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

Monitoring Times

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How to Monitor the Military

- All India Radio
- Florida Scanning
- 100 Years of the Vacuum Tube
- Reviews: ICOM IC-R20, ICOM IC-V8, WINRADIO G313i, FlexRadio SDR-1000

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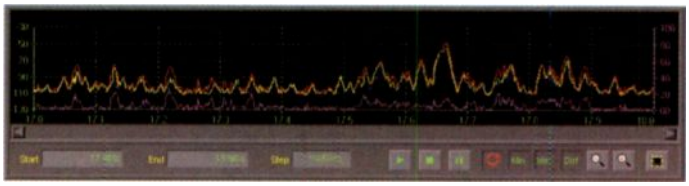
As with all other WiNRADiO receivers, the G303e receiver is supported by an entire family of WiNRADiO hardware and software add-ons and accessories, ranging from antennas and antenna matching adapters to powerful digital processing software, as well as the popular "XRS plug-ins" (many of them free) and even the free RadioBasic™ programming language for those who enjoy experimenting.

The advantages of this receiver, and its many exciting features are too numerous to mention in this limited space. Please surf our Web site www.winradio.com to learn more facts about this amazing receiver.

An intuitive control panel features a wide variety of tuning and scan modes, memory functions, and many other facilities.



The secondary wide-band spectrum scope complements the primary narrow-band one.

System Requirements

- IBM PC compatible (CPU 500MHz or higher)
- Spare USB port (or optional serial port)
- Sound Blaster 16 (or compatible sound card)
- Windows 98/ME/2000/XP

Monitoring Times

Vol. 23, No. 11 November 2004

Cover Story

A Beginner's Guide to Military Monitoring

By Larry Van Horn

The explosion of active frequencies and new systems in the military sector has been accompanied by a marked increase in interest in military monitoring by radio hobbyists. But where do you start listening if you're new to it? To get the most out of your monitoring, it helps to have some background.

Most listeners are within reach of military aircraft practicing airborne refueling maneuvers or communicating with air traffic control centers. Military training areas can be found off all coasts, along with naval activities; military ground bases and training areas are scattered throughout the nation.

The world of military communications in the VHF/UHF spectrum is vast and exciting, and our frequency list is your best bet for getting started! Story starts on page 12.

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On our cover: An F-14B Tomcat assigned to Carrier Air Wing Seven (CVW-7) launches from the flight deck aboard the aircraft carrier *USS George Washington*. (U.S. Navy photo by Photographer's Mate 2nd Class Summer Anderson)

Reviews:

This month we've advanced far beyond the vacuum tube and review two computer-based radios – one well-established model and the other so new they are still designing its components.

The **WiNRADiO G313i** receiver is a substantial improvement on its predecessor, the 303i HF receiver. The 313i features an internal DSP, an improved spectrum analyzer, and IF signal recording – all of which really improve speed and manipulation of the signal. (See page 82.)

Still on the cutting edge is **FlexRadio's SDR-1000** – the very first, fully-assembled, software definable radio available to the public. This month we lay the background and next month we'll look at its performance. (Page 84.)

Two ICOM products come in for good reviews this month. The **ICOM IC-R20** "superhandheld" exhibits impressive features and good overall performance (see page 78). **ICOM's IC-V8** two-meter handitalkie is a superb mono-band ham radio with performance equal to the reviewer's base model (see page 86).

A great accessory for those of you taking on the challenge of following a specific flight from start to finish (see "Planes") is **AirNav Systems' Flight Tracker 3**. Follow the flight you're listening to on your computer screen in real-time! (See page 80.)

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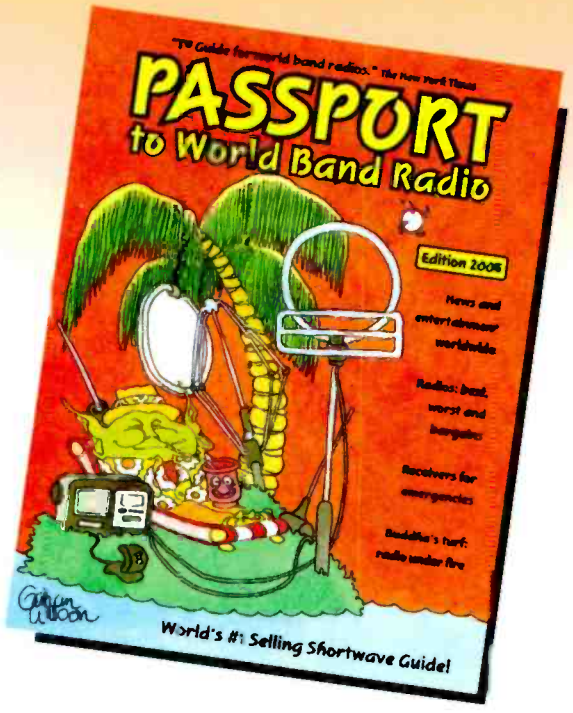

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This high-performance PLL synthesized, dual-conversion YB 400PE receiver pulls in AM, FM-Stereo, Shortwave, and Longwave, including continuous coverage from 520-30,000 KHz. Even Ham radio two-way communications can be heard using the SSB circuitry. 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

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

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

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S350 AM/FM/ Shortwave Radio

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

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

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

- AM/FM/Shortwave Tuning (SW1, 3.2-7.6MHz; SW2, 9.2-22MHz)
- Hand-crank power generator recharges internal Ni-MH battery
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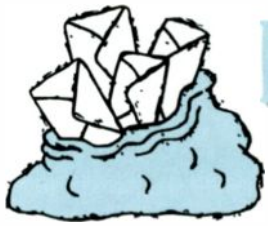

LETTERS TO THE EDITOR

Bob Parnass Retires from *MT*

Bob Parnass had already earned his reputation for objective product evaluations written in plain English before *Monitoring Times* coaxed him to write a monthly column on scanning equipment ten years ago! Since that time he has been an editor's dream – faithfully writing (ahead of deadline) to consistent size, style, and quality. Readers have also come to depend on Bob's reviews, often waiting to buy a new product until they see "what Parnass says."

So it is with regret and deep appreciation that we agreed to Bob's desire to retire from the monthly column. Job well done, Bob; you will be missed, but we know you will continue to enjoy "playing with radios" even though you no longer have to write to a deadline.

A list of scanning products reviewed in *MT* by Bob Parnass can be found at http://www.monitoringtimes.com. Watch for some exciting changes to the equipment review column, to start in 2005.

Hearing the Hurricane Hunters

Although hurricane season is officially over, its consequences will long be with us. The following letters address a couple of the many communications issues that arose during the storms. The first is an excerpt from a posting by Al Stern to the RadioMonitor's yahoo group:

"Because of … the interest everyone has in the Hurricane Hunter (callsign TEAL) aircraft, I am getting a lot of emails asking the best frequencies to hear them on.

"Living here in Florida's Hurricane Heaven, during the Hurricane Season I hear the TEALs daily on VHF ATC freqs [e.g. 119.825, 135.075, 132.15, 134.2 (Bahamas), 133.9 MHz, etc.] They often base out of MacDill, so I pick them up as soon as they are airborne (often on MacDill's Lightning Ops 311.0 freq). I can keep them as they fly down into the Caribbean towards Bahama, Antigua, etc.

"When they switch to oceanic freqs, I am able to hold them that way. Oceanic freqs 11330 and 11396 kHz (both USB) are often used.

"I also hear the Hurricane Hunters using the USAF HF-GCS freqs, especially 11175 and 8992. I hear them on Cape Radio's 10780 occasionally, and I hear them making phone patches on MARS freq 13927. The phone patches are both the Morale & Welfare variety to family, as well as official calls to TV News networks like CNN, the Weather Channel, etc. It is often quite a hoot to hear the side comments that network news reporters aboard the aircraft make when commenting about their wild ride.

"Just as *Monitoring Times* radio expert Larry Van Horn has recommended, I urge you to use Hugh Stegman's always up-to-date Hurricane Freq Listing at **http://www.ominous-valve.com/hurricne.txt** Hugh works hard to eliminate the obsolete listings that circulate on so many websites and waste so much of your listening time."

– Al Stern, Satellite Beach FL

Al Stern says: "I have several 'shack stations.' This photo shows part of my main shack station. The equipment wraps around me, with the computer and some handhelds on the desk in front of me, with the equipment shown in this picture to the right of me, and with more scanners and another computer on a credenza behind me. In this station alone there are 34 desktop units and 23 handhelds. They are supported by about 25 tower- and pole-mounted antennas. The balance of my radios are spread at other monitoring stations in my house, like at my TV-watching chair, bedrooms, etc." Check it out at **http://hometown.aol.com/scanaddict/index.html**

Hurricane Evacuation and AM Radio

"I was a recent hurricane evacuee from southern Louisiana. Once in the car and on the road we are radio dependent for 7 hours of driving to North Louisiana. I am disappointed in the stock radio that came with my new vehicle. After 150 miles I lost the clear channel powerhouse WWL 870 kHz. This has never been the case before in other vehicles. You gave information on a good Sony Car Stereo with an excellent FM section some months back. Could you maybe review in *MT* some current market radios that have good AM reception?

"PS. Thank goodness for the GE SuperRadio which enabled me to pick up WWL 870 in the hotel. WWL did an excellent job of giving vital information about road closures and when authorities would allow us to return to our homes.

"I heard a lot on my FRS radio, Ham 2 meters and CB. I had to turn off the CB several times because of cursing going on. These did help me with reports on traffic conditions ahead. I heard hams from south Louisiana asking for and getting directions around town from hams on 2m repeaters in north Lousiana. Heard a lot of caravaning groups of vehicles on FRS. Those little radios really help out.

"Thanks for a good magazine,"

– A. Mahler Raceland, Louisiana.

Doug Smith responded that "you're usually going to get what you're going to get in a car radio, unless you're willing to pick your brand of car based on the radio! (I think some DXers do.)

"I drive a '98 Ford Escort. I've been quite pleased with the radio, except for a somewhat too aggressive muting circuit on FM when strong intermod is present.

"I remember listening to WWL's coverage of the second phase of Andrew. It was the kind of thing radio is good at – and something WWL does exceptionally well. WOKV-690 in Jacksonville, Fla. has a similar reputation further east.

"I was surprised to *not* hear any hurricane refugees on 2m up here."

– Doug Smith W9WI, Nashville, TN

Ken Reitz also replied: "Here's some information which might help. One problem with all AM radios in cars is that they're using antennas optimized for FM reception, so I would recommend replacing the standard antenna with the one below from CCrane. I haven't used it, but this may be all he needs to improve reception.

"Secondly, if it's traffic info you're looking for, you just can't beat XM or Sirius satellite radio. I can tune in constantly updated traffic and weather reports in all major U.S. cities and it doesn't matter where in the U.S. you evacuate to. The units are all under $100 with specials all over the place to sign up. And, hey, you get BBC World, NPR, World Radio Network (Sirius only) and 100 more music and news. By getting a 'plug 'n' play' model of either service you get the added value of listening at home just by adding a home docking unit. (See this month's *What's New* for one more new Sirius receiver-ed)

"If you're still interested in old fashioned, free, AM radio, four mobile receivers always get good reviews: The incomparable (and impossible to find in the U.S.) Becker Mexico; the Blaupunkt Sacramento (Crutchfield); Pioneer Supertuner IIID (Crutchfield); Sony CDXS2000 (Crutchfield). AM reception is a complete afterthought for most auto radio manufacturers (with the exception of Becker, which still adds short wave to their band selector,). Details on sensitivity and other juicy details which might clue us into which would be better performers on AM go unlisted. I chose these

models because they're roughly the same price range (except for the Becker).

54" AM antenna replacement ($35): http://www.ccrane.com/am-fm-auto-antenna.aspx
Becker Mexico: Look on ebay
Blaupunkt Sacramento: http://www.crutchfield.com/S-wZ5JuNtToXA/cgi-bin/ProdView.asp?s=0&c=3&g=178850&I=023SACRAME&c=p&a=0&cc=01&avf=N&search=
Pioneer DEH 1600: http://www.crutchfield.com/S-wZ5JuNtToXA/cgi-bin/ProdView.asp?a=0&s=0&cc=01&g=178850&id=essential_info&i=130DEH1600
Sony CDXS2000: http://www.crutchfield.com/S-wZ5JuNtToXA/cgi-bin/ProdView.asp?s=0&c=3&g=178850&I=158S2000&o=p&a=0&cc=01&avf=N&search=

Frequency Tips

"New 6-Meter Beacon In Indianapolis: The Legion of Indianapolis DXers recently activated a new 24-hour beacon at 50.069 MHz. Located in grid EM69WT, in the heart of Indianapolis, the 12-watt beacon utilizes a turnstile antenna (horizontally polarized) at 70 feet.

"The message, which repeats at 10-second intervals, is as follows: VVV DE W9VW/B W9VW/B EM69WT INDY

"Reception reports are welcome and may be sent to: The Legion of Indianapolis DXers, P.O. Box 18495, Indianapolis, IN 46218 ... or e-mailed to Brian at bdsmith@indy.net

"We've already had reports from New Jersey, Wisconsin, Texas and Colorado, not to mention parts of Canada, so it seems to be doing reasonably well."

– Brian Smith, W9IND

Volunteerism

Last summer a group of hams and other volunteers in the "Save the Marconi" group helped make last-ditch repairs to an aging building housing the U.S. National Marconi Museum in Bedford, New Hampshire. After replacing rotted wood siding, the restored building was spray-coated with vinyl.

This private museum is oriented toward education and preserving radio history from "Spark to Space." In addition to the displays, the museum includes the extensive John Frey Technical Library, a restoration room and machine shop for repair of vintage radios, and amateur radio station W1FGM (Marconi's initials) for operation by any licensed ham.

Tax-deductible donations of vintage and modern electronic equipment and financial support are welcome at the Guglielmo Marconi Foundation, U.S.A., Inc., 18 North Amherst Road, Bedford, NH 03110, tel (603) 472-8312 ~ fax (603) 472-3622, or visit **http://www.marconiusa.org**. Sounds like a great field trip and a worthy project for any radio club.

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

Happy monitoring!

-Rachel Baughn, KE4OPD, editor

Monitoring and the Law

Jorge Rodriguez
jorgerodriguez@monitoringtimes.com

How High Can You Go?

The wacky world of scanner antenna regulations

As every serious listener knows, an outside antenna can dramatically improve your listening post. So one day you finally clear enough time on your calendar to put up an outside monitoring antenna. You've convinced your significant other that this is a true necessity to pursue your monitoring. You've even prepared yourself for the funny looks from the neighbors when they drive by and see that you've seemingly installed what appears to be a television antenna the wrong way – sideways instead of flat and horizontal like it should be.

The day arrives and you hold in your hands a brand new Grove Scanner Beam Antenna II, like a boy on Christmas day finally holding a coveted Red Ryder BB gun. But wait! Did you consider all the rules that might conspire to pull down that antenna or keep it from going up in the first place?

There are typically two to three areas, depending on whether you own or rent your home, that you should examine before deciding to install an outside antenna. The first of these is to determine what the local government zoning restrictions are, if any, on outside antennas. Secondly, you need to find out if there are any restrictive covenants or homeowners association restrictions for your property. If you rent your property, you should also check your lease or with your landlord to see if there are any lease restrictions.

◆ Zoning

When it comes to antennas, local governments typically zone for such things as antenna height, safety, general appearance, and compatibility with the surrounding land use. If you happen to be a licensed amateur radio operator, here you'll have the benefit of the still valid Federal Communications Commissions 1985 Memorandum and Order in PRB-1. The Order provides limited federal preemption of amateur antenna restrictions imposed by municipal land use regulations.

Local zoning authorities must make reasonable accommodations for the amateur communications radio service and their antennas. In restricting amateur communications, they must use the "minimum practicable regulations to accomplish the state and local authority's legitimate [zoning and land use regulatory] purpose."

If you're not a licensed amateur radio operator (which, by the way, also often provides you with an exemption to certain state laws prohibiting the mobile use and possession of a police scanner outside your home) you may not be familiar with the American Radio Relay League (ARRL), but you'll still want to take a look at their antenna restrictions web page.

The ARRL is the national association for amateur radio which provides their members with a rather comprehensive guide to overcoming antenna restrictions on their web site at http://www.arrl.org/FandES/field/regulations/antenna-restrictions.html.

Although written with the licensed amateur radio operator in mind, many of the ideas and rationale for overcoming these restrictions are transferable to the monitor radio listener pursuing an outside antenna building permit. Ambitious antenna installers should also consult Federal Aviation Administration (FAA) rules which could apply. If relying on Amateur Radio Service rules for your antenna installation, you should bear in mind that the rules require that any antenna structure over 200 feet above the ground (less than 200 feet if near an airport) must be reported to the FAA and registered with the FCC.

◆ Covenants

Restrictive covenants are restrictions that go with the deed to a property. Usually the home or lot is also part of a specific development or subdivision and the covenants are initially put in place by the original developer. Basically, these are contracts or agreements between you and the landowner to do and not do certain things with your land. Under property law rules, the agreement is enforceable by your neighbors and stays with the property. This means the original landowner is not the only one who can come back and enforce the agreement, and when you sell your property, the new owners make the same agreement for the benefit of the surrounding properties and neighbors.

While restrictive covenants can be one of the most challenging areas for encountering obstacles in installing an outside antenna, the FCC's 1996 Order (FCC 98-273) implementing Section 207 of the Telecommunications Act of 1996 may provide some relief. Especially when the scanner antenna you seek to install resembles a sideways television antenna such as the Scanner Beam Antenna II.

In order to promote consumer choice in television viewing, the revised over-the-air reception devices rule extends a prohibition on restrictions that hamper a consumer's use of television antennas; small, typically eighteen inch satellite dishes (such as those needed to receive digital satellite signals); and wireless cable antennas (also known as multipoint television distribution systems or microwave "pay TV") antennas. In order to preserve property rights, the rule excludes common areas, such as the roof of an apartment building.

◆ Lease Restrictions

Last but not least, antenna restrictions in a lease are the most difficult for a scanner enthusiast to overcome. Here, landlords will have almost unlimited authority to control what you do to property that remains theirs and which you are borrowing for the term of the lease. While the FCC's 98-273 order may provide some relief, especially if you can legitimately show that the antenna will be used for the rule's intended purpose of over-the-air television reception, landlords will usually have the final say when it comes to what uses and changes you make to their property.

Still, some landlords have been known to be quite antenna friendly and accommodating when the antenna, even a discone monitoring antenna, is installed just above the roofline and along the rear of the building, out of view and not visible to most tenants and guests. Asking for permission first and exercising discretion in the installation is always advised. Sometimes this may mean a less than optimal installation, but one which still is far superior to using an inside, ground-level antenna.

Disclaimer

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COMMUNICATIONS

AMATEUR RADIO

Emergency Training for Hams

The Corporation for National & Community Service (CNCS) has renewed the Amateur Radio Relay League's (ARRL) Amateur Radio Emergency Communications course tuition reimbursement grant for a third – and final – year. The third-year grant of $179,600 will place even greater emphasis on providing Amateur Radio emergency communications training to licensees age 55 or older and will provide training for 1700 volunteers.

ARRL Emergency Communications Course Manager Dan Miller, K3UFG, will be traveling extensively to both Amateur Radio and emergency communications-related events and meetings to drive home the point that hams play a vital role in times of disaster and emergency, as recent events have demonstrated. (See *Closing Comments* on page 92.)

"Please encourage everyone – especially seniors – to take the Level I Amateur Radio Emergency Communications course," Miller urged. "With full reimbursement of the registration fee for ARRL members, the training is virtually free – but only for one more year."

The ARRL also received new funding of nearly $90,000 from the CNCS to execute a pilot program that will enlighten localities about the value of Amateur Radio to community safety and security. The one-year grant will enable ARRL to develop the Community Education Project (CEP) to work through local civic organizations, news media, faith-based groups, schools, food banks and a variety of other community organizations to get Amateur Radio's message across.

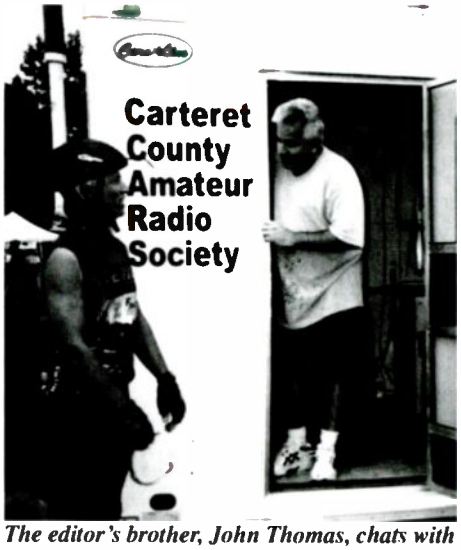
SCANNERS

Court Decision against McDermott

Scanner listeners aren't likely to forget the incident in 1996, when a Florida couple taped a cellphone conversation between then-Speaker Newt Gingrich and Rep. John Boehner and other GOP congressional leaders. The taped conversation concerned a House Ethics Committee investigation of Gingrich. The couple gave the tape to Rep. Jim McDermott who subsequently leaked the tape to the media. The ensuing furor in Congress had a negative impact on the public perception of scanner listeners, who were vilified as "electronic eavesdroppers."

The couple who recorded the conversation was eventually charged and fined by the FCC, but McDermott never faced any charges or sanctions by the House. So Boehner brought civil charges against McDermott, and for eight years the case has been working its way through the courts. Near the end of August, the chief judge in the U.S. district court for Washington, D.C., told McDermott he had no valid First Amendment defense against what he called "an illegal transaction."

Now Judge Thomas Hogan will decide what Boehner is entitled to in the way of punitive damages and legal costs.



The editor's brother, John Thomas, chats with a member of the communications team for the MS bikathon in eastern NC.

AVIATION

Maintenance not "Routine"

"Routine" maintenance doesn't necessarily mean "non-critical." Innumerable businesses and individuals have been caught unprepared and embarrassed when they failed to back-up current data before a computer crash, or back-up generators didn't work for lack of regular maintenance, or no adequate plans were in place for a worst-case scenario that came true. Still, this is the first instance I've heard of in which failing to perform the back-up check actually caused the failure.

On September 14 the Air Route Traffic Control Center controlling southern California, Los Angeles (LAX), San Diego, and parts of Utah and Nevada lost all communications for about four hours. Traffic controllers watched helplessly as they witnessed two or more near misses as planes came within 2 miles of each other and as about 400 flights were grounded by the FAA. Radar was still working and most airborne flights were safely handed off to controllers in other areas.

Later investigation proved that a required 30-day maintenance check on the primary radio communications system was not performed, and the system is designed to turn off if the check is not done. To compound matters, the backup system was not properly configured to come on line when the primary system shut off.

Plane Crash in Florida

A plane which was spraying near Lake Wales in Lakeland County, Florida, to prevent a mosquito infestation in the aftermath of two hurricanes clipped a 500-ft tower owned by Comcast Cablevision. A local power outage caused by an automobile accident had blacked out the area, and investigators are trying to determine whether the tower light was illuminated by a back-up generator or not. Even if it was not on, it was a clear night, the plane was equipped with GPS and a map of the terrain, and the pilots would have been aware of the tower. Veteran pilot Dave Wilkes and co-pilot Harold Miller were both killed in the 6a.m. crash.

FCC

FCC Tower-Siting Rules

Nothing moves quickly in government, but in an effort to speed up and simplify some aspects of communication tower sitings, the Federal Communications Commission adopted rules implementing an agreement designed to preserve the nation's historical resources.

The agreement describes standards for identifying historic properties, establishes enforceable deadlines for review, and excludes certain constructions from review.

Commissioners Kathleen Abernathy and Kevin Martin offered partial dissents. "I do not believe the FCC has the legal authority under the terms of the National Historic Preservation Act to adopt this NPA," said Abernathy. "To the extent that there is no license grant for the construction of an antenna facility it does not appear to me that there is any federal undertaking."

CTIA agrees with the dissents and indicated it will appeal the rules. So it will be back to the courts for this agreement which has already been four years in the making.

Children's Programming Rules

The FCC recently upheld the obligation of television broadcast licensees to provide educational and informational programming for children and the requirement that television broadcast licensees protect children from excessive and inappropriate commercial messages.

The Order increased the amount of children's television in digital television

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Nov 27: Evansville, IN
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multicasting and in particular requires at least three hours of children's programming per week on broadcaster's main channels. The Order concludes that the commercial limits of the Children's Television Act of 1990 ("CTA") apply to all digital programming directed to children ages 12 and under, whether or not that programming is aired on a free or pay stream.

The new guidelines will become effective after a one-year phase-in period.

FCC Kid's Zone

What is the difference between AM radio and FM radio? What is Broadband? What is Telecommunications Relay Service? How do Descramblers work? How does a V-Chip work?

To answer these, and other questions of significance to American kids such as, "What is unacceptable language for radio and television?" - "Why do all FM radio stations end in an odd number?" - "How does a fax machine work?" - the FCC has launched the Kidszone site **http://www.fcc.gov/kidszone/**

FCC Chairman to be Replaced?

A rumor has been circulating that if President George W Bush is reelected, FCC Chairman Michael Powell will be replaced. Powell failed to deliver the second round of radio and TV deregulation big media had been hop ng for. Then, he angered media when he cracked down on indecency on radio and television after a public outcry following the half-time show at the Super Bowl.

One rumor names Texan Becky Armendariz Klein as top contender for the spot in Powell's stead.

Powell himself won't reveal what he wants to do, saying speculation is "premature." But he has indicated that if President Bush were to win re-election, he would want to continue heading the agency. "I'm here, and I serve at the pleasure of the president," he said recently.

"SPACEY" NEWS

Living in Another World

Deutsche Welle is celebrating the 10th anniversary of its website by adding another language. To emphasize the station's philosophy of multicultural, intergalactic openness (and no doubt to garner some press coverage), the station is broadcasting online reports and audio clips in, of all things, Klingon!

IN MEMORIAM

James O. Page

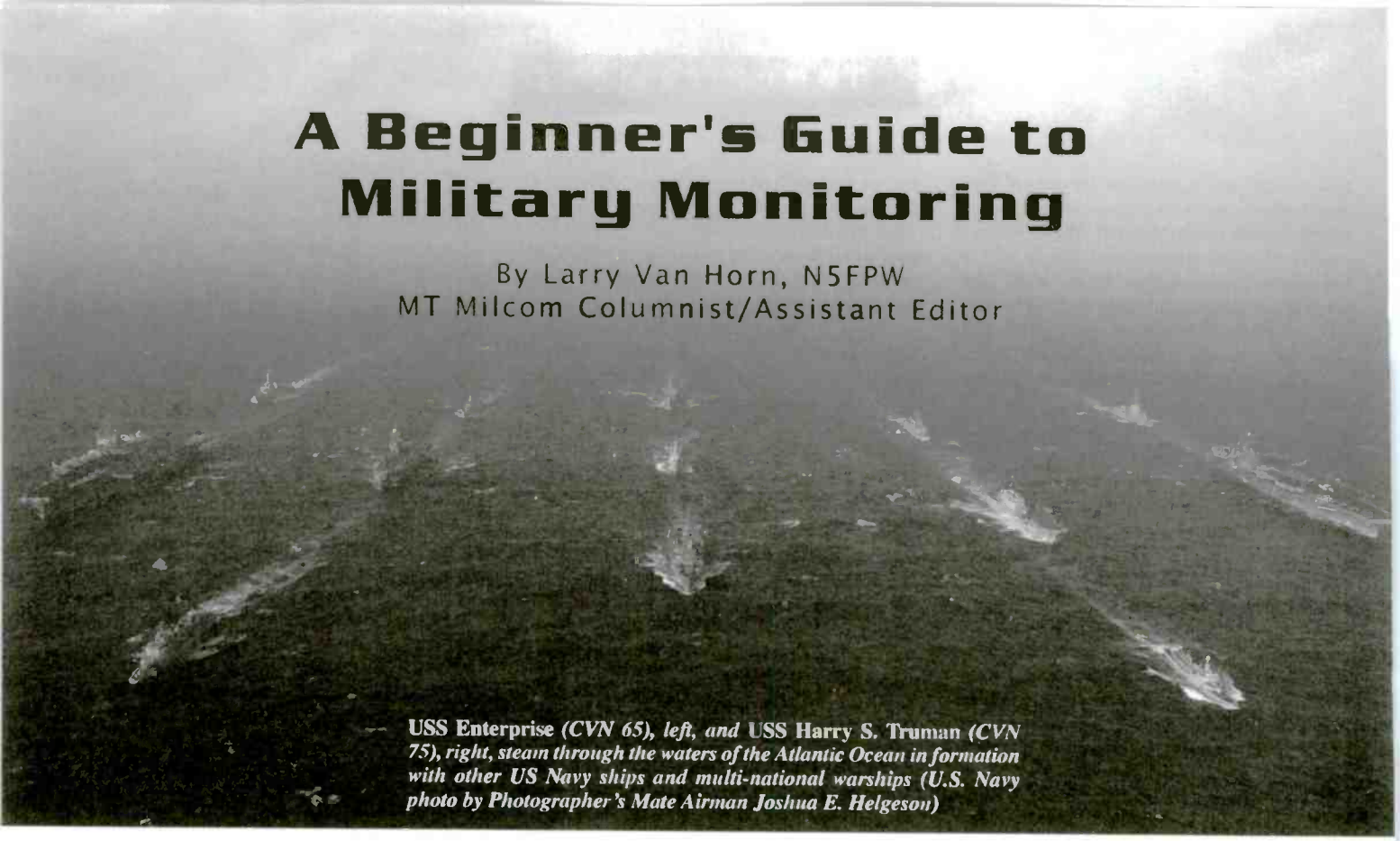
In 1971 James Page was a battalion chief in the Los Angeles County Fire Department when he was asked to implement paramedic rescue services in his county – one of only perhaps six systems nationwide. The same year, producer-actor Jack Webb hired him as technical advisor and writer for the television series "Emergency!" which helped the rest of the country learn about EMS.

In 1979 he started the *Journal of Emergency Medical Services*. He went on to help start emergency services in North Carolina, New York, and nationwide, and performed further service with fire departments in California. Page was also a licensed California attorney since 1971 and a partner in the law firm of Page, Wolfberg and Wirth when he died at age 68.

"Communications" is compiled by Rachel Baughn (editor@monitoringtimes.com) from newsclippings submitted by our readers. Anonymous, NY; Ian Abel, UK; Mike Chace: Norman Hill, VA; Pete Kemp; Rick Kissell; Sterling Marcher, CA; Stephen Newlyn, AU; Jerry None; Ken Reitz; Lee Reynolds, NH; Michael Reynolds; Doug Robertson, CA; Brian Rogers, MI; James Rubin, NY; Richard Sklar, WA; Tom Sundstrom; Larry Van Horn, NC; Peter Vieth; Robert Wyman; Ed Yeary; *MRT Bulletin*

A Beginner's Guide to Military Monitoring

By Larry Van Horn, N5FPW
MT Milcom Columnist/Assistant Editor



USS Enterprise *(CVN 65), left, and* USS Harry S. Truman *(CVN 75), right, steam through the waters of the Atlantic Ocean in formation with other US Navy ships and multi-national warships (U.S. Navy photo by Photographer's Mate Airman Joshua E. Helgeson)*

As the *USS Truman* pokes its bow into the wind, a navy crew maneuvers a VAW-124 E-2C Hawkeye off the ship's elevator in preparation for launch. From his privileged position high above it all, the Air Operations Boss (Air Boss for short) scans the flight deck for potential problems. He watches a sea of multi-colored jerseys scurry around the Hawkeye.

Once on the launch catapult, a member of the flight deck crew wearing a blue jersey moves within inches of the turning propellers and attaches the cable that will link the aircraft to the ship's number one forward catapult. The pilot throttles his engines up for takeoff. Human senses reel at the explosion of noise as the twin turboprops pour out waves of thunder and searing heat.

"Truman Control, Alpha Charlie 601 ready for launch on Cat 1," screams the UHF radio speaker in air ops. Then the air gives aircraft 601 permission to launch.

On the deck, hand signals are passed, deck crewman scramble from the aircraft's path, and then, in nearly an instant, it's off the metal deck. The catapult slams forward, shooting the 52,000 pound aircraft from zero to 150 miles per hour in less than two seconds. AC 601 is then on its way to a classified mission over the Caribbean Sea. It will spend the next six hours using complex electronic equipment to conduct surveillance of the ocean areas around them.

And, if you are lucky, *you* might even catch AC 601 using a special tactical call sign on one of our action band frequencies of 8972 kHz, checking in and giving ground/shore stations a status report (see this month's *Milcom* column for more action frequencies). You might even find it communicating on one of several high frequencies (HF – shortwave) used by the Immigration and Customs Enforcement services when looking for drug runners.

But, there is much more to military listening than just the Navy's HF communications and aircraft. There is a broad range of radio frequencies in the military spectrum to monitor, and you do not have to be within ground wave distance of a military base to get in on the action.

Military communications monitoring is the one segment of the radio hobby that has exploded in growth in recent years and is becoming more popular within the listening community every day. The world's military services are among the largest users of the entire radio spectrum. In the United States, the Department of Defense is the single largest individual user of the radio spectrum. And this offers the radio monitor a world of listening opportunity in all portions of the electronic communications spectrum.

To get the most out of your monitoring efforts, you should first know a little bit about how the military uses their radios, and what they use them for. We're going to divide this into two distinct areas of listening – aircraft and ground communications.

Aircraft Frequencies

Before we talk about the spectrum used by military aircraft, a few listening pointers are in order.

First, don't expect to hear a lot of chatter on military aircraft frequencies. These guys are entirely too busy in the cockpit, and if they are out dog fighting, you simply aren't going to hear a blow by blow description of the fight.

Second, if you are hearing it, you can rest assured it's not super secret and confidential conversation you are monitoring. You aren't going to endanger national security or even the aircrew's safety by repeating or reporting what you have heard. Contrary to popular belief, you won't hear the bombers heading for downtown Baghdad to drop a load of iron on the enemy. If the boys who fly don't want you to hear what they are saying, you won't. They have very sophisticated encryption and frequency hopping systems, and when those are on, the game is up.

Third, if we look at just one area of the spectrum, the 225-400 MHz frequency range, that represents 175 MHz of spectrum space or 7,000 25-kHz frequencies that can be active in your area at any one time. You can spend years exploring just this one section of the spectrum for interesting military communications to monitor.

And finally, you don't have to live next to a base to hear military communications activity. Here in Brasstown we are 90 miles from the nearest base. I have cataloged over 200 frequencies in the military aircraft band alone that are regularly active.

Most military aircraft have the capability of transmitting on both the civilian aircraft band (118-137 MHz) and the military air band (225-400 MHz), using the AM (amplitude modulation) mode. In a lot of cases, especially on air traffic control frequencies, a civilian VHF frequency will be paired with a military UHF frequency and ground controllers can be heard simultaneously on both. The majority of the communications in these two bands will use the AM mode and a frequency step of 25 kHz between channels.

Two other areas of concentrated military air communications can be found at 137-144 MHz,

just above the civilian air band, and at 148-150.8 MHz, just above the amateur radio 2-meter band. You will mostly find air-to-air comms using AM mode in these two frequency ranges, but you will find some air-to-ground as well. There will be very little in the way of air traffic control communications, and most of what you will hear will be brief, but very interesting. Land mobile or ground-only communications also share these two ranges, but they will use narrowband FM.

