Hightawer Radio (commentary); 0635 T-A Earthwatch (ecalogy); 0640 T-A Earth & Sky (astronamy); 0645 T Neumaier Report, W-A UN programs.

RADIO ROMANIA INTERNATIONAL
0600 D Radio Newsreel; 0610 S The Week, M Focus, T-A Commentary; 0615 S Warld of Culture, M Sunday Studia, T Pro Memaria (history), W Business Club, H Society Today, F Cards on the Table (debate) ar The Romanian Next ta You (interview), A Challenge for the Future or Terra 2001; 0620 S RRI Encyclopedia, T Political Flash, W European Horizons; 0625 S Roots (culture/traditions), M Romanian by Radio, T/H/A Business Update, W Tourist News, F Listeners' Letterbox; 0630 S Radio Pictures, M Romanian Itineraries, T Pulse of Transitian, W W Mather Nature (ecology), H Visit Romania, A Practical Guide; 0635 S Romanian Itineraries, M Listeners' Letterbax, T Perfarming Arts, W Youth Club, H Partners in a Changing World, A Cultural Survey; 0640 S, Bucharest Along the Centuries, T Pages af Romanian Literature, W/F Skylark (folk music), H Stage and Screen, A Spectator (voice of the people); 0645 S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Romanian Folk Music At Its Best; 0650 M Romanian Falk Music At Its Best, T Sports Raundup, W Athlete of the Week, H Sparts Club, F Faotball Flash, A Sports Weekend.

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

VOICE OF NIGERIA
0600 D Nigeria/Africa/World News (magazine); 0630 S In the News, A News Maker; 0645 A Window an Abuja.

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

WBCQ, Maine
7415 kHz.: 0600 S Juliet's Wild Kingdom.

WRMI, Florida
7385 kHz.: 0600 S Lou Gentile (the paranormal), M IBC Radio Network.

1000 UTC / 5am E / 2am P - Page 47 Freqs

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

RADIO AUSTRALIA
1000 D News; 1005 S Keys to Music (enjaying the classics), M-F Asia Pacific (regional current affairs), A Backgraund Briefing; 1030 M Health Report, T Law Report, W Religian Report, H Media Report, F The Sports Factor; 1055 A Reporter's Notebaok.

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

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1000 S CaunterSpin (media analysis), M Honoring Mather Earth: Indigenaus Voices, T-A Democracy Now!; 1030 S Freespeech Radia News (repeat of Fri. newscast).

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

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

1100 UTC / 6am E / 3am P - Page 48 Freqs

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

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

HCJB ECUADOR
1100 S Let My People Think, M-F Insight for Living, A Dawn Gilead Lane; 1130 S Renewing Your Mind, M-F Family Life Today, A Adventures in Odyssey.

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

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

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

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

RADIO NEW ZEALAND INTERNATIONAL
1100 S/A RNZ News, M-F Pacific Regional News; 1105 S/A Farces Programme (far NZ persannel serving in PNG & E. Timor); 1108 M-F Dateline Pacific; 1130 M New Music Releases, T Mailbax (letters & DX news) or RNZI Talk (statian info), W Tradewinds (Pacific cammerce), H The Warld in Spart, F Pacific Correspondent.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1100 S/F TUC Radio, M Living Enrichment Center, T Making Contact, W/H/A Peace Watch; 1130 S Warld of Radio, T Steppin' Out of Babylon, F Peace Watch.

WWCR, Tennessee
5070 kHz.: 1130 A Warld of Radia.

1200 UTC / 7am E / 4am P - Page 48 Freqs

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

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

HCJB ECUADOR
1200 S Moody Presents, M-F Precept, A Hour af Decisian; 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 af Things (spiritual matters), M-H Late Night Live (discussion and interviews), F Saund Quality (innovative music), A The Music Show (classical); 1255 S The Pulse (Aussie music naw).

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

RADIO NETHERLANDS
1200 S/A News, M-F Newsline; 1205 S Wide Angle (in-depth), A Europe Unzipped; 1225 S The Week Ahead (on RN), A Insight (comment); 1230 S Vox Humana (culture), M Research File (science), T EuroQuest (Europe in context), W Documentary, H Dutch Horizons, F A Good Life (development issues), A Amsterdam Forum (canversations).

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

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1200 S Mailbag, M Spiritual Awakening, T Middle East Project, W CounterSpin (media analysis), H Making Cantact, F Peace Watch (cont'd.), A WINGS; 1230 S Making Contact, M World of Radio, T-A Hightawer Radia (cammentary); 1235 T-A Earthwatch (ecology); 1240 T-A Earth & Sky (astronomy); 1245 T Neumaier Report, W-A UN programs.

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

Shortwave Guide

1300 UTC / 8am E / 5am P - Page 49 Freqs

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

BBC WORLD SERVICE (eas)
1300 D Newshour.

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

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

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

RADIO CANADA INTERNATIONAL
1300 M-F News; 1305 M-F The Current (current affairs-joined in progress).

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1300 S Between the Lines, M Radio Nation ("The Nation" magazine), T This Way Out, W World of Radio, H A Public Affair, F Living Enrichment Center, A Middle East Project; 1330 S Peace Watch, T University Forum, W Mailbag, F Progressive Radio, A World of Radio.

RADIO NEW ZEALAND INTERNATIONAL
1300 S/A RNZ News, M-F Pacific Regional News; 1305 S Tagata o te Maana, A New Music Releases; 1308 M-F Dateline Pacific; 1330 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 tba.

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

WHRI, Indiana
15105 kHz.: 1330 A DXing with Cumbre.

WRMI, Florida
15725 kHz.: 1300 A Shortwave Radio Network; 1330 S Viva Miami!

1400 UTC / 9am E / 6am P - Page 49 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 Top of the Pops, W Charlie Gillett (world music), H Music Biz, F John Peel (eclectic).

BBC WORLD SERVICE (eas)
1400 S/A News, M-F East Asia Today; 1406 S Talking Point (live phone-in), A Sportsworld (live action); 1432 M-F British News; 1445 M-H Sports Roundup, F Football Extra.

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

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

RADIO AUSTRALIA
1400 D News; 1405 S Books & Writing, M-F Margaret Throsby (interview/music), A The Comfort Zone (design issues).

RADIO CANADA INTERNATIONAL
1400 D News; 1405 S The Sunday Edition, M-F Sounds Like Canada (Canadian magazine); A The House (Canadian politics).

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

RADIO NEW ZEALAND INTERNATIONAL
1400 D RNZ News; 1405 S Touchstone (religion), M-F Cadenza (light classics), A In a Mellow Tone.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1400 S Peace Watch (cont'd.), M New Dimensions ("progressive" ideas), T Honoring Mother Earth: Indigenous Voices, W WINGS (women's news), H Global Community Forum, F Continent of Media, A Mailbag; 1430 S Daily Reading, W A World of Possibilities, F Steppin' Out of Babylon, A Disability Radio Worldwide.

RADIO PRAGUE
1400 D News; 2235 S Letter from Prague, M-F Newsview, A Insight Central Europe; 1410 S Mailbox, M One on One (interview), T Witness (oral history), W ABC of Czech (language), H Economic Report, F The Arts; 1420 S Readings from Czech Literature, T Talking Point (Czech issues), W Czechs in History or Spotlight (travelogue), F Away from Politics (poetry).

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

WRMI, Florida
15725 kHz.: 1400 S Wavescan, A Shortwave Radio Network (cont'd.).

WWCR, Tennessee
15825 kHz.: 1400 S Golden Age of Radio.

1500 UTC / 10am E / 7am P - Page 50 Freqs

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

BBC WORLD SERVICE (eas)
1500 D News; 1501 S In Concert; 1506 M Health Matters, T Go Digital, W Discovery (research), H One Planet (ecology), F Science in Action, A Sportsworld (live action); 1532 M I'm Sorry I Haven't a Clue (panel game), T Music Review, W/F Westway, H The Word (writers & writings) (exc. last H, World Book Club (discussion)]; 1545 W Heart & Soul (beliefs & values), F What's the Problem? (advice).

CHINA RADIO INTERNATIONAL
1500 D News & Reports; 1510 S Report on Developing Countries; 1515 A Cutting Edge (sci/tech); 1520 S In the Spotlight (cultural magazine); 1530 M People in the Know (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 Encounter (religion in Australia), M-F Asia Pacific (regional current affairs), A Nocturne (musical arrangements); 1530 M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor; 1555 S The Pulse (Aussie new music), A Business Weekend.

RADIO CANADA INTERNATIONAL
1500 D News; 1505 S The Sunday Edition (cont'd.), M-F Sounds Like Canada (cant'd., including 1530 F C'est La Vie (life in French Canada), 1545 T-F Out Front (first person views of life), A Vinyl Cafe.

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

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1500 S Daily Reading (cont'd), M Voices of Our World (Maryknoll program), T-A Daily Reading; 1515 T Disability Radio Worldwide, W-A Freespeech Radio News; 1530 S Continent of Media, M UN program; 1545 M Sneak Peaks, T-A UN Daily News.

WRMI, Florida
15725 kHz.: 1500 S Shortwave Radio Network, A Shortwave Radio Network (cont'd).

1600 UTC / 11am E / 8am P - Page 50 Freqs

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

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

RADIO AUSTRIA INTERNATIONAL
1605 S/A Insight Central Europe; 1615 M-F Report from Austria; 1625 S/A Listener Letters; 1635 S/A Insight Central Europe; 1645 M-F Report from Austria; 1655 S/A Listener Letters.

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

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1600 S Honoring Mother Earth: Indigenous Voices, M-F Democracy Now!, A CounterSpin (media analysis); 1630 A Freespeech Radio News (repeat of Fri. newscast).

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

KWHR, Hawaii
9930 kHz.: 1600 S DXing with Cumbre.

WHRI, Indiana
13760 kHz.: 1600 A DXing with Cumbre.

WRMI, Florida
15725 kHz.: 1600 S/A Shortwave Radio Network (cont'd).

1700 UTC / 12pm E / 9am P - Page 51 Freqs

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

RADIO AUSTRALIA
1700 D News; 1705 S Sound Quality (innovative music), M-F Australia Talks Back (phone-in), A The Spirit of Things (spiritual matters); 1755 M-F Perspective (commentary), A The Pulse (Aussie new music).

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

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1700 S Living Enrichment Center, M Making Contact, T/W/F Peace Watch, H/A TUC Radio; 1730 M Steppin' Out of Babylon, H Peace Watch, A World of Radio.

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

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

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

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

WBCQ, Maine
17495 kHz.: 1700 A Allan Weiner Worldwide.

WRMI, Florida
15725 kHz.: 1700 S Shortwave Radio Network, A Shortwave Radio Network (cont'd).

1800 UTC / 1pm E / 10am P - Page 51 Freqs

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

CHANNEL AFRICA, South Africa
1800 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

RADIO AUSTRALIA
1800 D News; 1805 S-H Pacific Beat (Pacific islands magazine), F Pacific Review, A Best of 'Late Night Live' (interviews); 1830 F Country Breakfast (rural life).

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1800 S Spiritual Awakening, M Middle East Project, T CounterSpin (media analysis), W Making Contact, H Peace Watch (cont'd.), F WINGS, A Mailbag; 1830 S World of Radio, M-F Hightower Radia (commentary), A Making Contact; 1835 M-F Earthwatch (ecology); 1840 M-F Earth & Sky (astronomy); 1845 M Neumaier Report, T-F UN programs.

RTE, Ireland
1830 S Saturday View, M This Week with Gerald Barry, T-A 5-7 Live (tap news of the day).

VOICE OF AMERICA, Africa Service
1800 S/A News & Reports, M-F Africa World Tonight; 1823 S/A Sports; 1830 S/A News Headlines, W Straight Talk Africa (continental phone-in); 1833 S/A On the Line (US foreign policy); 1855 S/A Government Editorial.

WBCQ, Maine
17495 kHz.:1800 A Zambo's Mondo Record Party.

WINB, Pennsylvania
1830 A DX Partyline.

WRMI, Florida
15725 kHz.: 1800 S/A Changesurfer Radio; 1830 S/A Shortwave Report.

1900 UTC / 2pm E / 11am P - Page 52 Freqs

ALL INDIA RADIO
1900 D News; 1905 D Press Review; 1910 S Women's World, M/W/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interviews-2nd/4th), H Panorama of Progress, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); 1920 S/M/W/F Film Songs, T Light Classicol 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.

DEUTSCHE WELLE
1900 D news; 1905 S Hard to Beat (sport), M-F Newslink Africa, A Religion & Society; 1915 S Inspired Minds, A German by Radio; 1930 S Hits in Germany or Melody Time, M World Music Live, T Arts on the Air, W Living in Germany, H Cool (youth culture), F Focus on Folk; 1945 W Europe on Stage.

RADIO AUSTRALIA
1900 D News; 1905 F Rural Reporter, A Earthbeat (ecology); 1910 S-H Pacific Beat (regional magazine w/Sport @ 1929); 1930 F Australian Country Style (music), A Business Report.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
1900 S Radio Nation ("The Nation" magazine), M This Way Out, T World of Radio, W A Public Affair, H Living Enrichment Center, F Middle East Project, A Between the Lines; 1930 M University Forum, T Mailbag, H Progressive Radio, F World of Radio, A Peace Watch.

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. *W Straight Talk Africa* cont'd.); 1923 S Sports; 1930 S Music Time in Africa (part 2), M-F World of Music, A News Headlines; 1933 A Our World (ecology, science & technology).

VOICE OF NIGERIA
1900 S Youth Forum, M Our Cities, T Our Environment, W Who Are the Nigerians?, H Listeners' Letters, F Nigerian Scene, A Folktales; 1915 H Wheel of Progress, F Business Weekly, A Nigerian Newsletter; 1930 S Window on Abuja, M Perspectives, T African Monarchy, W Theatre on the Air, H Women and Development, F Weekend Magazine, A Time for Highlife; 1945 S From the Bookshelf, T Listeners' Letters.

SWISS RADIO INTERNATIONAL
1930 S/A Swiss Scene, M-F Newsnet; 1935 A Take 2; 1740 S Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); 1945 F Business Spotlight.

WWCR, Tennessee
15825 kHz.: 1900 A Presidential Radio Address/Democratic Response.

2000 UTC / 3pm E / 12pm P - Page 52 Freqs

DEUTSCHE WELLE
2000 D News; 2005 S Mailbag, M-F Newslink Africa, A Inside Europe; 2030 M Insight (international affairs), T World in Progress (development), W Money Talks, H Man & Environment, F Spectrum (sci-tech); 2045 M Business German.

RADIO AUSTRALIA
2000 D News; 2005 F Pacific Review, A Australia All Over; 2010 S-H Pacific Beat (regional magazine w/Sport @2029), 2030 F The Buzz (technology).

RADIO FOR PEACE INTERNATIONAL, Costa Rica
2000 S New Dimensions ("progressive" ideas), M Honoring Mother Earth: Indigenous Voices, T WINGS (women's news), W Global Community Forum, H Continent of Media, F Mailbag, A Peace Watch (cont'd.); 2030 T A World of Possibilities, H Steppin' Out of Babylon, F Disability Radio Worldwide, A Daily Reading.

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).

SWISS RADIO INTERNATIONAL
2000 S/A Swiss Scene, M-F Newsnet; 2005 A Take 2; 1740 S Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); 2015 F Business Spotlight.

VOICE OF NIGERIA
2000 S News Bulletin, M-F Sixty Minutes, A African Hour; 2015 S Sports Roundup; 2030 S In the News.

VOICE OF AMERICA, Africo Service
2000 S/A Nightline Africa (weekend magozine), 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 Indion Vocal Music, A Regional Indian Devotional Music.

2100 UTC / 4pm E / 1pm P - Page 53 Freqs

ALL INDIA RADIO
2100 D News; 2105 D Commentary; 2111 S Regional Film Songs, M/A Classical Indian Vocal Music, T Kamatak Vocal Music, W/H Instrumental Music, F Orchestral Music; 2120 S Sports Roundup (1st wk)/Feature (2nd)/Film Story (3rd)/Discussian (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 Newshour*.
[*Special service to the Caribbean on *5975, 11675, 15390 kHz.*: 2105 M-F Caribbean Report. Special service to the Falklands on *11680 kHz.*: 2130 T/F Calling the Folklands.]

DEUTSCHE WELLE
2100 News; 2105 S Hard to Beat (sport), M-F Newslink Africa, A Religion & Society; 2115 S Inspired Minds, A

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German by Radio; 2130 S Hits in Germany [or] Melody Time, M World Music Live, T Arts on the Air, W Living in Germany, H Cool (youth culture), F Focus on Folk, A Africa This Week; 2145 W Europe on Stage.

RADIO AUSTRALIA
2100 D News; 2105 F Feedback (letters, station news, on communications), A Australia All Over (cont'd); 2110 S-H AM (morning news magazine); 2130 S Country Breakfast (rural life), M Earthbeat (ecology), T Innovations (new products), W Australia Now, H All in the Mind (the brain), F Music; 2145 A Asia Sunday.

RADIO JAPAN - NHK WORLD
2100 D News; 2110 S Pop Joins the World, M-F Songs for Everyone, A Weekend Japanalogy; 2115 M-F Asian Top News (headlines from region's radio); 2125 M Japan Music Treasure Box, T Basic Japanese for You, W Japan Musicscape, H Brush Up Your Japanese, F Music Beat; 2154 A Sights & Sounds of Japan.

RADIO FOR PEACE INTERNATIONAL, Costa Rica
2100 S Voices of Our World (Maryknoll program), M-F Daily Reading, A Daily Reading (cont'd); 2115 M Disability Radio Worldwide, T-F Freespeech Radio News; 2130 S UN program, A Continent of Media; 2145 S Sneak Peaks, M-F UN Daily News.

RADIO PRAGUE
2100 D News; 2235 S Letter from Prague, M-F Newsview, A Insight Central Europe; 2110 S Mailbox, M One on One (interview), T Witness (oral history), W ABC of Czech (language), H Economic Report, F The Arts; 2120 S Readings from Czech Literature, T Talking Point (Czech issues), W Czechs in History or Spotlight (travelogue), F Away from Politics (poetry).

VOICE OF AMERICA, Africa Service
2100 D News; 2106 S/A Jazz America, M American Gold, T Roots and Branches, W Classic Rock, H Top 20, F Country Hits.

WWCR, Tennessee
15825 kHz.: 2100 H DX Partyline, 2130 H World of Radio.

WHRI, Indiana
9495 kHz.: 2130 A DXing with Cumbre.

2200 UTC / 5pm E / 2pm P - Page 54 Freqs

ALL INDIA RADIO
2200 D News; 2210 D Commentary; 2215 S Women's World, M/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interview-2nd/4th), W Book Review (1st)/Window on Science (2nd/4th)/Times & Lives (biography-3rd), H General Talk, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); 2225 D Film Tune.

BBC WORLD SERVICE (am)
2200 D News; 2201 A Play of the Week; 2206 S Documentaries, M Health Matters, T Go Digital, W Discovery, H One Planet, F Science in Action; 2232 M I'm Sorry I Haven't a Clue (panel game), T Music Review, W/F Westway (drama serial), H The Word (writers & writings) [exc. last H, World Book Club (discussion)], 2245 W Heart & Soul (beliefs & values), F What's the Problem? (advice).

RADIO AUSTRALIA
2200 D News; 2205 F Asia Pacific (regional current affairs), A Correspondents' Report; 2210 S-H AM (morning news magazine); 2230 F AM Saturday (morning news magazine), A Music Deli (international); 2240 S-H Australia Wide (national report); 2254 A-H Perspective (commentary).

RADIO FOR PEACE INTERNATIONAL, Costa Rica
2200 S Honoring Mother Earth: Indigenous Voices, M-F Democracy Now!, A CounterSpin (media analysis), 2230 A Freespeech Radio News (repeat of Fri. newscast).

RVi, Belgium
2230 S Radio World, M-F News, A Music from Flanders; 2234 M-F Flanders Today (incl.press review, reports & 'CD of the Week'); 2238 S Tourism in Flanders; 2244 S Brussels 1043 (letters).

WBCQ, Maine
7415 kHz.: 2200 S Radio Free Euphoria, M Jean Shepherd, F Pan Global Wireless; 2230 F Pab Sungenis Project.
9330 kHz.: 2200 A Allan Weiner Worldwide.

WHRI, Indiana
5745 kHz.: 2200 S DXing with Cumbre.

WRMI, Florida
15725 kHz.: 2200 A Shortwave Radio Network.

2300 UTC / 6pm E / 3pm P - Page 54 Freqs

BBC WORLD SERVICE (am)
2300 D The World Today; 2332 A The Interview.

CHINA RADIO INTERNATIONAL
2300 D News & Reports; 2310 A Report on Developing Countries; 2315 F Cutting Edge (sci/tech); 2320 A In the Spotlight (cultural magazine); 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.

RADIO AUSTRALIA
2300 D News; 2305 F Country Breakfast (rural life), A All in the Mind (the brain); 2310 S-H Asia Pacific (regional current affairs); 2330 S Business Report, M The Europeans, T Rural Reporter, W The Arts on RA, H The Buzz (technology issues), F Lingua Franca (about language), A Innovations (new products).

RADIO AUSTRIA INTERNATIONAL
2305 S/A Insight Central Europe; 2315 M-F Report from Austria; 2325 S/A Listener Letters; 2335 S/A Insight Central Europe; 2345 M-F Report from Austria; 2355 S/A Listener Letters.

RADIO BULGARIA
2300 D News; 2310 A Views Behind the News, S Folk Studio (Bulgarian folk music), M-F Events and Developments (current affairs review); 2320 M Sports; 2325 M-F Timeout for Music; 2330 F Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places); 2335 M-F Keyword Bulgaria (Bulgaria and things Bulgarian), H Answering Your Letters; 2345 M Magazine Economy, T Arts and Artists; W History Club, H The Way We Live, F Radio Bulgaria Calling (for radio hobbyists).

RADIO CANADA INTERNATIONAL
2300 S/A The World This Weekend, M-F The World at 6; 2330 S Inside Track (sports anthologies) M-F As It Happens (interviews with newsmakers), A Madly Off in All Directions.

RADIO NEW ZEALAND INTERNATIONAL
2300 S-H Midday Report, F/S News; 2312 F Focus on Politics, A This Week in Parliament; 2333 F The Sampler (latest CDs), A Spectrum (life in NZ).

RADIO FOR PEACE INTERNATIONAL, Costa Rica
2300 S Living Enrichment Center, M Making Contact, T/W/F Peace Watch, H/A TUC Radio; 2330 M Steppin' Out of Babylon, H Peace Watch, A World of Radio.

RADIO ROMANIA INTERNATIONAL
2300 D Radio Newsreel; 2310 S Focus, M-F Commentary, A The Week; 2315 S Sunday Studio, M Pro Memoria (history), T Business Club, W Society Today, H Cards on the Table (debate) or The Romanian Next to You (interview), F Challenge for the Future or Terra 2001, A World of Culture; 2320 M Political Flash, T European Horizons, A RRI Encyclopedia; 2325 S Romanian by Radio, M/W/F Business Update, T Tourist News, H Listeners' Letterbox, A Roots (culture/traditions); 2330 S Romanian Itinerories, M Pulse of Transition, T Mother Nature (ecology), W Visit Romania, F Practical Guide, A Radio Pictures; 2335 S Listeners' Letterbox, M Performing Arts, T Youth Club, W Partners in a Changing World, F Cultural Survey, A Romanian Itineraries; 2340 M Pages of Romanian Literature, T/H Skylark (folk music), W Stage and Screen, F Spectator (voice of the people), A Bucharest Along the Centuries; 2345 M Romanian Hits, W Romanian Musicians, F Romanian Folk Music At Its Best, A DX Mailbag; 2350 S Romanian Folk Music At Its Best, M Sports Roundup, T Athlete of the Week, W Sports Club, H Football Flash, F Sports Weekend.