There are a couple of notable exceptions to this mode usage, such as those aircraft that use multiplex (MUX) radios which are wideband FM, and satellite transmissions, which can be either FM narrow or FM wide. I should also note that some aircraft have FM radios in the 30-70 MHz area, particularly older fighter aircraft like the A-10 Warthog. Almost any military aircraft that has a mission to support ground troops is a candidate for these low-band FM radios. However, on the VHF and UHF aircraft bands, most of the traffic you will intercept will be in the AM mode.

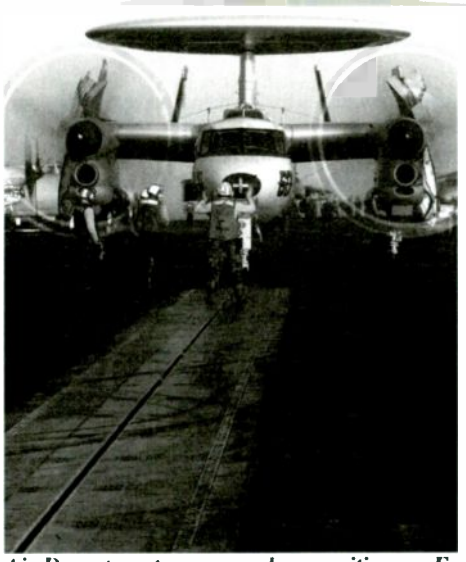
ATC Activities

Most communications start with an aircrew contacting a controller in the airport tower to ask for their clearance (the air route the aircraft will take during the flight) before the aircraft leaves its parking spot. This can occur on either a discrete clearance delivery frequency or on the ground control frequency.

As the aircraft taxies out to the runway, the crew will be talking on the aerodrome's ground control frequency. Then, once the aircraft takes off, they will switch to either the tower frequency or the area's approach/departure control frequency for further communications with air traffic controllers.

In some listings, you will see some frequencies designated as approach frequencies, some as departure frequencies, and some listed as both (approach/departure control frequencies). Any of these frequencies could be used by a departing

Aviation Boatswain's Mate holds up a weight board firming the weight of the aircraft to be launched n **USS Kitty Hawk** *(CV 63).* **Kitty Hawk** *demonstes power projection and sea control, as the world's y permanently forward-deployed aircraft carrier, ed in Yokosuka, Japan. (U.S. Navy photo by otographer's Mate Airman Bo J. Flannigan)*



Air Department crew members position an E-2C Hawkeye, assigned to the "Bluetails" of Carrier Airborne Early Warning Squadron One Two One (VAW-121) for launch from one of four steam powered catapults aboard* USS George Washington *(CVN 73) in support of Operation Iraqi Freedom (OIF). (U.S. Navy photo by Photographer's Mate Airman Lori Howard)

aircraft to help in navigation out of the local operating area.

Once the aircraft has left the immediate operating area and is "enroute" to its destination, the crew will be talking to one of the 20 Air Route Traffic Control Center (ARTCC) or "Centers." The ARTCC is the single largest component of our national air traffic control system.

To visualize the role of the ARTCC, think of it as your state highway patrol as compared to, say, the county sheriff's department. While the approach/departure control covers the busy terminal areas around an airport or military base, the Center covers a vast area of airspace outside of and in between the major airports of the nation.

Once an aircraft starts its descent into its destination airport, they will once again be communicating with the local approach/departure control. Of course, once they enter the airspace of the landing field, they will be talking to the field's tower controllers who will visually help them to land at the airfield.

However, if the weather conditions are bad, the aircraft might be handed off to a ground controller who will provide precision guidance information for instrument-assisted landing. These are known as Ground Controlled Approach (GCA) or radar frequencies. These frequencies can guide an aircraft on a precision radar approach to the field. These GCA installations are usually located at and operated by the personnel at the landing field.

There is another type of ATC or air traffic control station with which the aircrew may communicate. Flight Service Stations (FSS) and Automated Flight Service Stations (AFSS) are FAA air traffic facilities that provide valuable services to private pilots. They provide pilot briefings, en route radio communications and VFR (visual flight rules) search and rescue services. The nationwide military FSS frequency is 255.400 MHz, which should be programmed into any serious military aircraft listener's scanner.

Military Air-to-Ground Communications

Some other great aviation frequencies to check are the meteorology frequencies. These "meteo" frequencies are used by military aircraft to obtain information about weather conditions at a particular base. After receiving the weather information, the aircraft will often give the ground station a "PIREP" or Pilot's Report of current flight weather conditions at its location.

Some interesting monitoring can also be heard on Command Post (CP) and Pilot-to-Dispatch (PTD) frequencies. Even if you can't hear the ground station, the aircraft can often be heard over 200 miles away because of its altitude. The aircraft relays such information as maintenance problems, cargo information, and housing and meal requests. Sometimes you'll even hear an in-flight emergency declared on these frequencies. Routine traffic is handled informally, so be sure to look up the CP and PTD frequencies for bases within about 200 miles of your location.

You will find interesting communications on a unit's air-to-air tactical frequencies and the unit's squadron/unit common. Quite often they are used for training and routine communications among aircraft within a unit. These frequencies are also used for the range communications or in Military Operating Areas (MOA).

It can be especially entertaining if you catch communications between aircraft from the same unit traveling cross country. I have monitored many times the air-to-air chatter of some of the military's flight demonstration groups as they travel to a weekend air show site – most of these pilots think nobody is listening.

Aerial Refueling

Aircraft refueling operations are normally conducted in designated tracks or anchor areas. Each track or anchor area is controlled airspace assigned to a specific military unit. Most are assigned to the Air Force, but the Navy also has a handful they manage. The tanker aircraft is responsible for keeping the operation within the track or anchor unless clearance is otherwise granted.

There are differences between refueling tracks and refueling anchors. A track is a straight-line refueling area, whereas an anchor is a larger area for orbital refueling. On a track, the receiver aircraft initiates a rendezvous with the tanker, then descends to the refueling altitude after passing the Air Refueling Initial Point (ARIP). The tanker will orbit at the Air Refueling Control Point (ARCP), awaiting the receiver aircraft. All refueling is done under Instrument Flight Rules (IFR). (*See this month's 'Planes' column for more on VFR/IFR operation - ed.*) A track will have checkpoints to provide adequate navigation for refueling aircraft and for departure from the track after refueling.

A refueling anchor is a designated geographical area that is based on a specific anchor point. An anchor pattern surrounds this geographical point, which is a left-hand race track pattern with legs separated by a minimum of 20 miles, and with a minimum leg length of 50 miles. There are specified entry and exit points for the aircraft.

There are Center frequencies used at the entry and exit points for these tracks/anchors. Each track/anchor also has primary and secondary mili-

tary UHF frequencies, which is where the real action is taking place. Each track/anchor has its own designator. Often one base controls several ARs and they will usually have the same secondary frequency for all the AR routes they manage. Wherever you are in the continental United States, you should be within listening range of at least one track or anchor.

Military Training Areas

There are military training areas off the Pacific, Atlantic, and Gulf of Mexico coasts. Because they are in international air space, the U.S. military cannot take absolute control of the airspace. These areas are designated "Special Use Airspace," and the U.S. Navy provides air traffic control for aircraft entering these designated areas. Each section that provides this control service is called a FACSFAC, an acronym for Fleet Area Control and Surveillance Facility.

The major FACSFAC for the Pacific area is near Naval Air Station North Island and uses the call sign "Beaver." It controls transmitters located up and down the California coast. On the East Coast, another big FACSFAC, located at NAS Oceana with the call sign "Giant Killer," controls the areas along the Atlantic coast from Maine to the Carolinas.

The FACSFAC for the southeastern Atlantic coast is located at Jacksonville, Florida, and uses the call sign "Sealord." It has transmitters at Patrick Air Force Base, NAS Jacksonville, and at the Marine Corps Air Station (MCAS) Beaufort.

"Seabreeze" is the FACSFAC for the Gulf of Mexico, and it is controlled out of NAS Pensacola, Florida.

When an aircraft is about to enter these areas, it contacts the FACSFAC and is given a transponder (squawk) code and any advisories, then is shuttled off to a tactical frequency. These are often action-packed frequencies, and if you live in any one of these coastal areas, you should check them out. They are pretty good listening.

Many installations have ranges used by aircraft for practice bomb runs, tactical training, and so on. The frequencies used at these ranges are sometimes listed under the name of the base that controls the range. Often, clearance into and out of the range will be conducted on civilian Center frequencies, so you may want to listen to those also.

The FAA recognizes that the military has a continuing requirement to conduct certain training and Research/Development activities within airspace as free from other aircraft as is practicable. So they have created ATC assigned airspace (ATCAA), Altitude Reservation (ALTRV), military operations areas (MOA), restricted areas, warning areas, and IFR military training routes (IR), so that these activities are separated from other IFR traffic in controlled airspace. Flights to/from such areas are under the control of either the FAA or military ATC facilities.

Special Modes

Some aircraft use special frequency-hopping techniques called "Have Quick" or HQ. They use several frequencies and the radio switches the frequency several times per second. It is almost impossible to the monitor these comms if you only have one radio; the transmissions will be unreadable. There have been reports among the listening community of enthusiasts setting up five radios to monitor HQ, each one programmed to one of the five Have Quick frequencies being used in that set. Since I don't have five scanners, I have never tried it and haven't spoken to anyone who has actually done this, so the technique is pure theory from my experience. If you have done it, please let us know the results of your experiment.

Of course, the military has encryption devices aboard their aircraft. If they are using encryption, you won't be able to monitor these comms. And under the 1986 Electronic Communication Privacy Act, you won't be able to purchase a decoder for these encrypted comms. It is against federal law.

Ground Operations Frequencies

Military ground operations are almost all in the FM narrow mode. Some are digital, which will sound like a burst of tones and beeps. All kinds of operations are in the various FM bands, including base law enforcement, security, commander nets, aircraft maintenance, civil engineering, munitions handling, refueling trucks (also known as POL or Petroleum, Oil and Lubricants), fire and crash trucks, ambulances and much more.

Security Units

Every base, whatever the service, will have some type of security apparatus. There are some differences in the types of security found within each base that are determined by mission needs and local requirements.

On Army posts, the security is usually called the Military Police, or MPs for short. They provide perimeter protection, as well as protection for weapons storage and other sensitive areas. They also conduct regular law enforcement duties, including traffic enforcement on the posts. The Military Police also provide off-post patrols in many towns near large Army installations, to protect and control the Army personnel in that area. They have almost unlimited police powers off base when dealing with military personnel.

On Air Force bases, there are usually several different types of security. They are all called Security Police, but their missions can sometimes be very different.

The law enforcement section provides manpower for the external gates, traffic control, base housing areas, and free-access buildings on the base. They wear blue uniforms, carry side arms of various calibers, and drive around in marked patrol vehicles.

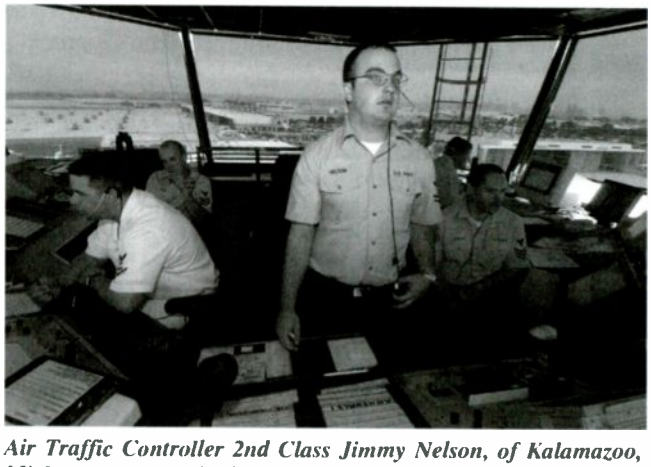
Another type of Security Police is the Security section. They provide protection for weapons storage, aircraft storage, and flight line areas. They wear fatigues and are more heavily armed, usually with M-16 rifles and other automatic weapons.

Yet another type of Security Police is used on bases that have missile sites. Called Missile Security, they also wear fatigues and are heavily armed.

Each section usually has its own radio frequency or talk group on the base trunking system, and they are all capable of talking on another section's frequency or meeting on common frequencies or talking groups.

Naval bases and ships can have their own Navy security, but often the larger bases and ships use Marine Corps personnel, the Marine Corps being a division of the Navy Department. Navy security assigned to patrol nearby towns are called the Shore Patrol. Local mission requirements dictate the type and amount of security needed on each base or ship.

Each military service has its own investigative branch. In the Army, it's called the Criminal Investigation Command (CIDC-formerly CID). The Air Force calls theirs the Office of Special Investigations (OSI). In the Navy, it is the Naval Criminal Investigative Service (NCIS). They conduct all investigations into major crimes on the base, provide intelligence functions, and conduct internal investigations where appropriate. They all have their own set of radio frequencies/trunk system talkgroups that are usually separate from base security functions.



Air Traffic Controller 2nd Class Jimmy Nelson, of Kalamazoo, Mich., manages multiple aircraft approaches during a busy day in the air traffic control tower. NAS North Island and Naval Outlying Landing Field work together to manage the air space above San Diego, Calif., for both military and civilian aircraft. Naval air traffic controllers perform duties similar to their civilian counterparts, and play a key role in the effective directing and managing of military air traffic throughout the world. (U.S. Navy Photo by Photographer's Mate 2nd Class Johansen Laurel)

Other Routine Operations

Almost every base will have a frequency/talkgroup or two for its fire department. At installations with an aircraft presence, these are called fire/crash frequencies, and those without aircraft will have structural firefighting equipment only.

On many installations, especially Air Force bases, there is a pair of frequencies or talkgroup that is referred to as the "Commanders Net." This is used to provide instant communications to certain individuals and duty officers, and most systems have a telephone interconnect so phone patches can be made from the vehicle radio or portable. If the base near you has one of these systems, be sure to monitor it for emergency communica-

tions.

Some installations have more than one Commanders Net, which is usually the case when there are two or more large commands on the base, such as at Andrews AFB.

The section that maintains the grounds and physical structures at the installations usually has its own frequencies/talkgroups. Called the Post Engineers in the Army, the Civil Engineers in the Air Force, and the Public Works Department in the Navy, these people are responsible for structure assembly and repair, snow removal, street and underground maintenance, lighting, power houses, and a host of other such facility maintenance duties.

Aircraft maintenance personnel usually have their own frequency/talkgroups, as well as the munitions handlers, and the aforementioned POL trucks. At the smaller bases, they may all be on a "Base Ops" or "Ramp" frequency/talkgroup, depending on what their mission and needs dictate. A lot of installations will have separate frequencies/talkgroups for the motor pool and for the base taxi or transportation section.

Medical nets provide communications for the hospitals, clinics, ambulances, and the other medical needs on the installations. Disaster Nets are activated during drills or actual large-scale emergencies.

Military Trunk Radio Systems

Most military installations have now installed trunk radio systems. The advent of the new trunk tracking scanners opens up a whole new era of military monitoring to radio enthusiasts. The majority of the trunk systems that we have studied so far are using frequencies in the 400-420 MHz range. There are a few VHF systems, but the newest twist is a whole new land mobile radio band dedicated to trunk systems in the 380-399.9 MHz spectrum. Originally, these were small, ten-channel systems – five base frequencies and five mobile frequencies. But that has changed, and we now see, especially on the larger bases, multi-site/multi-frequency systems.

You must remember that every trunk system is software-controlled and almost all the parameters of the system can be customized to suit the needs or wishes of each installation; no one size fits all. There is one "data" channel at a time unless it is a multi-site system, and they do not seem to change every 24 hours like some civilian systems do. Also, within the government/military complex there is no longer a standard for base/mobile offset frequencies, either.

So, the data channel can rotate or not, the mobiles can be either higher or lower than the base frequencies, and the base/mobile offset can be almost anything as long as it fits into the military allocation and does not cause interference to another system. There may or may not be phone-patch capabilities, they may or may not have encryption capabilities (but most systems would have both phone-patch and scrambling capabilities), and so on. Get the picture?

Almost anything can happen on a trunk system, and that's why monitoring them can be so much fun. When a military base installs a trunk system at a base, it will shift some work sections to it right away, and then phase in other sections. They will then usually give up their prior frequency allocation for that particular work group. The old frequency may be re-allocated to another section, or just dropped entirely.

So keep an ear out! If you detect a trunk system on your favorite base, there are certainly going to be many changes taking effect. Please let us know about them. You can have a lot of fun with this!

A significant footnote to all this is the changeover of government and military communications to the new narrowband APCO-25 digital protocol. If you don't have one of the new trunk following scanners like the BC-296D/BC-796D, land mobile communications on government frequencies and from military bases will gradually disappear from your scanner. Under current regulations all 162-174 MHz systems must be converted to the new narrowband technology no later than January 1, 2005. By January 1, 2008, both of the other two major land mobile bands (138-150.8/406-420 MHz) used by the military and the government must be converted. All new systems purchased by the government since January of 1998 have had to comply with these regulations.

So, if you are wondering where the ground comms from a nearby base or agency have disappeared, look no further than the world of digital communications, and get yourself an APCO-25 digital scanner.

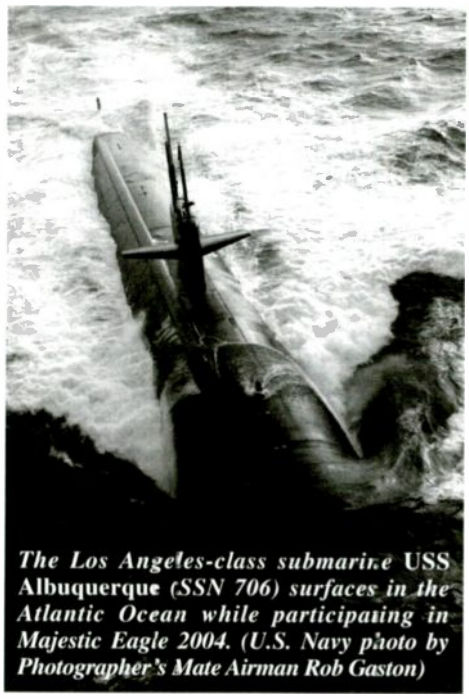
Related Communications

Almost all large military installations have various specialized detachments assigned to them. Most common are communications sections and investigative detachments, and quite a few of them have weather detachments. Some may have their own frequency/talkgroup for you to listen to.

Not to be confused with the Post Engineers, the Army Corps of Engineers controls wetlands, waterways, dams, canals, many docking areas, and dredging operations. They can be found throughout most of the USA, but they usually don't have much of a presence on military installations. They maintain offices at federal buildings and in civilian areas. They have their own set of frequencies and some even have their own trunk systems.

Very often the military will have the ability to transmit on civilian frequencies assigned to adjacent or nearby cities and towns. This is particularly true with the police and fire authorities. There may be instances when the military police need immediate communication with the civilian police, or the base fire department must coordinate their activity with the nearby civilian fire department.

If your state or local public safety agencies have mutual aid, EMS Hospital-Ambulance or law enforcement intersystem frequencies, keep an ear out for military activity on these frequencies.



The Los Angeles-class submarine **USS Albuquerque** *(SSN 706) surfaces in the Atlantic Ocean while participating in Majestic Eagle 2004. (U.S. Navy photo by Photographer's Mate Airman Rob Gaston)*

Active Frequencies

Each branch of the military has a host of frequencies that are in common use throughout the United States. Even if an installation's individual listing in hobby frequency guides do not include these frequencies, you should put them into your scanner and listen for activity on them. Table One has some of the common frequencies reported nationwide:

Best Source for Military Frequencies

If you are looking for a super source for frequency information then look no further than the Grove Enterprises Bookstore. Your best bet for current, comprehensive, and accurate frequency information is the new *Grove Military Frequency Directory*, second edition on CD-ROM. This 765 page Adobe Acrobat PDF format CD-ROM now offers frequency lists for:

- *Complete listings for all 50 states and overseas bases.
- *NORAD, including regions, CAP/tanker, discrete or primary, and frequency designators.
- *Aerial refueling tracks and anchors.
- *National Guard/Air National Guard tactical and contingency frequencies by state.
- *FAA Air Route Traffic Control Centers (ARTCC) by state and remote station locations.
- *VHF/UHF military trunk system frequencies and talk-groups.
- *Navy Fleet Area Control and Surveillance Facilities (FACSFAC).
- *Military UHF frequencies used by civilian airports.
- *Military training ranges, warning areas and operating areas (MOA).
- *Known satellite up/down links, band plans, designators and channel numbers.
- *Official Department of Defense (DOD) worldwide FLIP charts and tables.
- *Department of Defense (DOD) worldwide enroute planning directories and supplements

You can also get the accurate frequency and schedule information on monitoring air show communications in our annual March *MT Milcom* column or on the *MT* website (**http://www.monitoringtimes.com**).

So as you can see, the world of military communication in the VHF/UHF spectrum is vast and exciting. The best part is, you don't have to live next to a base to get in on the action. Anyone anywhere in the United States is within range of some military communications and can share in the experience of listening to the communications from our nation's armed forces.

Table One: Nationwide Military Frequencies

ALL MILITARY SERVICES

Aerial Refueling
228.550 235.100 236.750 238.650
238.900 254.600 255.750 260.200
264.900 266.500 275.950 276.100
276.500 279.800 282.700 283.900
286.300 286.900 288.900 289.700
291.900 292.600 293.000 295.800
297.300 305.500 314.500 318.000
319.500 319.700 320.900 322.800
324.400 324.600 327.600 336.100
339.200 341.400 343.100 343.500
344.700 348.900 352.600 352.700
352.900 359.100 361.700 366.300
368.600 370.400 372.300 375.700
378.200 384.600 388.400 391.000
391.800 394.600 394.900 396.200

Air Traffic Control 228.400 252.900 256.700 257.200

Automatic Terminal Information System
270.100 273.500

Civilian Flight Test Support
225.450 227.800 229.300 231.750
231.900 234.400 236.250 237.750
240.600 242.300 245.150 251.850
255.725 257.350 260.400 262.500
266.300 266.400 269.100 274.150
275.200 276.050 277.500 277.750
280.900 284.100 287.000 287.200
291.800 292.500 297.500 299.100
299.900 300.000 300.400 300.650
308.850 309.800 313.600 314.600
315.000 321.000 321.500 322.200
335.750 339.000 340.000 341.600
345.400 349.600 349.700 349.725
351.025 356.900 357.825 374.400
376.300 380.850 382.600 384.500
384.700 384.800 386.600 394.800
397.100

DoD Search and Rescue 40.500

Flight Check/Inspections 135.850
135.950 351.4750

Flight Service Stations (FSS) 255.400

Ground Control
121.600 121.650 121.700 121.750
121.800 121.850 121.900
225.400 (Military) 275.800 (Civilian/Military)
289.400 (Military) 335.800 (Military)
348.600 (Civilian)

JOSAC Aircraft Common 283.875
303.000 383.200

Meteorology (Metro)
239.800 257.750 267.400 271.600
274.750 306.500 316.950 342.300
342.400 342.500 342.550 343.400
343.500 344.600 346.550 346.600
355.300 369.900 373.100 375.200

NORAD
148.125 225.000 228.800 228.900
234.600 235.900 252.000 254.200
259.600 260.900 265.400 271.000
276.400 276.650 277.600 278.400
279.400 282.600 285.900 288.400
293.600 295.800 298.300 318.400
320.600 320.900 324.000 338.000
362.300 386.000 387.000 364.200
(Intercept Control)

Search and Rescue 282.800

Towers
126.200 (Military) 236.600 (Military)
239.000 (Civilian) 239.300 (Civilian)
241.000 (Military) 253.500 (Civilian/Military)
256.900 (Civilian) 257.800 (Civilian)
340.200 (Military) 360.200 (Military)

U.S.-Russian Military Coordination (Worldwide)
278.000

U.S. AIR FORCE

89AW Special Air Mission (SAM) Aircraft Air-to-Air 136.725

Air Combat Command (ACC) Air-to-Air
225.900 226.100 227.900 228.100
230.700 235.600 254.475 267.800
283.800 286.200 305.700 316.450
354.200 358.200

ACC Command Post 311.000 321.000 381.300

AFMC Air-to-Air 343.550 363.875

Air National Guard (ANG)/Air Force Command Post 303.000

Air Mobility Command (AMC) Airlift Air-to-Air
292.000 297.000 319.400

AMC Command Post 130.650
134.100 319.400 349.400

AMC Command and Control Air-to-Air
228.350

AMC ALCE Operations 279.850
283.750 340.600 340.800 349.400

AMC Special Operations 262.025
271.825 289.175 292.375

AWACS Aircraft Operations
225.100 225.650 225.800 225.825
225.875 237.150 253.800 257.500
261.200 264.625 265.900 270.400
282.600 283.850 288.200 296.650
303.100 313.600 317.950 320.600
324.650 335.950 341.750 375.725
375.825 375.925 375.975 376.025
376.125 388.950

AWACS/JStars Interflight 237.150
254.475 276.075 303.1000

Civil Air Patrol
143.750 143.900 148.125 148.1375
148.150 149.3975 149.5375 149.895
149.925

Drop Zone/Air Drop Training 239.650
240.100 287.650

JStars Aircraft Operations
225.150 225.575 225.725 225.975
226.875 227.725 227.925 228.225
228.500 228.750 228.975 231.750
235.050 235.175 235.325 236.000
236.150 238.350 239.950 246.150
257.250 262.450 267.850 271.100
271.950 273.050 276.800 279.750
283.250 283.650 286.250 286.450
288.900 289.050 293.550 298.650
303.275 308.575 308.750 308.850
315.275 317.950 319.450 324.650
335.725 338.450 341.750 342.150
347.025 351.025 355.250 372.150
376.125 376.150 381.000 387.225
388.225 388.950 394.775 395.150
395.825

Operations 49.850

Pilot to Dispatchers 139.300 372.200 (PTD)

Search and Rescue/Survival Training
46.850 236.000 251.900 252.800 259.000 381.000

Supervisor of Flying Common 280.500

T-45 Aircraft Air-to-Air 362.425
362.475

Thunderbird Flight Team
141.850 142.175 142.575 143.850
143.900 235.250 413.025 413.100

Training Exercises
225.450 225.650 225.725 225.850
225.950 226.150 226.250 227.875
227.950 228.050 228.150 228.250
228.475 228.650 228.725 228.850
228.975 229.075 229.275 235.150
236.150 236.550 236.650 238.350

UHF Wideband
230.000 230.650 232.450 266.050
282.075 286.350 296.650 300.400
312.500 345.500 352.750 355.000
356.150 356.350 357.000 357.700
359.500 359.750 359.950 361.100
362.150 364.500 365.000 366.000
366.600 366.750 368.250 370.100
370.400 372.850 374.550 374.900
375.375 376.750 382.350 382.850
387.500 389.550 390.050 390.550
397.050 398.050 399.200 399.550

U.S. ARMY

Air-to-Air Training 226.700 232.700

Air-to-Ground Training
226.350 226.450 226.550 226.650
226.750 226.850 226.950 227.000
227.050 227.100 227.200 227.250
227.350 227.450 227.550 227.650
230.500 230.500 230.850 230.950
231.000 231.050 231.150 231.250
231.350 231.450 231.550 231.650
231.750 231.850 231.950 232.050
232.150 232.250 232.350 232.450
232.550 232.650 232.750 232.850
232.950 233.050 233.150 233.250
233.350 234.050 234.150 234.250
234.350 234.450 234.500 234.550
240.500 243.500 244.400 246.800
249.500 267.100 267.200 277.500

An MH-60S Nighthawk helicopter, assigned to the "Chargers" of Helicopter Combat Support Squadron Six (HC-6), picks up supplies on the flight deck of **USS Harry S. Truman** *(CVN-75) during Majestic Eagle, a multinational exercise conducted off the coast of Morocco.* **Truman's** *participation in Majestic Eagle is part of her scheduled deployment supporting the Navy's new fleet response plan (FRP) Summer Pulse 2004, the simultaneous deployment of seven carrier strike groups (CSGs), demonstrating the ability of the Navy to provide credible combat across the globe. (U.S. Navy photo by Photographer's Mate Airman Craig R. Spiering)*

280.800 345.500 364.500 371.500
372.500 374.100 374.150 374.200
374.250 374.300 374.350 374.450
374.700 375.500 377.500 387.500
388.500 389.500 391.500 392.500
395.500

Army Corps of Engineers 163.4125
163.4375

Army Towers 41.500 241.000

Golden Knight Parachute Team
123.400 123.475 123.500

National Guard Common 38.500

U.S. COAST GUARD

Coast Guard Air Operations 282.800
381.700 381.800 383.900

Coast Guard Auxiliary 143.280
148.825

U.S. NAVY

Blue Angel Flight Team
163.000 164.900 165.225 170.900
236.450 237.800 238.150 249.625
251.600 254.500 265.000 273.300
275.350 284.250 299.650 305.500
345.900 381.000

HMX-1 Squadron Common 30.150

Leap Frog Parachute Demonstration Team
407.500

Naval Criminal Investigative Service
140.075 140.250 140.650 140.775
163.100 168.350 413.350 418.050
418.400 418.575

Navy Fire Departments 140.100

Squadron Common/Air-to-air 236.350
301.250

Listening to the Winds of Heaven

DXing India

By Gayle Van Horn

Next time you're scanning the shortwave bands on an autumn or winter's afternoon, listen carefully and you may hear one of the oldest musical traditions in the world being broadcast from one of the oldest cultures in the world. Around 2100-0045 UTC in the 19, 25 or 31 meter bands, listen carefully for a distinctive sound that fades in during mid afternoon. You may well be hearing the legendary musicians of India playing the sitar, tabla and tanpura.

Few countries offer such a diverse listening opportunity as India. It is a nation of overwhelming rhythms, color and cultures. One where mysticism is recognized as the very quintessence of consciousness. Where temple elephants exist amicably with the microchip. Modern India is home to both the tribal lifestyle and the sophisticated urban jetsetter, a nation of staggering poverty and opulent wealth.

India also remains popular with radio listeners for its diversity in broadcasting, from the external voice of All India Radio to the Indian domestic regional stations scattered throughout the vast country. India offers listeners not just afternoon or early evening monitoring: This time of year, depending on your location, India is likely to fade in quite nicely on several meter bands anytime from 1030 to 1730 UTC.

While India does not target the listening audience in North America, it is heard consistently, with the most favorable logging opportunity occurring during autumn and winter months. Before you begin targeting India for *your* listening opportunity, a closer look at the broadcasting history of All India Radio is an excellent introduction to your Indian journey.

Indus River near Batalik, Kashmir - courtesy Md. Sadiq

India's Broadcasting Roots

The subcontinent of India lies in south Asia, between Pakistan, China and Nepal. It is the second largest country in the world, exceeded only by China. The country is divided into 28 states and seven Union territories. Incredibly, its population is nearly equal to that of the continents of Africa and South America combined. As a consequence of India's size and population, the history of the country is seldom the same for two adjoining territories, resulting in an imprint of varying cultures.

Broadcasting in India began as several experimental tests on small Marconi transmitters. The first reported test was conducted in 1920 by Giandchand Motwane in Bombay. The following year, another test was conducted as a cooperative venture between the *Times of India* and the *Post & Telegraph* in Bombay. Until regular broadcasting began in 1927, several experimental low-powered stations were on the air, some lasting only one day.

On July 23, 1927, the Indian Broadcasting Company (IBC) began the first radio station – 7BY, inaugurated in Bombay by British Viceroy of India, Lord Irwin. Five weeks later, the Calcutta station was inaugurated, followed by expansions in Madras (now known as Chennai) and Bangalore.

The Delhi station went on the air January 1, 1936, using a 20kW medium wave transmitter. Shortly thereafter, Controller of Broadcasting, Lionel Linlithgow, proposed the station adopt the name All India Radio. The first 10kW shortwave transmitter was commissioned in Bombay on February 4, 1938. As an expanding voice, AIR adopted clear objectives to inform, entertain and educate the masses.

During World War II, the Indian government began to enlarge the broadcasting organization to meet the requirements of its war efforts. When India gained independence in 1947, estimates indicated a mere 275,000 radios were in operation in the county. The All India Radio organization comprised a network of six stations in Delhi, Calcutta, Bombay, Lucknow, Madras and Tiruchirapalli, with a complement of 18 transmitters, covering only 11 percent of the population. Listening on mediumwave was confined to the urban areas of the city.

In 1948, the News Services Division began, further expanding their broadcasting goals. Ensuing decades have ensured a future for India in the fields of FM radio and television, as well as an established network of medium wave and shortwave services.

All India Radio Today

Today, Prasar Bharati, the parent organization of All India Radio, is operated by the government's Ministry of Information and Broadcasting. A network of 214 broadcasting centers that include mediumwave, shortwave, television, satellite, and FM serve 99 percent of the population. Using 54 shortwave transmitters, the AIR External Service covers 27 languages and the Home Service broadcasts in 146 dialects and 24 languages – quite an accomplishment considering India's first voice began as an experimental station.

The Internet brought a yet another kind of service, launching AIR's on-line service and offering audio on demand. In 1997, Digital Audio Broadcasting was also introduced in Delhi on an experimental basis.

AIR Networking

The complex broadcasting mass of All India Radio serves a dual service on shortwave radio, divided into Program and Engineering Divisions. Programming provides services in many dialects from the regional and local production centers. It also consists of the News Services

Division (NSD) and External Services Division (ESD), both headquartered at Broadcasting House in Delhi.

The News Services Division produces bulletins which emanate from Delhi and are relayed by several AIR stations. The NSD produces a centralized Home News Service in English and Indian dialects, which are distributed by satellite to all AIR stations, besides being relayed by HF transmitters in Aligarh, Delhi, Chennai, Gorakhpur and Bombay. All regional and local stations relay these bulletins at appointed times.

The External Service Division, headquartered in Delhi is the most widely heard of AIR's broadcast services. The broadcasts in English are known as the General Overseas Service (GOS). News and current affairs programs are supplied by the News and Services Division. All news broadcasts in the External Services are produced in the Delhi, Tamil, Gujarati, Bombay and Chennai studios.

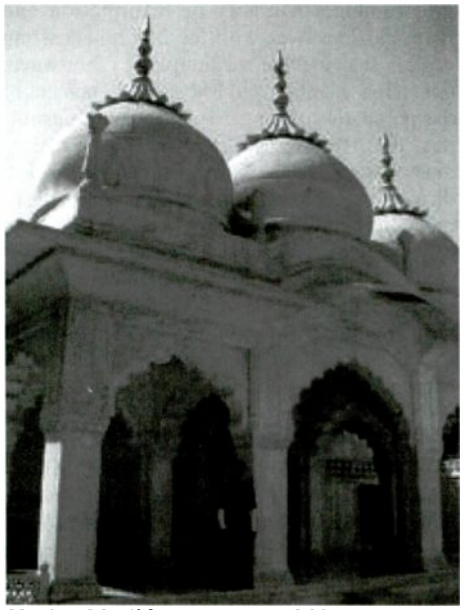
The regional domestic stations are targeted to a local listening audience, making them much sought-after by hobbyists eager to log them. Stations are scattered throughout the country and broadcasts are similar to the External Service. Their program format is usually easy to follow, consisting of news, interviews and current affairs, followed by classical Indian music.