RADIO PRAGUE
2330 D News; 2235 S Letter from Prague, M-F Newsview, A Insight Central Europe; 2340 S Mailbox, M One on One (interview), T Witness (oral history), W ABC of Czech (language), H Economic Report, F The Arts; 2350 S Readings from Czech Literature, T Talking Point (Czech issues), W Czechs in History or Spotlight (travelogue), F Away from Politics (poetry).

SWISS RADIO INTERNATIONAL
2330 S/A Swiss Scene, M-F Newsnet; 2335 A Take 2; 1740 S Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); 2345 F Business Spotlight.

VOICE OF TURKEY
2300 D News; 2310 D Press Review; 2315 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; 2320 M Hues & Colors of Anatolia, W Letterbox, A The Stream of Love or DX Corner; 2325 S/F Music, H In the Wake of a Contest; 2330 M/A Music; 2335 S Turks in the Mirror of Centuries, M From Post 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.: 2300 M-F Radio Caroline (the original Europirate radio station).
7415 kHz.: 2300 W World of Radio, F Pab Sungenis Project (cont'd), A Radio Timtron Worldwide; 2330 W Think Tank North America (the bizarre), H Uncle Ed's Musical Memories, F Wanton Display of Control & Disruption.

WHRI, Indiana
9495 kHz.: 2330 A DXing with Cumbre.

WWCR, Tennessee
12160 kHz.: 2300 S Travel Channel Radio.

WHRA, Maine
17650 kHz.: 2300 F DXing with Cumbre; 2330 A DXing with Cumbre.

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Mike Barnaclough, UK; Wolfgang Bueschel, Germany; Rich D'Angelo, *NASWA Flash Sheet;* Glenn Hauser, Enid, OK, *DX Listening Digest, World of Radio*; Jose Jacob VU2JOS, India; Evelyn Marcy/WYFR; Anker Petersen, DX Window; Harold Sellers, Canada, *ODXA/DX Ontario;* Larry Van Horn, MT Asst. Editor; Alexander Yeyorov, Ukraine; *BBC On Air; BCL News; BCDXC; CIDX; Cumbre DX; DXA; DX News; Fineware; Hard Core DX; NASWA Journal; Observer; Worldwide DX Club.*

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Monitoring the Test Pilots

The Air Force Flight Test Center (AFFTC) at Edwards Air Force Base, California, is the Air Force Materiel Command (AFMC) center of excellence for research, development and test and evaluation of aerospace systems for the United States and its allies. It operates the U.S. Air Force Test Pilot School and is home to NASA's Dryden Research Center and to considerable test activity conducted by America's commercial aerospace industry.

From the development of the country's first jet aircraft to the Air Force's newest fighter, the F-22 Raptor, the test forces at Edwards have played a role in virtually every aircraft to enter the Air Force inventory since World War II.

The two major organizations carrying out the Center's mission are the 412th Test Wing and the 95th Air Base Wing, with their mix of nearly 6,000 service members and government employees.

The 412th Test Wing manages the Center's flight operations programs and functions. In doing so, it manages all engineering support for manned and unmanned aerospace vehicle test programs. With many different types of planes operated by the 412th aircrews, the Edwards flight line takes on an almost expeditionary aerospace force look. The aircraft flown here include the B-1B, B-2, B-52H, C-12C, C-17A, NKC-135B/3, KC-135R, C-135C/E, CV-22B, F-15/A/B/C/D/E, N/F-16A/B/C/D, F-22A, YF-117A, A/T38A/B/C, NT-39A/B, T-39A, T-3A, X-45A, and RQ-4A.

Additionally the Global Hawk unmanned aerial vehicle and L-23 glider are tested at Edwards. The Airborne Laser 747 test platform arrived in late 2002 for testing and in 2005 the X-35 Joint Strike Fighter aircraft will be tested here.

The 412th Test Wing programs, develops, operates and maintains engineering technical services and facilities to support testing, as well as operates and manages logistic support.

The Test Wing's support-side counterpart, the 95th Air Base Wing, runs Edwards like a small town, delivering a quality of life that makes the base a great place to live and work. The Air Base Wing maintains the security, roads, buildings, transportation and community support services that make the flight-test mission possible. It provides the housing, childcare, recreational activities and medical care that affect every person on base.

Table One is a listing of the preset VHF/UHF frequencies for the AFFTC Support Fleet and Test Pilot School aircraft. Table Two is a complete list of squadron and other Edward base unit frequencies. Finally, Table Three is a list of ground and aircraft callsigns for Edwards base units.

Table One: AFFTC Support Fleet/USAF Test Pilot School Frequency Presets

Ch.	UHF	VHF	Use
01	269.90	116.40	ATIS
02	304.00		CONFORM
03	390.10	121.80	Edwards Ground Control
04	318.10	120.70	Edwards Tower Primary
05	272.00	132.75	SPORT
06	335.60	134.05	JOSHUA (Isabella)
07	322.30	126.55	JOSHUA (Owens)
08	256.80	123.95	JOSHUA (Saline)
09	291.60	120.25	JOSHUA (Panamint)
10	354.40		Air Refuel
11	315.90		Low Level
12	340.20	120.15	China Lake Naval Air Weapons Station (NID) Tower
13	290.30	126.10	JOSHUA (PMD-Palmdale)
14	317.60	123.70	Palmdale Production Flight Test Installation AF Plant 42 (PMD) Tower
15	286.40		MISSION
16	294.60		MISSION
17	297.40		MISSION (Test Pilots School)
18	262.50		MISSION (Test Pilots School)
19	236.60		Edwards Tower Secondary
20	308.70		Supervisor of Flight/ Tech Assistance

Table Two: Squadron/Organization Frequencies

Flight Test Squadron	Callsign	Primary	Secondary	Tertiary
410 FLTS	Dagger Ops	322.700	226.600	
411 FLTS	Raptor Ops	373.500	139.775	
416 FLTS	Zoom Ops	311.200		
418 FLTS	Tiger Ops	379.700	288.700	123.150
419 FLTS	Torch Ops			
B-1B	276.650	279.900		
B-52	266.300	383.200		
B-2	324.700	287.200		
Voron Ops	315.200			
445 FLTS	Eagle Ops	351.400	300.800	385.900
452 FLTS	Aria Ops	267.800		
TPS	Cobra Ops	297.400	262.500	
NASA	NASA 4	371.100	135.825	
OL-HM	X-ray Control	290.700	138.000	

Table Three: Edwards Callsigns

Ground Callsigns

AFFTC Operations Center	CONFORM
AFFTC Command Net	PONDEROSA
SPORT Radar Control Facility	R-2515SPORT

Airborne Callsigns

AFFTC Command	EDDIE
USAF Test Pilot School	COBRA – Normal Operations
AMMO – Student Crew Solo	(No instructor pilot on board)
DRAG – Low Lift/Drag	(Shuttle or Lifting Body approaches)
410 FLTS (F-117)	DAGGER
411 FLTS (F-22)	RAPTOR
412 FLTS (Speckled Trout)	TROUT
416 FLTS (F-16)	ZOOM
418 FLTS (C-12, C-17, C-141, C-130, T-39)	ARRIS
419 FLTS (B-1, B-2, B-52)	TORCH
445 FLTS (F-15, T-38)	EAGLE/RICK
452 FLTS (C-135, C-18)	AGAR/RICK
412 Operations Group, Det 2	X-RAY
AFTI	AFTI
NASA	NASA
Northrop	TIGER
McDonnell Douglas	LITER/DACO/POGO
General Electric	SPARE
9 Operations Group, Det 2 (ACC)	ASPEN

I would like to thank Robert Wyman for his assistance in preparing this Edwards AFB profile.

◆ Robins AFB, Georgia, Airshow Report

Some of our regular *Milcom* southeast military monitors attended the Robins Airshow in September and one of them, Mike Riffle, put together an excellent aftershow report which he shares with *MT Milcom* readers below. My additional comments will be offset in brackets.

Show Frequencies

123.150	Lima Lima flight team
126.200	Show Boss victor (Robins tower frequency)
133.225	Red Talon/Eagles flight team
143.850	Thunderbird four ship
239.350	Thunderbird solos
320.100	Show Boss uniform (Robins tower freq)
376.025	F-15 west coast demonstration team
413.250	Thunderbird ground (referred to as comm 1)

Aerial Demonstration Aircraft/Callsigns

COBB 05	C-130H 84-0205 700AS dropping the US Air Force Academy (USAFA) Wings of Blue parachute team (Sunday only)
EAGLE 01	F-15 west coast demo team aircraft
N89PS	Pitts S-2C Ed Hamill's Dream Machine aircraft
N908SP	Bell OH-58A Georgia State Patrol helicopter flying traffic control
RAZOR 22	E-8C 116ACW
RHET 71	KC-135 59-1507 99ARS
ROGUE 01	C-5B 86-0022 339FLTS Flew by himself on Saturday then a formation flyby on Sunday with a C-130 (88-4402) and C-141 (66-0132) along with two F-15 aircraft in trail. One of the F-15s was 90-0240 and the other may have been the F-15 aircraft listed below). All were from Robins Air Logistics Command (ALC).
ROGUE ##	F-15E 86-0184 445FLTS Robins ALC demonstration aircraft
STEALTH 81	F-117 49FW
TOIL 35	C-130H 357AS dropping the USAFA Wings of Blue and the 421st Quartermaster jump teams (Saturday only)

Static Displays

A-10A 79-0105 47FS had two frequency cards (below) onboard, both the same. First one was down by the radio, second one was on the left canopy pillar and was labeled Barksdale. Callsign SWINE 63

Ch	*Frequency*	
01	383.300	[917 Wing AFRES Tactical Communications, Barkdale AFB, LA]
02	275.800	[Barksdale AFB Ground Control]
03	295.700	[Barksdale AFB Tower]
04	350.200	[Shreveport Approach/Departure Control]
05	376.800	[Unknown user/usage]
06	346.250	[Fort Worth ARTCC-Shreveport, LA RCAG, Approach/Departure Control Services]
07	236.500	[Fort Worth ARTCC-Shreveport RCAG Special Use Discrete Air Force Training]
08	298.600	[Claiborne Range R-3801 Range Control/Operations]
09	399.800	[Razorback Range R-2402 Range Control/Operations]
10	259.150	[Fort Polk Joint Readiness Center/Polk AAF, LA TACCS Training Net]
11	226.500	[Fort Polk Approach/Departure Control]
12	255.400	[FAA Flight Service Stations – Nationwide]
13	288.100	[Houston ARTCC Alexandria, LA RCAG Low/High Altitude Sector]
14	278.800	[Fort Worth ARTCC MOA Anne Discrete]
15	327.000	[Shreveport Approach/Deporture Control]
16	261.300	[Fort Polk Approach/Departure Control]
17-20	No frequencies	

B-52H 61-0024 96BS

C-130E 63-7814 67SOS? this C-130 really stood out. A dark gray top with light grey underside. No markings except for a subdued USAF 37814 on the tail and national insignia on the side. Callsign JAMBO 21

C-130J 98-1357 135AS Callsign: WITCH 07

C-141C 65-0225 729AS

C-23B 94-0312 171 AVN

Ch	Frequency	Usage
01	271.600	Dobbins ARB, GA ATIS
02	275.800	Dobbins ARB Ground
03	397.200	Dobbins ARB Tower
04	126.975	Atlanta Approach/Departure Control
05	119.300	Atlanta Approach/Departure Control
06	121.000	Atlanta Approach/Departure Control
07	134.125	Dobbins ARB Ground Controlled Approach (GCA)
08	372.200	Dobbins ARB Pilot-to-Dispatcher (PTD)
09	47.000	AA?F OPS [Probably AASF Operations for the 1-171 AVN Company C]
10	274.750	Dobbins ARB Pilot-to-Metro Service (PMSV)
11	122.800	Common Traffic Advisory Frequency (CTAF)

C-5B 86-0019 436AW this was an ALC aircraft on display

E-8C 93-0597 116ACW

EA-6B 160436 VMAQ-1

F-15E 88-1677 333FS

F-16A 75-0745 part of the *Cross Into The Blue* exhibit

KC-10A 87-0118 60AMW Callsign: TOGA 79

RC-135V 64-14842 38RS

T-37B 64-13443 14FTW Callsign: CUTLASS 11 Note: the frequency card info was very difficult to see as it was sticking out perpendicular from the instrument panel, also the canopy was not open.

Ch	Freqs	
01	275.800	[Columbus AFB, MS Ground Control]
02	383.100	[Columbus AFB Runway Supervisor Unit]
03	289.600	[Columbus AFB Tower]
04	388.200	[In the south I only show the Atlanta Approach/Departure for Robins on this frequency, it is an ATC function frequency for someone]
05	#14.800	[This is surely 314.800 which is Meridian, MS Approach/Departure Control]
06	###.#	
07	291.#50	[This is surely 291.650 which is a new Columbus AFB Approach/Departure Control frequency]
08	317.500	[Memphis ARTCC Columbus RCAG Approach/Departure Control Service]
09	349.000	[Lots of choices nothing solid here to point to]
10	257.200	[This is a nationwide Air Traffic Control Services Common]
11	256.700	[This is a nationwide Air Traffic Control Services Common]
12	252.100	[Columbus AFB 14FTW Supervisor of Flying]
13	338.600	[Columbus AFB Clearance Delivery]
14	###.#	
15	301.175	[This is one of my notorious spectrum holes]
16	233.425	[This is one of my notorious spectrum holes]
17	226.000	[Columbus AFB Approach/Departure Control]
18	393.100	[Lots of choices nothing solid here to point to]
19	319.950	[This is one of my notorious spectrum holes]
20	369.000	[Interesting, a NORAD SE ROCC tactical frequency]

U-2S 68-10331 99RS Callsign: XRAY 27

Inside the cockpit of a C-5B on display (photo by Mike Riffle)

There was a C-141 parked in a roped off area by the static C-5 with tail 60143. According to Scramble that tail crosses to a "scrapyard on D" aircraft listing. However, this looked very much like an active aircraft from the 452AMW, including engine covers with the March AFB star on them. Could this have been the Thunderbirds support aircraft?

Robins ALC Aircraft

C-5A	69-0023 stripped of paint
C-5A	70-0452 no engines
C-5B	86-0025 missing nose cone and engines
C-17A	95-0107 tail sticking out from hanger

And finally, Mike passed along this fabulous bit of communications humor heard during the airshow that weekend. He wrote, "As COBB 05 was taxing back in on Sunday, NASCAR driver Ricky Rudd's #21 race car was giving rides down one of the taxiways. COBB 05 was instructed to 'hold short then taxi without delay, traffic is a, uh, Pontiac at your 10 o'clock.' Of course, Rudd drives a Ford, so that controller should be getting some remedial training for misidentifying a Ford as a Pontiac!"

Thanks to Mike for that great report. And until next month, 73 and good hunting.

Ricky Rudd's Ford "Pontiac"! (Mike Riffle)

TRACKING THE TRUNKS

TECHNOLOGY, EQUIPMENT, FREQUENCIES AND NEWS

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The Digital Diversity of APCO-25

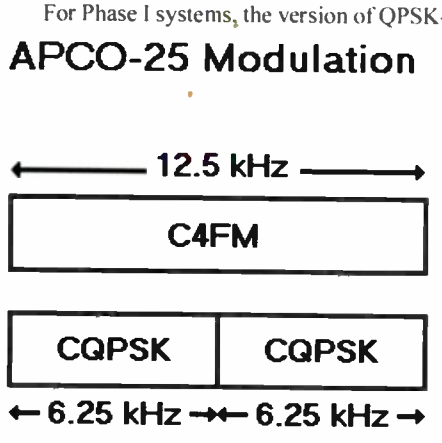
Despite all the silence you hear while listening to police and fire department radio systems, the public safety spectrum in many locations is quite full. While efforts are underway to allocate new frequency bands, the Federal Communications Commission (FCC) has also been pushing to fit more users in the same amount of space. Their basic plan is to slice up the existing channels into smaller pieces and require users to operate within those pieces. This is a difficult requirement for the older analog radios, but the new digital systems – including APCO Project 25 – are prepared for this eventuality.

❖ APCO-25 Modulation

The original APCO (Association of Public-Safety Communications Officials) Project 25 specifications, now a decade old, spelled out two phases for radio operation. Phase I operates in channels that are 12.5 kHz wide, which is the current FCC requirement. However, because the FCC wants to pack more users into the limited spectrum available, they'd like to eventually have everyone using radio channels that are 6.25 kHz wide, or half as much as before. To meet this requirement, Project 25 defined Phase II to operate within 6.25 kHz wide channels.

APCO-25 uses a modulation process called QPSK-c, which stands for Quadrature Phase Shift Keying, continuous. Modulation is just a fancy word for the process of carrying information content over some kind of *carrier* signal. The transmitter superimposes the information onto the carrier, and the receiver removes the carrier and reproduces the information. Everyday AM (Amplitude Modulation) and FM (Frequency Modulation) radios tune to a carrier signal and retrieve the audio information sent by the radio station.

For Phase I systems, the version of QPSK-c used is called Compatible 4-Level Frequency Modulation (C4FM). When the basic Project 25 specifications were being worked out a decade ago, C4FM was chosen primarily because it provides relatively good efficiency without requiring equipment manufacturers to produce complex and expensive radios. C4FM is designed to operate within a radio channel that is 12.5 kHz wide.



Under the Phase II plan of Project 25, another type of QPSK-c modulation called CQPSK (Compatible Quadrature Phase Shift Keying) is used. It's not all that different from C4FM, but requires a different transmitter and a little more work on the receive side to make things function correctly. The advantage is that it takes up less bandwidth than C4FM, allowing two users to fit where only one did before.

Because C4FM and CQPSK are so similar, the intent was that same basic receiver hardware could properly handle both Phase I (12.5 kHz) and Phase II (6.25 kHz) channels. This means that with modern digital signal processing (DSP) technology, the same scanner hardware should be able to handle both types of modulation.

❖ Digital Simulcasting

As the new APCO-25 scanners make their way into hobbyist's hands, there are reports that they don't work correctly while monitoring some simulcast systems. (*Simulcast* just means that the same information is transmitted from more than one repeater at the same time, allowing users across a wide geographic area to all hear the same messages.) The symptoms are mainly the inability hear an entire transmission. The first second or two of voice is heard, which then trails off to silence.

To add to your list of acronyms, there is another type of modulation scheme that's used with some multi-site Project 25 systems. Linear Simulcast Modulation (LSM) is a trademarked term for a form of CQPSK that provides a way for receivers to properly handle multiple identical transmissions. It's just different enough that the regular C4FM processing doesn't work correctly.

Because no Phase II systems are currently in operation, the developers at Uniden and GRE didn't expect an immediate need to handle this type of modulation. However, several municipalities are using LSM/CQPSK modulation for simulcast, including Phoenix and Mesa in Arizona; the greater Twin Cities area of Minnesota; Hamilton County in southwest Ohio; and Austin and Travis County in Texas.

If you live near any of these areas, or monitor systems that are "pure" APCO-25 with simulcasting, you may want to wait until Radio Shack has an upgrade for the PRO-96.

As described in the August *Tracking the Trunks* column, the Radio Shack PRO-96 (built by GRE) was designed to accept updates to the "DSP Application" portion of the scanner through the use of flash upgrades. This kind of flexibility allows production problems and bugs to be corrected without the need to buy a new scanner or replace circuit boards. In this case, an upgrade can also add new features and capabilities.

Radio Shack is expected to provide a firmware update that will give the scanner the ability to process LSM transmissions. As of this writing there's no release date for such an update, nor indication whether there will be a cost involved. There may be a way to have the upgrade done at your local Radio Shack store, or to download the upgrade from Radio Shack's web site. We'll keep you posted as we get more details.

No word yet from Uniden on a fix for their scanners, although they have a new pair of scanners in the works to compete with the PRO-96.

❖ New Uniden Scanner

There's a rule of thumb in the software business: "Never buy revision 1.0," meaning don't buy a product when it's first produced, since it's likely to have bugs. It takes time to iron out bugs and integrate new features. This happened to the Pontiac Fiero in the 1980s, which was famous for production problems early in its life. On the other hand, if no one ever bought revision 1.0 there would never be revision 1.1.

In any case, Uniden is circulating pre-release information about a pair of enhanced scanners to correct some of the shortcomings of the current 250D and 785D digital scanners. The new 296D (handheld) and 796D (base/mobile) scanners are very similar to the 250D and 785D, but will have the ability to track digital trunked systems that use a 9600-baud control channel. Also, a digital decoder card will be included – current scanners require the purchase of a separate card (the BCi25D) in order to handle APCO-25 systems.

So far there is no exact release date, although it's expected to be available in early 2004. Price is rumored to be around a thousand dollars, although no official list price has been forthcoming.

❖ Rapides Parish, Louisiana

Dear Dan,

In the July 2003 ***Tracking the Trunks column*** *you requested Talk Group IDs for Rapides Parish, Louisiana. This is a Motorola Type II*

system using frequencies 855.7125; 855.9625; 856.7125; 856.9375; 857.7125; 857.9375; 858.2625; 858.7125; 858.9375; 859.2625; 859.7125; 859.9375; 860.2625; 860.7125; and 860.9375 MHz.

All Talk Group Identifiers for the parish changed early in 2003; thus I've had some homework to do. (Thank you for motivating me to finally learn the ID Scan List feature on my scanners. Monitoring this way is a whole lot easier.) Here is a list of some of the more frequent IDs:

Rapides Parish Sheriff's Office

15344	Sheriff - Dispatch
15376	Sheriff - Tac 1
15400	Sheriff - Tactical
15472	Dept. of Corrections
15536	Dept. of Corrections
15568	Dept. of Corrections
15632	Sheriff - Tac 2
16240	
16272	
16400	
16432	Comm Interagency

City of Alexandria Police

15856	Police "A"
15888	Dispatch
15920	Dispatch 2
15952	Police "2"

City of Pineville

12272	Police
12304	Dispatch 2

City of Ball

2320	Comm Center
2384	Tac
2416	Fire Department

City of Lecompte

2640	Police
2672	Tac
2704	Fire Department

City of Woodworth

3184	Comm Center

City of Cheneyville

9744	Comm Center

England Air Park

13296	Security
13360	Grounds

Parish Fire/Rescue

3856	Comm Center Fire District # 2
12432	Pineville Dispatch
12784	Alexandria Dispatch
12816	Alexandria mobiles
13072	

Alexandria City Services

8016	Alexandria Transit Authority (ATRANS)
8048	ADA Van Service
8240	Building Services
13840	Electric
13872	Gas
13904	Water
13936	Wastewater
13968	Parks
14000	Utility (Meter Servicing)
14032	
14064	Motor Pool
14096	
14128	Traffic Signals
14160	Streets
14192	Animal Shelter
14224	
14256	Sanitation

There is a private TRS in the area using frequencies 853.3375; 856.1125; 856.5375; 857.1125; 857.5375; 858.5375; and 859.5375. Thanks to guidance from Larry Van Horn, and the FCC web site, I have discovered that this system is licensed to Tower Communications of Alexandria, Louisiana. They, in turn, contract out the system to area businesses. The following is nearly all of the active talkgroups, with some confirmations:

16	Kay Radio and Electronics
144	
272	
464	
720	
1104	
1232	
1344	
1360	Hixson Autoplex
2128	
2384	
2448	Newschannel 5
3280	
4240	
4368	
8736	
40976	
41024	
41040	
41104	
41136	
41216	Cabrini Outpatient Services **(most active channel!)**
41248	
41296	
41376	
41408	

I will continue to monitor this sytem to obtain a more complete list of users.

One tip for the scanner enthusiast: A city map and a telephone book are great tools to make your Talkgroup ID confirmations.

I hope that this information will be of use to you.

– Bill in Pineville, Louisiana

❖ Cleveland, Ohio

I was curious as to whether the Pro-96 will be able to receive the city of Cleveland digital radio system, which is not APCO-25 compliant. Any information would be appreciated. Thank You.

– Larry in Ohio

Like Memphis, Tennessee, the city of Cleveland uses Motorola digital radios – but they do not follow the APCO Project 25 standard. The digital voice is done through an older vocoder (voice encoder/decoder) called VSELP (Vector Sum Excited Linear Prediction) instead of the IMBE (Improved Multi-Band Excitation) vocoder specified in the APCO-25 standard. Since there is currently no consumer scanner that can process VSELP, you won't be able to hear digital transmissions on the PRO-96.

Cleveland's system uses the following frequencies: 851.0125, 851.1375, 851.1875, 851.2375, 851.2875, 851.3375, 852.0125, 852.1375, 852.1875, 852.2375, 852.2875, 852.3375, 853.0125, 853.1375, 853.1875, 853.2375, 853.2875, 853.3375, 854.1375, 854.1875, 854.2375, 854.2875, 854.3375, 855.1375, 855.1875, 855.2375, 855.2875 and 855.3375 MHz.

Some Cleveland talkgroups:

48	003	Citywide 1
80	005	Citywide 2
144	009	Public Safety Common
208	00D	Fireground Ops 1
240	00F	Fireground Ops 2
272	011	Fireground Ops 3
304	013	Fireground Ops 4
336	015	Fireground Ops 5
368	017	Fireground Ops 6
400	019	Fire Prevention Bureau
592	025	Fire Alerts
688	026	Fire Dispatch
3472	0D9	Airport Fire/Rescue 1
3504	0DB	Airport Fire/Rescue 2
3536	0DD	Airport Fire/Rescue 3
4976	137	Police
5104	13F	Police 1st District
5136	141	Police 2nd District
5168	143	Police 3rd District
5200	145	Police 4th District
5232	147	Police 5th District
5264	149	Police 6th District

Even though your scanner won't work with the VSELP transmissions, if you have a sufficiently fast connection to the Internet you can listen to a live "web feed" by following the links at **http://www.cleveland.com/policescanner/.**

❖ Pelham, New Hampshire

My town, Pelham, New Hampshire, just went to APCO-25 digital. I just bought a Radio Shack digital trunking scanner, the PRO-96. Now I need the codes they are using. Can you be of any help?

– Mike in NH

Pelham is a town of about 11,000 people in Hillsborough County, on the Southern edge of New Hampshire just across the border from Massachusetts. For many years Pelham has used VHF frequencies for public safety; police transmission on 154.770 MHz from a tower on Marsh Road and fire dispatches on 158.745 MHz from Jeremy Hill Road.

As far as my records go, Pelham continues to use these frequencies. However, the nearby city of Nashua, New Hampshire, is using a Motorola ASTRO system with analog and digital traffic on the following frequencies: 866.0500, 866.6000, 866.7750, 866.9750, 867.3625, 867.5500, 867.7500, 868.2625, 868.4500 and 868.5125 MHz.

Decimal	Hex	Description
8336	209	Highway Traffic
16784	419	Greater Nashua Transit Buses
32784	801	Fire Dispatch
32816	803	Fire Operations
32976	80D	Emergency Medical Services
49168	C01	Police

If any readers have more information about the Pelham radio system, please drop me a line!

That's all I have room for this month. Please e-mail questions, comments, and frequency lists to *dan@monitoringtimes.com*, and you can find more information on my web site at **http://www.signalharbor.com**. Until next month, happy monitoring!

THE FED FILES

A GUIDE TO GOVERNMENT COMMUNICATIONS

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NASA Callsigns

While prowling the net for frequency and callsign information recently, I stumbled upon a great list of National Aeronautics and Space Administration (NASA) callsigns, along with a writeup about how they are assigned.

Blocks of callsigns are allotted to NASA Centers and the Jet Propulsion Laboratory for assignment by the Federal Communications Commission (FCC) through the NASA National Spectrum Program Manager, who in turn allots them in groups to each Center or JPL Spectrum Manager. The Center Spectrum Manager assigns these callsigns, as required, to all frequency users at the Center or JPL, including commercial contractors.

For special requirements or when there's a shortage of basic callsigns, any assigned basic callsign may be expanded by suffixing any letter (A - Z) or any number (including zero), and may consist of more than one digit.

The callsigns allocated to each NASA Center and JPL are shown below.

Experimental Callsigns

Glenn Research Center	NA2XAA - NA2XGZ
Dryden Flight Research Center	NA2XHA - NA2XOZ
Langley Research Center	NA2XPA - NA2XZZ
Ames Research Center	NA3XAA - NA3XGZ
Goddard Space Flight Center	NA3XHA - NA3X0Z
NASA Headquarters	NA3XPA - NA3XRZ
Jet Propulsion Laboratory	NA3XSA - NA3XZZ
Marshall Space Flight Center	NA4XAA - NA4XEZ
Stennis Space Center	NA4XFA - NA4XJZ
Wallops Flight Facility	NA4XKA - NA4XUZ
Kennedy Space Center	NA4XVA - NA4XZZ
Johnson Space Center	NA5XAA - NA5XGZ

HF Callsigns

NASA Headquarters	KHA900 - KHA904
Ames Research Center	KHA905 - KHA909
Dryden Flight Research Center	KHA910 - KHA914
Goddard Space Flight Center	KHA915 - KHA919
Jet Propulsion Laboratory	KHA920 - KHA924
Johnson Space Center	KHA925 - KHA929
Kennedy Space Center	KHA930 - KHA934
Langley Research Center	KHA935 - KHA939
Glenn Research Center	KHA940 - KHA944
Marshall Space Flight Center	KHA945 - KHA949
Stennis Space Center	KHA950 - KHA954
Wallops Flight Facility	KHA955 - KHA959
Spare Call Signs	KHA960 - KHA969

Applicable only to fixed operations

VHF/UHF Callsigns

NASA Headquarters	WPBA200 - WP8A214
Ames Research Center	WP8A215 - WP8A229
Dryden Flight Research Center	WPBA230 - WPBA244
Goddard Space Flight Center	WPBA245 - WPBA259
Jet Propulsion Laboratory	WPBA260 - WPBA274
Johnson Space Center	WPBA275 - WPBA289
Kennedy Space Center	WPBA290 - WPBA304
Langley Research Center	WPBA305 - WPBA319
Glenn Research Center	WPBA320 - WPBA335
Marshall Space Flight Center	WPBA336 - WPBA350
Stennis Space Center	WPBA351 - WPBA365
Wallops Flight Facility	WPBA366 - WPBA380

Applicable only to land mobile radio systems operations, i.e. repeater operations.

❖ Monitoring the NIICD

Some of the more exciting communications in the VHF/UHF spectrum involve the government agencies who fight wildfires and forest fires. The National Interagency Incident Communications Department acts as a clearing house for these activities. Here is a list of the NIICD frequencies used by air assets.

NIICD National Air Frequencies

122.850 National Civil Air (AM) frequencies (Air-to-air, air-to-ground, rotor wing)
122.925 National Civil Air (AM) frequencies (Air-to-air, air-to-ground, fixed and rotor wing)
122.975 National Civil Air (AM) frequencies (Air-to-air, rotor wing)
123.025 National Civil Air (AM) frequencies (Air-to-air, air-to-ground, rotor wing)
123.050 National Civil Air (AM) frequencies (Air-to-ground, rotor wing)
123.075 National Civil Air (AM) frequencies (Air-to-air, air-to-ground, rotor wing)
166.675 Air Tactics (FM) <Group 2, Channel 1> Air-to-air and air-to-ground
167.950 Air Tactics (FM) <Group 2, Channel 5> Air-to-air and air-to-ground
168.625 Air Guard Frequency (Air-to-air initial contact; emergency ground-to-air communications; and initial call, recall and redirection.)
168.650 National Flight Following (Flight following, dispatch, and/or redirection of aircraft; air-to-ground and ground-to-air administrative traffic.) This frequency is not authorized for ground-to-ground traffic.
169.150 Air Tactics (FM) <Group 2, Channel 2> Air-to-air and air-to-ground
169.200 Air Tactics (FM) <Group 2, Channel 3> Air-to-air and air-to-ground
170.000 Air Tactics (FM) <Group 2, Channel 4> Air-to-air and air-to-ground

And while we are on the subject of the NIICD, according to their official website, this agency will change all the national cache radios to narrowband analog for the 2004 fire season. Radios will remain wideband analog in 2003. And some good news for owners of the new digital scanners: The NIICD will only purchase P25 digital radios in the future. Analog radios will be replaced during normal replacement cycles.

One additional note for federal monitors: The Departments of Agriculture and Interior have prohibited the use of Family Radio Service (FRS) radios. FRS radios cannot be used by anyone associated with federal wildland fire/incidents. This includes agency, military, and contractor personnel.

❖ US Government Comms in France

We have a new reporter this month from France who identifies himself as "Pizza Waves." He passes along the following report on US government frequencies in Paris, France.

444.4875	FM simplex (no encryption), security service embassy US (marines guard or diplomatic SS?) Callsigns : Charlie and Delta
464.4875	FM simplex (no encryption) American security service (not US embassy) Callsigns: Tango and Delta

Thanks, PW, and we look forward to future reports.

❖ More APCO Project-25 Comms

We continue to receive increasingly more mail regarding the federal government's use of the APCO Project 25 standards. *Fed Files* regular reporter Chris Parris passes along the following observations.

165.950 MHz P-25

"I just heard an extensive conversation on this frequency using P25 digital, but not encrypted between a mobile unit and 'Salem Base.' Both were hitting the Portland repeater very nicely and were commenting on how good the new radio system seems to be working and complimenting the radio techs. Also mentioned a repeater in Eugene, but didn't mention if it was on the same frequency pair. (What is the input to this repeater anyway?)"

417.200 MHz Analog

"I just heard the local (Portland, OR) Federal Protection Service dispatcher telling someone that 'We don't have digital at our end...,' but I did not hear any mobile unit trying to call in digital. They may have been trying from another region and the dispatcher was just keying up everyone in response, but the fact that they were talking about digital modes may mean they are moving that direction. Also heard today several units check-

ing in with 'newly issued radios...,' so they may be going digital..."

San Diego Area Fed Communications

Also, Chris had a chance to spend some time down in the San Diego area and report on some of the interesting communications being monitored by area members via the *Fedcom* newsgroup. Here are some of Chris' observations.

"First off, I do not believe that this system is running any kind of exotic digital mode other than Motorola ASTRO IMBE, APCO Project 25 compliant digital. I monitored these frequencies with the BC-250D scanner with the APCO-25 digital board, and heard both clear P25 and/or encrypted P25 digital on all these listed frequencies. I have looked into the 'Seneca' encryption that has been mentioned by some of the San Diego reporters, but the Motorola and Harris press information seems to describe 'Seneca' as the model name of the new line of radios, not a digital encryption standard, (There is a European project involving Motorola called SENECA, but it involves voice recognition in automobiles).

"Second, I can't be sure this is a trunked system. I searched from one end of the VHF spectrum to the other and was never able to hear anything that even remotely sounded like trunking control data, or any other kind of data (other than DES on known Customs frequencies or paging data). I tried all the frequencies that were posted as 'controllers,' but never heard a peep. I did do searches in very small steps, as recent posts from left coast seem to indicate some strange channel steps might be used (165.270 and 172.020 and 172.030 were listed), but nothing unusual was found.

"I searched the bands using several radios, including the BC250D, the Optoelectronics Optocomm radio and an Alinco DJX-10. I also sat a various locations around the San Diego County area, including Point Loma, Cabrillo National Monument area, Mission Valley, El Cajon and the Alpine area. Again, no sign of any trunking data was heard.

"Another interesting question is the sheer number of frequencies that seem to be used. In preparation for this trip, I started a spreadsheet of the frequencies that had been posted to Fedcom. Although I'm sure I only caught some of the posts, there were close to 200 unique frequencies listed. The major technical benefit of using a trunk radio system is the efficient use of radio spectrum. You are supposed to be able to fit maximum users in minimum radio frequencies. If the system reported in the San Diego is trunked, it would appear to be going the wrong way – a maximum number of frequencies with an apparently small number of agencies!

"I will freely admit that I have no idea of how this system is set up as far as inputs, outputs, transmitter locations, and channels. There are many active frequencies that seem to be involved in this, but since they are mostly encrypted and the users or purposes can't really be discerned, it's still a guessing game.

"I can confirm that some of the unencrypted communications that were monitored sounded like Immigration Service operations. But since I heard only ASTRO IMBE digital communications, I honestly don't think that the digital part of the system is somehow unique in requiring multiple repeaters inputs or outputs for its operation. Public safety radio systems around the country are using the same digital modes without any unusual requirements for multiple simultaneous repeaters. However, those of us who are old enough to remember the older INS radio system, which did have repeaters feeding into other repeaters, one could often hear an INS patrol unit talking into four or five repeaters at the same time for wide-area coverage.

"Even with the previously mentioned *Fedcom* frequency posts, I can only confirm about 40 or so active frequencies that I believe are part of this San Diego area system. I could not confirm that many different frequencies were all activated with one input. I was searching through the listed frequencies and when one came up active, I did not hear others come up at the same time. Also, when one frequency did become active, that frequency seemed to stay active with that particular conversation until it was through and not hop over to another frequency as you might expect on a trunked system. When I was able to catch an unencrypted radio talking with an encrypted radio, the back-and-forth communications would stay on that frequency for the duration.

"So, here are the frequencies that I found active with digital communications during my searches, along with any notes on what was heard. P25 means unencrypted APCO Project 25 compliant digital communications; ENC means encrypted P25 digital communications." (My comments will be in brackets as noted-LVH.)

Chris is planning on making further trips to the area to see what else he can find. I have a nice shopping list I am preparing for him and if anyone else in the San Diego area has some info they want to share we will be happy to present it here.

Finally, I would like to thank all of our reporters this month for their contributions to the column. Until next time – 73 and good hunting.

San Diego Area Frequencies

143.2750	P25	Military, probably not part of "Justice System"
162.7000	ENC	[Nothing in my files nationwide, new narrowband frequency allocation]
162.8500	ENC	[INS paired with 165.825]
163.6500	ENC	[INS]
165.0625	ENC	[U.S. Army allocation, probably the California National Guard, see 173.4625]
165.8250	ENC	[INS paired with 162.975]
165.8750	ENC	[INS sometimes paired with 168.975]
165.8875	ENC	Busy [New splinter frequency, nothing in my files nationwide]
165.9125	ENC	Busy [ATF simplex]
166.8750	ENC	[National Park Service in California]
166.9125	P25	Unencrypted digital heard [US Fish and Wildlife Service Nationwide]
166.9500	ENC	[US Geologic Survey in California]
167.1500	ENC	Strong at Mission Valley [Bureau of Reclamation reportedly in California and Interior/NPS in other parts of the US]
167.2250	ENC	[FBI]
167.2375	ENC	Strong at Mission Valley [FBI repartedly used in San Francisco and Sacramento]
167.3625	ENC	Busy [FBI reportedly used in Los Angeles and Sacramento]
167.3750	ENC	Busy [FBI]
167.5250	P25	Unencrypted digital heard [FBI]
167.6000	ENC	[FBI]
167.7250	ENC	[FBI]
167.7875	ENC	[FBI reportedly used in Los Angeles and Sacramento]
168.5000	P25/ENC	Suspected Border Patrol P25 [US Coast Guard Law Enforcement repeater system with inputs at 165.3125 and 164.300]
168.8250	P25	Unencrypted digital heard [INS paired with 162.875]
169.3000	P25	Transportation Security Administration repeater input at Lindbergh Field
169.6375	ENC	[New splinter frequencies, nothing in my files nationwide]
170.0625	P25/ENC	Unencrypted digital heard [New splinter frequency, nothing in my files nationwide]
170.6750	ENC	Busy [INS]
170.7500	P25	Unencrypted digital heard [US Marshal Service]
170.9125	ENC	[New splinter frequencies, nothing in my files nationwide]
171.1750	ENC	[FBI reported in San Diego]
171.2625	ENC	Busy [FBI in San Diego]
171.3375	ENC	[Transportation Department - Federal Highway Administration in California and US Coast Guard District 11]
171.4375	ENC	[New splinter frequencies, nothing in my files nationwide]
171.5125	ENC	Busy [NASA nationwide]
171.6375	ENC	[NASA nationwide]
172.0250	ENC	[National Park Service]
172.2875	ENC	[US Forest Service outside California]
172.4000	ENC	Busy [US Forest Service, Region 5]
172.5125	P25/ENC	Busy [US Department of Agriculture nationwide]
172.9000	P25	Transportation Security Administration repeater output at Lindbergh Field
173.3500	P25	Unencrypted digital heard [Nothing in my files nationwide]
173.4500	P25/ENC	Confirmed Border Patrol in P25
173.4625	ENC	[U.S. Army allocation, probably the California National Guard, see 165.0625]
173.6625	ENC	[Variety of users nationwide: NASA, VA, Air Force and Army]
173.9750	ENC	Busy [The only user I have for this one is the National Weather Service in Texas]

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IBOC and LPFM Status

Back in July I wrote a few notes about IBOC (In Band On Channel) digital radio. At the time, the original "PAC" compression scheme faced serious problems. Critical listeners heard serious compression artifacts in IBOC-FM, and even many non-critical listeners thought IBOC-AM sounded worse than analog. The whole transition went on hold.

(Data compression is necessary to make digital radio possible within the bandwidth available. To oversimplify, compression works by calculating what parts of the audio your hearing isn't sensitive to, and removing them from the bitstream.)

In mid-August, Ibiquity Digital Radio announced a new compression scheme or "codec". Engineers who've heard the new scheme say HDC works much better than the original PAC system. *Radio World* magazine reports all the IBOC receiver makers have been using programmable integrated circuit chips in their receivers, so IBOC receivers can be reprogrammed to handle the improved codec.

Radio World suggests there are still problems with IBOC-AM, though. As I'm sure most readers know, the FCC is not authorizing nighttime IBOC-AM, due to adjacent-channel interference issues. The magazine suggests the interference complaints received from adjacent-channel stations once IBOC begins deployment will put another brake on digital AM. I suppose that wouldn't surprise most DXers, either! The magazine makes mention of the European DRM shortwave digital system – though also noting that it doesn't allow simultaneous analog and digital broadcasts on the same frequency. That would be a deal-killer in the U.S..

On a vaguely related note, Ibiquity has announced KFUO-AM (850) in St. Louis has begun IBOC operation. KFUO belongs to the Lutheran Church and carries religious programs. It's one of a small number of "limited time" stations, operating from St. Louis sunrise until sunset at the Class A station on the frequency (KOA Denver). No mention is made of IBOC on KFUO-FM, a classical-music station that could probably make better use of digital!

❖ Low Power FM Settlement

National Public Radio reports FCC Chairman Michael Powell is planning on stepping up the issuance of LPFM permits. The Commission has taken some heat over excessive consolidation of media ownership, and apparently Powell feels loosening up on LPFM will allievate some of these concerns.

The primary means for speeding up the process appears to involve the opening of a settlement period for mutually-exclusive groups of LPFM applications. "Mutually-exclusive" applications are groups of applications of which any one can be granted without causing interference to existing stations, but if more than one is granted they will interfere with each other. For example, group #89 includes three applications for 97.1 MHz:

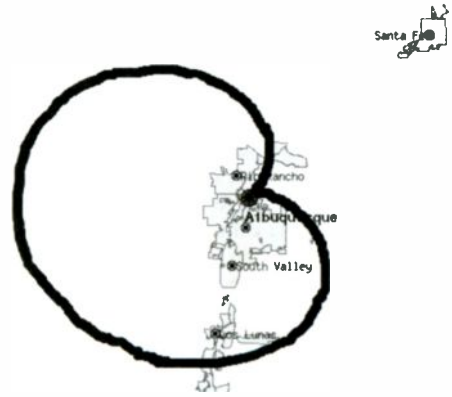
Polka Appreciation Society, Dane, Wisconsin
Lake City Church, Inc., Madison, Wisconsin
St. Raphael Educational Association, Sun Prairie, Wisconsin

There are a total of 95 such groups involving 285 applications. These applicants had until the end of October to amend their applications to eliminate the exclusivity – to make all applications in a group grantable without interference. This can be done by moving transmitters further apart – by changing frequency – or by time-sharing agreements. The FCC statement said: "This settlement opportunity could rapidly push the total number of outstanding LPFM authorizations to over one thousand by year end."

❖ Bits and Pieces

- Monte Carroll WC4MBC here in Nashville has had interesting results with a long-wire antenna. For years, he used a 300-foot long-wire pointed northwest. It worked great, but was ugly and inconvenient. So he restrung it, going 150 feet north from his 3rd-floor window to an 8-foot pole; then another 150 feet north to a 30-ft-high tree limb, then straight down to a terminating resistor and ground rod in a creek bed. It was a failure – "Lots of noise." When the antenna broke in a storm, Monte repositioned the north end over a lower limb, only about 10 feet high. It works perfectly.
- Most radio stations operate only one transmitter on a frequency at a time. KKOB-770 Albuquerque is an exception. They're required to protect WABC New York with a deep null in their directional antenna pattern. Unfortunately, the city of Santa Fe lies within that null; KKOB's main transmitter cannot be heard in Santa Fe at night. (See the map. Santa Fe is the city at the upper right.)

  So, they installed a 230-watt "synchronous" relay transmitter, also on 770, in Santa Fe. Patrick Griffith visited the relay transmitter site and confirmed the relay only operates at night. It shares a single tower with the other three Santa Fe AM stations (KSWV-810, KTRC-1260, and KVSF-1400). Santa Fe may be the only city in the U.S. to have four AM stations, none of which use directional antennas!



KKOB-770's nighttime directional pattern

- For a highly-technical but valuable education on AM propagation, take a look at Thomas Giella's "KN4LF HF/MF Radio Propagation Theory Notes" on **http://www.kn4lf.com/kn4lf8.htm**. Thomas also operates a "KN4LF 7 Day HF/MF Radio Propagation Outlook" on **http://www.kn4lf.com/kn4lf6.htm**.
- The operator of an unlicensed FM station in New York City has been fined $10,000. Rev. Yvon Louis was caught operating without a license on 93.7 MHz in November 2001. He closed the 93.7 station – only to show up again on 88.1. Upon being caught for this operation, he popped up instead on 90.1 – and then back to 88.1. Claims on Louis' part that the transmitter was a legal Part 15 operation weren't borne out by Commission measurements. Note that there are legal stations in New York on 93.9 (WNYC-FM), 89.9 (WKCR-FM), and in nearby Newark, New Jersey, on 88.3 (WBGO). If nothing else, Rev. Louis' choice of frequencies left much to be desired!
- On the legal side of things, an application has been granted to reactivate 1250 kHz in Ottawa, Ontario. This was the frequency of the Radio-Canada station CBOF until it moved to 90.7FM. The new station proposes educational and entertainment programs for children, in French. It'll use 1,000 watts daytime, 100 watts night. CJYE near Toronto (also on 1250 kHz) objected to the choice of frequency and suggested the new station use 1450 instead; pending approval by the Department of Industry the new station may indeed choose a different frequency.

Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to *dougsmith@monitoringtimes.com*. Good DX!

OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

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FM Pirate Radio Free Cascadia

During the late 1990s **Radio Free Cascadia** operated from time to time as an FM pirate on 98.5 MHz in the Eugene, Oregon, area. In March 2001 the station suffered a bust by the Federal Communications Commission. But, in September, during the conference of the World Trade Organization in Cancun, Mexico, DXers were startled to hear **Radio Free Cascadia** return to the air. This time the station was widely heard all over North America, 15,045 kHz shortwave.

Pirate and/or clandestine radio stations are commonly operated by political protesters at various World Trade Organization meetings. Although operations of **Radio Free Cascadia** ceased when the WTO meeting in Cancun ended, this piece of information is worth remembering when the next WTO conference is organized.

In the meantime, if you would like to see more about Cascadia, their mission statement remains up on the internet at the **http://www.efn.org/~radio985/statement.html** URL. Both the shortwave clandestine and FM pirate versions of this station have been opposed to capitalist corporate domination of the world's financial structure. During the special clandestine broadcast, Cascadia also mentioned other web sites, such as that of the Radio Project "Making Contact" program at **http://www.radioproject.org/** on the internet.

There was immediate speculation that the embattled **Radio for Peace International** in Costa Rica might have something to do with the Cascadia broadcast. But, despite some announcements during the transmission that they were in solidarity with RFPI, there has been no definitive proof of this. Nevertheless, given the frequency and propagation conditions, it is possible that RFPI and Cascadia had some relationship for the duration of these special clandestine broadcasts. The definitive transmitter site had not been pinned down by the deadline for this month's *Monitoring Times*, but this is often the case with ambiguous clandestine transmitter sites. Cascadia did announce an e-mail address at *rfci@riseup.net* for those who would like to send in reception reports.

❖ Arthur J. Green Found

Back in the 1920s many of the shortwave broadcasting stations in the world were, technically, pirates by modern definitions, given the fact that many nations had not yet established regulatory mechanisms for broadcasting. But, back in those chaotic pioneer days of radio, DXers were already searching for information on the stations that could be heard on the shortwave bands.

The first shortwave broadcast club in the world for DXers was the International Short Wave Club. It was founded in the Klondyke neighborhood of East Liverpool, OH, by Arthur J. Green. For several years your editor has been looking for a photo of Arthur J. Green, who was the "Bob Grove plus Glenn Hauser" of his day. Veteran DXer Jerry Berg has discovered that the February 10, 1930, edition of *Radio Design* magazine nominated Green "for the position of champion shortwave listener of the world." Green's qualifications were that he had heard 65 foreign shortwave stations. He had QSL verifications from 44 of them. Obviously there are hundreds of *MT* readers who have now exceeded Green's DXing totals of 1930.

Better yet, the issue discovered by Jerry Berg's includes a photo of Arthur J. Green. After 75 years, we need to memorialize both the pioneering work of Green's International Short Wave Club, and the pioneering journalism of *Radio Design* magazine. Without the long-forgotten work of Green and the ISWC, we would probably not be reading *Monitoring Times* magazine today.

Arthur J. Green, short-wave listener extraordinary.

More information on the history of the International Short Wave Club in Klondyke and East Liverpool, OH, is available on the shortwave section of your editor's web site, found at **http://www.nacs.net/~georgez**.

❖ What We Are Hearing

At least half of the pirates that our readers reported this month have moved down to what is starting to become a new "standard frequency" for North American pirate broadcasts. Many pirates have given up on 6955 kHz as a result of interference from Peruvian broadcast stations and utility transmissions. So, if you sit down at your receiver in an attempt to find pirates, 6925 kHz is now the place to start.

If you sent in material to us, but do not see your name acknowledged here, you were a victim of last summer's "Worm" incident.

Our readers heard all of these North American pirate broadcasters this month, despite thunderstorms and the big summer power failure. All pirates operate on a sporadic schedule, but shortwave pirate broadcasting increases noticeably on weekends and during major holiday periods.

Captain Morgan- Typical rock music and pirate advocacy format. (None, asks for reports on the Free Radio Network)

Grasscutter Radio- Rock music pirate. At times the announcer omits the "radio" part of the ID. (Uses *grasscutterradio@yahoo.com* e-mail)

Fookin Slob Net- Well, some pirate finally borrowed a pejorative term from various stations' programming and has created a new ID from it. Little is known about this one yet. (None, but may be related to WHYP)

Ironman Radio- Rock music. (Belfast)

KIPM-Alan Maxwell's elaborate existential dramas. (Elkhorn)

KPSA- New one during the late summer. Their slogan is "all PSA's, all the time," sometimes even in Morse code, but it remains to be seen if this was a one-shot effort. (unknown)

KROW- poetry and other material from the movie "Crow," apparently accounting for its call letters. (Elkhorn)

Lubavitcher Radio- This odd fundamentalist Jewish station continues to be heard from time to time by listeners on the east coast, using a medium wave frequency of 1710 kHz. (None)

Oxycontin Radio- Recreational drug advocacy. Recent shows mixed ragtime piano music in with the drug commercials. (none)

Polka Radio?- Several *MT* contributors logged an unidentified station playing polka music during the late summer. Polka Radio may have made a reappearance, but no one had a clear and definite ID. (Unclear)

Radio Cochiguaz- Cachito's South American pirate radio operations, commonly on 11430 kHz. (Santiago)

Partial India Radio- Parody of All India Radio with humor and comedy sketches. (Providence)

Purple Nucleus of Creation- Psychedelic and space music. (Elkhorn)

Radio Piraña International- Among the best heard of the South American pirates, this one is sometimes heard direct from South America, but, interestingly, it sometimes it uses Europirate relays. (Santiago)

Ragnar Radio- Rock music and pirate radio advocacy. Sometimes instigate two-way ham-radio style QSO conversations over the air with other pirates. (Uses *ragnarradio@yahoo.com* e-mail)

Shadow Radio- Mixes rock oldies and novelty music with replays of old-time radio detective dramas from "The Shadow" program. Also uses **WSDW** call letters. (Uses *the_shadow6950@hotmail.com* e-mail)

Sunshine Radio- Rock oldies format overshadowed by the odd accent in which the announcer gives station IDs, sometimes making it difficult to understand the "Sunshine" name. (None, but some replies have resulted via the *grasscutterradio@yahoo.com* e-mail address)

Sycko Radio- Not as active as earlier in 2003; eclectic formats and their own professionally produced jingles. (Still none)

Continued on page 73

SATELLITE SERVICES

MT TRANSPONDER GUIDE *www.monitoringtimes.com/mtssg.html*

All Frequencies MHz

Robert Smathers
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Americom Americom-3

Ku-Band - 87 degrees West longitude

1(H)	11720	Data Transmissions
2(V)	11740	Data Transmissions
3(H)	11760	Occasional video
4(V)	11780	Data Transmissions
5(H)	11800	Data Transmissions
6(V)	11820	Occasional video
7(H)	11840	Data Transmissions
8(V)	11860	Occasional video
9(H)	11880	Occasional video
10(V)	11900	Muslim TV Ahmadiyya – MTA International (digital)
11(H)	11920	Data Transmissions
12(V)	11940	Occasional video
13(H)	11960	CNN Newsource (digital)
14(V)	11980	Occasional video
15(H)	12000	Occasional video
16(V)	12020	Occasional video
17(H)	12040	Occasional video
18(V)	12060	The Florida Channel, Florida Knowledge Network (digital)
19(H)	12080	Louisiana Public Broadcasting (digital) / Montana PBS (digital)
20(V)	12100	Public Broadcasting Service (digital)
21(H)	12120	Public Broadcasting Service HDTV (digital)
22(V)	12140	Indiana Higher Educational Telecommunications Service (digital)
23(H)	12160	Public Broadcasting Service (digital) / Annenberg-CPB Channel (digitol)
24(V)	12180	Public Broadcasting Service (digital)

Panamsat Galaxy 11

C-Band - 91 degrees West longitude

1(H)	3720	WB 100+ Station feed (digital)
2(V)	3740	Fox Coble Networks (digital)
3(H)	3760	Black Entertainment TV (digital)
4(V)	3780	Fox Cable Networks (digital)
5(H)	3800	Fox Cable Networks (digital)
6(V)	3820	Game Show Network (VC2+) 8.06 Cable Radio Network
7(H)	3840	The Golf Channel (VC2+)
8(V)	3860	Occasional video
9(H)	3880	Ascent Media (digital) NBA TV Bloomberg TV Access TV 1 Access TV 2
10(V)	3900	Shop at Home / Shop at Home (digital)
11(H)	3920	Eternal Word Television Network (digital)
12(V)	3940	WE: Women's Entertainment (VC2+)
13(H)	3960	Comcast Media Center(digital) KTVD-TV Denver Varsity Television Ovation KJLA-TV Ventura, CA KXLA-TV Los Angeles, CA
14(V)	3980	Independent Film Channel (VC2+) 7.38 RAI Satelradio Italy
15(H)	4000	Major Broadcasting Cable (MBC) (digital) / The Word Network (digital)
16(V)	4020	Occasional video
17(H)	4040	Occasional video
18(V)	4060	Fox News Channel (VC2+)
19(H)	4080	America's Collectibles Network (digital) / National TV Liquidators (digital - occ) / Shop USA TV (digital – occ) / KLUZ-TV Albuquerque (digital)
20(V)	4100	Occasional video
21(H)	4120	Crawford Communications, TV Colombio (digital)
22(V)	4140	Fox Cable Networks (digitol)
23(H)	4160	Fox Cable Networks (digitol)
24(V)	4180	International Channel, TV5, Chinese Central TV (digital)

Panamsat Galaxy 11

Ku-Band - 91 degrees West longitude

1(H)	11720	Data Transmissions
2(V)	11740	Data Transmissions
3(H)	11760	Data Transmissions
4(V)	11780	Data Transmissions
5(H)	11800	Data Transmissions
6(V)	11820	ABC Satellite Newsgathering (digital) / Occasional video
7(H)	11840	Data Transmissions
8(V)	11860	Data Transmissions
9(H)	11880	Data Transmissions
10(V)	11900	Data Transmissions
11(H)	11920	Data Transmissions
12(V)	11940	Occasional video
13(H)	11960	ABC Satellite Newsgathering (digital) / Occasional video
14(V)	11980	ABC Satellite Newsgathering (digital) / Occasional video
15(H)	12000	ABC Satellite Newsgathering (digital) / Occasional video
16(V)	12020	Occasional video
17(H)	12040	Data Transmissions
18(V)	12060	Primedia Workplace Learning (digital)
19(H)	12080	Data Transmissions
20(V)	12100	Data Transmissions
21(H)	12120	Data Transmissions
22(V)	12140	Data Transmissions
23(H)	12160	Data Transmissions
24(V)	12180	Data Transmissions
1-EX(V)	10964	(Brazil beamed)
2-EX(H)	10976	(Brazil beamed)
3-EX(V)	10994	(Brazil beamed)
4-EX(H)	11006	(Brazil beamed)
5-EX(V)	11024	(Brazil beamed)
6-EX(H)	11036	(Brazil beamed)
7-EX(V)	11054	(Brazil beamed)
8-EX(H)	11066	(Brazil beamed)
9-EX(V)	11084	(Brazil beamed)
10-EX(H)	11096	(Brazil beamed)
11-EX(V)	11114	(Brazil beamed)
12-EX(H)	11156	(Brazil beamed)
13-EX(V)	11144	(Brazil beamed)
14-EX(H)	11156	(Brazil beamed)
15-EX(V)	11174	(Brazil beamed)
16-EX(H)	11186	(Brazil beamed)

Loral Skynet Telstar 6

C-Band - 93 degrees West longitude

1(V)	3720	TEN*Max (VC2+)
2(H)	3740	TCT Ministries (digital) / Data Transmissions
3(V)	3760	ABC Network hot-backup feed - West (LEITCH)
4(H)	3780	Occasional video
5(V)	3800	Occasional video
6(H)	3820	Occasional video
7(V)	3840	TEN*Blue Plus (VC2+)
8(H)	3860	Public Broadcasting Service Schedule X
9(V)	3880	Occasional video
10(H)	3900	Fox network feeds (digitol)
11(V)	3920	Occasional video
12(H)	3940	ABC Network hot-backup feed - East (LEITCH)
13(V)	3960	Fox network feeds (digital - occ) / 20th Century Fox syndication (analog - occ)
14(H)	3980	TEN*XTSY (VC2+)
15(V)	4000	Occasional video
16(H)	4020	Occasional video
17(V)	4040	Occasional video
18(H)	4060	Occosional video / CBS network feeds (occasional)
19(V)	4080	Occasional video / CBS network feeds (occasional)
20(H)	4100	CBS network feeds (digital)
21(V)	4120	Occasional video / CBS network feeds (occasional)
22(H)	4140	Occasional video / CBS network feeds (occasional)
23(V)	4160	CBS/UPN network feeds (digital)
24(H)	4180	Occasional video / CBS network feeds (occasional)

Loral Skynet Telstar 6

Ku-Band - 93 degrees West longitude

1(V)	11728.5	CBS Satellite Newsgathering (digital)
2(H)	11735.0	Reuters World Television Service (digital) / Data Transmissions
3(V)	11789.5	CBS Satellite Newsgathering (digital)
4(H)	11796.0	Occasional video
5(V)	11836.0	Data Transmissions
6(H)	11842.5	Old Dominion University distance learning (digital)
7(V)	11867.0	Data Transmissions / University Network – Dr. Gene Scott (digital)
8(H)	11873.5	Russian-language television services (digital)
9(V)	11898.0	Data Transmissions
10(H)	11904.5	Occasional video
11(V)	11929.0	ABC Satellite Newsgathering (digital)
12(H)	11935.5	Occasional video
13(V)	11960.0	ABC Satellite Newsgathering (digital)
14(H)	11966.5	ABC Satellite Newsgathering (digital)
15(V)	11991.0	Data Transmissions
16(H)	11997.5	Occasional video
17(V)	12022.0	Occasional video
18(H)	12028.5	Data Transmissions
19(V)	12053.0	ABC Satellite Newsgathering (digital)
20(H)	12059.5	Fox Satellite Newsgathering (digital)
21(V)	12084.0	Data Transmissions
22(H)	12090.5	Occasional video
23(V)	12115.0	Data Transmissions
24(H)	12121.5	Fox Satellite Newsgathering (digital)
25(V)	12146.0	DMX for Business (digital)
26(H)	12152.5	Data Transmissions
27(V)	12177.0	Data Transmissions
28(H)	12183.5	Data Transmissions

Panamsat Galaxy 3C

C-Band - 95 degrees West longitude

1(H)	3720	USIA Worldnet, VOA Radio, Radio Free Europe, Radio Liberty (digital)
2(V)	3740	Occasional video
3(H)	3760	Occasional video
4(V)	3780	Occasional video
5(H)	3800	Occasional video
6(V)	3820	Occasional video
7(H)	3840	Occasional video
8(V)	3860	Occasional video
9(H)	3880	Occasional video
10(V)	3900	Horse Racing (digital)
11(H)	3920	Horse Racing (digital)
12(V)	3940	Horse Rocing (digital)
13(H)	3960	Horse Racing (digital)
14(V)	3980	Horse Racing (digital)
15(H)	4000	Occasional video
16(V)	4020	Occasional video
17(H)	4040	Occasional video
18(V)	4060	Occasional video
19(H)	4080	Occasional video
20(V)	4100	Occasional video
21(H)	4120	Occasional video
22(V)	4140	Occasional video
23(H)	4160	Occasional video
24(V)	4180	Occasional video

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BeaconFinder FAQs or "Ask Kevin"

The first edition of the *BeaconFinder* was prepared in October 1998. Since then, several hundred copies have been shipped to DXers for use in identifying the stations they hear. My intent for the *'Finder* was not to replace the *Aero/Marine Beacon Guide*, (now defunct), but rather to offer an inexpensive alternative for those needing a guide focused squarely on North America and commonly logged foreign stations.

A second edition of the guide is now in print, entitled *BeaconFinder II*. (See advertisement elsewhere in this issue.) The book has been extensively revised, with a special emphasis on Canadian entries and commonly-logged Central and South American stations. Jacques d'Avignon, VE3VIA (ON) was instrumental in supplying the Canadian updates, and DX loggings/updates came from such longwave notables as Perry Crabil (VA), Dick Pearce (VT) and Al Hemmalin (RI).

Over the years, I've received several comments and questions about the guide. Experience tells me that if four people have a question, 40 more probably are wondering the same thing. The questions that follow, then, are representative samples of those I've received over the past few years. I've tried to answer each one completely, but I remain open to additional comments and will consider them for use in future editions.

Q. *In the "Location" column, why are the names of U.S. states spelled out instead of abbreviated? Isn't that a lot of extra work?*

A. Entries for the guide come from many sources, including FAA lists in the public domain, aviation databases, and hobby/personal loggings. In the case of the U.S. Aeronautical beacons, my source material already contains spelled out state names for each entry. As such, it is much simpler to leave them as they are. Sure, I could have used my computer's Search and Replace function to change them into abbreviations, but what would be the point? The process would need to be repeated 50 times – once for each state, and with the current mix of other abbreviations used in the same column (ITU Country Codes, Canadian Provinces, etc.) the state listings would not stand out as well as they currently do.

Q. *Why is the frequency listed for each station, rather than a single entry at the first occurrence, and then one entry at every increment thereafter?*

A. Again, this is primarily due to how I receive the source material for the guide. The majority of the databases I use include individual frequency entries for each listing. It would be a very time-consuming process to cull through the nearly 1,000 listings and manually edit out this information. Since they do no harm, I've chosen to leave them in place. There are usually only a handful of stations assigned to the same frequency anyway, so it is a simple matter to scan through the IDs (which are presented alphabetically) to find the station you need.

Q. *Why are Airport Designator Codes included in the guide? Of what use are they to a DXer?*

A. Beacon DXing is sometimes like detective work. You need to use every bit of information at your disposal to come up with the complete picture of an intercept. True, the designators are not useful to everyone, but they can be very helpful to the serious DXer who needs to determine a QSLing address or wants to know the closest major city to the beacon. Consider the case of FS/245 kHz, in Sioux Falls, SD. Relatively few people would know the actual name of the airport this beacon is associated with. However, armed with the Airport Designator code "FSD" we can visit a website such as **www.airnav.com/airports**, and learn that the beacon is associated with "Joe Foss Field." Using this technique, you will get more information than you ever wanted to know about an airport, including photos, runway maps, other nearby beacons, VHF frequencies, etc.

Q. *Why are some beacons listed which are not currently active?*

A. This was a judgment call. I could easily remove these listings, but sometimes a beacon will re-appear after being shut down for an extended time. I feel that as long as there is still a transmitter out there set to that frequency, it is possible that it will return to the air. Rather than remove it entirely, I have left many of these stations listed until their long-term status can be determined. Only when a beacon is confirmed as being *permanently* shut down do I consider removing it from the list.

Q. *Is price of the guide same for U.S., Canada, and Mexico? What about shipping costs?*

A. The cost of the guide is $13.95 (U.S. funds) anywhere in North America, including shipping. Although my cost for mailing is somewhat higher to Canada and Mexico, the volume of orders to those countries is typically not as great as U.S. orders, and I have chosen to absorb the increase for these destinations. For the time being, there will be no increased charge to our neighbors North or South of the U.S. border.

◆ Beacon Loggings

Our loggings this month come from Dale Parfitt, W4OP (NC). Dale enjoys exploring the entire radio spectrum and is now active from longwave to 1296 MHz. At the upper end of this range, he has even bounced signals off the moon (EME)! Dale is founder and President of Par Electronics (**www.parelectronics.com**) where he designs many types of antennas and other interesting products for hams and monitors alike. Welcome aboard, Dale. We look forward to hearing from you often.

Freq.	ID	Location
198	DIW	Dixon, NC
206	GLS	Galveston, TX
216	CLB	Wilmington, NC
223	AZW	Mount Airy, NC
248	FRT	Spartanburg, SC
257	CEU	Clemson, SC
323	OUK	Jasper, TN
326	UOT	Union, SC
327	ZEF	Elkin, NC
329	CH	Charleston, SC
335	MK	Marion, VA
338	GY	Greenville, SC
344	RFE	Rutherford, NC
345	VU	Albermerle, NC
350	LE	Raleigh, NC
353	JUK	Brunswick, GA
361	MNV	Madisonville, TN
379	BRA	Asheville, NC
379	TL	Tallahassee, FL
382	APT	Jasper, TN
386	EMR	Emory, GA
388	MAO	Marion, SC
391	FIQ	Morganton, NC
400	UWI	Dalton, GA
402	BPO	Oneida, TN
410	JU	W. Jefferson, NC
417	SLP	Shelby, NC
426	FTP	Ft. Payne, AL
430	IKY	Springfield, KY
433	IZN	Lincolnton, NC
437	IIY	Washington, GA

Have a great Thanksgiving, and best LW DX!

T.J. "Skip" Arey, N2EI
tjarey@monitoringtimes.com

Uncle Skip's Holiday List

You may have noticed that it seems like they start the holiday shopping season earlier and earlier. When I was a mere tad, the Christmas shopping crunch was signaled by Santa Claus climbing the steps at Macy's on Thanksgiving Day at the close of the annual parade. Now it seems the holiday tinsel and trimmings encroach on the Halloween pumpkins and masks. I expect some day not too far in the future we'll see Christmas ornaments sitting on the shelves next to the "Back to School" merchandise. So it goes.

Anyway, this being the November column and in a few short weeks Ole' Saint Nick will in fact be heading into Macy's, I thought it would be prudent to give all you hams a few thoughts about really nice gifts you may want to suggest to your significant other. After all, you've been exceptionally good this year, haven't you? And if you have been really, really, really good, the first item on Ole' Uncle Skip's list to Ole' Saint Nick will be right up your alley.

The Ten-Tec Orion
$3300 ($3599 w/ autotuner)
Ten-Tec
1185 Dolly Parton Parkway
Sevierville, TN 37862
1-800-833-7373
http://www.tentec.com

If you are an HF band ham and you aren't licking your chops over this radio, there can only be two possibilities. 1) You already own one (you lucky devil) or 2) You have gone *Silent Key*! The Orion is correctly described in its sales brochure as an "Ultra High-End HF Transceiver." This is a truly no-compromise rig utilizing the most up-to-date receiver technology available. Utilizing dual 32 bit DSP processors, low phase noise synthesizer as well as Ten-Tec's trademark Crystal filtering, the dual receivers in this unit deliver noise reduction characteristics that put it at the top to the charts.

In addition to the incredible receiver dynamic range and brick wall filtering, the unit makes use of "Panoramic Stereo"™ that allows the user to pick out signals in a pile-up with ease.