Some AIR regional stations have extended hours or special programming for the Indian hajj pilgrims in Saudi Arabia. Hajj is one of the five pillars of Islam, obligating every adult Muslim to visit Mecca at least once in his lifetime. The next pilgrimage or hajj occurs January 20-23, 2005. Frequency schedules monitored during hajj in 2004 were: 4950 kHz 0530-0100, 2330-0100 UTC; 11730, 13620, 17845 kHz 0530-0600 UTC.

Special sporting events or national holidays are also excellent opportunities to log special programming. Next Republic Day (January 26) and Independence Day (August 15), tune in and check for extended broadcast hours.

Double the Points

Two regional stations especially popular among DXers are from Goa and Sikkum.



Nagina Masjid - courtesy TrekShare.com

Set on the golden Konkan coast, along the Arabian Sea, is the state of Goa. This former Portuguese enclave presents an interesting addition for the reception log. Although it is an Indian state, it also counts as a separate country for QSL collectors, having been a Portuguese territory until annexation by India in 1961.

Programming is in Hindi and Asian dialects, on 7115 kHz 1615-1830 UTC and 11840 kHz 0315-0415 UTC. Recent loggings from Panaji, Goa, have also been observed on 9810 kHz 0130-0230; 12085 kHz 1615-1830; 15410 kHz 1115-1200 UTC.

QSL of Devidol, Gaurisagar - courtesy Gayle Van Horn

Another Indian state which also counts as an extra country is Sikkum. Situated along the northern Himalayan border, it has only recently become recognized by China as an Indian state. The two countries, once at border odds, have resumed border trade through the Nathu La pass in Sikku, thus providing the first steps toward China's recognition of Sikkum as an Indian state. AIR Gangtok, Sikkum, is on 3365 in Asian dialects 0100-0400 UTC; 0700-0930; 1030-1630 UTC.

Offshore Monitoring

Some call it India's *splendid isolation*, while others refer to it as an *emerald nirvana*. One DX target belonging to India remains in a class by itself. The Andaman and Nicobar Islands, an archipelago of 36 islands, is located off the eastern coast of India in the Bay of Bengal. In amateur radio circles, this rarely heard county is at the top of many an operator's Hit List. To the shortwave crowd, it is considered an equally excellent "catch."

Shortwave was introduced here in 1989. AIR transmitters are located at Brookshabad, south of Port Blair, using a dipole array antenna that ensures island coverage. Programming, which includes an English newscast, is mainly in Hindi and is intended for the northern and southern islands in the long island chain. Although beaming to the islands, it is heard consistently during the autumn and winter months by North American listeners.

Country collectors will be interested that, like Goa and Sikkum, logging the Nicobar and Andaman Islands also counts as a separate country. Now is an excellent opportunity to log this sought-after regional domestic station. Try 4760 and 7115 kHz at 2355-0300, 1033-1730 UTC; 2355+ on 4760; 0315-0345, 0700-0930, Saturday 0415, and Sunday 0505 and 1000 on 7115 kHz.

QSLing the Subcontinent

Looking to verify India? It's not too difficult, but it is erratic and may require diligence and patience, but first let's look at reporting guidelines. Details of what you heard should include frequency, time, date and programming details.

When monitoring India, a twenty to thirty minute session should be adequate. If you are monitoring more than one frequency or parallel frequencies, a "period report" is an excellent idea. A period report, as the name implies, covers a session at various broadcast times during one or subsequent days. These may be especially useful when reporting to a domestic station. A period or standard reporting session is adequate for All India's external service.

Instead of using a SINPO number (strength, interference, noise, propagation, overall quality) to rate signal conditions, report on the reception quality in a "plain English" explanation of fading, readability, interference, signal strength and quality. Reporting that you heard "New Delhi national news" may suffice, but for a weak signal or a domestic station, details on local programming are better and should convince the Engineer you monitored their station.

The time of reception should specify UTC and Indian Standard Time (UTC plus 5-1/2 hours). If you have a computer handy, **http://www.worldtimeserver.com** will calculate the Indian standard time for you.

Reports of India's domestic stations may be sent to the External Services Division in New Delhi, or you may request your letter be forwarded to the appropriate domestic station. There are DXers who opt for a more personal approach and send their letter directly to the individual domestic station. If doing so, you should address your letter to the Station Engineer. You may improve your chances for a reply (though it's not guaranteed). Letters are accepted in English using either approach. Consider, though, that most domestic stations have a small operating staff that handle all the broadcasting, correspondence and engineering.

Although not required, you may feel enclosures might increase your reply chances, (especially for a follow-up letter). Conceal mint Indian stamps or two IRCs (International Reply Coupons) within the letter. Wrapping them in tissue paper or foil, tucked into the bottom half of the letter should be adequate. IRCs are available at the post office; mint stamps may be obtained from DX Supplies, Bill Plum, 12 Glenn Road, Flemington, NJ 08822-3322. Send Bill an SASE for his latest price list.

Do not use fancy envelopes, lettering fonts, decorative stickers or commemorative stamps. All will draw attention immediately, and could result in postal theft. India, like many other countries, has experienced increasing problems with mail theft. If you're concerned, consider sending your correspondence as a registered letter or send

it without any enclosures. I've used both methods with success.

AIR is rather slow in replying, but hopefully you will not need a follow-up. If you do, wait at least three to four months. Most DXers wait six months to a year. If you have not received a reply within a year, a new monitoring session might be in order. Patience (or diligence) is in order when verifying All India Radio.

Don't forget to include your email address in the report. Many AIR stations are beginning to verify directly by email, or perhaps both! Try sending your email reception reports to: *spectrum-manager@air.org.in*

A Change in the AIR ?

This year, the listening audience has anticipated All India Radio's plan for a 24 hour-*News Channel* on shortwave. K.S. Sarma, CEO, stated, "We are resorting to shortwave for the simple reason that it covers the whole country." Unused transmitters from the external service were to be diverted for the purpose. Testing was initially monitored in English and Hindi in Calcutta on 7220 kHz (Mumbai 100kW), 7270 kHz (Chennai 100 kW), 7360 kHz (Delhi 50 kW), and 7420 kHz (Guawahati 50 kW). Transmission times monitored were 0025-0430, 0700-1330 and 1430-1740 UTC.

At this writing, no additional testing has been observed, leaving listeners and the hobby press speculating on the future of AIR's *News Channel*. Should testing resume (and it is rumored to do so), detailed reports of reception should be sent to: Sunil Bhatia-Spectrum Manager *spectrum-manager@air.org.in*. The postal address is: Director (Spectrum Manager & Synergy), All India Radio, Room No. 204, Akashvani Bhawan, New Delhi, 110001 India.

After several delays in 2004, will the *News Channel* become an reality?

An Alternative Voice

Clandestine broadcasts were monitored abroad from one station in 2003 and 2004. The Voice of Kashmir (Radio Sedaye Kashmir) is pro-Moslem and favors Azad Kashmiri independence from India. It was thought to be transmitting from Pakistan or Tajikistan; however, according to monitors, the choice of meter band would suggest transmitters possibly located in Kingsway, a northern suburb of Delhi. *DX Listening Digest* reported monitoring in the Urdu language on 6100 kHz at 0230-0330 and 1425-1600 UTC, and on 9890 at 0730-0830 UTC.

The Future of AIR

So what is going on with All India Radio? Past reports claimed AIR would abandon its External Services and phase out shortwave transmissions as recommended by the government. Citing poor reception quality, lack of staff and non-availability of shortwave receivers, AIR officials stated that shortwave in the analog mode should be discontinued. This, plus notice that existing transmitters were being used in the best possible manner until their life ends, led DXers to assume AIR's days were numbered.

But, to add to the confusion, All India Radio followed this revelation by going on a shortwave spending splurge. AIR installed five new shortwave transmitters for their external service – two in Aligarh and three in Delhi – at 250 megawatts each.

The hobbyists continue their speculation, and it remains to be seen what the future holds for All India Radio.

Ready for the Subcontinent?

This time of the year is an excellent opportunity to take advantage of enhanced radio signals from India. If you want to learn more and stay current on the radio scene, the DX-India emailing list deals exclusively with broadcasting developments in India. To join this group, email your request to: *dx_india-subscribe@yahoogroups.com*. The DX Asia group also has information on DXing India at **http://www.dxasia.info/**.

Radio continues to emerge as an important medium for the people of India. With new innovations and advancements, radio continues to be a part of their lives. As a radio listener it can be yours as well. Few countries offer hobbyists such a diverse listening opportunity as India. So, next time you tune the bands on an autumn or winter afternoon, if you hear the overpowering and mystic sounds of exuberant India fill your listening post, go exploring!

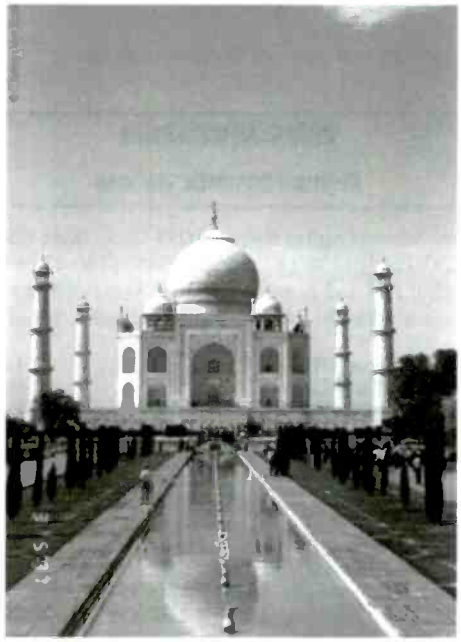
Table 1

All India Radio Addresses/Websites

AIR-External Services Division
http://www.allindiaradio.org
http://airkode.net (unofficial but contains updated schedules, news and information)

Broadcasting House
Sansad Marg, P.O. Box 500
New Delhi 110 001, India
(or)

Directorate General of All India Radio
Akashvani Bhawan, 1 Sansad Marg
New Delhi 110 001, India



Taj Mahal - Courtesy TrekShare.com

QSL of white tiger at Delhi Zoo - courtesy Gayle Van Horn

(QSLs continued on next page)

Prasar Bharati Corporation of India
Akashvani Bhawan
Room 204
Sansad Marg
New Delhi 110 001 India
Email: *spectrum-manager@air.org.in*

Regional Domestic SW Stations
(QSLs)
Prasar Bharati Corporation of India
Akashvani Bhawan
Room 204
Sansad Marg
New Delhi 110 001 India

AIR-Aizawl
Radio Tila
Tuikhuahtlang
Aizawl 796 001
Mizoram, India

AIR-Aligarh
Anoopshahar Road
Aligarh 202 001
Uttar Pradesh, India

AIR-Bangalore SW Transmitting Center
(see AIR-External Service Division address)
AIR-Bhopal
Akashvani Bhawan
Shamla Hills
Bhopal 462 002
Madhya Pradesh, India

AIR-Chennai
(see AIR-External Service Division address)
Domestic Service: Avadi, Chennai 100 062
Tamil Nadu, India

AIR-Gangtok
Old MLA Hostel 737 101
Sikkim, India

AIR-Gorakhpur
Town Hall, Post Bag 26
Gorakhpur 273 001
Uttar, Pradesh, India
(Nepalese service to AIR External Service Div.)

AIR-Guwahati
P.O. Box 28
Chandmari, Guwahati 781 003
Assam, India

AIR-Hyderabad
Rocklands, Saifabad
Hyderabad 500 004
Andhra Pradesh, India

AIR-Imphal
Palau Road
Imphal 795 001
Manipur, India

AIR-Itanagar
Naharlagun
Itanagar 791 110
Arunachal Pradesh, India

AIR-Jaipur
5 Park House
Mirza Ismail Road
Jaipur 302 001
Rajasthan, India

AIR-Jammu/Radio Kashmir-Jammu
Jammu 180 001
Jammu and Kashmir, India

AIR-Jeypore
Jeypore 764 005
Orissa, India

AIR-Kohima
P.O. Box 42
Kohima 797 001
Nagaland, India

AIR-Kolkata
G.P.O. Box 696
Kolkata 700 001
West Bengal, India

AIR-Kurseong
Mehta Club Building
Kurseong 734 203
Darjeeling District
West Bengal, India

AIR-Leh/Radio Kashmir Leh
Leh 194 101
Ladakh District
Jammu and Kashmir, India

AIR-Lucknow
18 Vidhan Sabha Marg
Lucknow 226 001
Uttar Pradesh, India
(or) External Services Division address

AIR-Mumbai
Backbay Reclamation
H.T. Parekha Marg
Mumbai 400 020
(or) External Services Division address

AIR-New Delhi
P.O. Box 70
New Delhi 110 011 India
AIR-Panaji SW Transmitting Center
(see External Services Division address)

AIR-Port Blair
Haddo Post
Dilanipur
Port Blair 744 102
South Andaman
Andaman and Nicobar Islands
Union Territory, India
Email: *pblairph@sancharnet.in*

AIR-Ranchi
6 Ratu Road
Ranchi 834 001
Jharkhand, India

AIR-Shillong
P.O. Box 14
Shillong 793 001
Meghalaya, India

AIR-Shimla
Choura Maidan
Simla 171 004
Himachal Pradesh, India

AIR-Srinagar/Radio Kashmir
Sherwani Road
Sringar 190 001
Jammu and Kashmir, India

AIR-Thiruvanathapuram
P.O. Box 403
Bhakti Vilas
Vazuthacaud, Thiruvanathapuram 695 014
Kerala, India

Radio Kashmir-Jammu
Jammu 180 001
Jammu and Kashmir, India

Radio Kashmir-Leh
Leh 194101
Ladakh District
Jammu and Kashmir, India

Radio Kashmir-Srinagar
Sherwani Road
Srinagar 190 001
Jammu and Kashmir, India

Table 2: All India Radio

Regional Domestic Stations

Regional domestic shortwave stations usually broadcast English news at 0035-0400; 0245-0300; 0335-0340; 0435-0440; 0630-0635; 0730-0735; 0830-0900; 0935-0940; 1030-1035; 1135-1140; 1230-1235; 1430-1435; 1530-1545; 1730-1735 UTC.

Programming is primarily in Hindi, with English IDs and news. Additional Asian dialects include: Arunachali, Assamese, Bengali, Gujarati, Kannada, Kashmiri, Oriya, Punjabi, Pushtu, Malayalam, Marathi, Nepali, Sanskrit, Sindhi, Tamil, Telegu, and Urdu.

Freq kHz	Service	Times UTC	Language/Notes
3225	AIR-Shimala Northern Svc	0025-0200; 1300-1700	Eng, Hindi, Sanskrit // 6020 (Sat 1740)
3315	AIR-Bhopal A Western Svc	*0023-0215; 1130-1745	Eng, Hindi, Urdu // 7180
3365	AIR-Delhi Khampur Northern Svc	1220-1841	Eng, Hindi, Punjabi //6030, 9595
3390	AIR-Gangtok, Sikkim Northern Svc	0100-0400; 0700-0930 1030-1600 (Sun. 1630)	Nepali, Hindi, Asian dialects
3945	AIR-Gorakhpar	0130-0300; 1330-1745	Eng, Hindi, Nepali, Urdu //6030, 7235 //11830, 15135
4760	AIR-Port Blair, Brookshabad Southern Svc	2355- (Apr.-Oct. 2325) 0300; 1030-1730	Eng, Hindi, Sanskrit, Bengali
4760	AIR-Leh, Kashmir	0100-0430; 1130-1630/1700	Eng, Hindi, Kashmiri
4775	AIR-Imphal Northeastern Svc	0025-0215; 1030-1730	Eng, Hindi
4790	AIR-Chennai A Southern Svc	0000-0045	Asian dialects

4800	AIR-Hyderabad Southern Svc	0025-0215; 1130-1744	Eng, Hindi, Asian dialects (Sun 1140)
4820	AIR-Kolkata A Eastern Svc	0025-0210; 1230-1755	Bengali, Eng, Hindi
4830	AIR-Jammu, Kashmir	0025-0445; 1030-1745	Hindi, Urdu, Eng, Asian dialects
4840	AIR-Mumbai B Western Svc	*2353-0400; 1230-1730	Eng, Hindi, Asian dialects
4850	AIR-Kohima A Northeastern Svc	0000-0415; 1000-1700	Eng, Hindi, Asian dialects
4860	AIR-Delhi A, Kingsway Northern Svc	0025-0440; 1230-1330 1430-1930	Eng, Hindi, Urdu Punjabi, Kashmiri //6085
4880	AIR-AIR Lucknow A Northern Svc*	0023-0400; 1215-1741	Eng, Hindi
4895	AIR-Kurseong Northeastern Svc	0100-0400; 1130-1700 (Sat/Sun 1741)	Eng, Hindi
4910	AIR-Jaipur A Northern Svc	0025-0415; 1130-1741	Eng, Hindi
4920	AIR-Chennai A Southern Svc	0015-0245; 1200-1745	Eng, Hindi, Tamil
4940	AIR-Guwahati Northeastern Svc	0015-0415; 1150-1700	Eng, Hindi, Asian dialects
4950	AIR-Srinagar B Northern Svc	0055-0215; 1130-1745 2330-0100 (during Ramadan)	Eng, Hindi, Urdu
4960	AIR-Ranchi, Jharkhand State Eastern Svc	0025-0440; 1130-1700	Eng, Hindi
4970	AIR-Shillong, Mawgrong Northeast Svc	0025-0400; 1055-1630	Eng, Hindi
4990	AIR-Itanagar Eastern Svc	0025-0400; 1000-1630	Eng, Hindi
5010	AIR-Thiruvananthapuram Southern Svc*	0018-0215; 1115-1735	Eng, Hindi, Asian dialects
5040	AIR-Jeypore, Orissa Eastern Svc	0025-0440; 1130-1742 (Sat 0445, 0545, Sun 1030-1740)	Eng, Hindi
5050	AIR-Aizawl Northeastern Svc	0025-0400; 1130-1700 (Sun 1125)	Eng, Hindi
5965	AIR-Jammu, Kashmir	0630-0930 (local daylight only)	Hindi, Urdu, Asian dialects
5985	AIR-Ranchi, Jharkhand State	0700-0950 (Su 0630-1130)	Eng, Hindi (local daylight only)
6000	AIR-Leh, Kashmir	0700-0900 (Su 1130)	Eng, Hindi, Kashmiri (local daylight only)
6020	AIR-Shamla Northern Svc	0215-0400; 0700-0935 1130-1230 (Sun 0415-1230)	Eng, Hindi, Urdu
6030	AIR-Delhi, Kingsway	0200-0310; 1215-1430	Eng, Hindi, Punjabi // 3365, 9595 (local daylight only)
6040	AIR-Jeypore, Orissa Eastern Svc	0700-094- (Sun 1030-1130	Eng, Hindi (local daylight only)
6045	AIR-Delhi, Kingsway Northern Svc	1430-1930	Urdu
6065	AIR-Kohima A Northeastern Svc	0430-0510; 0700-0900	Eng, Hindi (local daylight only)
6085	AIR-Delhi, Kingsway	1220-1310; 1330-1740	Eng, Hindi, Sanskrit, Asian dialects
6100	AIR-Delhi	0230-0330; 1430-1530	Hindi
6110	AIR-Srinagar B Northern Svc	0225-0445 0600-1115 (Sun 1115)	Eng, Hindi
6150	AIR-Itanagar Eastern Svc	(Nov-Mar) 0730-0930	Eng, Hindi
6155	AIR-Delhi, Khampur Northern Svc	0015-0430	Urdu
6165	AIR-Khampur Northern Svc	1230-1600	Sindhi, Asian dialects
6190	AIR-Delhi, Kingsway Northern Svc	0730-1030	Eng, Hindi
7105	AIR-Lucknow Northern Svc	0630 (Su 0415)-0935	Eng, Hindi
7115	AIR-Port Blair, Brookshad	0315-0345; 0700-0930 (Sat 0415 Sun 0505)	Eng, Hindi, Bengali, Malayalam
7115	AIR-Panaji, Goa	1615-1830	Asian dialects
7120	AIR-Jaipur Northern Svc	Sun 0420-0700; Sun 1030-1120	Eng, Hindi
7130	AIR-Shillong, Mawgrong Northeastern Svc	0700-0930	Eng, Hindi
7140	AIR-Hyderabad A Southern Svc	0225-0445; 0610-0930 (Sun 0530-1130)	Eng, Hindi, Asian dialects
7140	AIR-Delhi Kingsway (Domestic feeder)	1550-1615-1740	Eng, Hindi
7150	AIR-Delhi Kingsway	0030-0040	Eng, Hindi
7150	AIR-Imphal Northeastern Svc	0230-0430 (Su 0530) 0630-1010	Eng, Hindi
7160	AIR-Chennai A Southern Svc	0300-0400 (Su 0530)	Eng, Hindi (check. 4920)
7180	AIR-Bhopal Western Svc	0227-0447 (Su 1115) 0700-1115	Eng, Hindi (local daylight only)
7190	AIR-Guwahatim, Northeastern Svc	0630-1730	Eng, Hindi (FM Relay testing)
7195	AIR-Mumbai (poss. News Channel testing)	0025-0430; 0700-1500	Eng, Hindi
7210	AIR-Kolkata A Eastern Svc	0230-0400; 0730-1000 (Sat/Sun 0500)	Eng, Hindi
7230	AIR-Kurseong Northeastern Svc	0615-1030 (Su 1115)	Eng, Hindi, Sanskrit (local daylight only)
7235	AIR-Delhi, Kingsway	0215, 0330-0355	Hindi, Asian dialects //3945, 6030, 6085, 7235, 11830, 15135
7240	AIR-Mumbai B Western Svc	0530 (Su 0415)-1035	Eng , Hindi
7250	AIR-Gorakhpur (Domestic feeder)	0700-0830;1130-1140	Eng, Hindi, Urdu
7255	AIR-Aligarh (Feeder)	1315-1415; 1530-1545	Eng, Dai, Pushtu // 9820, 9910, 11740
7270	AIR-Chennai (poss. FM Gold Svc testing)	0025-0430; 0700-1330 1430-1740	Eng, Hindi // 7420
7280	AIR-Guwahati A Northeastern Svc	0600-0945-1145 (Sun 0530)	Eng, Hindi
7290	AIR-Thiruvananthapuram Southern Svc	*0129-0415; 0630-0930 (Sun 1030)	Eng, Hindi
7295	AIR-Aizawl Northeran Svc	0700-0930	Eng, Hindi
7360	AIR-Delhi (poss. News Channel testing)	0030-0430; 0700-1300 1430-1740	Eng, Hindi
7420	AIR-Guwahati (poss. FM Gold Svc testing)	0025-0430; 0700-1330; 1500-1740	Eng, Hindi //7270
9425	AIR-Bangalore Nat'l Channel	1320-0042	Eng, Hindi //9470
9470	AIR-Aligarh (poss. Delhi FM relay)	0130-0530; 0930-1230	Eng, Hindi //9425 (relay Nat'l Channel)
9575	AIR-Delhi	1215-1420; 1445-1615; 1700-1740	Eng, Hindi, Asian dialects
9595	AIR-Delhi, Aligargh	0700-800; 0830-1130	Eng, Hindi, Urdu, Punjabi // 3365, 6085, 9835, 11830, 15135
9820	AIR-Panaji, Goa (Domestic feeder)	1530-1545	English

9835	AIR-Delhi, Kingsway	1330-1445; 1615-1740 0000-0045; 0300-0345	Eng, Hindi, Asian dialects //6085, 9595 11830, 15135, 15260
9910	AIR-Delhi (Domestic feeder)	1315-1415	English // 7255, 9820, 11740
10330	AIR-Bangalore	0025-0435; 0900-1245 1245-1740	Eng, Hindi, Asian dialects, check. 9425
11620	AIR-Delhi	1130-1140	Eng, Hindi
11710	AIR-Delhi	1115-1140; 1215-1315	Eng, Hindi, Asian dialects //15185
11740	AIR-Panaji, Goa (Domestic feeder)	1530-1545	English //4910, 9820, 9910
11830	AIR-Delhi, Kingsway	0125-0355; 2300-0000	Eng, Hindi, Sanskrit, Asian dialects //6085, 9595, 9835, 15135, 15260
11840	AIR-Panaji, Goa	0315-0415	Hindi
15135	AIR-Delhi, Kingsway	0125-0205; 0225-0355	Eng, Hindi, Sanskrit, Asian dialects //6085
15185	AIR-Delhi, Kingsway (Domestic feeder)	0700-0930; 1115-1140	Eng, Hindi, Asian dialects // 9575, 11710 15135
15260	AIR-Delhi, Kingsway	0700-0930; 1405-1600	Eng, Hindi, Asian dialects //6085, 9595, 11830, 15135, 15260
17860	AIR-Delhi, Kingsway	1220-1245	Eng, Hindi, Sanskrit // 11830 (local daylight only)

* - denotes sign-on

Table 3: All India Radio External Service

AIR's external services broadcast in Arabic, Chinese, English, French, Indonesian, Russian and Swahili. Additional languages include: Baluchi, Bengali, Burmese, Dari, Gujarati, Hindi, Kannada, Malayalam, Nepali, Pashto, Persian, Punjabi, Saraiki, Sindhi, Singhala, Tamil, Telugu, Thai, Tibetan and Urdu.

Selected Non-English Services

Freq	Service	UTC	Language
4870	AIR-Delhi	0020-0400	Hindi
9810	AIR-Panaji-Goa	0130-0230	Nepalese
9905	AIR-Aligarh	1615-1945	Arabic
9910	AIR-Delhi	1415-1530	Pashto
11585	AIR-Delhi	1730-1945	Arabic
11620	AIR-Aligarh	1215-1315	Burmese
11715	AIR-Delhi	0130-0230	Nepali
11730	AIR-Delhi	0400-0430	Arabic
11985	AIR-Bangalore	0215-0300	Kannada
12085	AIR-Panaji-Goa	1615-1830	Hindi
13605	AIR-Aligarh	1515-1615	Swahili
13645	AIR-Aligarh	1115-1200	Thai
13695	AIR-Bangalore	1115-1215	Tamil
13695	AIR-Bangalore	1215-1245	Telugu
13795	AIR-Aligarh	0000-0045	Tamil
13795	AIR-Aligarh	2300-0000	Hindi
15045	AIR-Bangalore	*0130-0230	Hindi/English
15075	AIR-Bangalore	0315-0415	Arabic
15075	AIR-Delhi	1615-1730	Hindi
15410	AIR-Panaji-Goa	1115-1200	Thai

English External Service

(subject to slight adjustments, effective Oct. 31, 2004)

Time	Frequency/target area
0000-0045	9705as 9950as 11620as 11645as 13605as
1000-1100	13695as 15020as 15260as 15410as 17510as 17800as 17895as
1330-1400	9690as 11620as 13710as
1400-1500	9690as 11620as 13710as
1530-1545	9910as
1745-1800	7410eu 9445af 9950eu 11620eu 11935af 13605af 15075af 15155af 17670af
1800-1900	7410eu 9445af 9950eu 11620eu 11935af 13605af 15075af 15155af 17670af
1900-1945	7410eu 9445af 9950eu 11620eu 11935af 13605af 15075af 15155af 17670af
2045-2100	7410eu 9445af 9910au 9950au 11620eu 11715au
2100-2200	7410eu 9445af 9910au 9950au 11620eu 11715au
2200-2230	7410eu 9445af 9910au 9950au 11620au 11715au
2245-2300	9705as 9950as 11620as 11645as 13605as
2300-0000	9705as 9950as 11620as 11645as 13605as

Target Areas: af/Africa; as/Asia; au/Australia; eu/Europe

Clandestine

5101.2	Voice of Freedom of Jammu Kashmir	0230-0400; 1300-1430	Kashmiri, Urdu; check 5990, 7230
6100	Radio Sadaye Kashmir	0230-0330; 1430-1530	Urdu, Kashmiri
9890	Radio Sadaye Kashmir	0730-0830	Urdu, Kashmiri

Complete shortwave schedules of All India Radio may be located at:
By frequency: http://geocities.com/bcdxnet/sw/frequency.htm
SW schedule by station: http://geocities.com/bcdxnet/sw/location.htm
External Service by time: http://geocities.com/bcdxnet/es/time.htm
External Service by language: http://geocities.com/bcdxnet/es/language.htm

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$1500-$1999.99	$24.95
$2000-$2499.99	$28.95
$2500+	$32.95

UNIDEN

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BCT8	SCN08	$189.95
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BC796D	SCN43	$524.95
BC245XLT	SCN 35	$199.95
BCi25 digital board for BC250D & BC785D	ACC 4	$229.95
BC246T	SCN46	$229.95

ICOM

R10	SCN 4	$299.95
R3	SCN 7	$359.95
R5	SCN 2	$199.95
R20	SCN 20	$519.95

ALINCO

DJ-X10T	SCN 1	$319.95
DJ-X2000T	SCN10	$499.95

AOR

AR8200IIIB	SCN51	$589.95

YAESU

VR-500	SCN 6	$324.95

RADIO SHACK

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800 MHz base w/ right-angle conn.	ANT 23	$34.95
OMNI II Scanner	ANT 5	$29.95
Professional Wideband Discone	ANT 9	$94.95
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H800 Skymatch Active	ANT 15	$139.00
Select-A-Tenna	ANT 21	$59.95
Super Select-A-Tenna	ANT 40	$189.95
AOR DA3000 Aerial Discone	ANT 11	$139.00
AOR MA500 Wide Range	ANT 12	$99.00
AOR SA7000 super-wide receiving	ANT 39	$199.95
Range Extending Mobile Mag Mount	ANT 3	$24.95
WiNRADiO AX-31B Active UHF Ant.	ANT 4	$119.95
Grove Universal Telescoping Whip	ANT 6	$14.95
Nil-on Super-M Superior Mobile Ant.	ANT 10	$79.95
Create CLP5130TN Log-Periodic Ant.	ANT 16	$429.95
Create CLP5130ZN Log-Periodic An.	ANT 17	$299.95
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100' of RG-6U cable	CBL 100	$24.95

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PAR VHF Intermod Filter 462MHz	FTR 462DS	$69.95
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The Diode Vacuum Tube

A hundred years since the beginning of electronics

By Ian Poole G3YWX

November 2004 marks the one hundredth anniversary of the invention of the diode vacuum tube or "valve" as it's known in the UK. Why is that invention significant? Because the vacuum tube was the first active device, and it could well be argued that its discovery was the beginning of electronics as we know it today.

The invention of the diode, the foundation for the vacuum tube, arose from a need at the time to make more sensitive radio or wireless detectors. At the time, coherers and magnetic detectors were two of the main methods for signal detection, and neither was particularly efficient. In fact, Guglielmo Marconi found the limitations of the detectors used in his first transatlantic transmission in 1901 to be a significant problem.

Enter a man named Ambrose Fleming, professor of electrical engineering at the august British establishment, University College, and a consultant to Marconi. Indeed, he designed the transmitter that was used for the first transatlantic transmission, and had spent time working on many aspects of electrical engineering, making some significant developments. But we're getting ahead of ourselves ...

Beginnings

The real story starts some years before, because a number of foundations needed to be set in place. The famous pioneers like Galvani, Volta, and Ampere needed to make the first discoveries about electricity, and others also needed to make their contributions. One was Professor Guthrie. He was investigating effects associated with charged objects and he showed that a red-hot iron sphere that was negatively charged would become discharged. He also found that the same did not happen if the sphere was positively charged.

It was Thomas Edison who took the next major step in 1883. He was developing electric light systems and one of the major problems that he was facing was the short life of the electric light bulbs. Although the filament life was a problem, the main limiting factor was that the bulbs quickly became blackened.

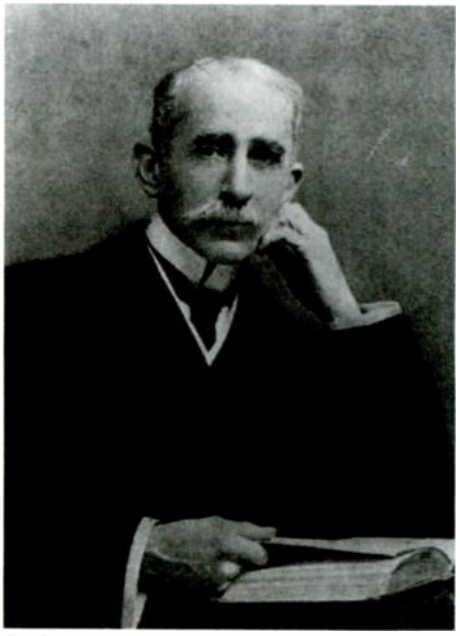
Initially, it was thought that this was caused by atoms of carbon from the element hitting the glass. As it was known that the particles leaving the element were negatively charged, experiments were carried out to prevent them hitting the glass.

One method that Edison tried involved placing a second element into the envelope. He reasoned that if he placed a positive charge on the second electrode, particles could be attracted away from hitting the glass of the bulb. Edison experimented with the polarity of the charge on the second electrode and he noticed that when the second element was made positive with respect to the filament, then a current flowed in the circuit. When the potentials were reversed he noticed that this did not happen.

Edison saw that the idea might be useful, and he patented the idea, the patent being granted less than a year later. Then in 1884, there was an international conference at which a paper was presented. One in the audience was Sir William Preece, the Chief Engineer of the British Post Office. He was puzzled by the concept and, like all the others, he was unable to understand how it worked. At this time the electron had not been discovered and it was difficult to envisage how the current could flow through a vacuum. Preece returned to Britain and (as agreed with Edison) he reported it to the Royal Society, coining the term "Edison Effect."

At this time Fleming was a consultant to the Edison Electric Light Company in London, and took a considerable interest in the Edison Effect. In 1889 he had some bulbs made so that he could reproduce the Edison Effect. However, it was not until a few years later that he observed that, if an alternating current of between 80 and 100 Hz was passed through the bulb, it became rectified.

Later, Fleming became a consultant to the Marconi company and he became very involved in this work. He was also somewhat eccentric. During his experiments with transmitters he would always use the letter V sent in Morse (...-) as the test letter. He became so involved in this work that he would often



Professor J A Fleming the inventor of the vacuum diode tube. Image courtesy Marconi plc.

be heard unconsciously humming the letter V or whistling it between his teeth.

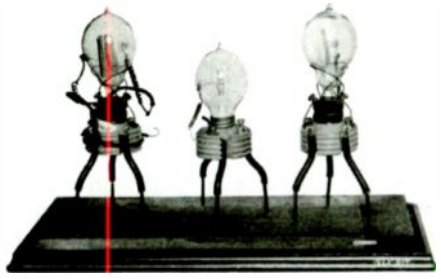
On a more technical note, Fleming was also struck by the lack of sensitivity of the detectors used for the wireless receivers of the time. If the technology was to be able to progress, then it would be necessary for new and improved methods of detection to be used.

Happy Thoughts

Fleming devoted his mind to this, and in his quest to make improvements he tried many new ideas to bring the required results. However, while pondering some improvements in October 1904, he had what he later described as a "sudden very happy thought." He instructed his assistant, G.B. Dyke, to set up an experiment with one of his evacuated bulbs with the additional element, to put his new idea to the test. It worked. Just one month later on a chilly November morning, a former colleague saw him "scudding" down Gower

Street in Central London on his way to patent what he termed his "oscillation valve."

Shortly afterward, Fleming wrote to Marconi to tell him of his discovery. In the letter he said that he had not mentioned the idea to anyone as he thought it might be very useful. Little did he know of its importance, although it did not bring any money to the Marconi Company. Any returns the invention might have made were used in fighting the legal battles that were to arise later.



Fleming's original diode or oscillation valves. Image courtesy Marconi plc

Competition

It did not take long before others saw the possibilities of the new oscillation valve and tried to look at new forms that might overcome the patents. In the USA, Lee de Forest took up the quest and started by making some replicas of Fleming's tube. In developing a new version, de Forest even used a Bunsen burner to heat the cathode – a method that was hardly practical or stable. However, his efforts resulted in a further patent being filed later that year of what de Forest termed a "static valve."

Several versions appear to have been described, including one with a heated electrode and a second element. De Forest even cited work undertaken by Fleming. Further applications were made, and finally he went public with his two element "Audion" by presenting a paper to the American Institute of Electrical Engineers in October 1906.

Work on de Forest's ideas proceeded and by the end of 1906 he had devised another device in which he had interposed a third element into the evacuated glass bulb. This wire was bent back and forth in the shape of a gridiron – hence the name given to it was the grid. He made it this shape, placing it between the other two electrodes, so that it did not completely shield them from one another and prevent the rectifying action.

No two of these devices were ever the same. It appears that the anodes were cut out of sheet metal by hand, sometimes corners were rounded, other times not. The grids were formed by wrapping them around nails driven into a board before they were assembled into the final tube.

The other surprising point is that, because little was understood about the way these devices worked, they were only used as diodes. It took some years before their amplifying action was discovered. It was about six years later in 1912 when de Forest made a two-Audion amplifier which he demonstrated as a telephone repeater. Though its output was distorted and the performance was erratic, its potential was plainly evident and it was taken up by AT&T.

Later Developments

The discovery that the tube could be used to amplify signals was a major step forward. However, these devices were still in their infancy, and there were still many misconceptions about the way in which they worked.

Initially, it was thought that some gases were required in the envelope for them to operate correctly. It took until 1915 before an American scientist named Langmuir proved that this was not the case. As a result, new, highly evacuated valves known as "hard" valves were soon produced with much better performance than their "soft" predecessors.

This development enabled other improvements to be made. It became possible for filaments to be coated to improve their electron emission. Filament temperatures could also be reduced, and this improved reliability as well as reducing the heater current consumption.

With these improvements, demand rose and large numbers were manufactured. One type, manufactured in France by the military authorities, was called the TM, of which over 100,000 were produced. An English version of it, called the Type R triode, was equally successful.

Heaters

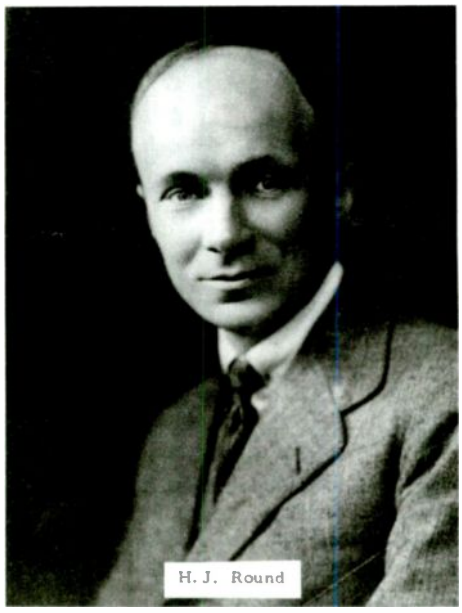
At this time, tubes still had directly heated cathodes. This hampered their operation because the cathode had to be held at ground potential, especially if several tubes were to be powered by the same heater battery. It was also not possible to drive the heaters using AC; otherwise, this would be superimposed onto any signal.

Once it was discovered that a cathode could be indirectly heated, this opened the way for tubes to be used more widely. AC mains could be transformed down to a suitable voltage to run the heaters, and by running them in this way it removed the need for costly batteries. These and other developments enabled their use to increase considerably.

More Electrodes

Even though many improvements had been made to tubes, their performance was still very poor. They offered a comparatively low level of amplification, and even at low frequencies they easily burst into oscillation. This resulted from the inter-electrode capacitance between the anode and the grid.

To try to overcome the problem, H. J. Round, a very gifted engineer working for Marconi, produced a low capacitance valve known as the Type V24 in 1916. Rather than taking all the leads out of the envelope through the base of the tube, Round passed the anode lead through a top cap away from the grid connections. While this solution was reasonably successful and Round managed to make his amplifier operate well for the day, it was by no means the complete answer to the problem.



H J Round – one of Marconi's engineers. Image courtesy Marconi plc

Many further attempts were made to solve the problem, but it was not until 1926 that the complete solution was found with the introduction of the tetrode. This used a second grid called the screen grid. This was placed between the normal control grid and the anode. Its introduction reduced the anode-to-control-grid capacitance to almost zero and solved the problem of instability.

In 1929 a new valve, called the pentode, was introduced having a further grid. This additional electrode improved the discontinuity in the characteristic of the tetrode caused by electrons bouncing of the anode when they hit it.

Heyday and Beyond

During the Second World War, the production of valves rose dramatically to meet the war needs. Valves were widely used for communications purposes, but were also used for new and interesting applications. Using valves, the first electronic computer was created at Bletchley Park in England to help decode the German Enigma encrypted transmissions.

However, after the war it was realized that size was an important issue. With the transistor entering the scene, smaller, all-glass encapsulated tubes started to be produced. Nevertheless, the relentless development of semiconductors meant that the fate of the valve was sealed and it was soon confined to specialist applications, particularly the high power arenas where semiconductors found it hard to compete.

The decline of the vacuum tube was inevitable. Yet it had made a significant contribution to the electronics industry, and many would state that the invention of the "oscillation valve" heralded the beginnings of the electronics industry we know today.

More information about all aspects of radio and electronics, including radio history, can be found at the author's website at **http://www.radio-electronics.com**

photo credit: Don Cline

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Condo Dishes and FM in the Office

This month it's time to click into the e-mail box and after spending hours dumping the ever growing spam file, deleting the spam masquerading as real e-mail, and once more tightening up the filters, I find that actual messages from genuine *MT* readers got through.

❖ Balcony Dishes for Condos

Richard Henderson, W2/VE3ECM, read my August *Beginner's Corner* entitled "New Tricks for Old Dishes" which was about rehabbing old satellite dishes. He writes, "...I would like to put one of the small Primestar dishes on my balcony, but the rules of my condo corporation say that I'm not allowed to. I was going to mount it on a tripod and place it on the balcony not attached to the building. You mentioned that FCC rules allow me to do this. Could you tell me what the exact rule is and its section number, so if I go ahead and do this and they attempt to fine me, I can take this information to them?"

Well, Richard, condo outfits love to put the fear of God into residents and they can never quite believe that there is a power which trumps their bogus rules. But there is. Yes, you can set up a Primestar dish or any other satellite dish on your balcony as long as it is no bigger than 36" in diameter, which is a pretty good-sized dish. The space in which you wish to put it, whether you bought or are renting your condo, must be under your control. This includes private decks, balconies, or fenced-in terraces.

What you want is the Fact Sheet for OTARD (Over-The-Air Reception Devices) rule. It has the force of Federal law and supersedes all state and local laws to the contrary. Here is the link: **http://www.fcc.gov/mb/facts/otard.html#links**.

Terk's AM/FM Q Powered indoor antenna is a versatile indoor FM antenna with wide and narrowband antenna tuning with built-in signal amp.
http://www.terk.com/images/items/AF1.jpg

This prompted a followup question from Richard, since he is an amateur radio operator: "What do you know about mounting ham antennas? Are we covered under a similar regulation here in the U.S.? I was reading a few things on [the net] and I'm just not sure what the rules are here."

The ham situation is totally different from the OTARD rules. The reason for this is that the FCC has ruled that Americans have the right to receive over-the-air TV stations and the only way to do that is with an Over-The-Air-Reception-Device, *i.e.* an outdoor antenna. This includes the ability to receive satellite TV. It forces condo and Home Owner's Associations to comply with the rule.

However, the Commission believes that hams have all manner of ways to communicate without needing to put up an outside antenna: the use of any number of FM repeaters using simple Handi-Talkies (HTs); EchoLink; remote control of HF stations through phone lines or Internet; and others. U.S. hams have been battling this position for years, but so far the FCC is unmoved. Just recently a request for a change of that rule was filed and subsequently denied.

❖ Going For the Big Dish

MT's own Kevin Carey, *Below 500 kHz* editor, wrote: "Your August column piqued my interest in giving satellite TV a try. After reading your column I inquired of a neighbor about a defunct C-band dish in her yard. She said I was welcome to take 'the old thing," so with the help of another neighbor and a John Deer tractor, we got it moved over to my yard..."

Kevin listed the equipment he got in the deal, including a 12' Conifer black mesh dish. The system is about 20 years old and that prompted a couple of questions: "If I am willing to settle for analog reception, can I start out with the receiving gear supplied, or is it hopelessly outdated?...How much analog programming is left? Enough to keep an experimenter busy? If I do want to get a digital receiver, do I need to sacrifice analog functionality or do they make units that will do both? Any reasonably priced suggestions on a receiver for someone just getting started? And, finally, how critical is having an absolute line-of-sight signal path? I have some moderate foliage problems in the southerly direction (deciduous trees about 300 feet away). I know this will attenuate signals, but will having a 12' dish give me a fighting chance of decent reception?"

Kevin, you got really lucky with your 12' Conifer dish, which should still be quite serviceable, but the Drake gear is strictly for the museum. LNA systems went out of use in the late '80s, though parts for such systems are still available. If you have the manuals you can hook it up and see if it works. If you don't have the manual, reprints may be found at **http://www.satellite911.com**. Unfortunately, the system is so old that model is not listed among the ones available. Another source for manuals is Skyvision, the mail order company: 800-500-9275 or **http://www.skyvision.com**.

If you have a good bookstore near you, pick up a copy of *Satellite Orbit* magazine, a monthly guide which has a pull-out card showing all the satellites and what's on them. On the back of the card is a list of all analog (in-the-clear and encrypted), digital channels (4DTV and MPEGII), as well as a list of satellite radio and Ku-band satellites. In addition, you'll get an idea of what kind of programming is available via VCII encryption or 4DTV subscription channels. Programming can also be found in *MT's Satellite Services Guide*; the full list of satellites is at **http://www.monitoringtimes.com/html/mtssg.html**

Any modern analog receiver will be able to pick up analog satellite TV signals in either C or Ku-band. For the digital signals you'll need either a Motorola 4DTV receiver or any of the many MPEGII Free-To-Air (FTA) receivers. I've been using both a 4DTV and an ST9900 from **http://www.smallear.com** for years without a problem. The 4DTV receiver has the ability to move the dish and tune analog as well as 4DTV digital channels. The ST9900 can't move the dish and has to be "slaved" to a receiver which can. There are literally hundreds of channels to watch, many of which are FTA in both MPEGII and 4DTV modes.

Not a thing of beauty, says the manufacturer, but who cares? It's meant to be in your attic! http://www.antennaperformance.com/images/products/intennalge-1.jpg

As for the line-of-sight

issue: it's more critical on digital reception, because with digital the signal is either there and the picture's perfect, or there's nothing. Analog will allow you to see a signal with some noise in the video. I'd say if the trees are 300 feet away you'll not have a problem. For a complete installation guide, see the installation section of the aforementioned satellite911 web site.

FM Tuning in the Office Cubicle

Ted Engel, from Chicago, writes: "...I work in a steel frame building with a large amount of electrical interference. Given the building and my work location – my cubicle is some thirty feet from the closest window – I could not receive FM at all until I purchased a CCRadio Plus and a Sony 7600GR in the last two months. Both are extraordinary receivers and the signal I hear at my desk, while noisy, is still far better than I've ever received before ... I've considered satellite radio, but I would miss some of the excellent local shows here in the Chicago market..."

An excellent question, Ted. And, it points out one of the shortcomings of satellite radio: Many people who enjoy extraordinarily good local programming won't benefit that much from going the satellite radio route. There are a small number of choices for those who can't use an outdoor antenna, but the choices for desk-bound listeners are even fewer. Here are some indoor FM antenna possibilities:

- *Antenna Performance Specialties' InTenna* is 48" tall, 8" round and hooks up directly to 75 ohm coax without need of a balun. It's pricey, ($189.95 plus $15 shipping) but they say it's worth it. If it's not worth it to you, you'll have to pay return shipping and 20% restocking fee (another $38) to return it. It's designed to be an attic mounted antenna. Buy direct from ASP at P.O. Box 9597 Bolton,CT 06043-9597 or you can FAX them at 860-643-9748. Visit their web site at **http://www.antennaperformance.com**
- *The Fanfare FM2G-C "College Band" FM antenna* is a 66" whip antenna which can be mounted in an attic or on a balcony with an "L" bracket included. It's also designed to be used with 75 ohm coax cable without a balun. It retails at $119. A full band version (FM2G) is available for $99. Buy directly from Fanfare at 800-268-8637. Their web site is **http://www.fanfare.com**
- *Magnum Dynalab*, the high-er stereo maker, sells two indoor antenna of note: The indoor/outdoor whip antenna which is 54" long and looks suspiciously like the Fanfare product above. It claims a 2.5 dB gain and comes with the mounting bracket and 24' of coax cable. It retails for $99.
- *The "Silver Ribbon Antenna"* from Magnum Dynalab is a desk-top antenna which retails for $29.95. This unamplified antenna will work best near a window, rotate for strongest signal. Both antennas are available from Audio Advisor mail order catalog **http:www.audioadvisor.com** or call 800-942-0220
- *The Terk AM/FM Q Powered Indoor Antenna* is amplified and has a built in tuner to match the frequency to the antenna. It is available through a number of retail outlets nationwide. Universal Radio has this model for $69.95. 800-431-3939 or visit their web site: **http://www.universal-radio.com**

Fanfare's FM2G-C "College Band" antenna is said to concentrate on the "public broadcasting" portion of the FM band.

The one which might prove the most effective in Ted's office situation is the Terk AM/FM Q antenna. It has a built-in FM antenna with two controls: one is a gain control on the built-in signal amplifier and the other is a "bandwidth" control which basically acts as an antenna tuner to peak the antenna to the frequency you're trying to receive. Initial tests at my location showed a marked improvement using the Terk Q. I found it worked best when it could be placed near a window and oriented to maximum signal strength as heard on the radio. The tuner control and amp additionally improved reception.

At home, where space is less a problem, either the whip antenna or the InTenna may produce much better results, but they are impractical in the office environment.

Final Indoor Antenna Tips

Both the InTenna or the FM2G-C can be mounted vertically or horizontally, though reception should be better in the vertical position. Avoid mounting these antennas near large metal objects such as metal chimneys or aluminum construction studs. On all FM antennas, use RG/6 coax cable. It's the highest quality 75 ohm cable available. Unless you have a really good coax crimping tool and can do a perfect job of attaching connectors, buy the cable with the connectors already attached. Remember, too, that the shorter any cable run is, the lower its loss.

Wire sculpture or indoor antenna? It's the "Silver Ribbon high efficiency indoor antenna" according to Magnum Dynalab.

Getting Started

Ask Bob

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

T2FD Antenna Update

Rich Line KC8HMJ comments, "In the August issue you mentioned that you hadn't seen a T2FD antenna commercially available. Well I tripped across one at one of your advertisers at **http://www.universal-radio.com/catalog/sw_ant/0562.html"** (RF Systems T2FD)

Rich is correct, and another writer pointed out that Barker and Williamson (B&W) still have one as well. An Internet search will turn up a variety of sources for the B&W antennas.

Thanks!

Q. I was reviewing the tunerless all-band antenna that you designed and feature on your web page ***http://www.monitoringtimes.com/html/mtswlprimer3.html****. What is the "Hy-Gain" connector shown on the diagram, and does "TVM 300 ohm" refer to standard TV twin lead? And what is the theory behind the off-center feed point? (Syracuse, NY)*

A. *MT* columnist Ken Reitz, who reproduced my antenna in that article, has modified somewhat my original design which simply used a glass or porcelain strain insulator at the feed point. The twin lead, which is standard TV ribbon, was soldered to the wires on either side.

A half-wave dipole (resonant at a specific frequency) has a center-fed radiation resistance of 70 ohms in free space (it's more like 50 ohms in the real world), and nearly that same impedance at odd harmonics (third, fifth, etc.) of that frequency. As you move the feed point progressively farther from the center, that impedance rises. The Windom feed point is chosen as a point where the radiation resistance is relatively stable at several harmonically-related ham bands (approximately 300-400 ohms).

Although a badly-impedance-matched antenna (non-resonant) will still radiate all the power that reaches it, the mismatches generate reflected voltages along the feed line which waste power as resistive heat from the insulation as it breaks down from the high voltages. While this is an important consideration for transmitting, it's less important for receiving at long and short wave frequencies where antennas are larger, and some signal as well as attendant noise can be sacrificed without noticeable reduction in signal-to-noise ratio.

Q. How close can multiple mobile antennas be spaced before they negatively interact with each other? Kenneth Pearson, Freehold, NJ)

A. As a rule, to prevent distortion of the omnidirectional pattern of mobile antennas, keep antennas at least 1/4 wavelength away as measured at the lowest operating frequency. However, this applies to antenna elements of the same resonant frequencies.

For example, even though a quarter wavelength for a 27 MHz CB antenna is about 9 feet, you could bring one within a foot or so of a 144 MHz ham whip without serious alteration in the pattern because they are not resonant at the same frequency range, nor even harmonically related.

But if you are operating two 144 MHz antennas atop the vehicle, separate them by at least 1/4 wavelength (18 inches) to prevent interaction.

So far as "Phantom" antennas, they are shorter than 1/4 wavelength antennas, and thus their reception will be diminished somewhat in comparison. The lower the frequency, the worse will be the reception. The larger (longer) the antenna, the more "capture area" it has to intercept the arriving signal wave front, thus receiving a stronger signal.

Q. What's the best way to prepare to provide power to a base scanner during a power outage? (William Moore, email)

A. There are several ways, but the best is probably to keep a 12-volt lawn-mower battery, computer backup battery, or even a marine or automotive battery charged by a small AC wall adaptor. It's best to select a sealed, maintenance-free battery to avoid spillage.

Simply connect the battery across the DC leads from the wall wart, but to avoid cutting the wires, use a Radio Shack DC jack and mating plug to the scanner, with wiring to the battery terminals. Some folks mount a 12-volt outdoor solar array which is connected by long leads to the indoor battery.

Alternatively, you can always prepare a long, two-conductor cord (lamp cord from a hardware or electrical supply works well for this, just so long as you watch the polarity!) with a cigarette-lighter plug on one end, and a DC plug for the scanner on the other. This can be plugged into your car's 12 volt outlet in an emergency.

Q. I just purchased an amplified speaker to go with my AC-operated base scanner, but it is designed for mobile applications since it just has two wires, one with a fuse. (Tim Griffin, email)

A. You will need to check the electrical specifications in the instruction manual of the amplified speaker to see how much current (milliamps or mA) it requires. Then you need to find an AC wall adaptor or other 12 VDC power supply that will provide at least that amount of current. You won't be able to find a single power supply that will have two cords, one for the amplified speaker and one for the scanner, nor can you tap off power from your scanner circuitry to operate the amplified speaker, so look for a supply that will power the amplified speaker alone.

Since your amplified speaker is equipped with two wires (one with an in-line fuse) for the 12 VDC power connection, you will need to either find a power supply with screws, binding posts or push terminals, or else solder a female connector on those two wires that will mate with the plug on the appropriate power supply. Pay attention to the polarity.

Q. Can I bring my car scanner antenna indoors and use it with my base antenna? (Tim Griffin, email)

A. If the mobile antenna is mounted on a large, metal surface, yes, since the car body serves as half the antenna. Many folks simply assume they can bring a mobile antenna inside, set it on a table, and it will work as well as on the car roof. It won't. Affix it to the top surface of a file cabinet, or even inverted and stuck to a ceiling vent.

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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80 This bright idea should have been in last month's issue. If you have an outside antenna, it's time to check the coax connections and the entry point into your house. Are these completely sealed and weather proofed? If not, take a quick trip to Radio Shack to get some "Coax Seal."

While you are there, check for clearance items. I found a nifty cigar shaped digital recorder stick (#14-1195) on clearance for $24.97 – even cheaper than last Christmas at $40! These are great for quick recording of vehicle pursuits or other interesting radio traffic. I carry the extra one in the car for those bright ideas that pop up while driving! That is why it pays to make frequent trips to RS looking for those yellow tag clearance items.

I must admit I have had a problem with my digital recorder. If I drop it or toss it, it tends to pop open the battery compartment, and out come the batteries. It has no backup, so all data is lost. Maybe that is why it is on clearance! The simple solution is to use scotch tape over the batteries and/or the battery cover to prevent this problem.

81 Snowed in? Take advantage of the day off, and grab the radio. Do you have all the frequencies for the snowplows, and school buses? Get searching!

82 I recently taught a technician level ham class. As a follow-up, I strongly recommended the ***FM Repeater Guide for Beginners*** book from AC6V at: **http://ac6v.com/FM101.htm**. (Spend some time at his website – It is one of the best for hams.)

I have a game to teach new hams how to program their transceivers. First they read though the manual. We all start on one repeater. Then I give them the frequency, shift, and PL tone for the next repeater. We see who can program it in, and talk there first. I use the scanner to check repeaters before we jump over to a new one. Works well with teenagers. They go from no skill to complete mastery in about 10 minutes. Adults will take longer. A lot longer.

83 Does your group or family use FRS radios for public service or emergency events? Don't use channel one. I suggest a higher frequency, and an oddball PL tone. Color code all FRS radios using the same frequency and PL tone. Brightly colored tape on the antenna will do the trick.

A few columns ago, I suggested using neck lanyards to retain, manage, and protect the micro FRS radios. A couple of readers, hearing of my new hobby of collecting neck lanyards, sent me one of their lanyards. Now I have a new proposal; send me one of yours, and I will send you a red one with white lettering that proclaims "ARES RACES."

84 I recently re-organized my junk and parts cabinets when it became hard to find what I needed. It makes a good winter day's project, and will save me a few trips to town looking for items I already have on hand.

85 FRS radios have fallen to ridiculous price levels. So I bought another matched set for under $30 that has rechargeable batteries and a charging cradle. It comes with an AC to DC wall adapter. I made up a custom cigarette lighter DC to DC power cord, and keep this set in the car. You never know when you might have to coordinate logistics or follow another driver on a trip. Caution, these rock bottom cheap sets often *do not* have PL capabilities, but with 22 channels, who cares?

86 Speaking of low power radios, did you watch the opening and closing ceremonies of the Olympiad in Athens? Did you notice all the color coded ear phones on the entertainers and participants? Besides orchestrating the logistics, I suspect some were used for instant language translations. I'll bet they had dozens of frequencies in use. Perhaps they also used small inexpensive FM receivers. What creative uses can you suggest for FRS radios? Let me know.

87 This winter, I intend to do much of my listening from my big new recliner chair. It is certainly more comfortable than the radio room. Naturally, I have connected my four favorite radios up to a DC power strip using Andersor Power Pole™ connectors. I can quickly plug in any of my radio devices.

I brought in the deep cycle battery to sit under my folding arm side stand. Up here in the mountains, lightning storms will cause power outages several times every summer. Winter storms bring down trees and lines. I have a Coleman fluorescent camping lamp. Luckily, it takes 12 volts. I found the right size plug and made a special power cord with Anderson connectors on the other end. When power fails, I just connect the lamp to the main power strip.

The Anderson power connectors make this process so quick and easy. Why didn't I think of inventing that? It could have been the "AB7NI™ Power Connectors." Well, I am developing some new ideas. Stay tuned.

88 It seems I am always creating a flyer, award certificate, or other creative endeavor related to radio. I bought a CD with some great graphics from **http://www.tk5nn.com**. There is a wide variety of images. For some FREE graphics try: **http://pages.prodigy.net/kg0zz/clipart/**.

89 As the winter season approaches, I decided to do some searching around in my garage for snow shovels, etc. I found a box full of model trains and accessories. I had purchased these years ago when I dreamed of using an entire room for a massive model train layout. Yeah, right.

I did decide to bring them into the house, and soon I had a plan. I have some wide window ledges, and I set up a static display. I swept the books off the coffee table for another impressive display of N and HO gauge trains.

Naturally, this awoke my dormant interest in trains. I was soon at the ***Police Call*** book for the RR frequencies in my area. (Hey, I had not listened to train traffic in years.) I went to the nearest bookstore and found a great book, ***Modern Diesel Locomotives***. The book was filled with beautiful color photos and details of the many types of engines, how they work, etc. I was stoked, so I picked up a copy of the magazine ***Model Railroader***. My little subscription post card was in the mail that very day. Funny how something can trigger a sudden interest in a new area of the radio monitoring hobby.

Next month the column will feature some of my bright ideas for Christmas gifts. You will want to check my column first thing, so you can leave some hints around the house. Have a happy Thanksgiving. A truly wise person turns off the radio on this day, to spend time with the family.

Dan Veeneman
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Tallahassee and Florida Scanning

It is during emergencies that public safety radio systems are most critical for saving lives and protecting property. Citizens who monitor these systems and take appropriate action can reduce the overwhelming workload of emergency personnel. This month we start by taking a look at Florida, which was ravaged by hurricanes this fall.

❖ Tallahassee, Florida

Hi Dan,

I recently moved to Tallahassee, Florida. I was wondering where I could get the codes and frequencies here?

Thanks, Kevin

The capitol of Florida, Tallahassee, is located in the northwest part of the state and is home to more than 150,000 residents. Situated in Leon County, the city operates a Motorola Type II analog trunked radio system on the following frequencies: 855.9625, 856.4625, 856.7125, 856.9625, 857.2125, 857.4625, 857.7125, 857.9625, 858.2125, 858.4625, 858.7125, 858.9625, 859.2125, 859.4625, 859.7125, 859.9625, 860.2125, 860.4625, 860.7125 and 860.9625 MHz.

Tallahassee Police Department

Dec	Hex	Description
16	001	Alpha Dispatch (Northeast)
48	003	Bravo Dispatch (Central)
80	005	Charlie Dispatch (South)
112	007	Alpha Administration
144	009	Bravo Administration
176	00B	Charlie Administration
208	00D	Teletype
240	00F	Alpha Talk
272	011	Bravo Talk
304	013	Charlie Talk
336	015	Alpha Cop
368	017	Bravo Cop
400	019	Charlie Cop
432	01B	Common UHF Link
464	01D	Investigation
496	01F	CID
560	023	Cop (Common)
592	025	Alpha Talk
624	027	Bravo Talk
656	029	Airport Police
688	02B	Special Event
720	02D	Special Event
752	02F	Special Event
784	031	Special Event
816	033	Special Event
848	035	Special Event
880	037	Special Event (Common)
912	039	Vice Operations
944	03B	Vice Operations
976	03D	Vice Operations
1008	03F	Vice (Common)
1040	041	Tactical
1072	043	Tactical
1136	047	Tactical (Common)

Tallahassee Fire Department:

1200	04B	Fire Dispatch-1
1232	04D	Fire Dispatch-2
1264	04F	Fire Tactical 1 (North)
1296	051	Fire Tactical 2 (North)
1328	053	Fire Tactical 3 (North)
1360	055	Fire Tactical 1 (South)
1392	057	Fire Tactical 2 (South)
1424	059	Fire Tactical 3 (South)
1456	05B	Emergency Medical Services 1
1488	05D	Emergency Medical Services 2
1520	05F	Emergency Medical Services 3
1584	063	Emergency Management

Florida State University:

1712	06B	Florida State University Police 1
1744	06D	Florida State University Police 2
1776	06F	Florida State University Police 3
1808	071	Florida State University Administration
1840	073	Florida State University Operations

The Leon County Sheriff's Office is also on the system, using a number of talkgroups above 8000. In particular, 8016 (1F5 in hexadecimal) appears to be the primary dispatch group.

This should be enough to get you started. If you're looking for a lot more detail, Doug Ferrell, KD4MOJ, operates **http://www.tallahassee-scanner.com**, which is an excellent resource for scanning the local area. Doug is also doing some interesting work with wireless Internet access points.

❖ Florida State Systems

Monitoring state law enforcement activity is a little more complicated. Florida is in the process of replacing their existing Motorola ASTRO network with an M/A-COM EDACS ProVoice system.

The Florida legislature began the process of planning and building a statewide radio system in 1988. Within two years the state had contracted with Motorola to build a demonstration system. Motorola recommended that the state use a brand-new technology called *SmartZone* that would allow users to automatically "roam" from area to area. They also recommended a new digital capability called ASTRO.

By 1992 the installation of a test system began in the southern counties of Broward, Dade and Monroe, where Motorola worked out most of the bugs in what eventually became Phase I of a statewide radio system. Based on the success of the test system, in late 1994 the state voted to proceed on a plan to link together all 67 counties, which they expected to be complete in five years. In 1997 another 12 counties were linked to the test system, covering the eastern part of the state up to Flagler County and over to the Florida Turnpike.

However, by 2000 the system was failing, causing Florida Highway Patrol officers to lose confidence in their new radios. At that point the state had spent about $96 million on the system and was looking at another $300 million to finish it. During this time the governor and legislature were looking for options and proposals to privatize the system.

In September of 2000, the state signed a controversial contract with Com-Net Ericsson (now part of M/A-COM) to complete what is now called the Statewide Law Enforcement Radio System (SLERS). At the time, it was the largest contract in land mobile history and effectively ended Motorola's involvement.

As of July 2004, all state law enforcement agencies were using SLERS. More than 6,500 officers are now served by the system, including a total of nearly 14,000 radios.

The new ProVoice system is operational now in the western and northern parts of the state, and according to M/A-COM operated continuously during Hurricanes Charlie and Frances without significant problems. Replacement of the existing 800 MHz Motorola system in the eastern and southern parts of the state is underway and should be complete next year. All counties are expected to be on-line in 2005.

For scanner listeners, SLERS is bad news. Not only does the ProVoice system use a proprietary voice protocol, but the state has decided to encrypt traffic on voice and control channels. No commercially available scanner is capable of monitoring ProVoice transmissions, but even with the right equipment it would be illegal to do so without authorization to use the electronic system keys.

Even with SLERS in place, occasional analog traffic may be heard on two mutual aid frequencies, 866.0125 (Calling) and 866.5125 (Tactical-1). These frequencies are available on each repeater site. In addition, the state plans to imple-

ment the following analog channels for interoperability:

45.86	Law Enforcement
154.280	Fire ("White")
154.950	Law Enforcement
155.370	Law Enforcement
460.275	Law Enforcement
463.175	Emergency Medical Services ("Med-8")
853.3875	Florida Mutual Aid
867.0125	Mutual Aid ("Tactical 2")
867.5125	Mutual Aid ("Tactical 3")
868.0125	Mutual Aid ("Tactical 4")

◆ Palm Beach County, Florida

Although the Statewide Law Enforcement Radio System apparently made it through the Florida hurricanes without major problems, the Motorola 800 MHz system in Palm Beach County crashed during the aftermath of Hurricane Frances and was down for 11 hours. Deputies switched to conventional shared radio channel and drastically curtailed routine voice traffic. Fire Department dispatchers relayed 911 calls to an amateur radio operator, who then contacted the appropriate headquarters facility. From there the message was relayed to the nearest fire station by cell phone, landline telephone, or other means.

◆ Cecil County, Maryland

M/A-COM landed an $8 million contract from Cecil County, Maryland, in November. Located in the northeastern part of the state, Cecil County will receive a trunked VHF radio system capable of carrying both analog and digital voice traffic. This will fit well with the nine-county Maryland Eastern Shore Interoperability Network (MESIN), which is also being installed by M/A-COM.

◆ Charleston, South Carolina

Please Help.

I am moving to Charleston, South Carolina in 2004. Can you help with the police/fire/emergency frequencies of the area, are they digital, VHF or trunked? Any help would be greatly appreciated.

Chris

The city of Charleston is an Atlantic Ocean seaport located roughly halfway between Myrtle Beach and Savannah. Much of the public safety radio traffic is on an analog Motorola Type II SmartNet system operated by Charleston County.

Frequencies in use are: 856.2375, 856.4875, 856.7375, 856.9375, 857.2375, 857.4875, 857.7375, 857.9375, 858.2375, 858.4875, 858.7375, 858.9375, 859.2375, 859.4875, 859.7375, 859.9375, 860.2375, 860.4875, 860.7375 and 860.9375 MHz.

Here are some of the many talkgroups on this very active system:

560	023	Coroner
592	025	Communications
752	02F	Airport
944	036	Sheriff Operations (West/South)
976	03D	Sheriff Operations (East/North)
1072	043	Sheriff Traffic
1104	045	Sheriff Records
1168	049	Sheriff Special Operations 1
1200	04B	Sheriff Special Operations 2
1232	04D	Sheriff Metro
1264	04F	Sheriff Public Safety
1392	057	Sheriff Boats
1424	059	Fire (East)
1456	05B	Fire (North)
1488	05D	Fire (West)
1616	065	County Jail (Operations)
1648	067	County Jail (Administration)
1680	069	County Jail (Transport)
1904	077	Emergency Medical Services (Command)
1936	079	Emergency Medical Services (Operations)
2000	07D	County Rescue Squad
4816	12D	State Tactical 1
4848	12F	State Tactical 2
4880	131	State Tactical 3
4912	133	State Tactical 4
4944	135	State Tactical 5
4976	137	State Tactical 6
5008	139	State Tactical 7
5040	13B	State Tactical 8
5072	13D	State Tactical 9
5104	13F	State Tactical 10
7216	1C3	North Charleston Fire Operations
7248	1C5	North Charleston Fireground 1
7280	1C7	North Charleston Fireground 2
7312	1C9	North Charleston Fireground 3
7344	1CB	North Charleston Fire (Night)
11024	2B1	State Disaster Mutual Aid
11056	2B3	State Disaster Mutual Aid
11088	2B5	State Disaster Mutual Aid
11120	2B7	State Disaster Mutual Aid
11152	2B9	State Disaster Mutual Aid
11184	2BB	State Disaster Mutual Aid
11216	2BD	State Disaster Mutual Aid
11248	2BF	State Disaster Mutual Aid

Don't forget to keep the nearest National Oceanic and Atmospheric Administration (NOAA) weather radio frequency programmed in your scanner. There is a station in nearby Awendaw transmitting on 162.550 MHz. You may also be able to hear 162.450 MHz, which is broadcast from Green Pond.

◆ Phoenix Update

Hi Dan,

I'd like to reply regarding the information in your September '04 Scanning report column in Monitoring Times...

In September we answered a request for information on the Phoenix area by "Motley in North Phoenix." The following information comes from John in Phoenix to clarify the current situation. Although the text is not in italics for better legibility, the words are all John's:

First, Phoenix still patches parts of its digital 800 MHz trunked system to its 12 analog conventional VHF channels. There are also seven analog conventional UHF channels to monitor. On the 800 system, the chase talkgroups are encrypted, but are patched to the three VHF chase channels, which are also patched to the three UHF chase channels. The regular patrol and alternate patrol talkgroups are not encrypted. So there is still plenty of analog conventional monitoring to be had if someone is interested in the Phoenix Police Department.