The Orion is no slouch in the transmitting department, either, offering 18 transmitter bandwidths through to a maximum of 3.9 kHz. It also offers transmit audio equalization.

The back panel sounds like a scene from Noah's Ark. Two of everything. Two antenna connections, two data connections, two amplifier keying lines all running out of a rig that has two receivers, two DSP units and two noise blankers.

On the front you get more buttons than your fingers can handle along with a large screen display that includes real time spectrum analysis in 5 bandwidths.

One of the two receivers is General Coverage, reminiscent of the Ten-Tec Paragon. The Orion is destined to be this latest generation's equivalent of that fine old rig.

The unit is backed by Ten-Tec's historic technical service and support including free Flash-ROM updates to bring your rig up to the latest operating version.

Like all of Ten-Tec's transceivers, there is a complete line of accessories including the Heil/Ten-Tec Studio One Microphone that takes full advantage of this unit's transmit audio controls.

Once you go over the specs you will be convinced that this radio could win a DX contest without even being taken out of the box! I'd sure love to find one under my tree.

The Yaesu VX-2R
$229.00
Vertex Standard
10900 Walker Street
Cypress, CA 90630
(714) 827-7600
http://www.vxstdusa.com

The VX-2R is billed as the "World's Smallest Dual-Band HT with a Wide-Band Receiver" and at a mere 1.9" x 3.2" x 0.9" and weighing in at less than 0.3 pounds I would have to take their word for it. To get all the features of this little gem I currently have to carry three more or less standard-sized "talkies" with a total weight of over 2 pounds. They get the job done, but I really worry that one of these days my pants are going to fall down!

When powered by the unit's internal 3.7 volt Lithium-Ion battery pack, the rig puts out 1.5 watts on 2 meters and 1 watt on 70 centimeters. More than enough for most local repeater work. Need a little more oomph? Supply the unit with an external 6 volts and you're up to 3 watts on 2 meters and 2 watts on 70 centimeters. Either power level is enough to drive most "brick" amplifiers designed for mobile or home use.

The feature that really gets me excited about this rig, given my weakness for DC to Daylight monitoring, is the Wide Band Receiver. Covering AM broadcast, HF Shortwave, FM Broadcast VHF/UHF up to 729 MHz (including Marine, Air & NOAA Weather) and 800 – 960 MHz (sadly cellular blocked). There is lots of good stuff to listen to when not talking on the other two bands.

The rig features the latest WIRES™ Internet Linking technology as well as a 9 memory DTMF autodialer. And, while we are talking about memories, the unit has the capacity to manage one thousand memory channels in 20 memory groups. More than enough to set the rig up for a variety of uses. The unit also has full CTSS/DCS encoding and decoding capability.

Even though it is diminutive in size, the VX-2R is built like a tank. The chassis is diecast metal.

I've been using the Yaesu R2 wide band receiver for a number of years now. It has more or less the same *form factor* as the VX-2R. I find that there is a small learning curve because of the multiple use controls, but once you get the hang of things the radio is a lot of fun to have in the shack. I expect the same will be said of the VX-2R. So if Santa were to see his way clear to leave a VX-2R in my stocking I'd be one happy radio puppy.

The Elecraft KX1 Ultra-Portable CW Transceiver Kit
Base Price $ 279.00
Elecraft
PO Box 69
Aptos, CA 95001
(831) 662-8345
http://www.elecraft.com

You folks have heard me rave about Elecraft rigs for a number of years now. I have built both the K2, which I use as my primary home station and the K1 which I use for portable use. Both rigs offer superior performance along with the fun of building professional quality gear with your own hands.

Well, for this holiday season the folks at Elecraft have produced a perfect stocking stuffer – the KX1 – A diminutive rig designed with the need of the backpacker in mind. It's enough to get me to blow the dust off my "Alice" pack and head for the trails.

The KX1 is just 1.2" x 3" x 5.3", but in that small package is packed a superhet receiver with variable passband crystal filtering, RIT, S-meter,

digital readout, memory keyer, voltage monitoring and 1 to 4 watt transmitter output. The unit's DDS VFO has three tuning rates and covers the entire ham portion of both 20 and 40 meters with receive only coverage of nearby SWL segments. 30 Meters can be added as an option. If that isn't enough crammed into such a small space, you can even add automatic antenna tuning as an additional option.

The KX1 is designed to be extremely miserly in the power consumption department, drawing a nominal 34 mA on receive. Casual operation runs between 20 and 30 hours from the internal battery pack (yes, they cram the batteries in the case as well.)

The KX1 is designed around a single printed circuit board and all end-user-installed parts are traditional "through-hole" components. Alignment can be performed with just a digital multi-meter and off the air signals.

Another option is a custom designed paddle that attaches right to the KX1.

As with all Elecraft designs, you get a well illustrated assembly manual that allows the unit to be built and tested in discrete sections. The KX1 Manual (as well as all other Elecraft product manuals) can be viewed on the Elecraft web site. You also get Elecraft's incredible customer support via telephone and Internet. And don't forget the very active Elecraft on-line user group. When you build a "K" box, you become part of a family.

I must confess...I don't *need* a KX1. But given the fun I had building my other Elecraft rigs, I expect if one doesn't show up under my Christmas tree I'll be ordering one anyway before Groundhog's Day!

The PowerPort GearHarness
$36.95
Cutting Edge Enterprises
130 Anacapa Circle
San Luis Obispo, CA 93405
1-800-206-0115
http://www.powerportstore.com

Something I do need is a way to keep my radios sorted out when I am operating in a *Tactical* environment. I may not even wait for the holiday gift giving season to get my hands on this next item.

I've become a rather rabid bicyclist in recent years. I ride over 100 miles per week and I participate in long distance rallies and bike-a thons. I also like to get out in the woods on my mountain bike as well. I also like to play radio while I do all this pedaling. I have been searching for a convenient way to carry a couple of handheld rigs and a few accessories. (Maybe even that KX1 if Santa is reading this article). The PowerPort line of products are made for just such uses and the GearHarness is perfect for anyone who plays radio and need to have their hands free.

The harness has three pockets just right for many portable and handheld rigs. One is in the back and would be perfect for a radio with a speaker mic. The other two are in the front for quicker access. There are two additional vertical pockets that can hold spare antennas and glowsticks. One large zippered pocket runs the entire width of the front of the harness allowing stowage of maps, manuals, notepads, writing implements, etc.

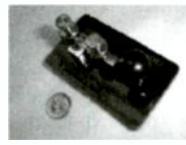
The harness also has a good number of connecting points for microphones and other "clip-on" accessories.

All this carrying capability is made with a heavy duty nylon exterior with foam padding and a mesh back for improved ventilation. Perfect for the bike riding (or hiking, or ARES/RACES) ham.

The Code Mite
$59.95
The Vibroplex Co., Inc.
11 E. Midtown Park, Mobile, AL 36606
1-800-840-8873
http://www.vibroplex.com

As most of you have probably figured out by now, I am a fairly dedicated CW operator. Part of the joy of being a code mode op is playing with various keys. Vibroplex is a time honored brand name in the telegraphy world. When they come out with a new product, CW oriented hams take notice. Just in time for the holiday season comes the Code Mite.

I must confess I'm a bit of a sucker for teensy weensy keys. When I use one to operate I get a Walter Mitty image of being a secret agent sending important information from behind enemy lines. Vibroplex feeds this fantasy with their latest offering, the Code Mite. This simple but sturdy straight key sits on a 3-inch x 1.5-inch engraved, black plastic base. The key has all chromed upper parts with a black knob. The total weight is only 2.6 ounces. And just think of it: when you're not using it you can add it as a decoration on your Christmas tree!



Well, that's about it for my "dream" shopping list this year. Maybe we can all ask Santa to send the three Christmas Ghosts to FCC Director Powell so he will wake up on Christmas morning with no thoughts of BPL. Have fun. I'll see you on the bottom end of 40 meters.

UNCLE SKIP'S CONTEST CORNER

ARRL Sweepstakes Contest (CW)
2100 UTC, Nov 1-0300 UTC, Nov 3

North American Collegiate ARC Championship (CW)
2100 UTC, Nov 1-0300 UTC, Nov 3

QRP ARCI Running of the QRP Bulls
2100 UTC, Nov 1-0300 UTC, Nov 3

Japan Int. DX Contest (Phone)
0700 UTC, Nov 8-1300 UTC, Nov 9

ARRL Sweepstakes Contest (Phone)
2100 UTC, Nov 15-0300 UTC, Nov 17

North American Collegiate ARC Championship (Phone)
2100 UTC, Nov 15-0300 UTC, Nov 17

RSGB 1.8 MHUTC Contest (CW)
2100 UTC, Nov 15-0100 UTC, Nov 16

CQ Worldwide DX Contest (CW)
0000 UTC, Nov 29-2400 UTC, Nov 30

Outer Limits continued from page 69

Undercover Radio- Dr. Benway's pirate advocacy and comedy format. (Merlin)
VUDU- Sometimes IDs as Voodoo Radio; rock music format. (Elkhorn)
WHYP- Takeoff on genuine licensed WHYP in North East, PA. Mixes pirate humor with outdated weather reports for the Cleveland, Erie, and Buffalo areas. Sometimes relays United Patriot Militia Bingo, the **KSMR** parody of Steve Anderson. (Providence)
WMFQ- Using slogan of "Where's my (censored) QSL?" this rock music pirate promotes the verification process, just like Arthur J. Green did many decades ago. (Providence)
WMPR- The "dance party" beat of "Micropower Radio" is fairly easy to recognize, even before the IDs. (Still none, but occasionally QSLs loggings in *The ACE*)

◆ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations. Addresses, identified above in parentheses: PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 69, Elkhorn, NE 68022; PO Box 293, Merlin, Ontario N0P 1W0; c/o AMPB, PMB22, 2018 Shaddik Avenue, Berkley, CA 94704; and Box 159, Santiago 14, Chile.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. Try *The ACE* ($2 US for sample copies via the Belfast address above) and the e-mailed *Free Radio Weekly* newsletter, still free to contributors via *niel@ican.net*. The Free Radio Network web site, another outstanding source of content about pirate radio, is found at **http://www.frn.net** on the internet.

◆ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: John T. Arthur, Belfast, NY; Dave Balint, Wooster, OH; Kirk Baxter, North Canton, OH; Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; Cachito, Santiago, Chile; John Calabro, Melrose, MA; Ross Comeau, Andover, MA; Harold Cones, Newport News, VA; Rich D'Angelo, Wyomissing, PA; Brian Duddy, Nyack, NY; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; William Hassig, Mount Prospect, IL; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Bill McClintock, Wellington, OH; Mark Mohrmann, Coventry, VT; Mike Prindle, New Suffolk, NY; Lee Reynolds, Lempster, NH; Robert Ross, London, Ontario; Martin Schoech, Merseburg, Germany; John Sedlacek, Omaha, NE; Ed Walsh, AL; Brian Williams, Taos, NM; Niel Wolfish, Toronto, Ontario; and Joe Wood, Gray, TN.

Antenna Designer
New Version 2.1 for Microsoft Windows 95 and 98
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CA residents add 8.5%
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Send check or money order to:
Small Planet Systems
623 Mangels Avenue
San Francisco, CA 94127
www.smallplanetsystems.com 415-337-9394

Clem Small, KR6A
clemsmall@monitoringtimes.com

A Useful, Easy to Make, Inexpensive Antenna

The random-length antenna is one of the simplest to make, easiest to erect, and least expensive antennas around. It is also a good performer for general use in radio monitoring. It's a favorite of mine, and when space allows I always put a long one up each time I move to a new QTH. In use, it almost always compares favorably with other antennas I erect. If I had to choose just one inexpensive antenna for general, all-purpose monitoring, I think that a long, random-length antenna mounted high and in the clear would certainly be a strong contender for that choice.

Random-length antennas are most often found on the HF band and lower frequencies. However, they are also useful on VHF and higher frequencies. At the higher frequencies open-wire feed line radiation, losses due to poor-quality coax, and balun bandwidth limitations can be problems. If the feed line is good quality then random-length antennas cut for HF will often perform well on VHF, too.

❖ How Long is Long?

Long random-length antennas are sometimes called "long-wire" antennas. But strictly speaking, long-wire antennas are cut for resonance at particular frequencies and random-length antennas are cut to whatever length best fits the location where they will be mounted. Yet random-length antennas will generally give decent reception on whatever frequency you want to monitor.

By definition, random-length antennas can be any length. At some locations a length of five or six feet may work reasonably well for general monitoring on HF, and even on lower frequencies. On the other hand, when received-noise levels are low, a longer antenna may well give better weak-signal results. As a general rule a random-length antenna for HF or lower frequency should be made as long as is convenient.

As explained above, random-length antennas are usually cut to fit available space, not to a resonant length for a particular frequency. However, it's useful to understand that practical random-length antennas a half wavelength or less in length at the frequency being received are relatively non-directional with shallow nulls off the ends.

As an antenna's length increases beyond a half wavelength, then more pronounced lobes (directions of maximum response) and more nulls (directions of minimum response) are formed in the antenna's radiation and reception (R&R) pattern. The more half wavelengths the antenna's length includes, the more lobes and nulls it will have. As its length increases progressively beyond one wavelength, the antenna progressively becomes a bi-directional beam with maximum response moving toward both ends. This also gives lower vertical angles in the R&R pattern. Both these directional characteristics are good for DX work.

The equations below yield approximations of the physical length of a wire antenna needed for an antenna of a specific number of wavelengths when operating at a specific frequency.

$$L_{(ft)} = 984(N-.025)/F$$

$$L_{(m)} = 300(N-.025)/F$$

Here L is the length of the antenna in feet or meters, N is the number of wavelengths desired, and F is the specific frequency (in MHz) utilized. For instance, at 10 MHz an antenna one wavelength long would be: L = 984 (1-.025)/10, or about 96 ft in length.

❖ A Bonus: Free Diversity Reception!

The longer any antenna is, the more it is likely to show "space diversity" performance. The area covered by a ray of incoming signals may wander around somewhat over time. This can cause signal fading. The more space an antenna covers, the more likely it is that some portion of the antenna will remain in the path of a wandering signal.

❖ Let's Make One

Fig. 1 shows some random-length antennas. Any wire that will take the strain is okay to use. Stranded or copperweld antenna wire is designed to stand up to strains and hard use. Solid copper house-wiring wire will work, but tends to break more easily than antenna wire.

At least two insulators are needed as shown. For longer antennas extra insulators may be tied from supports along the antenna's length to keep the antenna from sagging excessively. I have had good results with random-length antennas a couple of hundred feet long made by draping insulated wire across tree tops. In these, the only insulation, except at the ends, was the insulation covering the wire.

Make your antenna as long, high, and in the clear as is practical. Never run it over or under a power line. Don't forget lightning-induced damage protection: the minimum is to disconnect and ground the antenna when it is not in use, and never use it when weather is likely to produce lightning.

Feed Lines and Matching

The relatively high received-noise level generally determines quality of reception on HF and on lower frequencies. Thus it may not matter whether you attempt to match antenna's feed point impedance to the impedance of your receiver's antenna input circuit at these frequencies. At VHF and higher frequencies received-noise levels are generally relatively low, and at these frequencies matching becomes more im-

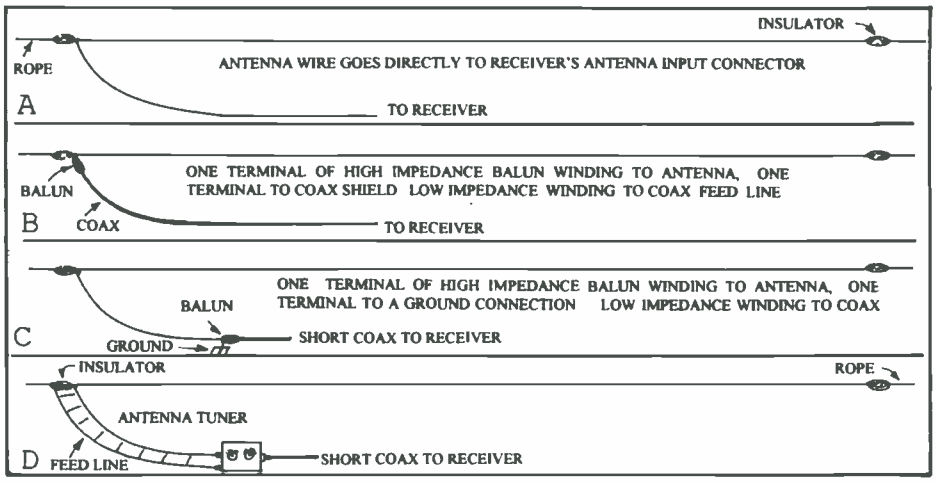

Fig. 1. Random-length antennas connected to their receivers with no matching (A), with a balun up at the antenna; coax feed line (B), with a balun near the receiver (C), with an antenna tuner near the receiver (D).

This Month's Interesting Antenna-Related Web site:

A site discussing a balun's use and effectiveness: **http://www.iserv.net/~n8kdv/xfmr.htm**. Some sources of baluns for random-length antennas are:
http://www.winradio.com/home/lwa.htm
http://www.universal-radio.com/catalog/sw_ant/1484.html
http://www.palomar-engineers.com/MLB-1/mlb-1.html

portant for weak-signal reception. Some rural and remote locations have little man-made electrical noise. Locations very far from the equator with its frequent lightning may also have little received-noise. In such locations matching may improve weak-signal reception even into the HF band.

If you are using an old, tube-type receiver which utilizes an antenna-input terminal with screws for attaching the antenna-input wire, then your receiver antenna-input circuit impedance is probably 300-ohms. In this case, HF and lower reception may not profit from further matching. If your receiver's antenna-input connection is a coaxial-cable socket then the input impedance is probably 50 ohms, and matching is more likely to improve reception.

Examples of ways to connect baluns and antenna tuners are given in fig. 1. When the antenna wire itself leads up to the receiver, excessive received electrical noise from household appliances may result. Using coax feed line as a lead-in through the noisy area often reduces this noise.

Baluns should have at least a 4:1 impedance ratio, or preferably higher. Baluns need no tuning; however, antenna tuners must be retuned when sizable frequency changes are made. An antenna tuner can yield a more precise match, but for reception at HF and lower frequencies such precision is usually unnecessary.

For Transmitting

If a random length antenna is used for transmitting, it is most likely that matching between line and transmitter will be needed. And, unless high-impedance feed line (twin lead, ladder line, open-wire line) is used, matching between antenna and feed line is likely to improve antenna-system efficiency. If coax is used make sure it's good quality.

RADIO RIDDLES

Last Month:

I said: "Okay, so a mismatched antenna on a feed line causes some portion of the RF energy arriving from the transmitter to reflect back down the line. And a matched antenna accepts all the energy from the line. What would happen if the end of the feed line were connected to nothing? Would the RF energy coming down the line just fly out the open end, and launch itself as a radio wave?"

Well, actually very little RF would escape from the open end of an ordinary feed line. The impedance of the space at the end of the line is not a good match for the line's impedance, and so there would be a mismatch at that junction. The RF energy coming down the line would be reflected back from the mismatch. On the other hand, if the end of the line was shaped like a funnel with the large part at the line's open end, and if the funnel's dimensions were a significant part of a wavelength in size then there would be more radiation.

Such funnel-shaped cone construction is sometimes used to launch RF from coax onto a single wire. The single wire then makes an inexpensive, relatively low-loss transmission line for long runs. And opening a waveguide into a funnel-shaped cone of appropriate dimensions is one way of making UHF and microwave beam antennas.

Now consider open-wire or twinlead feed line. Let's progressively separate and spread the last quarter wavelength of the two wires that comprise the line to form a "Y" shape. This improves the match between line and space at the Y's "mouth." More RF is radiated now than when the line was intact. As these quarter-wavelength wires are opened out even more, then even more of the RF energy coming down the line is radiated. When the wires are opened so far that they are perpendicular to the feed line, then radiation is maximum (if the line is 72-ohm impedance). And now those two quarter wavelength portions of the line have evolved into our old friend, the halfwave dipole!

This Month:

What is the "HCL" antenna? Want a not very-helpful hint? OK, it's also called the "hydrochloric acid antenna."

You'll find another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

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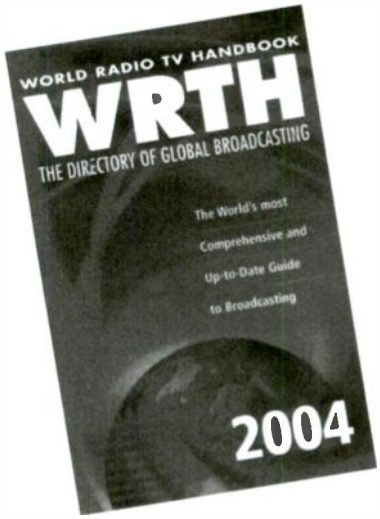

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Marc Ellis
marcellis@monitoringtimes.com

Recapping and De-Modifying the S-40A

Last month I wasn't able to spend a lot of time on our ongoing S-40A restoration, but did manage to complete the physical and mechanical work and reassemble the set. Now it was time to turn the chassis upside down and begin work on the wiring.

Normally this consists mainly of changing out all of the radio's paper and electrolytic capacitors – replacing each with a new one of the proper electrical specifications. However, this receiver presented a slightly more difficult problem. (Incidentally, I won't dwell here on the issues associated with choosing replacement caps because I've gone into them, in some detail, during two or three of the projects already chronicled in this column. The last one being the Zenith "black dial" radio completed just prior to this restoration.)

❖ A Twice-Traumatized Radio

I had already noted during an earlier inspection that the S-40A's power transformer had been replaced. At the time it looked as if the new unit was operating properly and conformed to original specifications, so I decided to leave it alone. Since all sections of the original filter capacitor were still wired into the circuit, it had apparently not been responsible for the short that carried off the transformer. There had most assuredly been a short, though, as was evidenced by the obvious discoloration of a couple of the power resistors in the receiver's filter circuitry.

Depending on what component had shorted out (probably a bypass capacitor), there might well be other, hidden, damage that would turn up later. As evidence, I remembered that I had earlier found two weak tubes (a rarer occurrence than you might think in radios of this era) as well as a couple more that were okay but definitely not original with the set.

A look under the chassis after completion of the recapping and "de-modifying." Power transformer is at lower right.

Besides the severe short-circuit damage suffered by the radio, it also showed signs of another type of trauma: modifications and "repairs" by a person with a limited technical background and/or very little respect for the set. Crudely-wired circuit changes were visible in several places. Though some of the paper capacitors had been neatly replaced with high-quality Sprague "Orange Drops," several others had been partially disconnected for testing but never hooked up again. I'd guess that the Sprague guy was not the person who left the other caps disconnected, and that the latter had obviously tried to trouble-shoot the radio and given up in disgust.

I decided to go through the S-40A methodically, starting with the r.f. stage at the front end and progressing through to the audio output tube. Each stage would be checked against the schematic as I replaced its paper and/or electrolytic capacitors. That way I would be able to catch and reverse any modifications made by the previous "technician" and make sure that the new caps replacing the half-disconnected ones were connected to the proper circuit points.

❖ Butchered "S"-Meter socket

The first anomaly I ran into was in the wiring of the socket for the accessory "S" meter. This 5-pin socket is supposed to have connections to ground, filament voltage (for "s"-meter illumination), B-plus, and the receiver's a.v.c. line. The ground had been cut, as had the lead to the a.v.c. line. In fact, the socket lug to which the a.v.c. lead should have been connected was missing entirely.