Phoenix Fire Department is still analog conventional VHF. They have not yet begun to switch over. Phoenix also dispatches for Glendale, Peoria, Sun City, El Mirage, Surprise, Tolleson, Avondale, Goodyear, Buckeye City and Valley, Gila Bend (Rescue only), Daisy Mountain, Tempe, Guadalupe, Chandler, and Sun Lakes fire departments and districts.

Mesa Police Department is also patching their analog conventional VHF channels to their 800 system, from what I understand.

Mesa Fire Department has not yet begun switching over. Mesa FD also dispatches for Gilbert and Apache Junction fire departments.

As for the other major cities:

Glendale Police Department:
P25 CQPSK two-site simulcast digital trunked, along with city services.

Peoria Police Department:
Analog conventional UHF, with no plans to go digital or trunking anytime soon. (I live here and have a friend in the department.)

Peoria City:
Analog conventional 800 MHz.

Sun City Sheriffs Posse:
Analog conventional 800.

Youngtown and El Mirage Police Departments:
Analog conventional UHF.

Surprise Police Department:
Analog trunked 800 on the county's system, primarily on the White tanks Mountain site, along with city services.

Tolleson Police:
Analog conventional 800 MHz.
Avondale Police:
Analog conventional UHF.
Goodyear Police:
Analog conventional 800 MHz.
Buckeye Police:
Analog trunked UHF.
Paradise Valley Police:
Analog conventional 800 MHz.
Scottsdale Police:
Analog trunked 800 MHz on the county system, primarily on the Thompson Pk. site, along with city services.
Scottsdale Fire:
Analog conventional VHF, currently through a contract with Rural-Metro Fire. To become a city Fire Department in the next year or two, I believe.
Rural-Metro Fire Department:
Analog conventional VHF. Scottsdale, Paradise Valley, Fountain Hills, Rio Verde, Carefree, Cave Creek, Litchfield Park, West and East Valley county areas.
Tempe Police:
Analog trunked 800 MHz
Chandler Police:
Analog trunked 800 MHz.
Gilbert Police:
Digital trunked 800, on Mesa's system. (Not positive on that.)
Apache Junction Police:
Analog conventional VHF.
Salt River Indian Police and Fire:
Analog conventional UHF
Maricopa County Sheriff:
Digital trunked 800 MHz, while the rest of county is analog trunked 800 MHz. Multiple sites throughout the county, which accounts for the long frequency listing.
Department of Public Safety:
Analog conventional UHF

If anyone in the Phoenix area, or anywhere else in Arizona, wants to have the latest information regarding any public safety radio system and then some, go to **http://www.scannerstuff.com** and check out the information available in the 8th Edition of the *Southwest Frequency Directory*. The *SWFD* is produced locally, and all the information is compiled by local scanner enthusiasts and public safety professionals.

By buying the *SWFD8*, you also have access to on-line updates, which includes much information on Phoenix-Mesa's PRWN system, including but not limited to talkgroups. You get not only frequencies and talkgroups, but radio codes, apparatus lists and a lot of other information not available in another mass-produced directory. I am a very satisfied owner of the *SWFD8* and previous editions, and have contributed to it myself as well.

They can also join **http://groups.yahoo.com/group/ArizonaScanner** and ask questions, and share information/updates with other local monitors.

I hope this clears up some confusion Motley has on the status of the radio systems in the Phoenix area, and helps anyone else interested as well.

John in Peoria, Arizona

Phoenix Police use the following analog frequencies that John mentions:

154.755	Chase (Tactical)
155.790	Chase (South)
154.890	Chase (North)
155.070	Central City
155.370	South Mountain
155.430	Maryvale
155.520	Squaw Peak
155.610	Information
155.640	Desert Horizon
155.700	Cactus Park
155.760	Car-to-car
156.060	Tactical
453.100	Chase (North)
453.200	Chase (Tactical)
453.450	Chase (South)
453.525	Operations
453.600	Detectives
453.675	Special Assignment/SWAT
453.800	Special Assignment/SWAT

The Phoenix Fire Department continues to use the following frequencies as they transition to their new 800 MHz network:

154.190	Dispatch
154.250	Phoenix (East)
154.070	Phoenix (West)
153.770	Phoenix (South)
151.370	Phoenix (North)
154.145	Tempe

❖ Another Phoenix Update

Dan,

I was just reading the Scanning Report column in the September Monitoring Times about Phoenix and Mesa's digital system. Motley in North Phoenix was saying everything is digital for Mesa and Phoenix.

I live in Pinal County about 50 miles east of Phoenix. I listen to Mesa Fire and Police. I know that Mesa is converting over to the digital system. The Superstition and Falcon Police Divisions have converted, but I also hear the broadcasts on their old high band frequencies yet. Mesa Fire is still using the high band frequencies. I live near Apache Junction and Mesa dispatches Apache Junction's Fire Department. I did hear that Mesa is having a problem with their digital system as they are hearing an echo in the mobile transmissions.

I can't say much about Phoenix's frequencies, as I don't listen to them.

I know that eventually I will have to get a digital scanner. Is the PRO-96 able to pick up CQPSK simulcasts yet? In an earlier Monitoring Times article it said that Mesa was going to use this, and that the PRO-96 would lose the audio after a few seconds.

The Bearcat could copy CQPSK with no problems. I do like that the PRO-96 has the Virtual Scanner feature with the frequencies already programmed.

Thanks, John in Arizona

The PRO-96 is capable of correctly monitoring CQPSK transmissions if it has received a firmware upgrade. The upgrade also improves the audio quality during reception of weak signals. You can find upgrade information on the Radio Shack web site, or you can click on the direct link from my APCO-25 web page at **http://www.signalharbor.com/apco25.html**.

❖ New Radio Shack Scanner

The PRO-2096, a base/mobile version of the handheld PRO-96, received FCC (Federal Communications Commission) type approval in September, meaning it is now legal to offer for sale in the United States. The draft manual submitted to the FCC indicates it will be a 500-channel scanner capable of monitoring APCO-25 digital radio systems, including "pure" systems with 9600-baud control channels. It will also be able to track Motorola and EDACS analog trunked systems. It will have the V-Scanner (virtual scanner) feature, allowing 11 different memory configurations. Like the PRO-96, it will be able to accept firmware updates.

No word yet on availability, but it would be a fair bet to guess that they'll be on the shelves in time for Christmas.

That's all for this month. More information is available on my web site at **http://www.signalharbor.com**, including detailed APCO-25 information and links to Radio Shack for scanner firmware updates. Please send your questions, comments and frequency lists to me at *danveeneman@monitoringtimes.com* . Until next time, happy scanning!

Scanning Canada

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Our "Northern" Neighbors

It's official. *ScanCan* stood in a park overlooking the Detroit River on a sunny afternoon in late summer. In front of me lay the City of Windsor's floral compass. The embossed lettering on the bronze plaque bore the legend, "The geographic location of the USA at this point lies due north of Canada." I looked across the broad, calm expanse of the river and, sure enough, the tall, gleaming office towers of Motown, Michigan, pointed skyward directly north of where I was standing.

Ontario's balmy southern extremes occupy a latitude further south than thirty percent of the continental United States (and that excludes Alaska). Twenty seven of the fifty states of the union include land that is farther north than the southern tip of Canada.

The border is often thought of as the forty-ninth parallel, but in fact, Canada's southernmost point (Middle Island in Lake Erie) is actually only a little north of the forty-first parallel. Here, Canada reaches slightly closer to the equator than the city of Chicago and parts of California.

ScanCan's schedule did not permit a trip out to the island archipelago in Lake Erie, but I did manage to witness the afternoon departure of the ferry to Pelee Island from the picturesque small fishing port at Kingsville, Ontario.

The frequencies used by the Kingsville fishery in the dock area are:
156.075 156.425 156.575 171.360

The local coast guard can be found on the familiar marine band frequencies of:
156.275 156.575 156.600 156.800
157.100 157.125 161.775 161.875
161.950 161.975 161.975 162.025

While in the area, the local fire department can be found on 153.770 154.070 (Essex County) and 154.280 154.635 159.270 (Town of Kingsville).

❖ Bridge, Tunnel, Tables and Slots

Meanwhile, back in Windsor, the elegant modern office towers of General Motors proclaim the wealth and prestige of the Detroit area on the north shore. On the south shore in Canada and directly across the river from GM, the bright lights, spectacular outdoor water feature and broad facade of Casino Windsor proclaim the intention to divest consumers of the wealth that might have been earned on the northern side of the river over the Ambassador Bridge or through the tunnel.

Five frequencies in a trunk group are licensed directly to the company that runs the casino:
858.8125 859.0625 860.2125
860.4625 860.7125

In addition, a further five frequencies are licensed to the City of Windsor for use at the casino:
857.0375 857.2875 858.0375
858.2875 858.5375

The casino operates 24 hours per day, 7 days per week 365 days per year.

❖ Mission Aborted

The same road trip that took *ScanCan* to Windsor also included a diversion to the southernmost place on Canada's mainland at Point Pelee, Ontario. This narrow spur of marshy land is a national park that extends several kilometers into Lake Erie. The peninsula narrows as the tip of the point approaches. On the day of my visit, late summer storms were threatening in the dark overhead skies. The *ScanCan* mobile monitoring post had driven halfway down the peninsula when rain started to fall.

Within minutes the rain had turned into a severe storm. The powerful waves that are often found on Lake Erie's shallow waters lashed the shores of Point Pelee and the slim park roads quickly flooded as heavy thunder and lightning crashed all around us. A wet and hasty exodus to the safety of the mainland replaced a planned afternoon of leisurely scanning the airwaves of southwest Ontario.

❖ Ontario Provincial FleetNet System Status

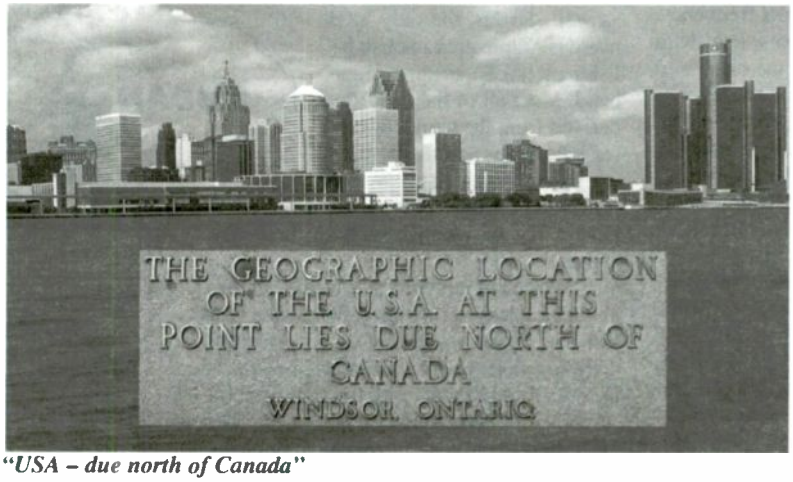
The Ontario government's FleetNet system is the new integrated emergency services radio network that is intended to replace traditional radio networks in the province. FleetNet is a dual mode ASTRO (digital) and analog VHF network incorporating 205 government-owned tower sites in four zones south of latitude 51 degrees. The system is based on Motorola's SmartZone trunking technology, and encryption is used by some of the user agencies.

Users are the Ontario Provincial Police, Ministry of the Solicitor General - Correctional Services, Ministry of Health ambulance services, Ministry of Natural Resources firefighting and conservation enforcement, and Ministry of Transportation highway safety and enforcement.

The network is built to reliability standards required for the support of emergency services. Network availability is guaranteed within 5 seconds 99% of the time and major system components have built-in redundancy. Coverage is rated at 97% of the population base in the province.

FleetNet includes system features such as automatic identification of calling stations and talkgroup, with timestamp on activation of the PTT (Push To Talk) key on the radio. Province-wide common talkgroups for all users allow interoperability, and network tones identify system access, out-of-range, or system busy states. A vehicular repeater system (VRS) expands the range of portable units. VRS crossband repeats UHF signals from handheld radios into the main VHF network.

At the time of writing , the first two zones in southwest and southeast Ontario are operational. The territory covered by these zones stretches from Windsor to Ottawa and as far north as southern Algonquin.



"USA – due north of Canada"

❖ Emergency Services Communications

Next month *Scanning Canada* goes inside one of Canada's largest regional emergency services communications rooms and reveals some of the insider secrets. There are surprises and excitement when we take a look at how 911calls are dispatched to police, fire and ambulance in the Greater Toronto Area's largest regional municipality. Until December, happy scanning north of the border.

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Hearing the Barking Sands

Barking Sands is the colorful name given to a United States military base near Kekaha, on the Hawaiian island of Kauai, where the Navy operates its Pacific Missile Range Facility (PMRF). This comes from the old name for a portion of the pristine, 17-mile beach nearby. Apparently, walking on the dry sand produces a distinctive sound, which has been likened to the barking of a dog. Best explanation is that the sand grains are hollow, and pretty much all the same size and shape, which causes some kind of acoustic resonance when they are crunched together by footsteps.

Utility fans might have heard of Barking Sands as the site of WWVH, the National Institute of Standards and Technology's Pacific time station. WWVH moved here in 1971, after beach erosion ate its former site on Maui. It uses 2.5, 5, 10, and 15 megahertz (MHz), all amplitude modulated (AM) and all 10 kilowatts except 2.5, which is 5.

Getting back to the missile range, PMRF covers a huge air and water expanse covering 42,000 square miles. This includes two warning areas, called W-186 and W-188, which are controlled by PMRF as opposed to the adjoining zones controlled by the more familiar Fleet Area Control and Surveillance Facility (FACSFAC). PMRF Control's radio call is "Outrider."

While range communications can use many modes and frequencies, veteran utility listener Ron Perron recently copied a US Coast Guard teleprinter broadcast which told mariners operating in the warning area during an upcoming activity that PMRF uses the upper-sideband (USB) voice frequencies of 2182.0 and 4491.0 kilohertz (kHz). 2182 is, of course, the old international USB calling and distress frequency. It used to have a mandatory radio watch, with its own silent periods offset from the ones used for 500 kHz Morse Code. The 2182 watch was discontinued for most vessels in 1999, and for everybody in 2002. Many USB users still keep idle radios tuned to this frequency, however.

4491.0 is in a fixed/mobile allocation, and it doesn't seem to be in any of the listings. This would seem kind of odd, except that the well-documented Plead Control frequency used by the Navy's California test facility at Point Mugu is 5080.0 kHz USB, also in this allocation. 5080 used to be a good frequency during exercises. For this reason, it may be worth keeping an ear on 4491 to determine if it's really active.

The Coast Guard broadcast itself is interesting, because its many warnings and information bulletins usually list upcoming events on the oceans that might be worth monitoring on the radio. Ron heard this one on 16806.5 kHz, in Simplex Telex over Radio (SITOR), mode B. SITOR-B is an error-correcting mode usually sent at 100 baud (a unit of transmission speed) and with 170-hertz frequency-shift keying.

Other frequencies used for these broadcasts are 6314, 8416.5, 12579, and 22376 kHz. All of these are assigned channel centers, so your dial/window frequency reading may vary. The full schedule is at **http://www.navcen.uscg.gov/marcomms/cgcomms/sitor.htm**.

Finally, this broadcast noted that the SITOR mode A traffic frequencies for NMC, the Coast Guard's Pacific master station (CAMSPAC) in northern California, and its remote station NMO, Honolulu, are (coast/ship): 8429.5/ 8389.5; 12589.0/ 12486.5; and 22389.5/ 22297.5 kHz. The 22 MHz is used from 1730-0330 Coordinated Universal Time (UTC). The rest are 24 hours.

❖ United Nations in Sudan

A bloody and prolonged civil war, more recently compounded by a drought, has brought the East African nation of Sudan to the brink of a humanitarian catastrophe. Millions of people are displaced in the Darfur region of Western Sudan, and in neighboring Chad. The United Nations Joint Logistics Center (UNJLC) is coordinating a massive operation to bring aid to nearly a million people.

Communication from this huge undertaking is being heard throughout Europe and the Eastern US. The frequencies are 12225.0 and 14420.0 kHz, and maybe 13390.0 as well. So far, the only mode heard is Automatic Link Establishment (ALE), in upper sideband. Most all of the calls are derived from the names of cities where operations are taking place. Several appear to be provincial capitals. Just below, we have a list of identifiers, with their city names.

While it's not really a utility, there is also a broadcasting station called Sudan Radio Service. It was started by an American non-governmental organization called the Education Development Center, with funding from the US Agency for International Development. It broadcasts for six hours each weekday in English, Arabic, Juba Arabic, and six local languages, on 11665, 15325, and 17660 kHz AM. Full schedule is at **http://www.sudanradio.org/**.

❖ Sudan ALE Hits

ATBARA	Atbara
BABANUSA	Babanusa
DAL	Dal
DMAZIN	Ed Damazin
FAS	Fasher
GADARAF	El Gederef
GIRBA	Girba
JUBA	Juba
KADOGLI	Kadugli
KOSTI	Kosti
MADANI	Wad Medani
MAL	(Could be several)
NYALA	Nyala
OBIED	El Obied
PORTSUDAN	Port Sudan
SHENDI	Shendi
WAU	Wau

❖ Interference on 6224

6224.0 kHz is an internationally designated, USB frequency for simplex (single-frequency) use by ships. Last summer in the Antarctic, many passenger ships operating in the South Atlantic and Southern Ocean had serious problems with interference from Northern Hemisphere winter broadcasting schedules on the adjacent 6225 kHz. The broadcast band actually stops at 6200. Anything higher is on a non-interference basis, not the easiest thing in a simplex mobile band.

Even so, 6225 has long been a favorite frequency for Europirates, clandestines, and at least one "numbers" station. Last year's problem, though, came from an unlikely source. It was a Deutsche Welle winter relay transmitter in, of all places, Kazakhstan, a former USSR republic next to Russia and China. This half-megawatt snow-melter appears in some old DW schedules, though not in the latest one. Listings also show a high-powered domestic service in Pakistan.

Antarctic summer is just around the corner. We'll see if the problem happens again this year. Perhaps someone's government needs to complain formally to the International Telecommunications Union, and see if Kazakhstan takes any action, though of course these things take time.

Happy Thanksgiving, and see you next month.

Utility World

Utility Logs

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ABBREVIATIONS USED IN THIS COLUMN

AFB ..... Air Force Base
ALE ..... Automatic Link Establishment
ARINC ..... Aeronautical Radio, Incorporated
ARQ ..... Automatic Repeat Request teleprinting system
ARQ-E3 ..... French ARQ teleprinting system
AWACS ..... Airborne Warning And Control System
CAMSLANT ..... Communication Area Master Station, Atlantic
CW ..... Morse code telegraphy ("Continuous Wave")
DEA ..... US Drug Enforcement Administration
DSC ..... Digital Selective Calling
EAM ..... Emergency Action Message
EOC ..... Emergency Operations Center
FAX ..... Radiofacsimile
FEC ..... Forward Error Correction teleprinting system
FEMA ..... Federal Emergency Management Agency
HF-GCS ..... High-Frequency Global Communications System
HFDL ..... High-Frequency Data Link
JSTARS ..... Joint Surveillance Target Attack Radar System
MARS ..... Military Affiliate Radio System
Meteo ..... Meteorological
MFA ..... Ministry of Foreign Affairs
RCC ..... Rescue Coordination Centre
RSA ..... Republic of South Africa
RTTY ..... Radio Teletype
SHARES ..... SHAred RESources, US Federal net
SITOR-A ..... Simplex Teleprinting Over Radio, ARQ mode
SITOR-B ..... Simplex Teleprinting Over Radio, FEC mode
UK ..... United Kingdom
Unid ..... Unidentified
US ..... United States
VOLMET ..... Flying Weather (loosely from French)

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

2072.1 Unid-German Coast Guard, SITOR-A traffic in German, at 2110. (Day Watson-UK)

2250.0 OWE-Danish Air Force, Karup, calling OWK, Vedbaek, in ALE at 2250. (Watson-UK)

3175.5 LOR-Argentine Navy, Puerto Belgrano, RTTY weather in Spanish, at 0020. (Bob Hall-RSA)

3349.0 NNN0ROS-US Navy MARS, working several Georgia stations in a directed net, at 0132. (Mark Cleary-SC)

4207.5 3FWZ5-Ship *Pegasus P*, DSC safety test with US Coast Guard Boston, at 2227. (Watson-UK)

4490.0 MM2-Federal Bureau of Investigation, Miami, FL, calling QT2, Quantico, VA, ALE at 1039. (Ron Perron-MD)

4500.0 AFA2GM-US Air Force MARS, Belleview, FL, working AFA2CX, Satellite Beach, and several other stations in the "2 Sierra 1" emergency net during hurricane Charley at 0100. (Cleary-SC)

4604.0 Red Robin 8-Civil Air Patrol, MI, checking in Red Robin stations, at 0103. (Perron-MD)

4841.0 OWE-Danish Air Force, Karup, calling OWK, Vedbaek, ALE at 0048. (Watson-UK)

5211.0 NMN-US Coast Guard CAMSLANT, radio check with NMN0X (unknown Coast Guard), and WGY 912, FEMA, Mount Weather, VA, during hurricane Charley at 0132. (Cleary-SC) WGY 912, checking NNN0AUH, Navy/Marine Corps MARS, into an emergency net for hurricane Frances, also monitoring 4041 (national MARS emergency) and 14483.5, at 0252. WGY 912, working WGY 944, GA State EOC, Atlanta, at 0253. (Rick Baker-OH)

5236.0 KNY91-SHARES Northeast Coordination Net for Frances, checking in many MARS stations, plus WWJ40S (Federal Highway Administration, PA) and PENNCAP 240 (PA Civil Air Patrol), at 1245. (Baker-OH)

5422.5 Coast Guard Auxiliary District 5 Radio Net, checking in PA and LA stations, meets every 4th Monday, at 0000. (Perron-MD)

5680.0 Kinloss Rescue-UK Royal Air Force, working RAF Rescue 122, 170, 194, and 195, helicopters on rooftop rescues from a flood in Cornwall, at 2030. (Patrice Privat-France)

5696.0 Rescue 1504-US Coast Guard, setting guard with CAMSLANT in a NC search and rescue, at 1504. (Baker-OH)

5711.0 King 22-US Air Force Rescue HC-130, working Angel Ops, Moody AFB, GA, at 0141. (Cleary-SC)

5717.0 Rescue 323-Canadian Forces CC-130, patch via Halifax Military to Halifax RCC, for medical evacuation from a vessel, at 0156. (Cleary-SC)

5732.0 Coast Guard 6019-US Coast Guard aircraft, ops-normal for Panther (DEA, Bahamas), at 0414. (Baker-OH)

6489.5 LOR-Argentine Navy, Puerto Belgrano, RTTY navigation information in Spanish, at 0610. (Hall-RSA)

6532.0 07-ARINC ground station, Shannon, Ireland, HFDL identifier at 1412. (Watson-UK)

6694.0 Halifax Military-Canadian Forces, relaying traffic from Rescue 908 to Halifax RCC, at 0044. (Cleary-SC)

6697.0 Decurrent-US military, with an EAM simulcast on 8992 and 11244, at 1806. (Jeff Haverlah-TX)

6715.0 JDGSPR-US Air Force secure network gateway, Diego Garcia, calling HAWSPR, Ascension Island, ALE at 1917, 1919, 1940, and 1946. (Watson-UK)

6761.0 Reach 405-US Air Force Air Mobility Command, calling tanker Ethyl 84 for air refueling, at 0101. (Cleary-SC)

6900.0 Lecaire-French Embassy, Cairo, working CER41, Paris MFA, ALE at 2351. (Watson-UK)

6928.0 1206-Possible Turkish Border Guard, ALE sound at 2327. (Watson-UK)

6981.0 INA-Sonatrach oil and gas net, In Amenas, Algeria, ALE sound at 0215. HR-Sonatrach Hassi R'mel, ALE sound at 0526. (Watson-UK)

7370.0 AAA-Israeli Air Force, Tel Aviv, ALE sound at 2053. (Watson-UK)

7390.0 BB1-Israeli Air Force, Palmaclim, ALE sound at 0135. AA1, Ben Gurion, ALE sound at 0208. (Watson-UK)

7400.0 AA2-Israeli Air Force, Ben Gurion, calling ACCES2, ALE at 0104, 1904, and 2204. (Watson-UK)

7441.0 2BG-Polish Army in Iraq, calling BF2, in ALE at 0319. (Watson-UK)

7460.0 AAA-Israeli Air Force, Tel Aviv, ALE sound at 2323. (Watson-UK)

7500.0 AA1-Israeli Air Force, Ben Gurion, calling ACCESS1, ALE at 0200. (Watson-UK)

7527.0 Coast Guard 1705-US Coast Guard HC-130, setting guard with CAMSLANT at 1214. (Cleary-SC)

7632.0 NNN0KAG-US Navy/Marine Corps MARS, acting as control in the SHARES Southeast Net, taking check-ins at 1623. (Cleary-SC)

7646.0 DDH7-Hamburg Meteo, Germany, Baltic weather in RTTY, at 2052. (Watson-UK)

7696.0 Unid-Unknown station running ungrouped letters in slow CW, at 2055. (Watson-UK)

7700.0 LCR152-Polish Military, Warsaw, calling MPQ608 in ALE, at 0729. (Watson-UK)

7805.0 BE1RL-New Hampshire EOC, Berlin, ALE sound at 1651. WPFJ625-New Hampshire State EOC, Concord, ALE sound at 1656. (Perron-MD)

7820.0 CENTR8-Romanian MFA, Bucharest, calling FQS in ALE, at 0635. (Watson-UK)

7880.0 DDK3-Hamburg Meteo, Germany, weather chart FAX at 2208. (Watson-UK)

8060.0 HOME-Unknown station, probably a test identifier, calling WORK in ALE at 1347. (Perron-MD)

8065.0 SKYWAT-Skywatch, US Army Flight Watch, Soto Cano Air Base, Honduras, ALE sound, also 8972 and 16144.5, at 1959. (Perron-MD)

8156.0 Romeo 266-Royal Bahamas Self-Defence Force, working Romeo 267 and "C-6-R," in a Frances search and rescue operation, at 0315. (Baker-OH)

8421.5 VRX-Hong Kong Radio, CW marker and SITOR-A traffic, at 1751. (Hall-RSA)

8664.4 HMZ-Pyongyang Radio, North Korea, short hand-sent CW markers at 1602. (Watson-UK)

8888.0 Tyumen-Russian Volmet, with Siberian flight weather in Russian, at 1650. (Privat-France)

8912.0 Hammer-US Immigration and Customs Enforcement, March AFB, CA, calling Omaha 241, Customs, at 0001. (Perron-MD) Coast Guard 1705-US Coast Guard, setting radio guard with CAMSLANT, enroute to the Bahamas after the hurricane, at 0326. (Baker-OH)

8918.0 New York-Caribbean Air Route Control, working Continental 112, at 0020. (Baker-OH)

8971.0 Wolf 02-US Navy E-2 AWACS, working Blue Star at 0047. Wafer 20- US Navy P-3C, Spare Group for Goldenhawk at 1457. Pelican 71A-US Navy P-3C, Spare Group for Fiddle, US Navy Tactical Support Center, FL, at 1659. (Cleary-SC)

8977.0 03-ARINC ground station, Reykjavik, Iceland, getting position in HFDL from N68155, Continental flight 55, at 1532. (Watson-UK)

8983.0 CAMSLANT-US Coast Guard, standing down for a fire evacuation, at 2356. (Cleary-SC)

8992.0 Ruler 15-Mississippi Air National Guard, radio check with McClellan HF-GCS, CA, at 1748. Incubate-US military, patch via Puerto Rico HF-GCS to Fire Bug, at 2334. (Haverlah-TX)

9007.0 Canforce 1501-Canadian Forces, weather from Trenton at 0216. (Cleary-SC)

9022.0 Goliath Alpha-Back end of US Air Force E-3 AWACS, working unknown station at 1756. (Cleary-SC)

9025.0 Dragnet Uniform-Back end of US Air Force E-3 AWACS, ALE-initiated patch to Raymond 24, at 2337. (Cleary-SC)

9040.7 5YE-Nairobi Meteo, Kenya, RTTY test loop at 1716. (Hall-RSA)

10100.8 DDK9-Hamburg Meteo, Germany, RTTY weather at 1551. (Watson-UK)

10242.0 51A-US Customs, position for Panther, DEA, Bahamas, at 0030. (Cleary-SC)

10248.0 8BY-French Military, Paris, CW traffic and markers, at 1943. (Watson-UK)

10493.0 WGY9494-FEMA, CO, radio check with WGY 912, VA, at 0355. (Baker-OH)

10534.0 CFH-Canadian Forces Metoc Centre, Halifax, NS, FAX Atlantic ice chart at 2323. (Jeff Seale-KY)

10993.6 C7R-Unknown aircraft working Sector Key West, on a search at 1633. (Cleary-SC)

11000.0 RIW-Russian Navy, Moscow, calling RMRV, CW at 1548. (Watson-UK)

11039.0 DDH9-Hamburg Meteo, Germany, RTTY weather in German, at 1030. (Watson-UK)

11175.0 Bolt 43-US Air Force Air Mobility Command tanker, patch via Sigonella to Lightning Ops at MacDill AFB, at 0131. Reach 456-Air Mobility Command, declaring emergency for bad engine, at 2333. (Cleary-SC) Rock 69-US Air Force Reserve C-130, no copy with Andrews HF-GCS at 1435. (Baker-OH)

11205.0 Teal 57-US Air Force Reserve 53rd Weather Recon WC-130 "Hurricane Hunter," no joy calling Smasher, Key West, FL, at 1102. (Cleary-SC)

11217.0 KLY 90-Unknown US government, in the SHARES net at 1807. (Cleary-SC)

11232.0 Razor 03-US Air Force E-8 JSTARS, patch via Trenton to Peachtree, GA, at 2339. (Cleary-SC)

11244.0 Feed Back-US military, with a 28-character EAM, simulcost on 8992, at 0307. (Haverlah-TX)

11384.0 OHLBV-Finnair Flight 2750, HFDL position at 1743. (Watson-UK)

11494.0 USDAHQ1-US Department of Agriculture, DC, working KNR43, possible National Communications System, ALE at 1307. (Cleary-SC)

12225.0 MADANI, United Nations forces, Wad Medani, Sudan, calling Atabora at 0431. DMAZIN, calling Port Sudan at 1630. FAS, Fasher, colling Nyala at 1935. (Watson-UK)

12577.0 VRUI5-Hong Kong motor vessel *Sai Kung*, calling 6010001 in DSC at 1902. EQXT-Iranian tanker *Iran Hoveizeh*, calling 5030001 in DSC at 1915. (Privat-France)

12579.0 NRV-US Coast Guard, Guam, SITOR-B Pacific weather at 1530. (Hall-RSA)

12587.0 LZW-Varna Radio, SITOR-B news in Latinized Bulgarian, at 0930. (Privat-France)

12669.0 UTRA-Russian vessel *Leonid Borodich*, calling in CW, at 0934. (Privot-Fronce)

13155.0 Plus Sign-US military, with a 28-character EAM, simulcast on 8992 and 11244, at 2237. (Haverlah-TX)

13390.0 GADARAF-United Nations, Gedaref, Sudan, ALE sound at 2308. (Watson-UK)

13444.0 RFQP-French Forces, Djibouti, long ARQ-E3 message in French to many stations, including US Central Command, regarding search of a suspicious vessel, at 1634. (Hall-RSA)

13898.1 BMF-Taipei Meteo, Taiwan, FAX typhoon warning in Chinese and English, at 1610. (Privat-France)

13927.0 Teal 64-US Air Force Reserve WC-130 "Hurricane Hunter" in tropical storm Bonnie, patch via AFA1RE, ME, for a news media interview, at 2237. (Cleary-SC)

13993.0 Unknown station, possibly AFA4BR, in US Air Force MARS "Charlie Echo" net for hurricane traffic, at 1500. (Perron-MD)

14325.0 VP5DB-Control in Hurricane Watch Net, working WX4NHC, National Hurricane Center, FL, at 2310. VP5DB, passing weather observations from emergency stations in hurricane Frances areas to WX4NHC, at 2334. (Hugh Stegman, using remote in Venezuela)

14396.5 AFA4BR-SHARES Gulf Coast Coordination Station, relaying to the net that WGY 914, FEMA at the Florida State EOC, had lost contact with all stations in an area being hit by Frances, at 1300. (Perron-MD)

14420.0 MADANI-United Nations, Wad Medani, Sudan, calling NYALA3, ALE at 0557. (Watson-UK) GIRBA-United Nations, Girba, Sudan, ALE sound at 2205. OBIED-UN in Sudan, ALE sound at 2354. (Perron-MD)

14653.0 C090AN-CA National Guard, calling HIC93NG, Hawaii National Guard weapons of mass destruction response unit, ALE at 2002. (Perron-MD)

15867.0 51A-US Customs, working Panther at 1716. (Cleary-SC)

15921.0 CER11-French MFA, Paris, calling RABAT, Morocco Embassy, ALE at 1808. (Perron-MD)

16338.5 I050LN-IL National Guard, passing an ALE message string to HQ703N, VA, at 1525. O100RN-OR National Guard, calling A100KN, Alaska, at 1558. (Perron-MD)

16355.0 SARBR-Brazilian Search And Rescue, ALE sound at 2353. (Perron-MD)

16804.5 EHVR-Spanish-registry vessel *Indalo*, calling Lyngby in DSC, at 1220. 9HUY7-Maltese vessel *Lady Virginie*, DSC to Corsen at 1302. P3ZY6-Cyprus container ship *Cosco Norfolk*, DSC to Lyngby, at 1310. SWVQ-Greek bulk carrier *Samjohn Captain*, DSC to Lyngby at 1341. ELSF4-Liberian bulk carrier *Avalon*, DSC to CAMSLANT at 1358. (Privat-France)

16829.5 UCE-Arkhangelsk Radio, SITOR-B news in Latinized Russian, at 0940. (Privat-France)

16840.5 RRR34-Moscow Radio, Russia, long SITOR-B traffic list at 1200. (Privat-France)

17010.0 ERMSAL-Brazilian Navy, Salvador, calling FRADEM, Frigate *Rademaker*, in ALE at 1729. (Perron-MD)

17029.0 Unid-Possible Russian factory ship, traffic in 3rd-shift Cyrillic RTTY, then operator chatter in fast CW, at 1606. (Watson-UK)

17146.3 CBV-Chilean Navy, Valparaiso, with FAX weather satellite image at 1145. (Hall-RSA)

17147.0 URL-Sevastopol Radio, CW markers, also working ships in fast CW, at 1714. (Watson-UK)

17230.1 CWA-Cerrito Radio, Uruguay, CW markers at 1752. (Watson-UK)

17247.0 URL-Sevastopol Radio, Russia, CW marker at 1015. (Privat-France)

18326.7 Unid-Egyptian MFA, Cairo, calling TVVX, Algiers, at 1454. (Watson-UK)

18444.5 RFFXL-French Forces, Naqoura, Lebanon, ARQ traffic at 1542. (Watson-UK)

18571.5 Unid-French MFA, Tunis, Tunisia, with FEC operator chatter in French, at 1540. (Hall-RSA)

19200.0 PR1-Venezuelan Navy River Patrol Craft *Lago1*, calling BNA, Naval Base Amario, ALE at 1253. T81-Venezuelan Navy Oiler *Ciudad Bolivar*, calling DHN, Navy hydrographic office, ALE at 1546. (Perron-MD)

19216.7 RFLI-French Forces, Fort De France, ARQ-E3 idling at 1300. (Watson-UK)

19814.0 022NHQCAP-US Civil Air Patrol National Operations Center, AL, sounding at 2043. (Perron-MD)

20906.0 N010HN-NH National Guard, calling HQ702N, unknown Arlington, VA station, ALE at 1912. (Perron-MD)

22168.0 BTLCMC1-Probable Brazilian Marines, calling ERMBEL, Navy Radio, Natal, ALE at 1843. (Perron-MD)

22403.0 UIW-Kaliningrad Rodio, Russia, CW identifier in ARQ marker, at 1236. (Hall-RSA)

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Brazilian Navy Networks

We look first this month to Brazil. Back in the December 2003 issue, we mentioned a Brazilian Navy net but weren't too sure about the identities of the stations. Well, some long research (with the help of some freshly indexed documents at Google) finally yielded some answers.

This net provides another good digital utility example for those with simple decoding equipment, as standard 100bd/170 Hz SITOR-B is used by most of these stations. Sometimes, however, stations will use a wider-shift 850 Hz version which can certainly be copied with many decoders, but probably not ones limited to fixed (and standard) tone shifts.

As you may recall, the stations tend to congregate around 12,255 kHz, some varying about +/-1kHz from that nominal channel. Most traffic consists of call-up sequences like the following:

```
pwr-44 pwr-44 pwr-44 de de de ni ni ni
ryryryryryryryryryryryryryryryryryryryryryryryry
sgsgsgsgsgsgsgsgsgsgsgsgsgsgsgsgsgsgsgsgsgsgsg
1234567890                    0987654321
1234567890  0987654321
int zbk/zbz int zbk/zbz int zbk/zbz int zbk/
zbz

wf wf wf wf wf de gj gj gj gj gj
zbk zbk 1111111111111111111111111
zbz zbz 55555555555555555555555
```

As one can see, for the most part, abbreviated two-letter codes are used for the stations involved: GC, WN, TR, etc. but 4-letter codes (PWGC, PWTR, etc.) and regular ITU registered callsigns (like PWR44) also appear from time to time.

Realizing that perhaps some of the 4-letter identifiers were, in fact, legitimate World Meteorological Organization (WMO) weather observing station codes, a search on the web finally yielded some results. This showed that indeed, the Brazilian Navy provides weather observing data from many of its ships and some shore stations. So far, these are the stations heard active on this network:

PW..	Ship	Routing ID
BR	Baracui	NPACUI
DG	Unidentified	
FS	Unidentified	
GB	Grauna	
GC	Guajara	
GJ	Grajau	NPAJAU
GK	Barroso Pereira	
GO	Goiana	
GT	Gravatai	
GU	Alte Guilem	RGILEM
JI	Itacuruca	
NI	Niteroi	FTEROI
UB	Guaratuba	
WN	Doce Orion	

PWB-33	Naval Station Belem
PWF-33	Unidentified (Fortaleza?)
PWN-33	Naval Station Natal
PWR-44	Naval Station Rio de Janeiro
PWZ-33	Unidentified

As you can see above, there are also a number of routing indicators in messages traveling across this network, which after a few weeks of listening are starting to become clearer, although many remain unidentified. For example:

ERMRIO	Rio de Janiero
ERMBEL	Belem
ERMNAT	Natal
OPENAV	Unidentified
GRNDES	Unidentified
GRNORT	Unidentified
GRNSTE	Unidentified
DLTIAO	Tritao

Notice that a few of these routing indicators are the same as those used as MIL-188-141A ALE identifiers elsewhere in the Brazilian Navy HF network (see below).

Occasionally, coded traffic, or more commonly short text messages, BBXX or AAXX synoptic weather reports will also be seen, as the following examples shows:

```
preferencial
p-131800z/jul/04
de fteroi
para cenhid
gr17
bt
bbxx pwni 13184 99237 50419 41397
30808
10230 20201 40187 57025 70101
82110 22282 00230 10310 80210 ==bt
eof
em em em zdk zdk
```

There are also frequent position reports from ships on exercise, general position reports, ships being detained on arrival in Brazilian waters, or other traffic movements, as this next example illustrates:

```
preferencial
p-131903z/jul/04
de fteroi
para openav
info cotram
grnc
bt
reinfope fteroi 1307040701 bipt
trafnm
parte 1 bipt
-ppvw/norma/brasil/tanque/130734zjul/
2353s3-04159w9/268-11/rio de janeiro/
/
-szgq/anangel argonaut/grecia/cargueiro/
131144zjul/2339s7-04217w4/221-13/
argentina// pt
parte 2 bipt
-vrx31/hebei lion/hong kong/cargueiro/
130918zjul/2342s1-04144w3/255-17/
paranagua//
-c6055/saint jones/bahamas/tanque/
131015zjul/2341s0-04208w4/081-13/
antuerpia// bt
eof
```

Take a listen to this interesting and easy to catch network and do let me know if you find answers to any of the unknown stations mentioned above.

Brazilian Navy ALE Network

Meanwhile, on other frequencies, many of the ships mentioned above appear in the Brazilian Navy's rapidly expanding ALE network:

ERMRGD	Naval Base, Rio Grande
ERMBEL	Naval Base, Belem
ERMNAT	Naval Base, Natal
ERMRIO	Naval Base, Rio de Janeiro
ERMSAL	Naval Base, Salvador
FBOSIS	Frigate, "Bosisio"
FDEFEN	Frigate, "Defensora"
FTEROI	Frigate, "Niteroi"
NEBRSL	Training Frigate, "Brasil"
NDDCEA	Dock Landing Ship, "Ceara"
NDCCMM	Large Landing Ship, "Mattoso Maia"
FRADEM	Frigate, "Rademaker"
NTGMTA	Fleet Oiler, "Almirante Gastao Motta"

You can hear these stations on the following frequencies:

8310 10914.5 11010 11486 12370 12437 13101 14780 15932 16408 17010 19709 kHz USB

Estonian Army

You may also want to try listening out for the Estonian Army's developing HF ALE

continued on page 81

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Minivan Radio, New Clandestine for Maldive Islands

As hinted last month, a new broadcast into the Maldive Islands has begun. It's not named after a small multi-person vehicle, but means "Independent" in the local language Dhivehi.

The first test was Wednesday, August 18 at 1630-1730 on 11525 via a secret transmitter site somewhere in eastern Europe, Friends of Maldives was told. The first half was to be at 100 kW, the second at 250 kW, to assess the power level required in the target area.

Reports from South Asia were wanted to *admin@friendsofmaldives.co.uk* or phone messages to +44 1722 504 330 or via snail mail to 64 Milford Street, Salisbury, SP1 2BP, UK. Media Network reported that the organization, FOM, says it is not primarily political, but it has concerns about the level of democracy on the islands. See **http://www.friendsofmaldives.co.uk/**

Thanks to *DX Listening Digest* publicity, the monitoring community was standing by for this, and it was widely heard in Europe, by Silvain Domen, Belgium; Henrik Klemetz, and Björn Fransson, Sweden; Kai Ludwig and Wolfgang Büschel, Germany; Paul Gager, Austria; Mike Barraclough, Alan Pennington and David Kernick, UK; Ignacio Sotomayor, Spain; and Jari Savolainen, Finland, who promptly got an E-mail reply. But there was little or no reception in India. The first part was buzzy and undermodulated. Guesses as to transmitter sites included Russia, Moldova, Romania – and Bulgaria (which seemed the most likely but was denied by *The Observer*).

FOM received reports from all over the Maldives, with quality ranging from none at all to poor, to clear and good. There were complaints of interference by the government from Malé. Dave Hardingham of FOM told us, "The Maldivians are literally desperate for this radio. We can't let them down. At present we are a one man band – Mr Honey Voice Ahmed Naseer, producer and presenter. For an hour programme every day!"

A form response from Rebecca Cork said: "The language is Dhivehi, and the people are called Dhivehin. This language is ancient with influences from Arabic traders, Dutch and Portuguese travellers. It is originally Sanskrit according to many sources, a beautiful language and I only understand a very little. Unfortunately, independent thought and literature such as that in the poem I read out are not welcomed in Maldives as they are considered to be anti-governmental."

The poem, The Walk for Freedom, was quoted on an FOM forum, says Henrik Klemetz, at **http://www.friendsofmaldives.co.uk/phpBB/viewtopic.php?t=11** – also repeated on subsequent broadcasts, and a clip of it is on *World of Radio* 1242, at **http://www.w4uvh.net/wor1242.ram**

After assessing the test results, Minivan Radio decided to go with T-Systems via Jülich, Germany, instead, daily from Aug 25 on 13855 at 1600-1700, 100 kW, 115 degrees, Andy Sennitt and Jeff White informed us. Calculations showed this would put a 50 dbU signal into the target area. We wondered if a morning broadcast would work better, but Dave Hardingham told us that times other than 2100/2230 local for Minivan Radio are out due to prayers – unfortunate, but a deciding factor.

An allied website is the Dhivehi Observer, **http://www.dhiveiobserver.com** where lots of news about the Maldives appears and audio files of the Minivan programs are stored along with a request to copy and distribute them by CD. This site reported that the dissident radio's frequency was "hijacked" by a Voice of Maldives government transmitter with pro-Gayyoom propaganda.

The new time and frequency were also widely monitored; unlike 11525, 13855 was also audible in North America, but in Europe and Asia was squeezed by Russian and Chinese broadcasts on either side. This one starts with an ID by Radio Miami International, which brokered the deal. But results seemed to be adequate in the Maldives.

Minivan Radio made another test with its original broker WRN, Sept 3 only at 1630-1730 on 11535 and 9985, said Savolainen and Sotomayor, but decided to stay with Germany on 13855. This shortwave service was increasingly important as the Gayoom government shut down internet access throughout the country. Another site, run out of New Zealand, provides more background: **http://www.maldivesroyalfamily.com/**

Closest to the Maldives, Victor Goonetilleke in Sri Lanka reported to *BC-DX* that 13855 came through OK, but there was interference in the form of two beeps per second. Then Russia complained that 13855 was causing interference to 13850, so Minivan moved Sept. 21 to 12015, and Jeff White advised it would probably move again for the winter season (B-04) from Oct. 31.

AFGHANISTAN [non] A new station named Ashma Radio in Dari and Pashto reported at 1430-1830 UT on 12140 kHz. The studio most likely is located in Washington, DC (Rumen Pankov, R. Bulgaria DX Program via John Norfolk, *DXLD*) VOA, alternating Dari & Pashto, 250 kW, 340 degrees, via Sri Lanka as usual; a new name for the service, or a misunderstanding? (gh) The word is Ashna ("Voice"). VOA is using this label "Radio Ashna" for its programs in Dari and Pashto to Afghanistan. See **http://www.voa.gov/West&SouthAsia.pdf** (Bernd Trutenau, Lithuania, *WORLD OF RADIO*)

15195, Internews Radio, *1330-, ID as "Salaam Watandar" via UK. Frequency change information from Kenji Hashimoto (Kouji Hashimoto, Jopan *Premium*) included Simon and Garfunkel tune, local music at, off at 1500 (via DXTuner OZ, Hans Johnson, *Cumbre DX*) ex-17700, via Rampisham, but 15195 is totally blocked on Sundays only by RVi in Dutch via Moscow 250 kW, 248 degrees to WEu (*Observer*, Bulgario) *Salaam Watandar* is produced by Internews in Kabul, primarily aired vio satellite for rebroadcasting by local Afghan radio stations. Internews will decide whether to continue SW relays beyond October 15, probably not (Bernd Trutenau, Lithuonia, *DXLD*)

ALASKA KNLS, The New Life Station, tentative schedule 31 October 2004 to 27 March 2005, English;

To E Russia & China:

9690	0800-0900	31/10/04 to 26/12/04
7365	0800-0900	26/12/04 to 30/01/05
11765	0800-0900	30/01/05 to 27/03/05

To Asian Pacific Coast:

9690	1300-1400	31/10/04 to 27/03/05

(via Manuel Méndez, Lugo, Spain, *DXLD*)

What about their long anticipated second transmitter? Surely it will be in use by then, and frequencies ought to have been planned for it. Notice how the effective dates overlap, when two transmitters would be required, but surely a mistake. I wonder if 9690 at +1200-1400 means that Greece via Delano will be moving away; else it will totally blot KNLS here, and might be a problem in the target (gh)

ANDAMAN & NICOBAR ISLANDS Those interested in receiving verifications from the exotic station, AIR Port Blair, better make it fast. The Station Engineer, Mr. K. S. Venkatesarlu, who is now very promptly replying to reception reports by email and post is being transferred by December 2004 – Who knows how the new engineer will be?! The station operates on SW with 8.6 kW: 4760 2355-0300 1030-1630/1700/1730 [depending on day of week]; 7115 0315-0346(Sot 0415, Sun 0505), 0700-0930(Sun 1000). Note: AIR Leh is also on 4760 at s0100/w0213-0430 1130-1630/1700. Send reception reports by email with your full postal address to: pblairpb@sancharnet.in To avoid confusion, write the date/timings in Indian Standard Time, UT +5:30 (Jose Jacob, VU2JOS, *dx_india*)

AUSTRALIA HCJB B04, includes English, daily from KNX = Kununurra WA with CIRAF target zones, power, azimuth; same sked actually from late Aug:

11750	0700 1100	51,55,56,59,60,62 120			5 0
15390	1430 1800	40,41,49,54		100	307
15425	1100 1230	49,54		100	307
15525	2230 0100	44,50,54E		100	340
15560	0100 0230	40,41,49,54		100	307

(via Alokesh Gupta, India, *DXLD*)

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

There was some confusion about the actual timing of the 11750 broadcast due to DST in NZ. *DX Partyline* had been Sat 0730, but *DXPL* claimed it would switch to 0830; other airings: Sat 1200 15425, 1500 15390 (gh) Another version says power on 15560 and 15390 is 75 kW (Observer, Bulgaria)

After not hearing ARDS, 5050, I sent Dale Chesson an email and got this reply: We have been off the air since the beginning of May as we found we were in breach of licence conditions regarding our allowable bandwidth of the transmitted signal. We will be placing a filter in the system to allow us to meet our licence conditions and so anticipate being back on air by Sat 18 Sept. We will also be increasing power from 200 W up to the maximum permissible under our licence, 1 kW. So I will be interested to hear from anyone after the 18th (Dale Chesson, Radio Service Manager, via Hans Johnson, Cumbre *DX*)

BOLIVIA unID at first on 4845.06, which had been occupied by R. Fides, but not // Fides 6155.05; nonstop LA music without any talk, not even at full hour or at close down 0230. Later, ads came from Caranavi, which is in La Paz dept. Varies to 4845.04, 4845.02. It's a new station, Radio Municipal, probably in Aymara (Björn Malm, Quito, Ecuador, *DXLD*) Also heard Caranavi mentioned at 0948, almost armchair, but blocked by Brazilian after 1000 (Chuck Bolland, FL, *DXLD*) Already on at 0906; nice ID at 0929 (Dave Valko, Dunlo PA, *Cumbredx*) According to Mark Mohrmann's *LA-DX*, R. Fides had not been heard on 4845 for four years. Looks like Municipal acquired Fides transmitter, which was also slighty offset above (gh) R. Fides relinquished 4845 to SITTEL in 2002 and R. Municipal has no connection with Fides. Altho in La Paz Dept., Caranavi is in the remote semi-tropical Valle de Yungas (Rogildo Aragão, Bolivia, via Malm website)

While WYFR's relay of Taiwan was off 5950 following Hurricane Frances, R. Pio Doce could be heard with clear, booming signal on 5952.5 at 0027-0204 including singing children, 0102 ID (Scott R. Barbour, Jr., NH, *DXLD*)

BRAZIL Rádio Nacional da Amazônia, originally on 6180, has been jumping to 6190 and 6170: at 0006 on 6170 but two days later at 2338 on 6190 (Adán González, Venezuela, *DXLD*) On 6170 it clashes with the much weaker Brazilian, R. Cultura São Paulo (gh)

Rádio Clube do Pará, 4885, sent verie letter in English signed by Director General Camilo Centeno, also with postcard showing the station, tech info that they use a 10 kW EASA transmitter, full wave dipole at 03 degrees north. Also said they were sending separately stickers and a T-shirt; I sent one IRC and it took 37 days. Address: Radio Clube do Pará, Av. Almirante Barroso, 2190, 1° andar Marco. CEP 66095-000 Belém, Pará, Brasil (Manuel Méndez, Spain, *DXLD*)

CAMEROON Some Christian/missionary websites feature "prayer bulletins" where you may find hints of planned stations. From **http://www.galcom.org/**: "July 2004 Fri. 9th. Continue to pray for Dave Casement as he finalizes the details to install a SW radio station in Cameroon. Pray that the leaders there will be able to work out the licensing problems this summer." (via Jari Savolainen, Finland, *WORLD OF RADIO*)

CANADA For B-04, CRI registered 7190 at 0400-0600 for Americas via Sackville. This is prohibited as 7100-7300 is exclusively ham in Region 2 (Bob Padula, Radio EDXP, HCJB *DX Partyline*) Maybe a typo for 6190, where they have been at those hours, via Sackville? Or a wooden registration. Can't imagine RCI allowing this to happen (gh)

COLOMBIA We are close to having approval from MINICOM to operate on 5910 in addition to 6010. The transmitter is finished and installation is progressing. I estimate that we will be on the air in a test phase within the next couple weeks if not sooner. Blessings, (Russell Martin Stendal, LV de tu Conciencia, Aug 17, via Henrik Klemetz, Sweden, *WORLD OF RADIO*) A year or more late, and still no sign of 5910 a month afterwards (gh)

R. Macarena, Villavicencio reactivated Sep 2, and heard in the morning on new 6090.35. I have not noted it for some years, the last time on 5975.28, 3-4 years ago (Björn Malm, Quito, Ecuador, *DXLD*)

The army reports Sept. 14 that it has killed in a rural zone of Tolima, the guerrilla leader Jairo "Moisés" Sepúlveda, considered to be the director of the Voz de la Resistencia network of FARC clandestine radio stations. He had been with FARC for at least 20 years, setting up propaganda stations in the south and west of the counry (ANSA via Horacio Nigro, *Conexión Digital*)

CONGO DR More on the item in Sept. MT about a new missionary station on 4585: it's Radio Tangazeni Kristo (RTK), from the town called Aru in Congo DR, just west of town Arua in Uganda. Actuolly on 4845 with very low power, a Christian station jointly operated by CECA-20 [Central African Evongelical Community] and DIGUNA [Good News for Afrika] (the latter based in Germany). Mainly in local languages, some Swahili, French, English. Schedule converted to UT: Daily 0330-0515; Mon-Fri 1400-1930; Sat/Sun 1155-1930. One source said the power increase to 300-500 W would happen at beginning of September (Jari Savolainen, Finland, *DXLD*)

What better place to hide than under the huge 100 kW Mauritania signal on 4845? But when that is only on at 1800-0100 and from 0625, os in *WRTH* 2004, RTK still has a chance – except now during Romadan, mid-October to mid-November, when Mauritania runs 24h. Then there's Malaysia 24 hours, and the Latin Americans (Glenn Hauser, *DXLD*) Later in Sept, RTK told me they were still only 30 watts; no wonder no DX reports yet (Mika Mäkeläinen, *dxing.info*)

CUBA [and non] Hurricane Charley, which crossed western Cuba August 12-13, blew Radio Habana Cuba off the air, as well os its relays of China ond Venezuela. Nothing could be heard for some three weeks, and more than a month later only a few RHC frequencies were back, one or two Venezuelan relays and no China relays. The extent of the damage was difficult to determine; tho RHC's website kept running, there was no info on the missing SW transmissions for weeks, and then it was contradictory: in English they said antennas were downed by 200 kph winds; in Spanish it was transmitters. One thing for sure: the first problem was the collapse of 13 high-voltage electrical towers, putting much of western Cuba, including the three SW transmiter sites, in the dark.

Tho RHC was silent, bubble-jamming against R. Martí's SW frequencies (four at a time) continued unabated. This strengthened our theory that many if not most of the jammers are situated in eastern Cuba, which was not bothered by Charley; from there they can "serve" the populated Habana area on the first hop.

Ron Trotto, IL, reported the first return of RHC, UT Sept. 3 at 0200 on 6000, and then a few other RHC frequencies reappeared but on an irregular and abbreviated schedule, often barely modulated: 11760, 11875, 15230; as well as R. Rebelde on 5025. A week later Hurricane Ivan was passing eastern Cuba, tho not a direct hit, and this time the jammers against Martí did go off for three or four days, allowing Cubans and the rest of us to listen unimpeded to the surrogate station, including emergency info from the National Hurricane Center; what a lucky break. And Martí took advantage of this by skipping its usual weekly Monday 0300-0900 UT silent period on Sept 13. We figure that on this occasion the winds were high enough in eastern Cuba that the jammers had to close down for safety to protect their antennas. Ivan's skirting the western tip of Cuba did not appear to impede RHC any further, tho it was still not back to full service (Glenn Hauser)

DENMARK World Music Radio was off for a few weeks, but returned in mid-August to 5815, testing with a good mix of music interspersed with IDs in English (Dave Kenny, BDXC-UK) Then off again due to problems with low pass filter and our compressor causing low modulation, back first weekend in Sept (Stig Hartvig Nielsen, WMR) Continued testing weekends only, Fri nite until Mon morn (gh)

DOMINICAN REPUBLIC Our condolences to daughter Ana Rosina Objío Meléndez and family of César Objío, well-known DXer and authority on broadcasting in his country, who died Sept. 3 of cancer at age 76. Ana Rosina notified NASWA, NRC and other clubs he was involved with, and this drew many touching eulogies by those who had met or corresponded with him, universally regarded as a great and kind friend. He hosted visitors to the DR, including gh, and was able to attend several DX conventions in the US (Glenn Hauser)

GEORGIA Radio Georgia, the external service, was due to be closed down 1 September, but following pleas for listener support heard on the German and French services, got a one-month extension. Trying to rescue the station was Lia Mumladze of the German section, *lia_mumladse@yahoo.de* who urged copies be sent to several functionaries including the President of Georgia (A-DX List via Bernd Trutenau) It also has/had an English service, difficult in North America (gh)

GERMANY DW advised by letter that from Aug 9 it would be running German on 3995 in DRM from 1800 to 0559 daily, bad news for all those non-DRM listeners to this and adjacent frequencies (Dario Monferini, Milano, Italy, *bcInews.it*) This is a disaster for the amateur radio service; demolishing a solid 10 kHz of bandwidth is totally inexcusable. Please consider ceasing these transmissions or retiming them so that they will not propagate to North America (Al Quaglieri, NN2U and shortwave listener, NY, to DW) Not tests any longer. Schedule Aug. 10 lists 3995 as Wertachtal, 200 kW, non-directional (Uwe Volk, Germany, *hard-core-dx*)

DW qo': *wa'maH ben chen 'ach wej Doy'* – DW added Klingon to its multilingual website if not its broadcasts, the Guardian reported: **http://klingon.dw-world.de/klingon/history.php** (via Daniel Say, DXLD) Wonder how much it cost DW to do this, expressed in the value of Antigua transmitter-hours? While I grumble, this did get DW some publicity (Richard Cuff, PA, *swprograms*)

INDIA South Asian reception greatly improved in late August, notably AIR Shillong, 4970 with English program that seems to vary in its schedule, one day 1237-1315, another 1340 past 1352 with US pop music. This station has the most unusual programming of 60 mb AIR channels and is almost armchair quality between 1245 and 1345. The only thing that spoils reception is occasional ute 2-way SSB on channel (Bruce Churchill, CA, *Cumbredx*)

INTERNATIONAL WATERS Reception report of 15500 Information Radio to marlo@nsa.bahrain.navy.mil got a brief confirmation from Lt. González (Jari Savolainen, Finland, *DXLD*)

IRAN [non] Initially unID, a program in Persian on 15670 at 1325-1355 (Finn Krone, Denmark, *BC-DX*) Overlapped with R. Free Asia in Khmer via Kazakhstan until 1330 (Wolfgang Büschel, Germany, *ibid.*) Long talks, a song and march music, sounded political rather thon religious (Noel R. Green, UK, *ibid.*) Dear compatriot, We are a group of young people, who love their homeland, and wish, with the help of our compatriots, to turn Iran into a free ond flourishing land, and desire to establish the rule of people in our country. We have started – from a certain corner of the homeland, and welcoming every kind of danger entoiled – to broadcast a daily 30-minute radio program, since a few days before Tir 18th (July 9th), in order to be able to do our share in awakening the nation ond encouraging and supporting the students: *Radio Seda-ye Mellet-e Iran*, Voice of the Iranian Nation Radio (*Clandestine Radio Watch*) My Persian neighbor listened to it, and says no location or contact info is given, and it takes Fridoy off. Another friend did direction-finding which pointed to Israel (Wolfgang Büschel) It's via Sofia, Bulgaria, 100 kW, 90 degrees (Observer, Bulgaria) And also heard on a Friday (Mike Barraclough, UK, *Cumbre DX*)

ISRAEL Kol Israel rearranged networks and retimed SW in late August including English as monitored, here with shift one UT hour loter as expected from

end of their DST Sept 22:
0430-0445 11585 15640
1030-1045 15640 17535
1830-1845 11605 15640 17535
2000-2025 15615 15640 17535
(*Observer*, Bulgaria)
This could have entailed further frequency changes, as well as for B-04 from Oct 30 (gh) At 0430 (originally 0330) actually on 11590 (Erik Køie, Denmark, *DXLD*)

LAOS [non] Hmong Lao Radio, UT Wed & Fri only 0100-0200 had been broadcasting to Laos on 15260 via Taiwan, but changed a second frequency from 11725 to 9515 (via Wolfgang Büschel, Germany) Both 11725 on Aug 25 and 9515 on Aug 27 were blasting in here, from what site? Website **http://www.hmonglaoradio.org/default.asp?active_page_id=33** says their mission is "live broadcast... to Hmong and Lao people in Laos and in the United State and also around the world through the Internet." (Jerry Berg, MA, NASWA *Flashsheet*) 9515, ULMD pounding into Wyoming (Hans Johnson, *Cumbre DX*) And into OK, nice folk music to end, tho missing on one occasion (gh) 9515 is via Rampisham, UK (Wolfgang Büschel, Germany, *DXLD*) Hey, BBC WS could use that to broadcast to North America, novel idea (gh)

NEPAL Visiting Chengdu, Sichuan, China, in late August I was able to hear R. Nepal, only on 5005 with national and international news and weather in English at 1415-1425 (David Norcross, *DXLD*)

NETHERLANDS ANTILLES As Hurricane Ivan passed near Bonaire Sept 8, the RN relay station with its 20 antennas up to 100m high was closed down and evacuated for safety reasons. Flevo substituted on some of the frequencies. There was little damage and Bonaire resumed 25 hours later; the third transmitter, with water cooling, took a bit longer to check out and bring back (Andy Sennitt, Radio Netherlands, *DXLD*)

NIGERIA VON has been using 15120 and 17800 alternatively during English to Europe from 2000-2300, altho 15120 is announced from 0445 to 2300 (Thorsten Hallmann, Germany, *DXLD*) Seemingly 15120 one day, 17800 the next day and so on (Brian Alexander, PA, *ibid.*)

OMAN R. Sultanate of Oman reactivated 15140, including the English hour at 1400, heard under India in Russian (Mauno Ritola, Finland, *BC-DX*) Scheduled as the Thumrayt site, 315 degrees; the other English hour at 0300 on 15355 is at 220 degrees (*BC-DX*) Also heard at 1432 on 15140, mixing with HCJB in Spanish too (Roger Chambers, NY, *ODXA*)

SPAIN REE in English, UT Aug 22 at 0030 not only on 15385 but also on 12035 which cut off at 0038 (Joe Hanlon, NJ, *DXLD*) Maybe just testing 12035 transmitter scheduled later in the morning; or as possible fall replacement for 15385. It's always seemed to me that 15385 to 6055 is a bigger seasonal jump than necessary (Glenn Hauser, OK, *DXLD*) 15385 already starting to propagate poorly by end of August, especially the last half hour. Wish they used 25 or 31 m instead until the change in October (Roger Chambers, NY, *ODXA*)

SRI LANKA SLBC, 15747.9, 0103-0128, in English, with assorted oldies, pops and country music requests, birthday greetings, "All Asia Service" ID // 9770 (Scott R. Barbour, Jr., NH, *DXLD*) Varies from 15745; peaple keep hearing this and wondering if it's a pirate (gh)

SUDAN A friend of mine visited New Site, South Sudan. He hand-delivered my 9 March 2004 reception report to the staff at the Radio Peace (4750) transmitter site (which, I believe is some 10 km from New Site). In return he received a handwritten canfirmation letter. That letter arrived at my letterbox, mailed from outside Sudan. The letter says there is no e-mail nor postal service to the station. I've heard that many people there use PO Boxes in Loki, Kenya, which is the frontier tawn near the border. It is abaut two hours drive from New Site. So there is a faint chance to get a letter through routing it "via Loki, Kenya." Letter fram Augustino Makude Anur (?) says schedule is 0230-0430 and 1600-1800 UT including "Spotlight English." Some photos of Radio Peace:
http://www.dxing.info/community/viewtopic.php?t=1506
(Jari Savolainen, Finland, *DXLD*)
[non] Opposition station, Voice of Sudan, by the National Democratic Alliance, NDA, poor to fair on 7999.34 at 1535 UT, scheduled 1530-1600, said to be located in Eritrea (Jouko Huuskonen, Finland, *DXLD*)

SYRIA [non] Press release from Reform Party of Syria says R. Free Syria added a broadcast at 1800-1900 on Friday to the one on Sunday (Tarek Zeidan, Egypt, *DXLD*) Got confirmation letter specifying Jülich, Germany site for 13650, from P. O. Box 59730, Potomac, MD 20859, USA; Tel: 301-346-5000, Fax: 301-299-4955 (Björn Fransson, the island of Gotland, Sweden, *DXLD*) Also got E-QSL in 9 days from Walter.Brodowsky@t-systems.com Report sent directly to Radio Free Syria got no reply (Luca Botto Fiora, Italy, *ibid.*) From Oct 1 [end of DST in Syria] at 1900-2000 instead and on new 9495, 100 kW, 120 degrees Fri/Sun to ME Arabic, ex-13650 (*Observer*, Bulgaria)

U K [non] When WYFR was without power after Hurricane Charley, the BBCWS relay on 11835 at 0000-0300 went missing. But BBC was prepared for Hurricane Frances; as soon as WYFR went off, another site picked up 11835 during this period, later identified as Ascension (via Dan Elyea and Evelyn Marcy, WYFR)

U S A WYFR was off the air several days due to power outage, not damage, caused by Hurricane Charley in mid-August. But Hurricane Frances on Labor Day weekend was much worse (gh) Dan Elyea at WYFR tells me that they closed down well before Hurricane Frances arrived, as their antennas cannot handle sustained winds over 30 mph (George Thurman, TX, *WORLD OF RADIO*) We checked all scheduled WYFR frequencies on Sept 4-5, and found them all missing; with 14 transmitters, the bands were a lot quieter than usual. What happened? (gh)

Extensive damage to the building. Moderate damage in the field. Power is still out. When power is restored, we anticipate being able to bring up about half of the systems. Within another two weeks, we hope to have the rest restored. But repairs will take months before the building is back to rights. Lost a good part of the roof, and water damage ruined many ceilings and walls (Dan Elyea, WYFR, Sept 7 via Jeff White) I have power at my house and computer capability. Yes, everyone is OK. WYFR had part of the roof come off, which caused extensive woter damage in the office area. We lost ceilings, had standing water, and an overall real mess. It looks like the transmitters are OK, but there are some transmission lines down and antenna switch platforms in need of repair (Evelyn Marcy, WYFR Okeechobee)

We'll gradually restore one at a time, making repairs as we go. Almost every circuit that we put power to seems to have problems. Still no power at home. The entire WYFR office area is totally trashed, so I'll be working in a very low-efficiency mode for a while. Best regards (Dan Elyea, WYFR, 12 Sep, via Jeff White, George Thurman, DXLD) First frequencies back on the air were UT Sept 12 at 0207, 9505 and 15440. Then at 0228, 5950 [Taiwan relay]. Five transmitters were up 24 hours later, and eleven by the following day (Dan Elyea, WFYR, DXLD)

During its downtime, DXers checked WYFR frequencies for other stations it normally blocks; e.g. BOLIVIA (gh)

When Hurricane Ivan passed near Birmingham, we noted all WEWN frequencies were off the air, probably as a precaution, as they were back the next day (gh)

Amos and Andy is now on WWRB, UT Tue-Sat 0130-0200 on 5745 (Dave Frantz, WWRB, *rec.radio.shortwave* via John Norfolk) Sounds like the same show which was on WBCQ 7415, 0400-0415 UT Mon-Sat, recreations by Ed Bolton [if still on same schedule, one UT hour later after DST ends Oct 30] (gh)

Since VOA has turned into a multifaceted media system and is focusing on TV programs, radio broadcasts in Uzbek will not be aired as of Saturday, 31 July. The Uzbek service will continue via satellite and TV (VOANews.com)

Radio Free Asia now offers QSLs via Automated Reception Reports, anonymous or attributed, at **http://www.techweb.rfa.org/form/dx.html** (Nino Marabello, Italy, *DXLD*) This advanced new service combines the power of the Mambo **http://www.mamboserver.com** open-source content management system and a database. RFA also will issue a new design for the QSL every quarter or when special events dictate (Andrew Janitschek (A. J.), RFA, DSWCI *DX Window*)

WORLD OF RADIO, as projected after DST timechange Oct 30: WBCQ: Wed 2300 7415, Thu 0000 17495-CUSB, 2200 9330-CLSB, Sat 2130 17495-CUSB, Sun 0400 9330-CLSB, Mon 0200 9330-CLSB, 0530 7415, 2200 9330-CLSB, Tue & Wed 2200 9330-CLSB. WWCR: Thu 2130 15825 [Dec-Feb 9475], Sat 1130 5070, Sun 0330 5070, 0730 3210, 2030 12160, Wed 1030 9475. WRMI: Mon 0330 6870. For latest update see **http://www.worldofradio.com/radioskd.html**

VANUATU R. Vanuatu missing from 7260.06 lately, off or moved? (Dave Valko, PA, *Cumbre DX*) Vila transmitter problems: it's only on around 200 watts; however, by Sept 7 heard at a good level here in Sydney at 0700 (Johno Wright, NSW, ARDXC)