A new lead, connected to an unused lug on the socket, had been tack-soldered, via a resistor, to a location somewhere in the first audio stage. As it snaked its way under the chassis between the two points, it looped into and out of the bottom of one of the i.f. cans – as if to pick up some r.f. energy there. The purpose of this wire is known only to the previous owner. But since there had been an extra lug for it available on the "s"-meter socket, one has to wonder why the lead from the a.v.c. line had to be disconnected. (Some of you may remember a similarly crazy wire, removed earlier in the project, that had been coiled inside the b.f.o. transformer).

Replacement "s"-meter plug, now installed with screws instead of rivets, is at upper right. Cluster of three electrolytic caps on the new terminal strip is at lower left.

I wanted to restore the "s"-meter socket wiring to its stock configuration, and when I located and untaped the end of the disconnected a.v.c.-line wire, I found out why its connection lug was missing. Some of it was still soldered to the wire, apparently having been cut off as a convenient way of removing it from the socket! I share this with you so that you will not be surprised, or feel compelled to understand, any madness you may uncover in your own restoration projects.

I disconnected the mutilated socket, drilled out its mounting rivets, and replaced it with a new 5-pin socket. Then I was able to restore the wiring as indicated on the schematic. It gave me great pleasure to accomplish this and, especially, to remove the crazy jury-rigged extra connection.

❖ Other Parts Substitutions

As I went through the stages of the radio, I spot-checked the values of the various resistors. These were generally okay, except for three of the four power resistors mentioned earlier, whose discolored appearance suggested that they had been overloaded. The resistances of two of them had dwindled to one-third and one-half of their specified values, respectively. The third was completely open. I had suitable replacements for these on hand and wired them in. I'm thinking that these seriously out-of-spec resistors could have been responsible for significantly increased plate currents that might well account for the weak and replaced tubes found in the set.

I almost missed a broken quarter-watt 15 megohm resistor in the first audio stage. Only half of it was still there. Luckily I had a replacement for this odd value in my resistor drawer. Its leads were less than a half-inch long (I save everything!) but I was still able to install it.

I disconnected the leads to the 3-section can-type electrolytic capacitor, leaving it in place to preserve the radio's original appearance above the chassis. A long terminal strip was installed under the chassis by soldering its

mounting lug to one of the disconnected capacitor's mounting "feet." That lug also served as a convenient ground point for the three individual electrolytics that were installed on the strip to replace the units in the can. Some of the leads that had been connected to the original electrolytic wouldn't reach their new locations on the terminal strip and I had to substitute longer ones.

◆ Transformer Surprise

The last haywired item in the radio was the "standby-receive" switch. The switch, definitely not an original one, was not connected to the set's wiring. Instead, a length of zip cord had been attached to it. The free end was cut off and I have no idea how it was originally hooked up.

I removed a proper switch from my S-40 parts set and checked the schematic to see how it should be wired. No problem: it was to be connected in between the center tap of the transformer's high-voltage winding and ground. I assumed that, for some inscrutable reason, the previous owner had bypassed the switch by connecting the center tap directly to ground.

I attached a couple of long leads to the switch, installed it on the panel, and went looking for that center tap. Guess what – it wasn't there! I had checked the transformer voltages before beginning the restoration project, and am sure I found the expected voltage across the high-voltage winding and fifty percent of it between each end of the winding and ground.

Perhaps there was, somehow, an internal connection from the transformer's center tap to ground. If so, the "standby-receive" switch could not be hooked up in the normal manner. And that certainly explains why it had been disconnected.

Continuing to test the transformer in place, I found that there was continuity between the high-voltage winding and the 6.3-volt filament winding. A short circuit? Or was one end of that winding internally connected to the center tap? Both points are usually grounded, so this might have been some kind of manufacturing shortcut.

In any case, the setup was a little too peculiar for my taste. I decided to remove the replacement transformer and put in an original one from that indispensable parts set of mine. Of course I checked it out *thoroughly* in advance. I didn't want any unpleasant surprises this time!

Here's a look at the parts removed to complete the restoration—including paper and electrolytic caps, power resistors, power transformer, butchered "s"-meter socket, and various strange haywired items.

Even though the chassis opening had been made wider to accept the slightly larger replacement transformer, the original-design transformer still fit pretty well. It almost covered the enlarged opening so that it was hardly noticeable from above the chassis. I was also able to use the original mounting bolts by utilizing flat washers to help them get a grip on what was left of their matching holes.

That accomplished, I wired up the transformer and the 'standby-receive" switch, and also re-installed the headphone jack (which would have blocked access to the switch had I replaced it earlier). Finally, I needed a new line cord. Like most early zip cord, the original had badly deteriorated. But amazingly, the period line cord from the parts set – itself a rusted hulk – was perfect and supple. I quickly removed it and hooked it up in my project set.

At last, the receiver was ready to try out. I have to admit that I felt a certain sense of satisfaction as I looked over my work. The job had been a little grueling at times, and the very convoluted Hallicrafters schematic hadn't made it much easier. But, through my efforts, the electronics were now in essentially stock condition, with all of the nutty modifications removed.

◆ The "Smoke Test"

Now I was ready to power up the radio for a "smoke test."

As always, I ran it first without the rectifier tube, just to check the filament circuits and the high-voltage wiring without applying plate voltage. After that, I plugged in the tube and crossed my fingers. A meter had been clipped across the B-plus line to make sure it was not shorted and the expected voltage was present.

My expectations were low, considering the traumas to which this abused radio had been subjected. However, I was very pleased to find the set picking up stations all over the broadcast band. The bad news was that reception was nil on any of the other three bands. I didn't even hear the usual rush of atmospheric noise.

We'll work on that next time. I have a feeling that we may be dealing with a lack of gain in the i.f. channel. It may have been misaligned by the late, unlamented owner of the set. Or perhaps one of the i.f. transformers went south in the original trauma.

I also noticed that the b.f.o. was not functioning. This didn't surprise me a bit, since the crazy coil of hookup wire that had been stuffed inside the b.f.o. transformer suggested some kind of attempt at a fix. Before calling it a day on this work session, I rechecked the wiring associated with the b.f.o. circuit to see if I had missed something.

I had indeed. A tiny capacitor intended to couple the output of the beat frequency oscillator to the detector plates of the 6SQ7 first audio amplifier was missing. This was identified on the parts list as a "gimmick" capacitor – just a couple of pieces of hookup wire twisted together. I finally found the lead coming from the oscillator. It was cut off near the 6SQ7 socket – but the "gimmick" was nowhere to be seen. We'll attend to that next time.

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http://www.parnass.org

Aceco FC2002 Frequency Counter

The Aceco FC2002 is a handheld, wide range frequency counter which is useful both for finding nearby transmitters and as a general purpose counter on the test equipment bench.

Aceco Electronics Corporation (http://www.aceco.com.tw) builds the FC2002 in Taiwan. The company specializes in manufacturing handheld frequency counters that wear other brand names around the world, e.g., MFJ, Elenco, and GW. For instance, Aceco makes the MFJ-886 frequency counter, a less sophisticated model (February 2002 *MT*).

Hamtronics, Inc. of Hilton, NY, was kind enough to lend me this FC2002 for review. The Hamtronics name is familiar to scannists who have been in the hobby for many years. In the 1980s, Hamtronics manufactured a series of military air and 800 MHz band frequency converters for scanners. Today, Hamtronics manufactures several kits, including receivers, transmitters, and other accessories.

◆ Features

The FC2002 is capable of counting audio and radio frequency signals between 10 Hz and 3000 MHz. That's a wider frequency range than the MFJ886, which has a lower limit of 1 MHz.

A top mounted BNC jack conducts RF signals to the counting circuitry. An internal prescaler circuit serves as a frequency range "extender" and a 2-position slide switch sets the frequency range. The lower frequency range is applied directly to the low frequency counting circuitry and the higher frequency range applies the RF signal to the prescaler, which divides the frequency by a fixed amount for measurement by the low frequency circuitry.

The Range switch is marked 300 MHz and 3 GHz. The 3 GHz position is for use between 10 MHz and 3 GHz and scannists should use the 3 GHz position when sniffing for transmitters.

A Gate key lets you choose among four gate times: 0.0625, 0.25, 1, and 4 seconds. The longer the gate time, the longer you must wait before the 10 digit LCD display is updated with the current frequency. A red LED located near the upper right corner of the display blinks each time the gate closes. Longer gate times permit the frequency to be displayed with higher resolution, i.e., more digits (see specifications table).

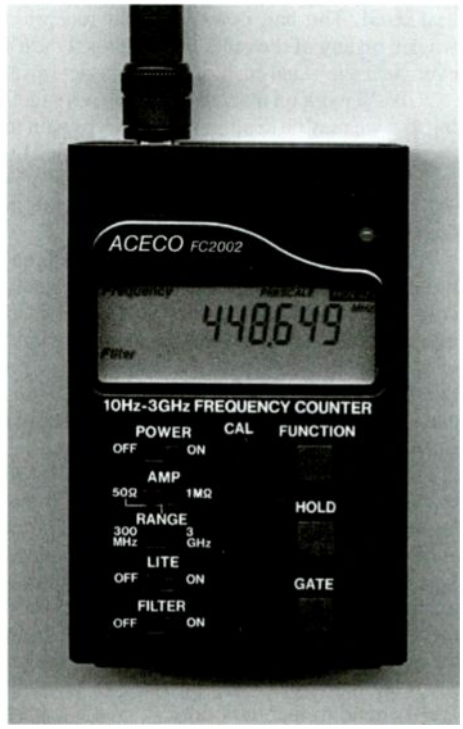
You don't need much precision, perhaps 1 kHz, for transmitter hunting. The higher precision capability is suitable for other applications, such as radio alignment.

In addition to frequency, the FC2002 can measure period, which is useful primarily for measuring very low frequency signals. Period is the reciprocal of frequency. For example, a 1200 Hz signal has a period of approximately .0008333 seconds (1/1200), which is 833.3 microseconds.

One advantage to measuring period instead of frequency is better resolution. For example, the highest resolution displayed for a 1200 Hz signal in frequency mode is 0.0012000 MHz. You must use a gate time setting of 4 seconds to obtain that resolution so the display is only updated every 4 seconds. By contrast, the period mode display shows 833.3333333 microsecond (µs) regardless of gate time.

The FC2002 provides selection of two different input impedances, 50 ohm and 1 megohm. Scannists would usually choose the 50 ohm input, which is restricted for use above 1 MHz.

The 1 megohm position should be employed when connecting the FC2002 to the circuit being measured. In this case, you would use a cable or probe instead of the telescoping antenna. The high impedance helps prevent the counter from "loading down" or drawing current from the circuit under test, which would interfere with the circuit's operation. The high impedance position is restricted to measurements below 50 MHz.



The FC2002 provides a "capture" feature to freeze the display when a signal is detected. This works for measuring either frequency or period. When armed in capture mode, the counter emits a beep and the display is updated each time a new signal is detected. The capture facility, a signal activated latch, frees you from having to keep your gaze on the display and watch for a signal. This is a major advantage of the FC2002 over the MFJ-886.

In addition to the capture mode, the FC2002 also provides a Hold key which freezes the frequency display reading when pressed.

◆ What You Get

The FC2002 counter is powered by an internal 600 mAH NiCd battery pack. The included 9 VDC 300 mA wall wart power supply plugs into a jack atop the counter and can recharge the batteries in 12 to 16 hours.

The LCD display shows the frequency using digits 5/16-inch tall. It is easy to read in daylight and illuminated for night viewing. A bar graph portrays relative signal strength.

We are impressed with the 24-inch black telescoping antenna included with the counter. The same antenna is furnished with the MFJ-886. A rubber ring around the BNC plug makes it easy to grip. The collapsed antenna fits handily in a shirt pocket, and incorporates a pocket clip similar to a ballpoint pen.

The FC2002 construction feels hefty. The cabinet is a 2-piece anodized aluminum affair thick enough to resist flexing when pressed. A rubber pad along the bottom prevents the counter from scratching a table when sitting upright.

The instruction sheet contains basic guidelines, cautions, and limited specifications but provides no schematic.

The display has indicators for frequency, period, hold, signal detected, filter, and low battery. There are also indicators for MHz, milliseconds, microseconds, nanoseconds, the last three being used for period measurements.

A selectable backlight uses a pair of green LEDs to illuminate the display for night viewing.

◆ Performance

The FC2002 (s/n 0318-5-7623) performed well in both quantitative lab tests and during field testing. However, our FC2002 was not as sensitive on VHF as the MFJ-866 (s/n 0126-2-

7959) we tested earlier.

We measured the FC2002's sensitivity from 30 MHz to 1300 MHz using a signal generator and the results appear in the accompanying graphs.

The FC2002 displayed the frequency of a 146 MHz walkie-talkie up to 185 feet away when testing in a flat, open field. It captured a 446 MHz walkie-talkie up to 161 feet under the same conditions. Adjusting the telescoping antenna to the proper length made a significant difference in whether the counter could lock on a distant signal.

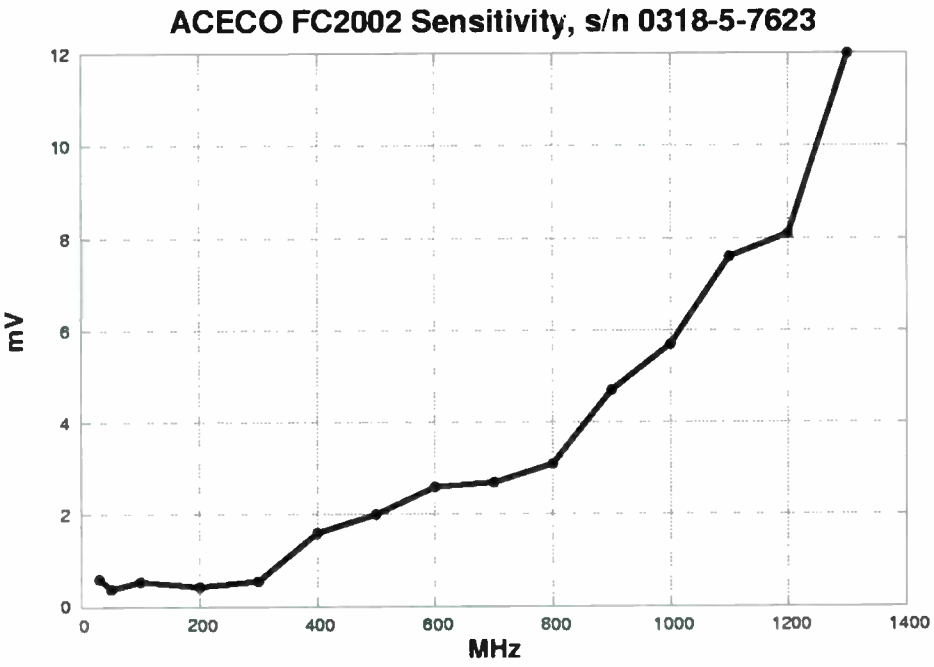
We took the FC2002 mobile. It snagged several VHF-high band signals while connected to a 19 inch magnetic mount whip antenna atop the truck, including a 151.415 MHz base station used at the local golf course, a 158.1 MHz paging transmitter, a 151.385 MHz fire repeater, and a 95.9 MHz commercial FM broadcaster.

We used a Yaesu VR-500 receiver to verify most signals, though the FC2002 detected a signal on 164.975 MHz, a US government frequency, before we were able to turn on the scanner to identify the user.

The counter displayed the frequency of a 171.055 MHz wireless microphone 7 feet away, but was able to detect two 49 MHz baby monitor transmitters only when brought within a couple of feet.

The FC2002's display is easy to read and the backlight is very effective. A front panel hole provides easy access to the timebase alignment adjustment.

The FC2002 has a switchable filter which blanks the displays until a signal is detected. When the filter is off, the counter displays random readings until it detects a signal.



Conclusions

The Aceco FC2002 performed flawlessly during testing. It is well built and extremely sensitive. The capture and filter features make the FC2002 more useful than simpler counters for transmitter hunting.

The 600 mAH rechargeable battery pack is low capacity by today's standards. We would prefer the ability to use individual AA cells instead of a monolithic battery pack.

The Aceco FC2002 is available from Hamtronics, Inc., 65 Moul Rd., Hilton, NY 14468-9535. Tel. (585)-392-9430, http://www.hamtronics.com.

Manufacturer Specifications

Aceco FC2002 Frequency Counter

Price range: $219

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http://www.hamtronics.com

Frequency coverage (MHz):
10 Hz - 3 GHz

Specifications

Weight: 250 g.
Size: 100 mm high x 68 m wide x 31 mm deep
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Digital Radio Mondiale Overview - Part 1 Who and What is it?

We have heard all the fuss about DRM, Digital Radio Mondiale, being the radio mode of the future. But we have heard this claim a number of times before from radio modes that have almost been forgotten. Remember AM Stereo?

Over the next few columns we'll look at DRM in a very objective manner. We'll try to sort marketing hype, if any, from actual use and throw in a bit of science. This series on DRM will follow the *Computers & Radio* approach of striving to inform, entertain and perhaps stimulate further investigation.

Before I get any technology tutorial emails, let me clearly state something. In order to entertain and reach the widest audience, without putting them to sleep, I will be taking ***great*** liberties with technical details.

Go To The Source

The source of much of the DRM information will be listed at the end of each column. As I was once told by my world-renowned professor of relativity who had worked with Einstein, "If you want to learn what Einstein knew, read Einstein, not someone writing about Einstein!" In other words, if this column stimulates your interest in any subject I suggest that you then go right to the source.

It is said, "The longest journey starts with the first step." So let's begin our DRM journey.

Why Digital Anyway?

A number of years ago, in the *Computers & Radio* column, we explored the technical and functional differences between analog and digital signal technologies. Then we compared the benefits and deficits.

In summary, in order to listen to analog signals we must detect and separate many small differences in signal shift levels. In contrast, decoding digital signals is all about detecting just two levels, 1's and 0's. The big benefit is that 1's and 0's can be separated by relatively large signal level. This minimizes any ambiguity in the detecting method. In other words, once the 1's and 0's are sensed, and converted back to a listenable analog sound, noise is a thing of the past. And if the digital signal is sampled at a high enough rate we are rewarded with high fidelity sound with no noise.

DRM's Benefits

According to their website, the benefits of the DRM digital mode to the listeners are:

FM-like sound quality with the AM reach ;
Improved reception quality;
Flexible use of radio, whenever and wherever you want it;
No change to existing listening habits:
- same frequencies,
- same listening conditions (fixed, portable and mobile radio),
- same listening environment (indoors, in cities, in dense forests..);

Low cost receiver, low energy consumption;
Easy tuning: with selection by frequency, station name or program type;
More diverse program content, using the full capabilities of new digital features;
Wide receiver range with more and better features;
Radios that will give you programs with associated text information, station name, record title, singer's name..."

That's quite an ambitious list!

Downside of Digital Communications

The downsides of digital communications can be summarized as:

Increased circuit complexity
High speed computer processing required

The digital world is a world of mathematical functions and transformations implemented in hardware. Also there is the conversion of analog audio into digital bits, requiring high speed and high accuracy in analog to digital conversion. Then the process needs to be reversed at the receiver end with a comparable digital to analog converter.

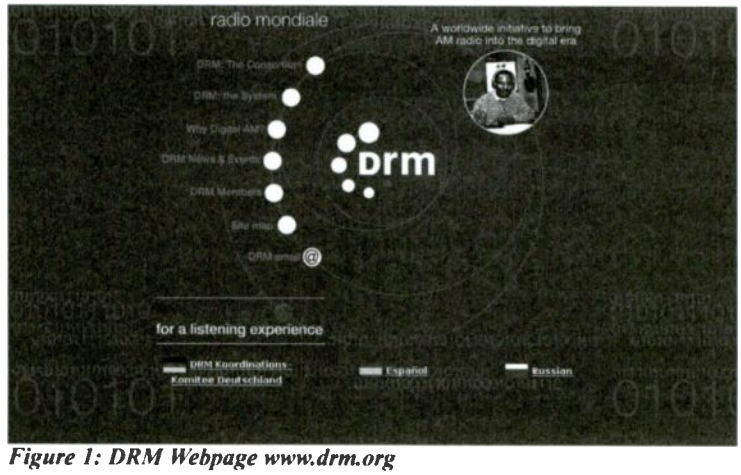


Figure 1: DRM Webpage www.drm.org

Finally, in order to maintain reasonable sound quality this signal processing has to be done at a relatively high clock rate. This all translates to a pretty powerful DRM decoding "computer" using power. These requirements seem to be in contradiction to the "Low cost receiver, low energy consumption" benefit listed above.

Who Is Backing DRM?

According to a press release on their website, **http://www.drm.org**, the DRM system was developed in 1998 by a consortium of companies in China. Its purpose is to create a universal digital system for the AM broadcasting bands below 30 MHz – shortwave, medium wave and longwave. It is headquartered in Geneva, Switzerland, and now has 82 members in 29 countries including broadcasters, network operators, equipment manufacturers, broadcasting unions and regulatory bodies.

This august body includes many heavy hitters in the radio world including: Atmel ES2, British Broadcasting Corporation, Deutsche Welle, Hitachi Kokusai, Harris Broadcast, JVC Victor Company of Japan, Merlin Communications International Ltd, Nippon Hoso Kyokai (NHK), Radio(s) Canada, France, Netherlands, Sweden, Vatican, Sangean America, Sony, Telefunken and Thales (UK) – to name a few you might recognize.

Having What It Takes!

The members are key to the ultimate success of DRM. Long gone are the days when superior technology won the day, becoming a standard and commercial success. One has to just read of Edwin Armstrong's life and the origins of FM radio in early days of commercial radio. No, instead it takes lots of technical, political, marketing and economic might. Finally, this must be augmented with corporate resolve and determination to make any standard a commercial reality.

My initial observation was that although many of these DRM companies such as Sony have a semiconductor division, I did not see any major semiconductor company in the

DRM consortium. Atmel does produce excellent semiconductors; however, Philips and Intel are notable by their absence. For DRM to succeed, a major international semiconductor company with world-class analog, DSP and perhaps PC component experience will be required to reduce the DRM system to a very inexpensive integrated circuit and supply it to radio manufacturers. Okay, enough crystal ball gazing. Let's look at the structure of a DRM system.

DRM Channel Structure

According to the DRM Standard paper files with ETSI (the European Telecommunications Standards Institute **http://www.etsi.org**), DRM system consists of three channels: the Main Service Channel (MSC), the Fast Access Channel (FAC), and the Service Description Channel (SDC). Each has a different function and character. For those who are interested, I have included a summary of the data format for each channel.

It's Not Called Main For Nothing

The MSC (Main Service Channel) is where the audio or data for transmission resides. It may contain may up to four different "broadcasts" or services. Each broadcast may be either in the form of audio or digital data.

If you looked at the MSC on an oscilloscope you would find that it is composed of one stream of data for each "broadcast." Each stream is sent in blocks, which are 400 ms long in duration.

The specific DRM channel bandwidth and the transmission mode determine the bit rate of the MSC. The transmission mode is a combination of signal bandwidth and efficiency related parameters such as the highest useful bit rate relative to resulting effects of noise and/or multi-path propagation.