VENEZUELA [non] Just as things were getting interesting with the referendum on Pres. Chávez Aug. 15, RNV relay was knocked off the air Aug. 12 by Hurricane Charley hitting Cuba. We kept checking almost every day, and the "San Francisco" service was not back until Sept. 3, sporadically, and announcing a modified schedule, all in Spanish, cantrary to their own autdated and confusing website:
1900-2000 13740 San Francisco
2000-2100 9550 Caribe
2000-2100 13680 Chicago
2000-2100 15230 Buenos Aires
2000-2100 17705 Rio de Janeiro
2100-2200 11875 Santiago de Chile
2300-0000 9820 and 13680 Chicago
2300-0000 11760 Norte, Centro y Sud-América
In the following fortnight, the only frequencies we could confirm were 13740, 15230 and 11760. If 13680 had been used at 2300, it would have collided with China-via-Canada! The Sunday morning *Aló Presidente* around 1400-1800 could not be heard on Sept. 5 or 19, but was on 11875 Sept. 12 (Glenn Hauser, OK)

ZIMBABWE Plans by Zimbabwean multi-media company New Ziana to launch a radio station are at an advanced stage with equipment expected to arrive in country by the end of September. "We will be launching a radio station before the end of November," said New Ziana Electronic Business Unit head Happison Muchechetere. It will be an all-news 24 h, 7 day radio station based in Gweru. Staff recruitment was underway while program preparations had started. News 247 will broadcast on SW, which goes further than all other frequencies (Xinhua via WorldSources, Inc. via Mike Cooper)

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

Global Forum

Broadcast Logs

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com

0020 UTC on 5010
INDIA: All India Radio-Thiruvananthapuram. Weak signal for traditional Indian music. Station identification at 0035 as, AThis is All India Radio,@ followed by news script of national items. Signal peaking by 0045. Noted on subsequent days past 0100. (G. Van Horn, NC) 7290, *0129 (Scott Barbour, Intervale, NH) **AIR-Mumbai** 4840, *0020-0033 (Rich D=Angelo, Wyomissing, PA/NASWA Flash Sheet) **AIR-Bangalore** 9445 // 9950 at 2115 via **Delhi**. (Bob Fraser, Belfast, ME) ; 15040, *0132-0209; **AIR-Chennai** 7270, 0056-0101 Hindi; **AIR-Delhi** 11985, 0044-0056. (Barbour, NH)

0030 UTC on 4915
BRAZIL: Radio Anhangera. Portuguese. Soccer game Brazil vs Colombia with Radio Brazil Central 4985// 11815 in tandem. Brazilians monitored in Portuguese; **Radio Guaiba** 6000, 0230; **Radio Congonhas** 4775, 0856-0903 (Dave Valko, PA/Cumbre DX) **Radio Missoes da Amazonia** 4865, 0930; **Radio Universo/Radio Tupi** 11765, 2300. (Fernando Garcia, Baltimore, MD)

0040 UTC on 4915
BRAZIL: Radio Anhanguera. Portuguese. Sports interviews and ABrasil@ promos and mentions of Paraguay. (Harold Frodge, Midland, MI) Brazilians monitored in Portuguese; **Radio Pioneira** 5015, 0103-0130*. (Barbour, NH) **Radio Cancao Nova** 4825, 0115-0130 (Van Horn, NC) **Radio Educacao Rural** 4755, 0126-0150 (Barbour, NH) **Radio Educadora** 2380, 0344. **Radio Relogio** 4904, 0955. **Radio Cultura** 4845, 1005-1011. **Radio Caiari** 4785, 1014-1020. (Arnaldo Slaen, Buenos Aires, ARG) **Radio Nacional Amazonia** 11780, 1115. (Van Horn, NC) Tentative on **Radio Trans Mundial** 11735, *1200-1220. (Barbour, NH)

0051 UTC on 6060
ARGENTINA: Radio Nacional. (Tent.) Spanish. Baladas music and mentions of Argentina. Religious sermon to 0057, covered by Spain=s interval signal on 6055 at 0100.(Frodge, MI) 0935-0947 with IDs amid signal fades. (Barbour, NH) **Radio Continental** LSB feeder on 10490 at 0130. (Garcia, MD)

0130 UTC on 9435
SWEDEN: Radio. Sign-on for world service news into live coverage from political convention. Local and national news to weather update. (Garcia, MD) Report on Swedish-built hybrid cars 15240 at 1245. (Fraser, ME)

0130 UTC on 17880
PAKISTAN: Radio. Presumed Urdu. Regional Asian style music to station commentary format. Poor to fair signal quality // 15485. (Sam Wright, Biloxi, MS)

0400 UTC on 6030
GERMANY: Sudwestrundfunk. German news followed by pop music tunes and occasional ads during a Morning Show format. Poor to fair signal during Radio Marti=s silent period. (D=Angelo, PA/DX Window) *Station plans to leave the air at the close of 2004, log them while you can. - ed.*

0505 UTC on 9625
CANADA: CBC. Excellent reception for indigenous language and French sign-off announcements. IDs, studio location, phone numbers and transmitter location given. National anthem to 0508 followed by single tone into open carrier at 0508. (Walter Salmaniw, Victoria BC, Canada/ODXA) **Radio Japan**=s Canadian relay 6120, 1035; **China Radio Intl** Canadian relay 6040, 1045; **Radio Canada Intl** 5960, 2230. 9 (Fraser, ME) CBN, CFGB/CKZN relay 6160 at 0200. (Garcia, MD)

0830 UTC on 4390
PERU: Radio Imperio. Spanish program Feliz Amanecer to local time checks. Valcecitos/criollos music into la Voz de la Salvacion at 0901. Peruvian=s stations monitored in Spanish: **Radio Maranon** 4835, 1000; **Radio Sicuani** 4826, 1000; **Radio Atlantida** 4790, 1000; **La Voz de la Selva** 4824, 1020; **Radio Tarma** 4775, 1050; **Radio Tawantinsuyo** 6173.7, 1100. (Garcia, MD) **Radio Ilucan** 5678.6, 0002-0031. (Barbour, NH) **Radio Santa Monica** 4965, 0945-1001; **Radio Horizonte** 5019.93, 1000-1020; **Radio Chota** 4890.23, 2330-2345. **Radio La Hora** 4856.14, *1000. (Barbour, NH) **Radio Victoria** 9720.26, 0020-0030. (Slaen, ARG)

0830 UTC on 3365
PAPUA NEW GUINEA: Radio Milne Bay. Easy listening music into Pacific culture and voice ID as, AThe Voice of Kua@ at 0900. (Garcia, MD) PNG=s **Radio East New Britain** 3385, 0936-0945. (Chuck Bolland, Clewiston,FL/HCDX)

0906 UTC on 6034.78
COLOMBIA: La Voz del Guaviare. Spanish. Romantic music sung by Luis Miguel, Leonardo Favio and Robert Carlos. Two IDs at 0955 ALa Voz de Guaviare.@ (Slaen, ARG) Colombia=s **Radio Unica** 2320.4, 1040 (harmonic 2x1160) talks on US military involvement in Colombia to 1101. Mixing with Brazilian. (Garcia, MD)

0914 UTC on 4870.83
INDONESIA: RRI-Sorong. Indonesian. Noted with Quran recitations from tune-in. Man=s Indo announcements with fair-poor signal fading by 0930. **RRI-Serui** 4605, 0947-0955. **RRI-Fak Fak** 4790, 1052-1100 (Bolland, FL) **Voice of** Indonesia 9525, 1110-1130. (Barbour, NH)

0926 UTC on 4810
MEXICO: XERTA. Spanish commentary to religious music and instrumentals. Brief ID with fair signal quality. (Barbour, NH) Tentative on Mexico=s **Radio Transcontinental** 4810, 0848-0900. (Slaen, ARG) **Radio Mil** 6010, 0837-0902 (Barbour, NH)

1020 UTC on 7280
CHINA: Voice of the Strait. Mandarin text with talks over classical music. Presumed ID at 1030 then announcement block. Fair quality. **China Natl Radio** 9380, 1030-1050. (Barbour, NH) **CRI** 12080, 2150-2155*, 9570, 1339-1355+. (Frodge, MI) **PBS Heilongjiang** 7349.22, Tent. at 0911 with Asian format. (Valko, PA)

1030 UTC on 7270
MALAYSIA: RTM-Sarawak. Tentative for vernaculars heard with presumed ID. Talk over music and sound bites. Fair at tune-in, fading up to just audible by 1046. (Barbour, NH)

1159 UTC on 11820
POLAND: Radio Polonia. Interval signal with English sign-on announcements. Brutal audio quality and bad transmitter hum. Surprised to hear a clear ID,@This is Radio Polonia, broadcasting from Warsaw.@ *Insight* program at 1204, then back to poor audio quality for items on European Parliament. (Barbour, NH) 5965, 0800-0826* (Garcia, MD)

1500 UTC on 9980
ICELAND: AFRTS/AFN via Grindavik. National news and public service announcements. Heard all day and night on this freq. (Bjarke Vestesen, Radby, Blommenslyst, Denmark/DXW)

2000 UTC on 17680
CHILE: Voz Christiana. Spanish news text covering items from South America. AVoz Christiana@ identification to religious programming to pop music. SIO 2+53+ (Frodge, MI) Hearing in English again on 11665, 2225 religious format of text and music. Should be audible 2000-0000 on 11665. (Duane Hadley, Bristol, TN)

2045 UTC on 15476
ANTARTICA: LRA-36 Radio Nacional.(Tentative) Spanish announcer duo at tune-in. Music ballads/pop variety. Station ID/announcement format at 2055. Hearing this station consistently, and though verified several years ago, nice to log again. (Van Horn, NC)

2308 UTC on 6307.21
PIRATE/South America: Radio Pirana Intl. Spanish. Romantic music to Spanish/English, ARadio Pirana Internacional,@ including frequencies and mentions of broadcasting from South America. Beatles tune at 2331, with 24332 SINPO. (Slaen, ARG)

2321 UTC on 9737
PARAGUAY: Radio Nacional. Spanish. Commercial string to Asuncion, Paraguay promos. Sports interview with 343 SIO, best heard in quite a while. (Frodge, MI)

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*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, W4GVH
gaylevanhorn@monitoringtimes.com

Automated Reception Reports

You may recall that in December 2003 I predicted electronic reporting would broaden in the shortwave QSLing scene, and it has indeed.

Radio Free Asia, the latest to initiate electronic reporting, is funded by the U.S. government. Broadcasts are non-English with programming of bi-partisan topics, news, music and commentary targeted to Burma, China, Laos, North Korea and Vietnam.

For years, RFA processed written reports through standard postal services. However, RFA's Chief Techrology Officer, David M. Baden, is spearheading a new trend in how DXers submit reception reports and how radio stations receive feedback. Earlier this year, RFA began accepting email submissions of reception reports at *QSL@rfa.org*. A new automated system is now available online at **http://www.techweb.rfa.org**.

By clicking on *QSL Report*, hobbyists can submit a reception report with the click of a button. You may submit "Anonymously," where you do not have to identify yourself, or "Attributed," where you register your mailing information. When you submit a report and provide your email address, RFA will confirm receiving your report via email, in addition to sending the QSL card to your postal address.

QSL cards will be mailed regularly, and RFA will issue a new design for the QSL card every quarter or for special events. For additional questions on QSLing or programming, consult the RFA website or write to: Radio Free Asia, Reception Reports, 2025 M. Street NW, Washington, DC 20036, USA.

AMATEUR RADIO

Belize-V31AD, 12/17 meters SSB. Full data folder card. Received in 138 days for a SASE. QSL Manager: Donald Daze N5DD, 8706 Winningham Lane, Houston, TX 77055-6634. (Larry Van Horn N5FPW, NC)

Germany-DF0HQ, 40,20/15/10 meters SSB. Full data card. Received in 227 days via ARRL. bureau. (Van Horn, NC)

Trinidad and Tobago-9Y4ZC, 10/15/20 meters SSB. Full data color card. Received in 169 days for a Euro nested airmail envelope and two US dollars. QSL Manager: Bernd Och DL6FBL, Christian-Wirth-Str., 18, 36043 Fulda, Germany. (Van Horn, NC)

CANADA

CKZN, 6160 kHz. Full data QSL card signed by Keith Dunford-Transmission Supervisor, plus list of Newfoundland AM/FM/SW stations, and CBC sticker. Received in 90 days for a taped reception report. Station address: CBC Newfoundland & Labrador, P.O. Box 12010, Station "A", St. John's, Newfoundland A1B 3TB Canada. **http://www.stjohns.cbc.ca** (Ben Loveless WB9FJO, Bloomfield, MI)

INDIA

Andaman & Nicobar Islands; All India Radio-Port Blair, 4760 kHz. Full data verification letter signed by K.S. Venkateswarlu-Station Engineer. Received in 70 days for one IRC (returned). Report sent as registered mail. Extremely pleased with this one! Station address: AIR-Port Blair Haddo Post, Dilanipur, Port Blair 744 102, South Andaman, Andaman and Nicobar Islands, Union Territory, India. (Scott Barbour, Intervale, NH) Received in 15 days from same veri signer with the notation, "We would like to keep receiving reception reports from you whenever possible." The QSL concludes with the magic word every DXer likes to hear, "these blessed islands attract any nature-lovers, who seeks absolute peace and tranquility in the lap of Mother Nature." Received in 19 months after follow up, two years and 15 days after the original report. (Gerry Bishop, Niceville, FL, DXLD)

All India Radio-Jammu, Radio Kashmir. 4830 kHz. Short but nice email verification from R.K. Garg-Superintending Engineer *gargrajkr@yahoo.com*. Not much, but I'll take it! (Jerry Berg, MA/DX Window)

All India Radio-Mumbai, 4840 kHz. Full data verification letter signed by M. Indiran-Suptg. Engineer. Received in 26 days for an English report. Station address: All India Radio, Backbay Reclamation, H.T. Parekha Marg, Mumbai 4000 20 India. (Sam Wright, Biloxi, MS)

All India Radio-Thiruvananthapuram, 5010 kHz. Full data *Safdarjung's Tomb* card with site, signed by Y.K. Sharma-Director-Frequency Assignments. Received in 85 days for an English report and two IRCs. Report sent to Thiruvananthapuram, reply received from: Akashvani Bhawan Room 204, Sansad Marg, New Delhi 110 001 India. (Wright, MS)

MEDIUM WAVE

KNRC, 1150 kHz AM. Verification letter signed by Rodger Tighe-Chief Engineer. Letter stated mine is the first report received. QSL package included station logos, bumper stickers and coverage map of their twelve Colorado stations. Received in 28 days for an English AM report and one US dollar (returned). Station address: 1201 18th St. Suite 250, Denver, CO 80202. (Patrick Griffith N0NNK, Westminster, CO)

WQSN, 1660 kHz AM. Verification letter signed by Gearry S. Morill-CPBE-Tech. Manager. Received in 90 days for a taped report. Station address: 4200 S. Main Street, Kalamazoo, MI 49006. (Patrick Martin, Seaside, OR)

MYANMAR

Radio Myanmar, 5986 kHz. Partial data (date and time) verification letter with station seal, signed by Ko Ko Htay, plus program guide and media index. Received in 169 days for an English report and one IRC and prepared card (not returned). Station address: GPO Box 1432, Yangon-11181, Myanmar (or) 426, Pyay Road, Yangon 11041 Myanmar. **http://www.myanmar.com** (Barbour, NH)

ST. HELENA

Radio St. Helena, 11092.5 kHz USB. Full data card signed by Ralph H. Peters-Station Manager, plus form letter. Received in 12 days for follow-up to report from 1998 special broadcast, and two IRCs. A total of five years and nine months to verify. Station address: Pounceys, St. Helena Island, South Atlantic Ocean. (Bill Wilkins, Springfield, MO)

USA

Radio Taiwan Int'l relay via Okeechobee, FL, 5950 kHz. Full data color lighthouse card unsigned, plus RTI schedule, post card and *Taiwan Journal*. Received in 25 days for a taped English report and one US dollar. Station address: P.O. Box 24-38 Taipei, Taiwan. **http://www.cbs.org.tw**. (Mark Redfox, Albuquerque, NM)

November Holiday DXing

Algeria Revolution Day, Nov. 1
Antigua Independence Day Nov. 1
Cambodia Independence Day, Nov. 9
Angola Independence Day, Nov. 11
Monaco National Day, Nov. 19
Lebanon Independence Day, Nov. 22
Bosnia & Herzegovina Natl Day, Nov. 25
Suriname Independence Day, Nov. 25
Albania Independence Day, Nov. 28
East Timor Leste Independence Day, Nov. 28
Mauritania Independence Day, Nov. 28
Serbia & Montenegro Republic Day, Nov. 29
Barbados Independence Day Nov. 30

John Figliozzi
johnfigliozzi@monitoringtimes.com

Listening to Canada

Before I discovered shortwave, I discovered Canada!

Or, rather, I stumbled across it on my Riviera 6 shirtpocket transistor AM radio during the mid-1960s. My insatiable preteen thirst for yet another baseball game led me to ever-so-carefully turn that little tuning wheel in a search for faraway games that I had learned were there only after dark.

One night I came across a station that was distinctly different from all the others. For one thing, its announcers seemed comparatively reserved and almost, but not quite, formal. For another, it broadcast drama and rather sophisticated talks that I hadn't heard anywhere else. It also didn't use any Ws or Ks when it identified itself. "This is CBC Toronto," intoned that sober fellow; "This is CBC Montreal," said another. "What is this CBC?" I thought.

Of course, I was listening to Canada's public broadcaster – the **Canadian Broadcasting Corporation**. In the mid-60s, there was no public broadcasting to speak of in the U.S. So, stations like **CBL** in Toronto on 740 kHz and **CBM** in Montreal on 940 really stood out to these newly minted radio ears. These were nightly visitors to my little transistor in Pleasant Valley, New York; but today they are no longer. Those now legendary medium wave frequencies – and others – have been turned over to commercial broadcasters.

But the **CBC** is more available to us today than ever.

On Shortwave

When **Radio Canada International (RCI)** refocused its own programming efforts on Africa and India earlier this year, it stopped broadcasting all but one of its in-house features (that one being *The Maple Leaf Mailbag*) to the U.S. For many years, **RCI** has filled out its schedule with programs from its domestic partner, **CBC Radio**. So, American listeners are used to hearing a considerable amount of **CBC** programming on shortwave via **RCI** and, if within range, the **CBC North Quebec** service on 9625 kHz. (Note: The latter's English schedule now appears, along with RCI's, in *MT's Shortwave Guide* program listings.) Flagship **CBC** programs like *As It Happens* and *The Sunday Edition* have been mainstays of the **RCI** schedule for decades.

In July, **RCI** even expanded its offerings to the U.S. via shortwave with three new afternoon hours daily, programmed entirely with **CBC** domestic radio content.

But there is still more to be had – much more.

The CBC <cbc.ca/radio>

In fact, virtually ALL of **CBC Radio** is available via the internet. (Since Canada is officially bilingual, there's also a French counterpart – **Societe Radio-Canada (SRC)**; but you can explore *http://www.radio-canada.ca* on your own. We'll stick to English in this series.) The English network is structured to provide three services – **CBC Radio One**, **CBC Radio Two** and **CBC Radio Three.** Furthermore, the various regional studios around the country make their local content available as well.

Radio One perhaps can best be described as a variety network. It offers a range of news and news magazines, documentaries, talks, entertainment and music of various genres. **Radio Two**, on the other hand, is devoted – with some exceptions – primarily to the arts and classical music. **Radio Three** is experimental – a self-described music and modern media base – an emerging multimedia network made available principally over the internet with some content broadcast overnight on **Radio Two**.

Like the **ABC** in Australia, the **CBC** was created as a national institution whose legacy was to tell a diffused population over a vast territory what they had in common. In other words, the **CBC**'s charge was to do nothing less than stitch the country together – to help forge and reinforce a sense of national identity. This was and is no small task, given the gravitational pull of its neighbor to the south.

Valuable Perspective

Americans often make the mistake of assuming that they and their northern friends have no significant distinguishing features. Canadians would politely beg to differ. As former Prime Minister Pierre Trudeau once put it, "Living next to you is in some ways like sleeping with an elephant. No matter how friendly and even-tempered is the beast, if I can call it that, one is affected by every twitch and grunt." Indeed, Canada's proximity to us requires it to take more than passing note of much of what goes on here.

Consequently, its media – and especially the **CBC** – serves to hold a mirror up to U.S. society and activities, offering a worthy, sometimes countervailing perspective that is, at the same time, intimate yet more detached than our own. It tells us things we may not want to hear, but need to hear.

So there would appear to be value in listening – *really* listening – to Canada.

Some Recommendations

CBC radio programming, as you already know from **RCI**, is distinctively high quality, professionally produced, artistically crafted, innovative and diverse. **CBC Radio**'s internet site allows one to listen directly to all of the content on each of the networks' major regional affiliates in real time. That gives the multiple option of listening to any network program at the same time it is broadcast from Newfoundland through to the Pacific time zones. A growing list of programs or segments of programs are available on-demand. Furthermore, **Sirius Satellite Radio** is slated to begin carriage of two English and two French program streams – including **CBC Radio One** and the **SRC's Premiere Chaine** – within a few months.

Here are some of my favorite programs not currently available on shortwave, but fully accessible today from **CBC Radio** via the internet:

- ***Disc Drive*** - Jurgen Gothe's weekday afternoon (3-6 pm local) **Radio Two** mainstay with carefully but eclectically chosen music (mostly popular classics with some surprises) and a bit of whimsy.
- ***Sunday Showcase*** - hour-long dramas (10-11 pm local, **Radio One**) featuring the talents of the finest Canadian writers and actors. Repeated as ***Monday Night Playhouse*** (9-10 pm local, **Radio Two**).
- ***Brave New Waves*** - brashly showcasing new experimental and underground music (midnight-4 am local, weeknights on **Radio Two**).
- ***Ideas*** - documentaries and talks on social issues, culture and the arts, geopolitics, history, science and technology, biology and the humanities (9-10 pm local, **Radio One**). Only for people who enjoy thinking!
- ***Between the Covers*** - short stories and novels mostly by Canadian authors, read by Canada's most celebrated performers in 15-minute installments (10:40-11 pm local, weeknights on **Radio One**).
- ***A Propos*** - the best music from Francophone Canada – a unique and underappreciated culture – with special emphasis on the Quebec popular music scene (10-11 pm local, Saturday on **Radio One**).
- For some local flavor, sample any of the regional morning (6-8:30am local), noon or afternoon (4-6 pm local) magazine shows and other locally produced programs. Click on the "Local" link provided on the CBC Radio web page and choose a regional center!

Happy Thanksgiving! See you next month.

How to Use the Shortwave Guide

Convert your time to UTC.

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

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

Find the station you want to hear.

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

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

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

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

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

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

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

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

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

Choose a program or station you want to hear.

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

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

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

MT Monitoring Team

Gayle Van Horn, Frequency Manager, *gaylevanhorn@monitoringtimes.com*
John Figliozzi, Program Manager, *johnfigliozzi@monitoringtimes.com*
Daniel Sampson, *danielsampson@monitoringtimes.com*

Program Highlights

John Figliozzi

DX, SWL, MEDIA, IT

Our semi-annual review of programs on our favorite topic. Refer to the frequency pages for where to tune. Times approximate; all subject to change.

Allan Weiner Worldwide - ***WBCQ*** - **A** 0100, **S** 2200.
Ask WWCR - ***WWCR*** - **F** 1045, 2130; **A** 0945; **S** 0045, 0245, 1115; **W** 2030, **H** 1815.
The Buzz - ***R. Australia*** - **H** 2330, **F** 2030, **A** 0730, **S** 0605.
CIDX Report - ***R. Canada Int.*** - **S** 2107; **M** 0137; **T** 2135. (fortnightly within *The Mailbag*).
DX Corner* - ***R. Budapest*** - **A** 0220, 0350.
DX Corner* - ***Voice of Turkey***, fortnightly - **A** 2310; **S** 0410.
[*Not the same program, although sharing the same title.]
DXers' Corner - ***All India Radio***, fortnightly - **M** 1840, 2130; **T** 2340.
DX Partyline - ***HCJB Australia*** - **A** 0730, 1200; ***HCJB Ecuador*** - **A** 1230;***WWCR*** - **S** 0300, **T** 1030, **H** 2100.
DXers' Special - ***RAE Argentina*** - **W** 1945; **H** 0345.
DXers Unlimited - ***R. Habana Cuba*** - First edition - **A** 2105, 2332; **S** 0135, 0335, 0535.
Second edition - **T** 2105, 2332; **W** 0135, 0335, 0535.
DXing with Cumbre - ***WHRI*** - **A** 0600, 0830, 1330, 1600, 2030; **S** 0130, 0830, 1630, 2130; **M** 0430. ***KWHR*** - **A** 0800; **S** 1200. ***WHRA*** - **F** 2100, **S** 0900, **M** 0230.
DX Radio School - ***WWCR*** - **S** 0430, **M** 2100, **H** 1030.
Go Digital - ***BBCWS*** *Americas stream* - **T** 1506, 2106; **W** 0106.
Mailbox - ***R. New Zealand Intl.*** (fortnightly alternating with **RNZI Talk**) - **M** 0830, 1130, 1330, 1530; **T** 0330.
Media Report - ***R. Australia*** - **H** 0130, 1030, 1530.
Off the Hook - ***WBCQ*** - **H** 0000.
Radio Bulgaria Calling - ***R. Bulgaria*** - **A** 0040, 0340.
Radio Waves - ***R. Exterior de Espana*** - **S** 0040.
Radio Weather - ***WHRA*** - **S** 0900, **T-A** 0030; ***WHRI*** **A** 1300, 1830, **S** 0030, **M** 2230; ***WBCQ*** **A** 2100, **S** 2100, **M** 2300, **H** 2200; ***WWCR*** **S** 0400, 1400.
Radio World - ***R. Vlaanderen Intl.*** - **S** 2200; **M** 0400.
The Real Amateur Radio Show - ***WBCQ*** - **S** 0000.
The Whole World on the Radio Dial - *R. Ukraine Int.* - **S** 0118, 0418.
Voice of the NASB - ***WRMI*** - **S** 0330, 1030, 2230.
Wavescan - ***WRMI*** - **S** 2200, **M** 0400.
World of Radio - ***WBCQ*** - **W** 2300, **A** 2100, 2130; **M** 0200. ***WWCR*** - **H** 2130, **A** 1130, 2130; **S** 0330, 0730.
Worldwide Friendship - ***R. Korea Intl.*** - **A** 1210, **S** 0210.

Special thanks to Glenn Hauser, John Norfolk, Ernest Riley and *DX Observer* whose valuable work has been included here.

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

0000	0007	vl	Sierra Leone, SLBS 3316do		
0000	0015	vl	Cambodia, National Radio	11940as	
0000	0027		Czech Rep, Radio Prague Intl	7345na	9440na
0000	0030	vl	Croatia, Croatian Radio	9925ca	
0000	0030		Egypt, Radio Cairo 11725na		
0000	0030		Japan, Radio 13650as	17810as	
0000	0030		Serbia & Montenegro, Intl Radio	9580na	
0000	0030		Thailand, Radio 5890va	9570va	
0000	0030		UK, BBC World Service	3915as	5970as
			6195as 9410as 9740as	11945as	11995as
			15280as 15360as	17655va	17790as
0000	0030		USA, Voice of America	7215va	11995va
			15185va 17820va		
0000	0045		India, All India Radio	9705as	9950as
			11620as 11645as	13605as	
0000	0057		Canada, Radio Canada Intl	9640as	15205as
0000	0059		Germany, Deutsche Welle	7130as	9505as
			9825as		
0000	0059		Spain, Radio Exterior Espana	15385na	
0000	0100		Anguilla, Caribbean Beacon	6090am	
0000	0100		Australia, ABC NT Alice Springs	2310irr	4835do
0000	0100		Australia, ABC NT Katherine	5025do	
0000	0100		Australia, ABC NT Tennant Creek	4910do	
0000	0100		Australia, HCJB 15525as		
0000	0100		Australia, Radio 9660pa	12080va	13630pa
			15240pa 17750pa	17775as	17795as
			21725as		
0000	0100		Canada, CBC Northern Service	9625do	
0000	0100		Canada, CFRX Toronto ON	6070do	
0000	0100		Canada, CFVP Calgary AB	6030do	
0000	0100		Canada, CKZN St John's NF	6160do	
0000	0100		Canada, CKZU Vancouver BC	6160do	
0000	0100		China, China Radio Intl	6145va	
0000	0100		Costa Rica, University Network	5030am	6150am
			7375am 9725sa		
0000	0100	mtwhf	Germany, Bible Voice Broadcasting		6010as
0000	0100	DRM	Germany, Deutsche Welle	3980eu	4010eu
0000	0100		Guyana, Voice of 3290do		
0000	0100		Japan, Radio 6145ca		
0000	0100		Malaysia, Radio Malaysia	7295do	
0000	0100		Namibia, Namibian BC Corp	3270af	3290af
			6060af		
0000	0100		Netherlands, Radio 9845na		
0000	0100		New Zealand, Radio NZ Intl	17675pa	
0000	0100		Sierra Leone, Radio UNAMSIL	6137af	
0000	0100		Singapore, Mediacorp Radio	6150do	
0000	0100	vl	Solomon Islands, SIBC	5020do	9545do
0000	0100		UK, BBC World Service	5975ca	7545af
			9825ca 11835ca	12095ca	
0000	0100		Ukraine, Radio Ukraine Intl	7545na	
0000	0100		USA, AFRTS 4319usb	5446usb	5765usb
			6350usb 7507usb	10320usb	12133usb
			13362usb 13855usb		
0000	0100		USA, KAIJ Dallas TX 13815va		
0000	0100		USA, KTBN Salt Lake City UT	7505na	15590na
0000	0100		USA, KWHR Naalehu HI	17510as	
0000	0100		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
0000	0100		USA, WBOH Newport NC	5920am	
0000	0100		USA, WEWN Birmingham AL	5825na	7425na
			13615va		
0000	0100		USA, WHRA Greenbush ME	7580va	
0000	0100		USA, WHRI Noblesville IN	7315am	7535am
0000	0100		USA, WINB Red Lion PA	9320am	
0000	0100		USA, WJIE Louisville KY	13595am	
0000	0100	as	USA, WRMI Miami FL	9955am	
0000	0100	mtwhf	USA, WRMI Miami FL	6870na	
0000	0100		USA, WTJC Newport NC	9370na	
0000	0100		USA, WWCR Nashville TN	3210na	5050na
			7465na 13845na		
0000	0100		USA, WWRB Manchester TN	5050na	5085na
			5745na 6890na		
0000	0100		USA, WYFR Okeechobee FL	6065na	9505na
			15130sa 15195as		
0000	0100		Zambia, Radio Christian Voice	4965af	
0005	0030	twhfa	Austria, Radio Austria Intl	9870sa	
0030	0100		Australia, Radio 9660pa	12080va	13630pa
			15240pa 15415as	17750pa	17775as
			17795as 21725as		
0030	0100		Canada, Radio Canada Intl	9755am	11990am
			13710am		
0030	0100	s	Germany, Pan American BC	9740eu	
0030	0100		Iran, Voice of the Islamic Rep	9905sa	
0030	0100		Lithuania, Radio Vilnius	11690na	
0030	0100		Sri Lanka, SLBC 6005as	11905as	15745as
0030	0100		Thailand, Radio 5890na	15395na	
0030	0100		UK, BBC World Service	6195as	9410as
			9740as 11955as	15280as	15310as 15360as
			17655as	17790as	
0030	0100		USA, Voice of America	7215va	11760va
			15185va 15290va	17740va	17820va
0035	0100	sm	Austria, Radio Austria Intl	9870ca	
0045	0100		Pakistan, Radio 9340as	11565as	
0055	0100		Italy, RAI Intl 11800na		

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

0100	0115		Italy, RAI Intl 11800na		
0100	0115		Pakistan, Radio 9340as	11565as	
0100	0127		Czech Rep, Radio Prague Intl	6200na	7345na
0100	0128		Vietnam, Voice of 6175na		
0100	0130	vl	Croatia, Croatian Radio	9925na	
0100	0130	mtwhf	Germany, Bible Voice Broadcasting		5925me
0100	0130	s	Germany, Universal Life	9485as	
0100	0130	mtwhfa	Hungary, Radio Budapest	9590na	
0100	0130	mtwhfa	Serbia & Montenegro, Intl Radio	9580na	
0100	0130		Slovakia, Radio Slovakia Intl	5930am	9440am
0100	0130		Uzbekistan, Radio Tashkent Intl	7190as	6165as
			9715as		
0100	0156		Romania, Radio Romania Intl	9690na	11940na
			15430na 17760na		
0100	0157	DRM	Netherlands, Radio 15525na		
0100	0159		Canada, Radio Canada Intl	9755am	11990am
			13710am		
0100	0200		Anguilla, Caribbean Beacon	6090am	
0100	0200		Australia, ABC NT Katherine	5025do	
0100	0200		Australia, ABC NT Tennant Creek	4910do	
0100	0200		Australia, HCJB 15560as		
0100	0200		Canada, CBC Northern Service	9625do	
0100	0200		Canada, CFRX Toronto ON	6070do	
0100	0200		Canada, CFVP Calgary AB	6030do	
0100	0200		Canada, CKZN St John's NF	6160do	
0100	0200		Canada, CKZU Vancouver BC	6160do	
0100	0200		China, China Radio Intl	9580am	9790ca
			11770va		
0100	0200		Costa Rica, University Network	5030am	6150am
			7375am 9725sa		
0100	0200		Cuba, Radio Havana	6000na	9820na
0100	0200	DRM	Germany, Deutsche Welle	3980eu	4010eu
0100	0200		Guyana, Voice of 3290do		
0100	0200		Indonesia, Voice of 9525as	11785as	15150al
0100	0200		Iran, Voice of the Islamic Rep	9905sa	
0100	0200		Japan, Radio 6025va	11860as	15325as
			17560va 17685pa	17810as	17835am
			17845sa		
0100	0200		Malaysia, Radio Malaysia	7295do	
0100	0200		Namibia, Namibian BC Corp	3270af	3290af
			6060af		
0100	0200		Netherlands, Radio 9845na		
0100	0200		New Zealand, Radio NZ Intl	17675pa	
0100	0200		North Korea, Voice of	3560as	7140as
			9345am 9720as	11735am	13760as
			15180as		
0100	0200		Russia, Voice of 5945me	7180na	15595na
			17660na		
0100	0200		Sierra Leone, Radio UNAMSIL	6137af	
0100	0200		Singapore, Mediacorp Radio	6150do	
0100	0200	vl	Solomon Islands, SIBC	5020do	9545do
0100	0200		Sri Lanka, SLBC 6005as	11905as	15745as
0100	0200		UK, BBC World Service	5975ca	6195as
			9410as 9525ca	9825ca	11835ca 12095ca
			15280as	15310as	15360as 17790as
0100	0200		USA, AFRTS 4319usb	5446usb	5765usb
			6350usb 7507usb	10320usb	12133usb
			13362usb		
0100	0200		USA, KAIJ Dallas TX 13815va		
0100	0200		USA, KJES Vado NM	7555na	
0100	0200		USA, KTBN Salt Lake City UT	7505na	
0100	0200		USA, KWHR Naalehu HI	17510as	
0100	0200	mtwhf	USA, Voice of America	7115va	9885va
			11705va 11725va		
0100	0200		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
0100	0200		USA, WBOH Newport NC	5920am	
0100	0200		USA, WEWN Birmingham AL	5825na	7425na
			13615va		
0100	0200		USA, WHRA Greenbush ME	7580va	
0100	0200		USA, WHRI Noblesville IN	7315am	7535am
0100	0200		USA, WINB Red Lion PA	9320am	
0100	0200		USA, WJIE Louisville KY	13595am	