The current channel widths for radio broadcasting below 30 MHz are 9 kHz and 10 kHz. DRM system also supports half channel modes with bandwidths of 4.5 kHz to 5 kHz allowing for simultaneous transmissions of analog AM and digital AM. Double channel modes with bandwidths of 18 kHz to 20 kHz are possible. Typical data rates on a 9 to 10 kHz channel are 20 to 24 kbps. In double channel mode, maximum data rates may reach as high as 72 kbps.

MSC and Digital Data Transmissions

A data service comprises one data stream or one data sub-stream. Digital data stream "...may be composed of up to four 'sub-streams' consisting of data packets. A sub-stream carries packets for one service." Data services generally consist of streams of information, in either synchronous or asynchronous form, or files of information. The maximum length of a data unit is eight 215 bytes.

Data Services Packet Format

The packet is made up as follows:

Header 8 bits
Data field *n* bytes
CRC 16 bits

The **header** contains information to describe the packet. The **data field** contains the data intended for a particular service. The **CRC** is the Cyclic Redundancy Check.

MSC and Audio Programs

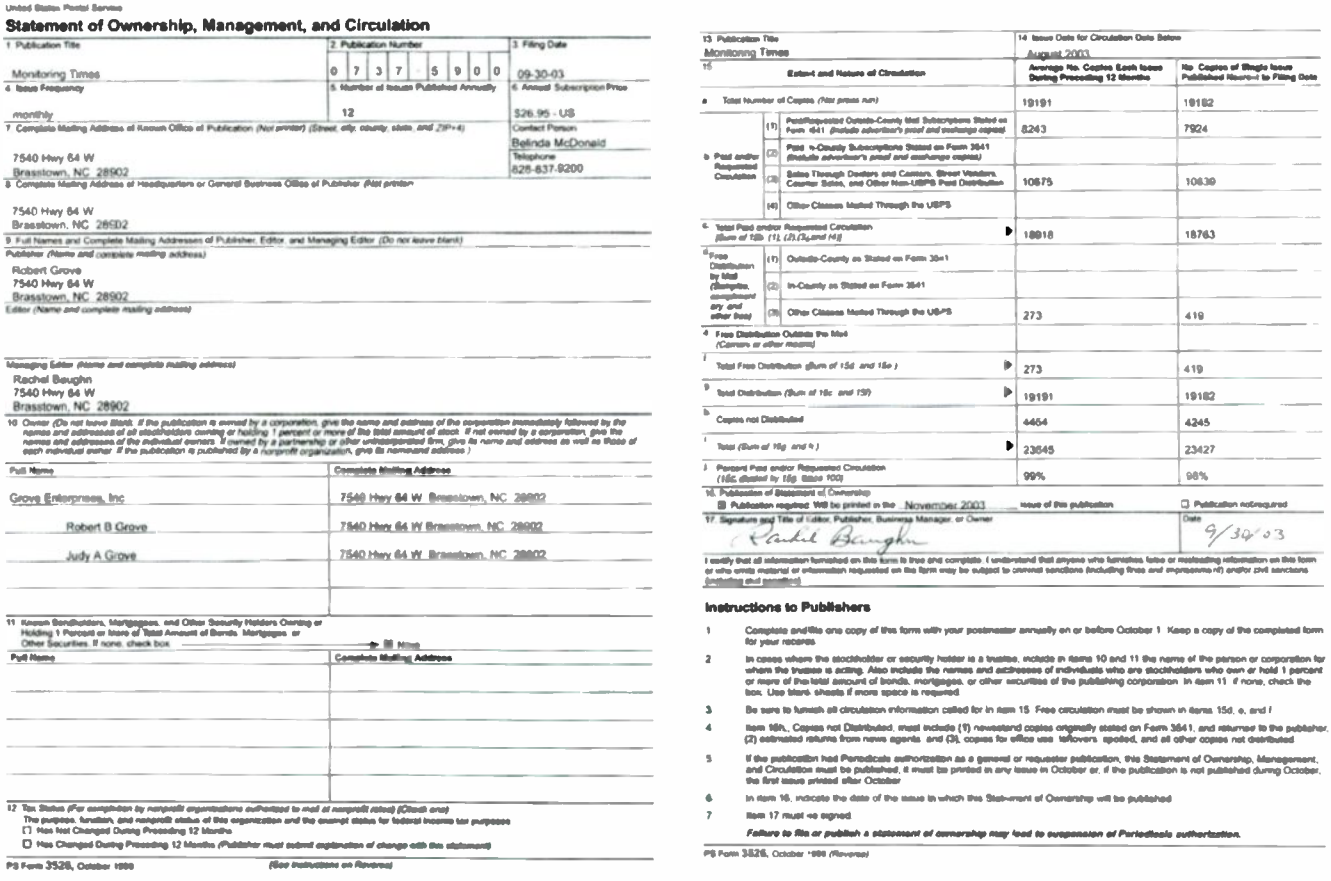
Audio broadcasts are digitized and compressed using MPEG-4 type compression and Spectral Band Replication (SBR). Keeping it simple, let's just say that these complex advanced techniques have the potential of producing near-FM broadcast audio quality.

In addition, audio streams can also carry simple text messages. The text message is a basic part of DRM and consumes only 80 bits.

Still With Us ?!

Next time we'll look at the other channels and see how it's all put together in a DRM transmission. Then we'll look at what hardware and software is need for DRM monitoring.

Get ready for some alphabet soup discussions full of acronyms. If you're not into the digital details don't worry. Only the basics are needed to follow the rest of the DRM Digital Radio Mondiale story as it unfolds. I'll leave you with one question. What the heck is Mondiale?



United States Postal Service

Statement of Ownership, Management, and Circulation

1 Publication Title	2 Publication Number	3 Filing Date
Monitoring Times	0 7 3 7 - 5 9 0 0	09-30-03
4 Issue Frequency	5 Number of Issues Published Annually	6 Annual Subscription Price
monthly	12	$26.95 - US

7 Complete Mailing Address of Known Office of Publication (Not printer) (Street, city, county, state, and ZIP+4): 7540 Hwy 64 W, Brasstown, NC 28902 — Contact Person: Belinda McDonald; Telephone: 828-837-9200

8 Complete Mailing Address of Headquarters or General Business Office of Publisher (Not printer): 7540 Hwy 64 W, Brasstown, NC 28902

9 Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor (Do not leave blank)

Publisher (Name and complete mailing address): Robert Grove, 7540 Hwy 64 W, Brasstown, NC 28902

Editor (Name and complete mailing address):

Managing Editor (Name and complete mailing address): Rachel Baughn, 7540 Hwy 64 W, Brasstown, NC 28902

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13 Publication Title: Monitoring Times	14 Issue Date for Circulation Data Below: August 2003	
15 Extent and Nature of Circulation	Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a Total Number of Copies (Net press run)	19191	19182
b Paid and/or Requested Circulation (1) Paid/Requested Outside-County Mail Subscriptions Stated on Form 3541. (Include advertiser's proof and exchange copies)	8243	7924
(2) Paid In-County Subscriptions Stated on Form 3541 (Include advertiser's proof and exchange copies)		
(3) Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Non-USPS Paid Distribution	10675	10839
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j Percent Paid and/or Requested Circulation (15c divided by 15g times 100)	99%	98%

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☒ Publication required. Will be printed in the November 2003 issue of this publication. ☐ Publication not required.

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PS Form 3526, October 1999 (Reverse)

MT REVIEW

K40 RD850 Radar Detector

By Bob Grove W8JHD

Radar detectors have become rather commonplace along America's highways and interstates. The temptation to push the pedal just a little over the posted limits is hard to resist, and any device that will let the driver know that his speed is being monitored is welcome.

Older radar detectors had their share of problems. Some had enough oscillator radiation to disrupt downlink satellite terminals (VSATs) in the 11.7-12.2 GHz range, such as those used at gas pumps for credit card transactions, Muzak in fast-food establishments, financial transactions and other business applications. As of 2002, these are now illegal to sell.

Except for commercial vehicles (truckers), radar detectors are legal to use in every state except Virginia and Washington DC. They are illegal to even own, much less operate, in much of Canada! To cope with illegal use of radar detectors, law enforcement agencies employ "radar detector detectors" like the VG-2 Interceptor. These units listen for the weak emanation of oscillator signals from the radar detectors.

To thwart such detection, some consumer radar detectors are now equipped to listen for the oscillators from the police radar detector detectors! When heard, the radar detector is shut down for a few seconds, allowing the vehicle to drive past the radar detector detector – without detection!

Another new technology designed to thwart consumer radar detectors is "instant-on" ("POP") or pulsed radar, such as the MPH Industries BEE III. This presumes that a speed-measuring pulse can be so short that the detector, which requires at least 150 milliseconds of signal to respond, won't flash an alert. However, the 67 millisecond pulse is too short for MPH's own circuitry to stabilize fast enough for an accurate reading that will hold up in court. Therefore, the "POP" must be followed by a longer-duration radar beam which alerts the detector.

◆ K40 Electronics

K40 rose to prominence in the CB arena some 25 years ago when antenna manufacturers were endlessly beating the drum for their particular products. I had the pleasure of publishing my findings following a field test of the K40 antenna. The bottom line was that it worked well, better than other antennas with which it was compared. It's still on the market and selling well. Recently, I was given the opportunity to perform a similar test with their new, sophisticated radar detector.

◆ The RD850

The RD850 comes with a distinguished pedigree, carefully developed to respond quickly and sensitively to all three traffic radar bands: X, K and superwide Ka (33.8, 34.7, 35.5, 24.15, and 10.525 GHz). In addition, the RD850 responds to laser, "POP" (instant-on pulse radar) and VG-2 (11.4-11.6 GHz) radar detector detectors.

Power is derived from a convenient source of 12 VDC; both a cigarette-lighter cord and direct-connect cable are provided. Audible alert volume is continuously adjustable. The compact, lightweight unit can be mounted with the included sun-visor clip, window suction cup, or dashboard Velcro strips.

When a target signal is detected, the unit flashes its LEDs and emits a tell-tale tone as well to inform the user of the identification of the signal: Chirp (K), tweet (X), buzz (Ka), high-pitched beep (laser), or warble (VG-2).

◆ False Alerts

Occasionally a radar detector will go off for no apparent reason; this is caused by extraneous signals which share the same frequency bands. Such signals include oscillator radiation from neighboring vehicles with radar detectors (the most common), high-power radio transmissions, some cell phones, and other incidental radiators. Parking at or driving alongside shopping centers and industrial complexes affords an excellent opportunity to activate your radar detector! A special filter mode may be selected to reduce, but not totally eliminate, such interference.

Our older model detector did this frequently as we drove down the interstate and as we stopped at busy complexes. The RD850, however, remained quiet until activated by more legitimate radiators like the occasional stray radiation from other radar detectors employed by passing motorists.

◆ The Lab Tests

At the request of K40 Electronics, on April 17, 2003, Speed Measurement Laboratories of Ft. Worth, TX (http://www.speedlabs.com) conducted an independent, objective evaluation of the RD850 as compared with two other contenders in the field, the Passport 8500 and the Bel 985. Nine of the newest radar and laser guns were operated by a certified traffic officer to eliminate any doubts concerning authenticity of the tests. The 10-year veteran officer was instructed to use the radar guns just as he would in his daily traffic routine.

The results? To quote SML's own release, "In our test of the industry's top rated radar detectors, no other detector outperformed K40's new portable RD850..."

Apparently K40 feels pretty confident in their new product as well; they will pay any speeding fines incurred during the first year of the owner's operation of the device!

◆ On the Road Again

A 1200 mile trip along I-75 afforded an excellent opportunity to test the new RD850; we decided to try a side-by-side comparison with an older Radio Shack model, each facing out through the windshield of my wife's new 2003 Jeep Liberty. It didn't take long for both units to start sounding their alarms. As a matter of fact, all day long they sat there chirping away happily while I visually scanned the horizon unsuccessfully trying to locate the sources of these alerts. False alarms, but from where?

Finally I had an epiphany: Could the two units be interfering with each other? (Duh...) I switched off the older unit and the falses stopped immediately! This close to each other, the units were hearing each other's oscillators, just like the radar detector detectors!

Now quiet, and my wife finally talking to me again, actual radar beams were signaled for great distances. In one case, a low-powered radar speed sign, normally

set to alert drivers of their measured speed at a maximum range of 250 feet, triggered the RD850 alarm at 0.8 miles!

In SML's tests, the RD850 consistently reported radar in excess of 2 miles from the target – seven times the normal targeting distance of police radar. At this distance, a vehicle traveling at 60MPH would have approximately two minutes to casually slow down before the typical radar gun could get an accurate reading.*

The ability to fine-control the audible volume, or instantly mute it, or even replace the various tones with a pleasant Geiger-counter "tick" sound that increases in rate as a radar speed trap is approached, is a welcome touch.

I was very impressed with the overall performance of the RD850 and feel that it offers a reliable warning well in advance of an activated speed-measurement device.

The RD850 carries a manufacturer's suggested retail price of $299.95. For ordering information, visit the K40 web site at **http://www.k40.com**, or call (800) 323-6768.

**At 60 MPH (1 mile per minute) it would take 1.75 minutes to get within 0.25 miles; but since the vehicle is gradually slowing down, it allows even more time.*

❖ PAR Antenna Follow-up

Hank Lane, KB1JLA, of Groton, Massachusetts, had purchased the PAR EndFed antenna prior to its review by Larry Van Horn in the September edition of *MT*. He wrote, "Everything you say in your review is right-on for build quality, performance, appearance, etc." However, he had run into a problem when a crimp joint gave way. "*All the stress* on the unit is carried by the single crimp joint where the wire end connector attaches to stud #3 on the matchbox. Strung between two trees and end-weighted normally for a N-S horizontal configuration, there is no strain relief mechanism to back up or offset all the stress hitting that one single crimp."

While neither Grove Enterprises nor Par reported any other returns for this reason (and the crimp is the same also used on Par's amateur line), Dale Parfitt said there had been a design change in the past few months. "We changed over to soldering the Flex Weave to the #10 lug and applying a short piece of heat shrink to the transition from lug to wire because we felt it gave the connection a better 'look.' I have never been a big proponent of crimps and the resultant flattening."

He added, "On further reflection, we will be adding a section to the manual regarding strain relieving the antennas. As a teenager, I had a 40M dipole hung between the house and a stand of pines. Each week it was resonant lower in the band. Several times it broke. It finally occurred to me to put a pulley and window sash at the tree end. Guess I was lucky the strain on windy days did not pull down my folk's chimney! I don't know what Hank's installation was, but know from experience that the force from a moving tree driven by the wind is powerful."

Hank reported he would gladly accept the new radiator Dale offered as a replacement, and added, "It sounds as if the new, modified design should solve any 'crimp' problems that might have turned up (although I guess I was the only lucky one for that.)

"The reason I didn't return the unit to Grove was that I didn't want to part with it and as an alternative I made my own radiator with a solder connection. I am still using it as my main receiving antenna. Although, now, I'd much rather use the original radiator as supplied. (I couldn't find your original indestructible wire anywhere, and had to use some inferior coated wire from Rat Shack.)

"Overall, the antenna blows away most any others I've tried for general SWL and Ute listening, including Grove's own Skywire of which I've owned two. Both Skywires have corroded away in New England weather because the twisted copper strands are not coated with any protective material. Eventually, one or more of the copper strands will break and then it's just a question of time.

"Thanks for the super technical support."

– *Hank Lane, KB1JLA*

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"How a Geek Sets His Watch"

By Robert Osband N4SCY

There is only one thing a geek wants when he sets his or her wrist watch. The knowledge that when that watch chimes the top of the hour, the network news will start on the radio, or the TV program will start on the tube. People are amazed by the simplest things, and will usually ask me my favorite question: "How did you *do* that?" My usual reply to that question is, "We both set our watches to the same Atomic Clock."

First, you need something to set your watch *to*. Something accurate. The atomic clock of the National Institute of Standards and Technology (NIST) in Colorado is pretty accurate. So are the two at the US Naval Observatory in Washington DC. One is named "Tick" and the other is "Tock." A quick peek at **http://www.time.gov/** (operated jointly by both agencies) will get you the time of day within a second or so, depending on your internet connection. In fact there are programs that utilize the internet's Network Time Protocol (NTP) that can set your system clock to within tenths of a second to the nation's great atomic clocks.

My favorite source for time, though, is radio station WWV on shortwave. The atmosphere plays funny tricks with radio waves, and at different times of the day the signal will be better on different frequencies. WWV transmits on 2.5, 5, 10, 15 and 20 MHz on shortwave from Ft Collins, CO, and WWVB is at 60 kHz in the low frequency bands. There is also a sister station WWVH in Hawaii on the same shortwave frequencies as WWV.

WWV, Ft Collins, Colorado (courtesy NIST)

Many of the newer "Atomic Wall Clocks" set their time to WWVB. It's usually helpful if these clocks and watches are set near a window at night when the signals come in best. You can also dial up telephone numbers that will link you to the time signal for 3 minutes or so (see sidebar).

Next, don't worry about hitting "The Top of The Minute." You are going to set your watch a minute later. At the top of the minute, you just want to notice at which second on *your* watch that your time source gives the different "beep" for the "Zero Second" that starts the next minute. You can also look at your watch at the top of the *hour*, when radio networks send a time signal "beep" just before the news starts (the one we want to match, or be *real* close to). Notice which second the "beep" hits on. Now, put your watch in "Setting Mode," and when that second comes around again, hit the button to reset your watch to the top of the minute. That should put you right. Have a friend in the car when the network news comes on the radio, and wait for The Question: "How did you *do* that?"

About the Author

Ozzie N4SCY is a ham radio operator who lives on the Space Coast of Florida, just because he likes to watch things go "up." His job requires him to take his breaks on a highly regulated schedule, which he inputs to his computer and downloads to his watch — a Casio PC-Unite. He can be reached at N4SCY@amsat.org

Sources of accurate time:

5, 10, 15, 20 MHz on a shortwave radio

+1 303 499-7111, WWV, NIST, Ft Collins CO

+1 202 762-1401, US Naval Observatory Master Clock, Washington DC

NISTime.exe: a computer program to set the time on a PC.

ftp://time-b.nist.gov/pub/daytime/nistime-32bit.exe

International Date/Time format: YYYY-MM-DD hh:mm:ss - Not just an International Standard, it's computer sortable!

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Cobra's Sweet-Sounding PR4000WX

The old-timers have a saying about the weather in Maine: if you don't like it, just wait a minute and it will change. So it is with the FRS/GMRS market. Just when you think you know what's going on, things change.

A case in point: recently the nice folks at Cobra Electronics sent me a pair of PR4000WX handitalkies. Among other things, what made these radios interesting is that Cobra is packing more features into these radios at a very modest price.

Check it out: for a paltry $119.95 (SRP), you get two 22-channel radios with 38 so-called "privacy" codes (really Continuous Tone-Coded Scanning System – CTCSS – codes), 10 channel NOAA All Hazards Alert Radio, voice-operated transmit (VOX) operation, enhanced water resistance, silent vibrating paging, 10-channel memory, battery saver circuit, selectable power with output key lock, 10 call tones, and roger beep. Pretty cool, huh?

As they say in the infomercials, "But wait, there's more!" The PR4000WX, according to Cobra's data sheet, also has the industry's first true 3 watts of power, an 8-point digital compass, and a clock/stopwatch/alarm.

George Carlin once said, "You nail together two things that have never been nailed together before and some schmuck will buy them from you." His point is well taken, but in this case, I think the extra features make sense. If you're using the PR4000WX in the woods, the digital compass certainly could come in handy, and there are a number of instances where an alarm might prove useful. As to more power for more range, who could object to that?

Coverage

The PR4000WX offers transmit and receive capabilities on 22 channels – 7 FRS/GMRS, 8 GMRS, and 7 FRS.

Here's how they are laid out according to the owner's manual:

Frequency	Service	Power (watts)
462.5625	FRS/GMRS	3, 2, .5 (selectable)
462.5875	FRS/GMRS	3, 2, .5 (selectable)
462.6125	FRS/GMRS	3, 2, .5 (selectable)
462.6375	FRS/GMRS	3, 2, .5 (selectable)
462.6625	FRS/GMRS	3, 2, .5 (selectable)
462.6875	FRS/GMRS	3, 2, .5 (selectable)
462.7125	FRS/GMRS	3, 2, .5 (selectable)
467.5625	FRS	.5
467.5825	FRS	.5
467.6125	FRS	.5
467.6375	FRS	.5
467.6625	FRS	.5
467.6875	FRS	.5
467.7125	FRS	.5
462.5500	GMRS	3, 2, .5 (selectable)
462.5750	GMRS	3, 2, .5 (selectable)
462.6000	GMRS	3, 2, .5 (selectable)
462.6250	GMRS	3, 2, .5 (selectable)
462.6500	GMRS	3, 2, .5 (selectable)
462.6750	GMRS	3, 2, .5 (selectable)
462.7000	GMRS	3, 2, .5 (selectable)
462.7250	GMRS	3, 2, .5 (selectable)

FRS is the Family Radio Service, an unlicensed radio service limited by FCC regulation to one-half watt transmitter power. GMRS stands for General Mobile Radio Service, a licensed radio service. To operate on GMRS frequencies, you must pay a fee to the Federal Communications Commission to get a license. The reason for getting a GMRS license is so you can use more power for more range. In the case of the PR4000WX, you can choose 3, 2 or .5 watts on the GMRS frequencies, but the handitalkie locks the power to .5 watt on the FRS-only frequencies. There are GMRS repeaters across the country, but the PR4000WX is simplex only.

The Cobra PR4000WX: lots of power, a digital compass, weather radio, for $119.95 a pair.

Features

Let's take a tour of the PR4000WX. This is a large handitalkie, measuring about 7-5/8 inches from the tip of the antenna to the bottom of the case, about 2-5/8 inches across the widest part, and about 1-5/8 inches deep from faceplate to the back of the belt clip. At the center of the upper front panel is a backlit liquid crystal display that serves as information central for the radio. Surrounding the LCD are a series of buttons: Call, Channel Up/Down, Hi-Med-Low Power, Lock and Compass. These are all pretty self-explanatory.

The Mode button covers all the other functions of the radio – some 16 of them – such as CTCSS codes, NOAA all hazards radio channel and alert, stopwatch, clock, alarm, VOX, memory channels, various scanning functions, roger beep on/off and so forth. In all, it is a pretty easy operating system: the frequently used functions each have a button, and the rest are accessible through the Mode button.

Below the display and surrounding buttons is a grill for the speaker and microphone. On top of the case is the antenna, a jack for an external speaker/microphone, and the On/Off/volume knob. On the left side of the case are the push-to-talk button and a button for activating the LCD backlighting and defeating the autosquelch for listening to faint transmissions. On the right side of the case is a jack for an optional charger for rechargeable batteries. On the back of the case are the wrist strap connector, the belt clip, the battery compartment (for four AA alkalines), and the battery door latch. On the very bottom of the case (which can stand up on a flat surface) are a couple of metal contacts that could be used with a drop-in charger.

The performance of the PR4000WX was excellent. The NOAA radio received the local weather broadcasts very well; the compass, once calibrated (a necessary user operation), pointed in the appropriate direction. The range was as good as any FRS/GMRS radio that I have ever tested (the limitation here was not the radio, but the terrain – even the best can't reach beyond certain physical obstacles on my standardized test course). All of this is top-rank performance. But what really set this radio apart was the almost-hi-fi-quality audio: it's crisp, clear, and lifelike without being harsh.

The bottom line is that the PR4000WX offers an outstanding combination of features and performance. Highly recommended. For additional information, visit **http://www.cobra.com**.

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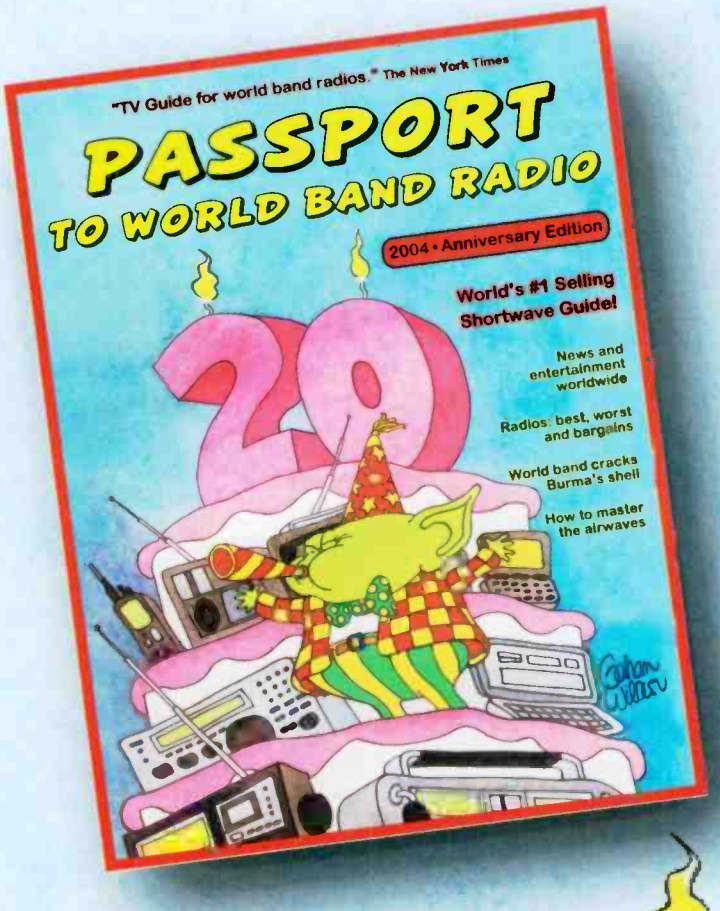

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What's NEW

Tell them you saw it in Monitoring Times

First Look at the PRO96

By Bob Grove

With reception modes that include APCO-25 conventional and 3600/9600-baud digital trunking as well as analog Motorola and EDACS trunking, along with conventional AM and FM communications, Radio Shack's new PRO96 hand-held scanner is a winner. We had the opportunity to preview one of these just before we sent it off to Bob Parnass for a full lab review which will appear shortly in *MT*.

Frequency range is 25-54, 108-174, 216-225, 406-512, 806-960 (less cellular) and 1240-1300 MHz.

The PRO96 is a triple-conversion superheterodyne, a scheme virtually mandated now by the FCC's austere image-reduction requirements to minimize the likelihood of unauthorized cellular telephone reception. Image IF rejection is stated as 60 dB (380.8 MHz IF) and 100 dB (21.4 MHz IF) – very formidable. Spurious signal rejection is a healthy 40 dB.

Sensitivity on FM mode averages 0.5 microvolts. Selectivity bandwidths for -6 dB and -50 dB filter attentuation for AM are specified as +/-5 kHz and +/-6 kHz, and for FM +/-8 kHz and +/-14 kHz respectively.

Scan rate is up to 60 channels per second, with frequency searches at 75 steps per second. Scan delay is fixed at 2 seconds. Up to 500 memory channels (10 banks of 50 channels each) may be scanned, with virtual pages storing up to 5500 channels for call-up.

Audio is crisp, loud and clear on the internal speaker, with only slight distortion introduced at high volume levels.

Additional functions include second-unit cloning, channel-selectable -20 dB attenuator, alphanumeric display labeling, battery saver, backlight, selectable key tone, digital AGC, updatable (downloadable) DSP firmware, custom-contrast display, SAME weather alert, "Zeromatic" exact frequency readout on search, and CTCSS/DCS decoder squelch.

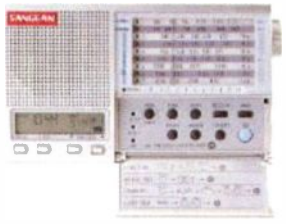
The PRO96 can be powered by four AA alkaline or rechargeable cells, 9 VDC wall adaptor, or 9VDC car cigarette lighter adaptor; none of these are provided and must be purchased separately.

Grove Enterprises is carrying this unit at $499.95. See their web site at **http://www.grove-ent.com** or call 1-800-435-8155, and watch for a full review in *MT*.

Sangean Travel Pro

By Bob Grove

For shortwave listeners seeking a low-cost, high-performance portable, the new Sangean Travel Pro is hard to beat. Offering worldwide shortwave frequency coverage along with conventional AM and FM broadcast reception, the pocketable Pro runs off three AA cells (not provided) or an optional 4.5 VDC power adaptor.



The internal speaker provides good, loud, crisp audio; while you can't expect chest-pounding bass from its small internal speaker, you can expect clear, undistorted voice audio. A set of ear buds is provided for private listening and reception of stereo in the FM mode.

Tuning is accomplished by the traditional slide-rule dial method, a tight dial cord moving a pointer across a printed scale; there's no digital frequency readout. There is a digital clock that displays local and world time as well as 24 time zones to assist the listener's scheduling.

Nor is the radio continuous coverage; the shortwave broadcast bands are the target, not the utilities between them. The radio is designed for convenient shortwave listening in a highly-affordable package, and that's what it does.

The radio weighs about one pound and measures 5-3/4" W x 3-1/4" H x 1-1/4" D. It is accompanied by a soft leatherette carrying pouch.

What we liked

The small size, ease of operation, clean audio, choice of frequency coverage and low-backlash tuning make this radio a good choice as a gift, or for backup listening on the road or during power outages.

While serious SWLs like external antenna attachments, inexpensive radios invariably suffer from strong-signal overload when operated with long antennas. The telescoping whip and internal ferrite-bar loop provide adequate reception when the radio is placed in most convenient, interference-free locations.

The new Sangean Travel Pro is available for only $59.95 plus shipping from Grove Enterprises (call 800-438-8155 or email *order@grove-ent.com* for details).

Uniden BCT8

The BCT8 is a new trunk tracking scanner which includes Uniden's BearTracker technology designed to alert you when the highway patrol is active in your vicinity. It can store 250 frequencies such as police, fire/emergency, marine, railroad, air, amateur, and other communications into 5 banks of 50 channels for a total of 250 channels.

Nine preprogrammed search bands include frequency information (user can specify state) for

Highway Patrol as well as local Police and County Sheriffs, Fire and Emergency Medical Service, News Media, Weather (continuous NOAA weather and Canadian Coast Guard broadcasts), CB Radio, Aircraft, Railroads, Marine Band, and Department of Transportation.

Trunking systems supported by the BCT8 are Motorola Type I, Type II, Type IIi (Hybrid), EDACS Wide band Scat, and LTR. Trunked and conventional channels can be scanned simultaneously. Scan Rate is a speedy 100 channels per second (conventional mode); the search rate is at 100 steps per second for normal search, or 300 steps per second for Turbo search.

The BCT8 covers 13 frequency bands:

25.0-28.0 MHz Petroleum Prod., CB Class D channels, Business and Forest Products
28.0-29.7 MHz 10 Meter Amateur Band
29.7-50.0 MHz VHF Low Band
50.0-54.0 MHz 6 Meter Amateur Band
108-137 MHz Aircraft Band
137-144 MHz Military Land Mobile
144-148 MHz 2 Meter Amateur Band
148-174 MHz VHF High Band
400-420 MHz Federal Government
420-450 MHz 70 cm Amateur Band
450-470 MHz UHF Standard Band
470-512 MHz UHF T Band
806-956 MHz 800 Band

Though the BCT8 has been FCC type accepted, price was yet to be announced at presstime. Look for the BCT8 trunk tracking scanner from your local dealer or from Grove Enterprises (1-800-438-8155 or *order@grove-ent.com*).

Digital DRM Receiver

The new, second Generation Digital Radio Mondiale (DRM) receiver from MAYAH is now available from Germany with a target price of around 700 euro (around $768US depending on the exchange rate). It is the result of a joint development effort of MAYAH, Coding Technologies, Himalaya and AFG. The DRM2010 is based

What's NEW

Tell them you saw it in Monitoring Times

on standard components and is smaller and lower cost than the first generation receiver.

A DSP module performs all the DRM specific decoding functions. The software of the DSP module can be updated via the USB interface. The receiver can decode mono and stereo audio signals; full stereo is available at the headphone outputs.

The display indicates station name, used frequency, field strength and the number of service components of the received DRM signal. Additional information transmitted will be displayed if available. The station can be selected by directly entering the frequency using the numeric keypad.

Besides the DRM standard, the receiver also supports reception of analog AM programs in the MW, LW and SW bands as well as FM programs. Bands covered include 4.5, 5, 9, 10, 18 and 20 kHz.

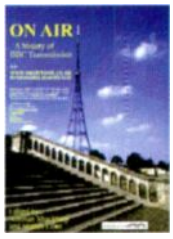
For more information or to order the DRM2010, contact MAYAH Communications GmbH, Am Söldnermoos 17, 85399 Hallbergmoos; E-Mail: *drm@mayah.com*; **http://www.mayah.com/drm** Watch for an upcoming review in *MT*.

On Air – A History of BBC Transmission

Compiled & edited by Norman Shacklady & Martin Ellen

It's always interesting to ask a shortwave radio listener what their favorite station is. Among the varied international broadcasters, BBC has steadfastly remained a favorite. Through the decades, millions of listeners have benefitted from the entertainment and information that BBC brings to the world.

On Air-A History of BBC Transmission, is an exceptional book for any hobbyist interested in the broadcasting history of BBC. Initially known as "2LO," they began broadcasting in 1922 from Marconi House in London, as a medium wave domestic radio service. Within two years,the station now known as the British Broadcasting Company, boasted total service coverage estimated at about 65% of the population.



Over half of the book is devoted to the reminiscences of the people involved from the early years, to the BBC's privatization in 1997 by Crown Castle International and Merlin Communications. These fascinating personal recollections reveal a staff devoted to advancing technological and organizational developments within a worldwide network. Go behind the scenes during the turbulent years prior to and during World War II. An exceptional chapter describes the troubled logistics of broadcasting from Ascension Islands during the Falkland Islands War... before the days of satellite technology. What tenacity!

Ever wondered about the BBC relay stations? Find out why only the committed would endure the early days on the volcanic terrain of Ascension Island in the South Atlantic Ocean. Find out why the Hong Kong relay site was demolished and what was HRH The Duke of Edinburgh doing in Thailand in October 1996?

On Air-BBC Transmission is an easy and quick read. As a devout listener of the BBC, I found it a fascinating "behind-the-scenes" look at a power house in broadcasting. This nostalgic book celebrates a lifetime involving thousands of people that maintained and operated the BBC facilities that millions depend on.

On Air-A History of BBC Transmission may be ordered from **http://www.onairhook.co.uk** or you can print out an order form from the site (if paying by check) and send to; Wavechange Books, 94 Goddington Lane, Orpington, Kent BR6 9DY. Prices for hardback are £17.50; paperback £12.50 (plus £2 p&p in the UK). If you are ordering outside the UK, please send your email to *editors@onairbook.co.uk* and they will provide postage, handling and payment details.

My compliments to Norman Shacklady and Martin Ellen ... we listeners applaud you. Or as my British colleagues would say, "Simply Brilliant"!

- Gayle Van Horn

Newnes Guide to Radio and Communications Technology

By Ian Poole

Ian Poole, an occasional freelance writer for *Monitoring Times*, has written this guide to the technology and applications of modern radio communications equipment. While covering the technology and principles of radio, this book is written in an easy to understand style that provides a very useful foundation for anyone interested in understanding more about radio or wireless technology and its applications.

The key areas covered by this book are: radio principles; broadcasting, including digital radio; private mobile radio including trunking and TETRA; cellular telecommunications, including GSM and 3G; data communications, including Bluetooth and 802.11

The book is published in paperback, 320 pages, (2003 ISBN 0750656123), and is available directly from the publisher at **http://www.newnespress.com**, *Email:* directorders@elsevier.com. *For US customers the price is $24.99. In the UK it's* £16.99 from Elsevier Customer Service, Linacre House, Jordan Hill, Oxford, OX2 8DP, UK.

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LRIT Testing, Testing...

Another month of interesting developments in the weather satellite (WXSAT) field: NOAA conducted its first tests of the new digital format LRIT (Low Rate Information Transmission), and during late August, NOAA-14 imagery became synchronized once more.

◆ LRIT Gets Underway

The **National Environmental Satellite, Data and Information Service (NESDIS)** approved the Low Rate Information Transmission (LRIT) Global Specification as the new standard to replace current WEFAX data transmissions. This new digital format will therefore replace the existing analog design in due course.

Darrell Robertson of NOAA confirmed that the first ever GOES LRIT Test was successful. It was conducted as a live data transmission test during the second daily vacant time slot on August 21in the GOES-East WEFAX schedule. NOAA's plan involves transmitting LRIT test data during two daily "vacant" time slots in the GOES-East WEFAX schedule.

The LRIT test data was transmitted Monday through Friday, excluding U.S. public holidays, during these two vacant slots throughout the months of August and September. The first daily test transmission period was from 16:50 to 17:06UTC, with the second period from 17:50 to 17:58UTC. A one minute buffer at the start and end times is used to avoid interference with WEFAX transmissions. Daily timeshare transmissions of WEFAX and LRIT were planned to start in October.

These irregular test transmissions of LRIT data from the GOES-East satellite will continue during 2003. A schedule of alternating analog WEFAX and digital LRIT products will begin in 2004, and by early 2005, NOAA expects to completely convert to full time LRIT service from both GOES-East and GOES-West.

Europe's LRIT

The European LRIT transmission tests have continued, together with concurrent HRIT (High Rate Information Transmission) tests. Europe's Meteosat Second Generation (MSG-1) satellite is currently located over longitude 10° west and has been providing test transmissions to approximately 100 users since late April. The transmission is actually made via a television DVB downlink from HotBird-6, due to a hardware failure on MSG-1.

This failure proved to be a welcome event (for amateur users!) because it led to the decision to not use the original downlink transmission from MSG-1. That downlink would have excluded the amateur community due to the near impossibility of operating giant reception dishes on domestic properties! Instead, we have only needed to set up conventional satellite television systems and then take the cable feed to a computer fitted with a DVB card to decode the telemetry. So far we have received virtually all the types of digital transmission – HRIT and LRIT. Picture quality has been excellent and WEFAX is rapidly becoming just a memory of the old analog system!

◆ NOAA-14 bears watching

The HRPT telemetry stream from NOAA-14 became degraded some months back. Degradation was due to the AVHRR (advanced very high resolution radiometer) providing a partially unsynchronized image. One consequence of this was that the APT transmission in the 137 MHz band was terminated to prevent periodic interference with other satellites using the same frequency.

The 1700 MHz (HRPT) telemetry downlink was left operational, so many of us have continued to monitor the transmissions. I made a habit of taking a pass, two or three times a week. Even so, it was Thomas Scheelen of Germany that advised me on August 23 that telemetry from NOAA-14 had apparently recovered synchronization for several days. Thomas commented: "In the last two weeks NOAA-14 works great without sync errors."

NOAA-14 provides a strong signal and is therefore well worth monitoring. Launched on December 12, 1994, it is currently the AM standby satellite, with several of its systems in condition green (operational, or capable of), some in yellow (operational with limitations), and only the AVHRR at red; and as of early September this was working..... but it failed again on the 6th!

◆ Next launch

NOAA-N has an anticipated launch date of June 2004. Various tests are being carried out and preparation for the flight software load is underway.

Meanwhile, the other NOAA WXSATs continue with mostly unchanged status. NOAA-17 transmits just 2.5 watts power on its HRPT transponder – compared to its much larger output following launch in June 2002. This results in somewhat shorter effective passes where partial interference is experienced – such as through trees!

◆ Hurricane Fabian

Those using WEFAX systems to monitor either GOES-E or GOES-W, or possibly even both, are able to monitor the development and movements of every tropical storm and hurricane anywhere in the world. During early September, hurricane Fabian was being monitored. On September 1, David G. Brooks of Worthing, Christ Church, Barbados, West Indies, received figure 1, an image from NOAA-15 while Fabian was over the Atlantic Ocean. Fabian had been moving northward at 15 knots with maximum sustained winds estimated at 105 knots, gusts to 130 knots. It was reaching landfall over Bermuda as this article was being compiled, with winds having increased to 200km/hour. Visit David's highly weather-orientated site at **http://www.brohavwx.com/**

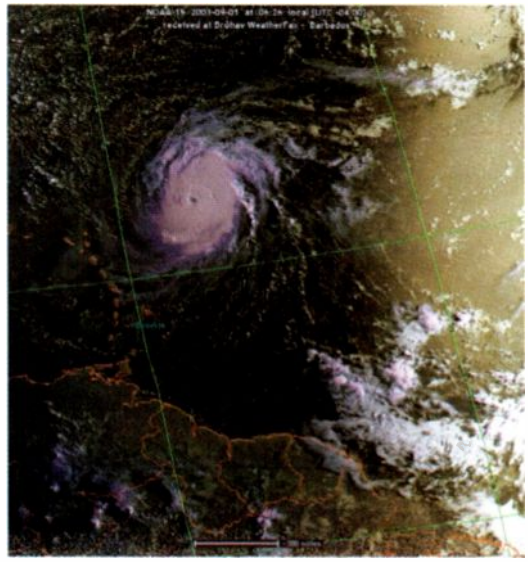

Fig 1: Hurricane Fabian - NOAA-15 image September 1, from David Brooks

Frequencies

NOAA-12 and -15 transmit APT on 137.50 MHz
NOAA-17 transmits APT on 137.62 MHz.
NOAA-12 and NOAA-16 transmit HRPT on 1698.0 MHz
NOAA-14 and NOAA-17 transmit HRPT on 1707.0 MHz
NOAA-15 transmits HRPT on 1702.5 MHz
GOES-10 (west) and GOES-12 (east) use 1691 MHz for WEFAX (and LRIT tests on GOES-12)

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Closing Comments

This page is open to thoughtful opinions on radio-related topics. Submissions should be about 800 words in length and may be mailed to Closing Comments, care of this magazine, or emailed to editor@monitoringtimes.com

Interoperability: Public Safety's Holy Grail

By Dan Veeneman

Nearly two decades before the terrorist attacks on the World Trade Center and the Pentagon, emergency personnel from Washington, D.C. learned an important lesson in how to work together.

During the evening rush hour on January 13, 1982, in the middle of a snowstorm, an Air Florida 737 jet crashed on takeoff from National Airport. Half an hour later, across town a commuter train derailed. Numerous municipal and federal agencies responded to both of these incidents but were hampered when they discovered that they couldn't talk to each other – their radios were incompatible with each other. In addition, what few frequencies were available soon became overloaded.

The resulting confusion, delays and inefficiencies were the impetus to begin developing common standards for public safety operations. Committees, working groups, and consortiums generated hours of testimony and reams of paper to address these problems. But even with all of their efforts, how far have we really come?

Two decades later, despite good intentions and a lot of hard work, confusion, delays and inefficiencies plagued the investigation of sniper attacks in the Washington, D.C. area in 2002. More than 1,000 law enforcement officers and analysts were involved, coming from several cities, three states and the federal government. Because the department radios issued to these officers didn't work with other agencies (sound familiar?), hundreds of very expensive portable radios were handed out, programmed to work over a brand new digital system in Maryland. Many investigators simply used cellular telephones. Some senior officials made use of wireless personal digital assistants to send and receive electronic mail.

Although it's self-evident that the ability for public safety personnel to communicate with each other is critical during emergencies, what does it take for this to happen?

Technical Difficulties

The first step is getting equipment that can work together. Radio equipment for public safety agencies is currently available in several frequency bands, determined primarily by historical licensing decisions by the Federal Communications Commission (FCC). Older systems typically use VHF and UHF frequencies, while new systems commonly operate in the 800 MHz band.

However, one size does not fit all, even for frequencies. Generally speaking, systems operating in the 800 MHz band perform well in dense urban environments, while VHF and UHF systems are more appropriate for rural areas where they can provide greater coverage. There are patchwork solutions that can pass traffic between these frequency bands, but they're expensive and don't always work well.

Even if the radios can talk to each other, there often aren't any available channels to use. Trunking technology can help in using the existing channels more efficiently, but the next frontier is 700 MHz, which holds the promise of open, unencumbered bandwidth. It's currently allocated to UHF television channels 52 through 59, but is scheduled to become available in a few years. There are a number of proposals pending at the FCC as to how best use this space – some good, some not so good. As the final decision-maker, the FCC must establish rational rules about how the 700 MHz band is to be used. Poor decisions will simply duplicate the problems that currently exist in other bands and are especially acute in 800 MHz.

Standards

There are somewhere in the neighborhood of 30,000 emergency response agencies in the United States. Nearly all of these agencies use some type of Land Mobile Radio (LMR) technology. Much of this equipment is proprietary and will only work with radios built by the same manufacturer.

In 1989 the Association of Public Safety Communications Officials (APCO) began work on Project 25 to establish a set of open, publicly available standards for efficient narrow band digital communication. Instead of a proprietary system provided by a single equipment manufacturer, these open standards allow any number of manufacturers to produce compatible equipment. This allows some degree of healthy competition, potentially lowering prices for everyone.

Phase I of these standards is complete and quickly becoming commonplace, especially in large metropolitan areas. The federal government has specified Project 25 equipment for nearly all of their new systems, so future interoperability will require the use of these APCO standards.

Funding

Local jurisdictions typically cannot afford to build their own system. Even small systems run into the millions of dollars, where a single radio can cost several thousand dollars.

A potential solution is to follow the model used by such states as Colorado and Michigan, where the state government provides a basic network and invites local jurisdictions to join. In Minnesota, the Metro Public Safety Communication System covers nine counties, including the Twin Cities. It operates a common "backbone" of repeaters and related equipment, providing basic services to nearly 5,000 radios in Hennepin County alone; twice that are expected across the system when it reaches full deployment. The backbone cost $36 million to install, which was shared among the various participants.

If planned and equipped correctly, this type of cooperation can also solve much of the lack of capacity problems plaguing metropolitan radio networks.

Who is in charge here?

Although much progress has been made in addressing technology, interoperability is more than just getting radios to talk to each other. It requires procedures and processes to cure the jurisdictional conflicts and command struggles that occur when multiple agencies have to work together. This is perhaps the most difficult part of all, to create a true partnership focused on a common goal.

So, to summarize, several things need to happen:

- The FCC needs to establish clear, rational rules for public safety operation in the 700 MHz band;
- Additional funding needs to be made available for local police and fire departments to purchase, install, and be trained on new radio equipment that is Project 25 compatible; and
- Common operating procedures and clear lines of authority need to be established for agencies at every level of government, especially as public safety and national security continue to overlap.

Until these things can happen, the citizens of this country will continue to be at risk from a lack of interoperability.

What's on the Horizon?

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Nor is the radio continuous coverage; the shortwave broadcast bands are the target, not the utilities between them. The radio is designed for convenient shortwave listening in a highly-affordable package, and that's what it does.

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