SELECTED PROGRAMMING BEGINS ON PAGE 57

0100	0200		USA, WRMI Miami FL	6870na		
0100	0200		USA, WTJC Newport NC	9370na		
0100	0200		USA, WWCR Nashville TN	3210na	5070na	
			5935na	7465na		
0100	0200		USA, WWRB Manchester TN	5050na	5085na	
			5745na	6890na		
0100	0200		USA, WYFR Okeechobee FL	6065na	9505na	
			15060va	15195as		
0100	0200		Zambia, Radio Christian Voice	4965af		
0105	0130	sm	Austria, Radio Austria Intl	9870na		
0115	0120	mtwhf	Kyrgystan, Radio Kyrghyz	4010irr	4795irr	
0115	0130	twhfa	Austria, Radio Austria Intl	9870am		
0130	0145	s	Germany, Pan American BC	9495eu		
0130	0200		Australia, Radio	9660pa	12080va	13630pa
			15240pa	15415as	17750as	17775as
			17795as	21725as		
0130	0200		Sweden, Radio	6010na	9435va	
0130	0200		USA, Voice of America	9775am	13740am	
0135	0150	sm	Austria, Radio Austrio Intl	9870am		
0140	0200		Vatican City, Vatican Radio	9650as	12055as	
0145	0200		Austria, Radio Austria Intl	9870am		

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

0200	0230		Australia, HCJB	15560as		
0200	0230		Austria, AWR Europe	9820as		
0200	0230	fmw	Belarus, Radio Belarus Intl	5970eu	7210eu	
0200	0230	vl	Croatia, Croatian Radio	9925na		
0200	0230		Iran, Voice of the Islamic Rep	9905sa		
0200	0230	a	UK, Wales Radio Intl	9795na		
0200	0230		USA, KJES Vado NM	7555na		
0200	0230	a	USA, WRMI Miami FL	9955am		
0200	0257		Canada, Radio Canada Intl	15510as	17860as	
0200	0300		Anguilla, Caribbean Beacon	6090am		
0200	0300	twhfa	Argentina, RAE	11710na		
0200	0300		Australia, ABC NT Alice Springs	2310irr	4835do	
0200	0300		Australia, ABC NT Katherine	5025do		
0200	0300		Australia, ABC NT Tennant Creek	4910do		
0200	0300		Australia, Radio	9660pa	12080va	13630pa
			15240pa	15415as	17750as	21725as
0200	0300		Bulgaria, Radio	9700na	11700na	
0200	0300		Canada, CBC Northern Service	9625do		
0200	0300		Canada, CFRX Toronto ON	6070do		
0200	0300		Canada, CFVP Calgary AB	6030do		
0200	0300		Canada, CKZN St John's NF	6160do		
0200	0300		Canada, CKZU Vancouver BC	6160do		
0200	0300		China, China Radio Intl	11770va		
0200	0300		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa		
0200	0300		Cuba, Radio Havana	6000na	9820na	
0200	0300		Egypt, Radio Cairo	11855na		
0200	0300	DRM	Germany, Deutsche Welle	3980eu	4010eu	
0200	0300		Guyana, Voice of	3290do		
0200	0300		Malaysia, Radio Malaysia	7295do		
0200	0300		Myanmar, Radio	7185do		
0200	0300		Namibia, Namibian BC Corp	3270af	3290af	
			6090af			
0200	0300		New Zealand, Radio NZ Intl	17675pa		
0200	0300		North Korea, Voice of	4405as	11845as	
			15230as			
0200	0300	as	Philippines, Radio Pilipinas	11885me	15120me	
			15270me			
0200	0300		Russia, Voice of	5945me	7180na	9860na
			15595na	17660na		
0200	0300		Sierra Leone, Radio UNAMSIL	6137af		
0200	0300		Singapore, Mediacorp Radio	6150do		
0200	0300	vl	Solomon Islands, SIBC	5020do	9545do	
0200	0300		South Korea, Radio Korea Intl	9560na	11810na	
			15575na			
0200	0300		Sri Lanka, SLBC	6005as	11905as	15745as
0200	0300		Taiwan, Radio Taiwan Intl	5950na	9680na	
			11875as	15320as	15465as	
0200	0300		UK, BBC World Service	5975ca	6195me	
			9410va	9750af	9825ca	11760me
			11835ca	11955as	12095ca	15280as
			15310as	15360as	17790as	
0200	0300		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
0200	0300		USA, KAIJ Dallas TX	5755va		
0200	0300		USA, KTBN Salt Lake City UT	7505na		
0200	0300		USA, KWHR Naalehu HI	17510as		
0200	0300	mtwhf	USA, Voice of America	7115va	9885va	
			11705va	11725va		
0200	0300		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
0200	0300		USA, WBOH Newport NC	5920am		
0200	0300		USA, WEWN Birmingham AL	5825na	7425na	
			13615va			
0200	0300		USA, WHRA Greenbush ME	7580va		
0200	0300		USA, WHRI Noblesville IN	7315am	7535am	
0200	0300		USA, WINB Red Lion PA	9320am		
0200	0300		USA, WJIE Louisville KY	13595am		
0200	0300		USA, WRMI Miami FL	6870na		
0200	0300		USA, WTJC Newport NC	9370na		
0200	0300		USA, WWCR Nashville TN	3210na	5050na	
			5070na	5935na	7465na	
0200	0300		USA, WWRB Manchester TN	5050na	5085na	
			5745na	6890na		
0200	0300		USA, WYFR Okeechobee FL	5985na	6065na	
			9505na	11855ca	15255ca	
0200	0300		Zambia, Radio Christian Voice	4965af		
0215	0230		Nepal, Radio	3230as	5005as	6100as
			7165as			
0230	0258		Vietnam, Voice of	6175na		
0230	0300	mtwhfa	Hungary, Radio Budapest	9790na		
0230	0300		Sweden, Radio	6010na		
0245	0300		Albania, Radio Tirana Intl	6115eu	7160eu	
0250	0300		Vatican City, Vatican Radio	7305am	9605am	
0250	0300		Zambia, Radio	4910do		

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

0300	0315		Vatican City, Vatican Radio	17590va		
0300	0327		Czech Rep, Radio Prague Intl	7345na	9870na	
0300	0330		Egypt, Radio Cairo	11855na		
0300	0330	as	Philippines, Radio Pilipinas	11885me	15120me	
			15270me			
0300	0330		Thailand, Radio	15395na		
0300	0330		Vatican City, Vatican Radio	9660af		
0300	0350		Turkey, Voice of	6020va	6140va	7270me
0300	0355		South Africa, Channel Africa	3345af	6160af	
			9770af			
0300	0400		Anguilla, Caribbean Beacon	6090am		
0300	0400		Australia, ABC NT Alice Springs	2310irr	4835do	
0300	0400		Australia, ABC NT Katherine	5025do		
0300	0400		Australia, ABC NT Tennant Creek	4910do		
0300	0400		Australia, Radio	9660pa	12080va	13630pa
			15240pa	15415as	17750as	21725as
0300	0400		Canada, CBC Northern Service	9625do		
0300	0400		Canada, CFRX Toronto ON	6070do		
0300	0400		Canada, CFVP Calgary AB	6030do		
0300	0400		Canada, CKZN St John's NF	6160do		
0300	0400		Canada, CKZU Vancouver BC	6160do		
0300	0400		China, China Radio Intl	9690am	9790ca	
			11770va	13720va	15110va	17500va
0300	0400		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa		
0300	0400		Cuba, Radio Havana	6000na	9820na	
0300	0400	DRM	Germany, Deutsche Welle	3980eu	4010eu	
0300	0400	vl	Guatemala, Radio Cultural	3300am		
0300	0400		Guyana, Voice of	3290do		
0300	0400		Japan, Radio	21610pa		
0300	0400		Malaysia, Radio Malaysia	7295do		
0300	0400		Malaysia, Voice of	6175as	9750as	15295as
0300	0400		Namibia, Namibian BC Corp	3270af	3290af	
			6090af			
0300	0400		New Zealand, Radio NZ Intl	17675pa		
0300	0400		North Korea, Voice of	3560as	7140as	
			9345os9720as			
0300	0400		Oman, Radio	15355af		
0300	0400		Russia, Voice of	7180na	7300na	9860na
			15595na	17660na		
0300	0400		Sierra Leone, Radio UNAMSIL	6137af		
0300	0400		Singapore, Mediacorp Radio	6150do		
0300	0400	vl	Solomon Islands, SIBC	5020do	9545do	
0300	0400		Sri Lanka, SLBC	6005as	11905as	15745as
0300	0400		Taiwan, Radio Taiwan Intl	5950na	15215na	
			15320as			
0300	0400	vl	Uganda, Radio	4976do	5026do	7196do
0300	0400		UK, BBC World Service	5975ca	6195eu	
			9410va	11760me	11835ca	12095va
			15280as	15310as	15360as	15575me
			17760as	17790as	21660as	
0300	0400		Ukraine, Radio Ukraine Intl	7545na		
0300	0400		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
0300	0400		USA, KAIJ Dallas TX	5755va		
0300	0400		USA, KTBN Salt Lake City UT	7505na		
0300	0400		USA, KWHR Naalehu HI	17510as		
0300	0400	mtwhf	USA, Voice of America	6080af	7105af	
			7290af 7340af	9885af	12080af	17895af
0300	0400		USA, Voice of America	9620va	11695va	
0300	0400		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
0300	0400		USA, WBOH Newport NC	5920am		
0300	0400		USA, WEWN Birmingham AL	5825na	7425na	
			13615va			
0300	0400		USA, WHRA Greenbush ME	7580va		

0300	0400		USA, WHRI Noblesville IN	7315am	7535am	
0300	0400		USA, WINB Red Lion PA	9320am		
0300	0400		USA, WJIE Louisville KY	13595am		
0300	0400		USA, WMLK Bethel PA	9465eu		
0300	0400	smtwhf	USA, WRMI Miami FL	6870na		
0300	0400		USA, WTJC Newport NC	9370na		
0300	0400		USA, WWCR Nashville TN 5070na 5935na	3210na	5050na	
0300	0400		USA, WWRB Manchester TN 5745na 6890na	5050na	5085na	
0300	0400		USA, WYFR Okeechobee FL 11740na	6065na	9505va	
0300	0400		Zambia, Radio 4910do			
0300	0400		Zambia, Radio Christian Voice	4965af		
0300	0400	vl	Zimbabwe, ZBC Corp	5975do		
0330	0357		Czech Rep, Radio Prague Intl	11600va	15600va	
0330	0358		Vietnam, Voice of 6175ca			
0330	0400		Albania, Radio Tirana Intl	6115eu	7160eu	
0330	0400		UK, BBC World Service 6190af 7120af 7160af	3255af	6005af 12035af	15420af
0345	0400		Tajikistan, Radio 7245irr			

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

0400	0415		Israel, Kol Israel 9435va	11590va	17600va	
0400	0430		Belgium, Radio Vlaanderen Intl	11635na		
0400	0430	vl	Croatia, Croatian Radio 12110va	9480na	12105va	
0400	0430		France, Radio France Intl 11955af 13610af	9550af	9805af	
0400	0430		Sri Lanka, SLBC 6005as	11905as	15745as	
0400	0430	mtwhf	USA, Voice of America 7290af 9575af 9885af	4960af	6080af 12080af	17895af
0400	0456		Romania, Radio Romania Intl 15235na 17860na	11820na	15140na	
0400	0457	DRM/as	Netherlands, Radio 15400au			
0400	0458		New Zealand, Radio NZ Intl	17675pa		
0400	0459		Germany, Deutsche Welle 9710af 11945af	7225af	9630af	
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	4910da		
0400	0500		Australia, Radio 9660pa 15240pa 15515va	12080va	13630pa 17750as	21725as
0400	0500		Canada, CBC Northern Service	9625do		
0400	0500		Canada, CFRX Toronto ON	6070do		
0400	0500		Canada, CKZN St John's NF	6160do		
0400	0500		Canada, CKZU Vancouver BC	6160do		
0400	0500		China, China Radio Intl 9755am 13720am	6190am	9560am 17490am	17650am
0400	0500		Costa Rica, University Network 7375am 9725sa	5030am	6150am	
0400	0500		Cuba, Radio Havana	6000na	9820na	
0400	0500	DRM	Germany, Deutsche Welle	3980eu	4010eu	
0400	0500		Guyana, Voice of 3290do			
0400	0500		Malaysia, Radio Malaysia	7295do		
0400	0500		Malaysia, Voice of 6175as	9750as	15295as	
0400	0500		Namibia, Namibian BC Corp 6090af	3270af	3290af	
0400	0500		Netherlands, Radio 6165na	9590na		
0400	0500		Russia, Voice of 7180na 17660na	7300na	15595na	
0400	0500		Sierra Leone, Radio UNAMSIL	6137af		
0400	0500		Singapore, Mediacorp Radio	6150do		
0400	0500	vl	Solomon Islands, SIBC	5020do	9545do	
0400	0500	vl	Uganda, Radio 4976da	5026do	7196da	
0400	0500		UK, BBC World Service 6005af 6190af 6195eu 9410va 11760me 12095va 15280as 15420af 15575me 21660as	3255af	5975ca 7120af 11835ca 15310as 17760as	7160af 12035af 15360as 17790as
0400	0500		USA, AFRTS 6350usb 13362usb	4319usb 7507usb	5446usb 10320usb	5765usb 12133usb
0400	0500		USA, KAIJ Dallas TX 5755va			
0400	0500		USA, KTBN Salt Lake City UT	7505na		
0400	0500		USA, KWHR Naalehu HI	17780as		
0400	0500		USA, Voice of America	9620va	11695va	
0400	0500		USA, WBCQ Kennebunk ME 9330na	5105na	7415na	
0400	0500		USA, WBOH Newport NC	5920am		
0400	0500		USA, WEWN Birmingham AL 13615va	5825na	7425na	
0400	0500		USA, WHRA Greenbush ME	7580va		
0400	0500		USA, WHRI Noblesville IN	7315am	7535am	
0400	0500		USA, WJIE Louisville KY	7490am	13595am	
0400	0500		USA, WRMI Miami FL	6870na		
0400	0500		USA, WTJC Newport NC	9370na		
0400	0500		USA, WWCR Nashville TN 5070na 5935na	3210na	5050na	
0400	0500		USA, WWRB Manchester TN 5745na 6890na	5050na	5085na	
0400	0500		USA, WYFR Okeechobee FL 9715na	6855va	7355va	
0400	0500		Zambia, Radio 4910do			
0400	0500		Zambia, Radio Christian Voice	4965af		
0400	0500	vl	Zimbabwe, ZBC Corp	5975do		
0415	0420	mtwhf	Kyrgystan, Radio Kyrghyz	4010irr	4795irr	
0430	0500		Nigeria, Radio/Enugu	6025do		
0430	0500		Nigeria, Radio/Ibadan	6050do		
0430	0500		Nigeria, Radio/Kaduna	4770do	6090do	
0430	0500		Nigeria, Radio/Lagos	3326do	4990do	
0430	0500		Serbia & Montenegro, Intl Radio	9580va		
0430	0500		Swaziland, TWR 4775af	6120af		
0430	0500	mtwhf	USA, Voice of America 7290af 9575af 11835af	4960af	6080af 12080af	17895af
0445	0500		Italy, RAI Intl 6110af	7235af	9875af	
0445	0500		Nigeria, Voice of 7255af	15120af		
0459	0500		New Zealand, Radio NZ Intl	11820pa		

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

0500	0530		France, Radio France Intl 15155af	11850af	13610af	
0500	0530		UK, BBC World Service 7160af 11765af 15310as 17760me	6005af 11940af	6190af 11955as 15360as 17790as	15280as 15420af 17885af 17640af 21660as
0500	0530		Vatican City, Vatican Radio 13765af	9660af	11625af	
0500	0559		Germany, Deutsche Welle 12045af 15410af	9630af	9700af 17860af	
0500	0600		Anguilla, Caribbean Beacon	6090am		
0500	0600		Australia, ABC NT Alice Springs	2310irr	4835do	
0500	0600		Australia, ABC NT Katherine	5025do		
0500	0600		Australia, ABC NT Tennant Creek	4910da		
0500	0600		Australia, Radio 9660pa 15160pa 15240as 17750as 21725as	12080va	13630pa 15415va	15515as
0500	0600		Canada, CBC Northern Service	9625da		
0500	0600		Canada, CFRX Toronto ON	6070do		
0500	0600		Canada, CKZN St John's NF	6160do		
0500	0600		Canada, CKZU Vancouver BC	6160da		
0500	0600		China, China Radio Intl 11760am 17490am	9560am	13720va	9755na 15350va 17540am
0500	0600		Costa Rica, University Network 7375am 9725sa	5030am	6150am	
0500	0600		Cuba, Radio Havana 9820pa	9550ca	9655pa	
0500	0600	DRM	Germany, Deutsche Welle	3980eu	4010eu	
0500	0600		Guyana, Voice of 3290da			
0500	0600		Japan, Radio 15195va	5975va	6110na 17810va	7230va 21755va
0500	0600		Malaysia, Radio Malaysia	7295do		
0500	0600		Malaysia, Voice of 6175as	9750as	15295as	
0500	0600		Namibia, Namibian BC Corp	6060af	6175al	
0500	0600		New Zealand, Radio NZ Intl	11820pa		
0500	0600		Nigeria, Radio/Enugu	6025do		
0500	0600		Nigeria, Radio/Ibadan	6050da		
0500	0600		Nigeria, Radio/Kaduna	4770da	6090da	
0500	0600		Nigeria, Radio/Lagos	3326da	4990do	
0500	0600		Nigeria, Voice of 7255af	15120af		
0500	0600		Russia, Voice of 21790pa			
0500	0600		Sierra Leone, Radio UNAMSIL	6137af		
0500	0600		Singapore, Mediacorp Radio	6150da		
0500	0600	vl	Solomon Islands, SIBC	5020da	9545do	
0500	0600		South Africa, Channel Africa	7210af	9770af	
0500	0600		Swaziland, TWR 6120af	7205af	9500af	
0500	0600	vl	Uganda, Radio 4976do	5026do	7196da	
0500	0600		UK, BBC World Service 15565me 15575me	9410me	11760me	
0500	0600		USA, AFRTS 6350usb 13362usb	4319usb 7507usb	5446usb 10320usb	5765usb 12133usb
0500	0600		USA, KAIJ Dallas TX 5755va			
0500	0600		USA, KTBN Salt Lake City UT	7505na		
0500	0600		USA, KWHR Naalehu HI	11565as	17780as	
0500	0600	mtwhf	USA, Voice of America 6180af 7290af 12080af	6035af	6080af	
0500	0600		USA, WBCQ Kennebunk ME	5105na	7415na	
0500	0600		USA, WBOH Newport NC	5920am		
0500	0600		USA, WEWN Birmingham AL 13615va	5825na	7425na	
0500	0600		USA, WHRA Greenbush ME	11730no		
0500	0600		USA, WHRI Noblesville IN	7315am	7535am	
0500	0600		USA, WJIE Louisville KY	7490am	13595am	
0500	0600		USA, WMLK Bethel PA	9465eu		

0500	0600	smtwhf	USA, WRMI Miami FL	6870na		
0500	0600		USA, WTJC Newport NC	9370na		
0500	0600		USA, WWCR Nashville TN 5770na 5935na	3210na	5070na	
0500	0600		USA, WYFR Okeechobee FL	6855vo	9355eu	
0500	0600		Zambia, Radio Christian Voice	9865af		
0500	0600	vl	Zimbabwe, ZBC Corp	5975do		
0505	0530	s	Austria, Radio Austria Intl	17870me		
0515	0525		Rwanda, Radio 6005do			
0525	0600	vl	Ghana, Ghana BC Corp	3366do	4915do	
0530	0600		Serbia & Montenegro, Intl Radio	9580va		
0530	0600		Thailand, Radio 21795eu			
0530	0600		UAE, Radio Dubai 15435va	17830va	21700va	
0530	0600		UK, BBC World Service 7160af 11765af 11940af 15360as 15420af 17790as 21660as	6005af 11955as	6190af 15310as 17760as	
0535	0600	s	Austria, Radio Austria Intl	17870me		

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

0600	0620		Vatican City, Vatican Radio 7250eu	4005eu	5890eu	
0600	0630	vl	Croatia, Croatian Radio 12110va	9480na	12105vo	
0600	0630		France, Radio France Intl 15155as 17800as	11665as	11725as 21620as	
0600	0630		Swaziland, TWR 6120af	7205af	9500af	
0600	0630	mtwhf	USA, Voice of America 12080af	6035af	6180af	
0600	0657		China, China Radio Intl 13720vo 15350vo	11740as 15465va	13620va 17540va	
0600	0659		Germany, Deutsche Welle 17860af 21675af	7170af	15275af	
0600	0700		Anguillo, Caribbean Beacon	6090am		
0600	0700		Australio, 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 13605pa 13630pa 15160pa 15240as 15415va 15515vo 17750as	11880pa	12080va	
0600	0700		Canada, CFRX Toronto ON	6070do		
0600	0700		Canada, CFVP Calgary AB	6030do		
0600	0700		Canada, CKZN St John's NF	6160do		
0600	0700		Canada, CKZU Vancouver BC	6160do		
0600	0700		Costa Rica, University Network 7375am 9725sa	5030am	6150am 11870sa	
0600	0700		Cuba, Radio Havana 9820pa	9550ca	9655pa	
0600	0700		Germany, Deutsche Welle	6140eu		
0600	0700		Germany, Deutsche Welle	6110eu		
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do	
0600	0700		Guyana, Voice of 3290do			
0600	0700		Japan, Radio 7230va 11690va 17870va	11715va 11760vo	11740va 13630vo 21755va 15195va	
0600	0700		Liberia, ELWA 4760do			
0600	0700		Malaysia, Radio Moloysia	7295do		
0600	0700		Molaysia, Voice of 6175as	9750as		
0600	0700		Namibia, Namibian BC Corp	6060af	6175ol	
0600	0700		New Zealand, Radio NZ Intl	11820pa		
0600	0700		Nigeria, Radio/Enugu	6025do		
0600	0700		Nigeria, Radio/Ibadan	6050do		
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do	
0600	0700		Nigeria, Radio/Lagos	3326do	4990do	
0600	0700		Nigeria, Voice of 7255af	15120af		
0600	0700		Papua New Guinea, NBC	4890do		
0600	0700		Russia, Voice of 21790pa			
0600	0700		Sierra Leone, Radio UNAMSIL	6137af		
0600	0700		Singapore, Mediacorp Radio	6150do		
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do	
0600	0700		South Africa, Channel Africa	7210af	15215af	
0600	0700		UK, BBC World Service 7160af 9410eu 15485eu 17640af	6005af 11760af 15545af	6190af 11940af 15565me	12095eu 15575me
0600	0700	as	UK, BBC World Service	17885af		
0600	0700		USA, AFRTS 6350usb 13362usb	4319usb 7507usb	5446usb 10320usb	5765usb 12133usb
0600	0700		USA, KAIJ Dallas TX 5755va			
0600	0700		USA, KTBN Salt Lake City UT	7505na		
0600	0700		USA, KWHR Naalehu HI	11565as	17780as	
0600	0700		USA, Voice of America	6080af	7290af	
0600	0700		USA, WBCQ Kennebunk ME	5105na	7415na	
0600	0700		USA, WBOH Newport NC	5920am		
0600	0700		USA, WEWN Birmingham AL 7580va 13615no	5825na	7425na	
0600	0700		USA, WHRA Greenbush ME	11730na		
0600	0700		USA, WHRI Noblesville IN	7315am	7535am	
0600	0700		USA, WJIE Louisville KY	7490am	13595am	
0600	0700		USA, WMLK Bethel PA	9465eu		
0600	0700	smtwhf	USA, WRMI Miami FL	6870na		
0600	0700		USA, WTJC Newport NC	9370na		
0600	0700		USA, WWCR Nashville TN 5770na 5935na	3210na	5070na	
0600	0700		USA, WYFR Okeechobee FL 11580eu	7355eu	11530eu	
0600	0700	vl	Vanuatu, Radio 4960do	7260do		
0600	0700		Yemen, Rep of Yemen Radio	9780me		
0600	0700		Zambio, Radio Christian Voice	9865af		
0600	0700	vl	Zimbabwe, ZBC Corp	5975do		
0630	0700		Bulgaria, Radio 11600eu	13600eu		
0630	0700	vl	Georgia, Radio Georgia	11805eu		
0630	0700		Swaziland, TWR 7205af	9500af		
0630	0700		Vaticon City, Vatican Radio 13765af 13795af	5890va	11625af 15570af	15595af
0645	0700	as	Albania, TWR 11865eu			
0645	0700	as	Monaco, TWR 9870eu			

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

0700	0705		New Zealand, Radio NZ Intl	11820pa		
0700	0715		Israel, Kol Israel 11590va	15640va	17600va	
0700	0720		UK, BBC World Service 11940af 15400af	6190af	11765af	
0700	0720	as	UK, BBC World Service	17885af		
0700	0726		Romania, Radio Romania Intl	11830na	15150na	
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu	
0700	0730		Belgium, Radio Vlaanderen Intl	5985eu		
0700	0730		Slovakia, Radio Slovakia Intl oc	9440	oc	15460
0700	0730	a	Tibet, Xizang PBS 6110as	9490as	9580as	
0700	0730		UK, BBC World Service	15565me	15575me	
0700	0750	as	Albanio, TWR 11865eu			
0700	0750	as	Monaco, TWR 9870eu			
0700	0800		Anguilla, Caribbean Beacon	6090am		
0700	0800		Australia, ABC NT Alice Springs	2310irr	4835do	
0700	0800		Australia, ABC NT Katherine	5025do		
0700	0800		Australia, ABC NT Tennant Creek	4910do		
0700	0800		Australia, HCJB 11750pa			
0700	0800		Australia, Radio 9580pa 12080va 15415va	9660pa 13630po 15515as	11880pa 15160pa 15240as 17750os	
0700	0800		Canada, CFRX Toronto ON	6070do		
0700	0800		Canada, CFVP Calgary AB	6030do		
0700	0800		Canada, CKZN St John's NF	6160do		
0700	0800		Canada, CKZU Vancouver BC	6160do		
0700	0800		China, China Radio Intl 15465va	13720va	15350va	
0700	0800		Costa Rica, University Network 7375am 9725sa	5030am	6150am 11870sa	
0700	0800		Eqt Guinea, Radio Africa	15184af		
0700	0800		France, Radio France Intl	15605af		
0700	0800		Germany, Deutsche Welle	6140eu	21675af	
0700	0800		Germany, Overcomer Ministries	6110eu		
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do	
0700	0800		Guyana, Voice of 3290do	5950do		
0700	0800	vl/as	Italy, IRRS 13840va			
0700	0800		Liberia, ELWA 4760do			
0700	0800		Malaysio, Radio Malaysia	7295do		
0700	0800		Malaysia, Voice of 6175as	9750as		
0700	0800		Myanmar, Radio 9730do			
0700	0800		Nigerio, Rodio Enugu	6025do		
0700	0800		Nigeria, Radio/Ibadan	6050do		
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do	
0700	0800		Nigeria, Radio/Logos	3326do	4990do	
0700	0800		Nigeria, Voice of 7255af	15120af		
0700	0800		Papua New Guinea, NBC	4890do		
0700	0800		Russia, Voice of 17495pa 21790pa	17525pa	17635po	
0700	0800		Sierra Leone, Radio UNAMSIL	6137of		
0700	0800		Singapore, Mediacorp Radio	6150do		
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do	
0700	0800		South Africa, Channel Africa	11825af		
0700	0800		Swaziland, TWR 7205af	9500af		
0700	0800		Taiwan, Radio Taiwan Intl	5950na		
0700	0800		UK, BBC World Service 15360as 21660as	11955as 15545af	15310as 17760as	17790as
0700	0800		USA, AFRTS 6350usb 13362usb	4319usb 7507usb	5446usb 10320usb	5765usb 12133usb
0700	0800		USA, KAIJ Dallas TX 5755va			
0700	0800		USA, KTBN Salt Lake City UT	7505na		
0700	0800		USA, KWHR Naalehu HI	11565as	17780as	
0700	0800		USA, WBCQ Kennebunk ME	5105na	7415na	
0700	0800		USA, WBOH Newport NC	5920om		
0700	0800		USA, WEWN Birmingham AL 7580no 11875va	5825na	7425na	

0700	0800		USA, WHRA Greenbush ME	11730na		
0700	0800		USA, WHRI Noblesville IN	7315am	7535am	
0700	0800		USA, WMLK Bethel PA	9465eu		
0700	0800	mtwhf	USA, WRMI Miami FL	6870na		
0700	0800		USA, WTJC Newport NC	9370na		
0700	0800		USA, WWCR Nashville TN	3210na	5070na	
			5770na 5935na			
0700	0800		USA, WYFR Okeechobee FL	9715va	9930va	
0700	0800	vl	Vanuatu, Radio 4960do	7260do		
0700	0800		Zambia, Radio Christian Voice	9865af		
0706	0800		New Zealand, Radio NZ Intl	9885pa		
0715	0800	mtwhf	Albania, TWR 11865eu			
0715	0800	mtwhf	Monaco, TWR 9870eu			
0720	0800		UK, BBC World Service	6190af	11765af	
			11940af 15400af			
0730	0745		Vatican City, Vatican Radio	4005va	5890va	
			6185va 7250va	9645va	11740va	
			15595va			
0730	0800		Georgia, Radio Georgia	11910eu		
0730	0800	as	Guam, TWR/KTWR 15205as			
0730	0800	as	UK, BBC World Service	15575me	17865af	
0730	0800	mtwhf	UK, BBC World Service	11760me	15565me	
0740	0800	mtwhf	Guam, TWR/KTWR 11840as	15205as		
0755	0800	s	Monaco, TWR 9870eu			

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

0800	0820	smtwhf	Albania, TWR 11865eu			
0800	0820	mtwhfs	Monaco, TWR 9870eu			
0800	0830		Australia, ABC NT Katherine	5025do		
0800	0830		Australia, ABC NT Tennant Creek	4910do		
0800	0830		Malaysia, Voice of 6175as	9750as		
0800	0830		Myanmar, Radio 9730do			
0800	0857		China, China Radio Intl	13720va	15350va	
			15465va 17540va			
0800	0900		Anguilla, Caribbean Beacon	6090am		
0800	0900		Australia, ABC NT Alice Springs	2310irr	4835do	
0800	0900		Australia, HCJB 11750pa			
0800	0900		Australia, Radio 5995pa	9580va	9590as	
			9710pa 12080va	13630pa	15475as	
			15515va 17750as			
0800	0900		Canada, CFRX Toronto ON	6070do		
0800	0900		Canada, CFVP Calgary AB	6030do		
0800	0900		Canada, CKZN St John's NF	6160do		
0800	0900		Canada, CKZU Vancouver BC	6160do		
0800	0900		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa	11870sa		
0800	0900		Eqt Guinea, Radio Africa	15184af		
0800	0900		Germany, Deutsche Welle	6140eu	21675af	
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do	
0800	0900	as	Guam, TWR/KTWR 15205as	15330as		
0800	0900	mtwhf	Guam, TWR/KTWR 11840as			
0800	0900		Guyana, Voice of 3290do	5950do		
0800	0900		Indonesia, Voice of 9525as	11785as	15150al	
0800	0900	vl/as	Italy, IRRS 13840va			
0800	0900		Liberia, ELWA 4760do			
0800	0900		Malaysia, Radio Malaysia	7295do		
0800	0900		New Zealand, Radio NZ Intl	9885pa		
0800	0900		Nigeria, Radio Enugu	6025do		
0800	0900		Nigeria, Radio/Ibadan	6050do		
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do	
0800	0900		Nigeria, Radio/Lagos	3326do	4990do	
0800	0900		Nigeria, Voice of 7255af	15120af		
0800	0900	vl	Pakistan, Radio 15100eu	17835eu		
0800	0900		Papua New Guinea, Cath Radio Network		4960va	
0800	0900		Papua New Guinea, NBC	4890do		
0800	0900		Russia, Voice of 17495pa	17525pa	17635pa	
			21790pa			
0800	0900		Sierra Leone, Radio UNAMSIL	6137af		
0800	0900		Singapore, Mediacorp Radio	6150do		
0800	0900	vl	Solomon Islands, SIBC	5020do	9545do	
0800	0900		South Korea, Radio Korea Intl	13670eu		
0800	0900		Swaziland, TWR 7205af	9500af		
0800	0900		Taiwan, Radio Taiwan Intl	9610au		
0800	0900		UK, BBC World Service	6190af	11760me	
			11955as 12095eu	15310as	15360as	
			15400af 15485eu	15565me	15575me	
			17760as 17790as	17830af	21470af	
			21660as			
0800	0900		USA, AFRTS 4319usb	5446usb	5765usb	
			6350usb 7507usb	10320usb	12133usb	
			13362usb			
0800	0900		USA, KAIJ Dallas TX 5755va			
0800	0900		USA, KNLS Anchor Point AK	9690as		
0800	0900		USA, KTBN Salt Lake City UT	7505na		
0800	0900		USA, KWHR Naalehu HI	11565as	17780as	
0800	0900		USA, WBCQ Kennebunk ME	5105na	7415na	
0800	0900		USA, WBOH Newport NC	5920am		
0800	0900		USA, WEWN Birmingham AL	5825na	7425na	
			7580na 11875va			
0800	0900		USA, WHRI Noblesville IN	7315am	7535am	
0800	0900		USA, WJIE Louisville KY	7490am	13595am	
0800	0900		USA, WMLK Bethel PA	9465eu		
0800	0900	smtwhf	USA, WRMI Miami FL	6870na		
0800	0900		USA, WTJC Newport NC	9370na		
0800	0900		USA, WWCR Nashville TN	3210na	5070na	
			5770na 5935na			
0800	0900		USA, WYFR Okeechobee FL	5950af	9930af	
0800	0900	vl	Vanuatu, Radio 4960do	7260do		
0800	0900		Zambia, Radio Christian Voice	9865af		
0830	0850		Bangladesh, Bangla Betar	7185as	9550as	
0830	0900		Australia, ABC NT Katherine	2485do		
0830	0900		Australia, ABC NT Tennant Creek	2325do		
0830	0900		Georgia, Radio Georgia	11910eu		
0830	0900		Lithuania, Radio Vilnius	9710eu		

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

0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do	
0900	0929		Czech Rep, Radio Prague Intl	21745va		
0900	0930		Guam, TWR/KTWR 11840as			
0900	0930		Russia, Radio Ezra 17590va			
0900	1000		Anguilla, Caribbean Beacon	6090am		
0900	1000		Australia, ABC NT Alice Springs	2310da	4835irr	
0900	1000		Australia, ABC NT Katherine	2485da		
0900	1000		Australia, ABC NT Tennant Creek	2325da		
0900	1000		Australia, HCJB 11750pa			
0900	1000		Australia, Radio 9580va	9590as	11880as	
			12080va 13630pa	15415as		
0900	1000		Australia, Voice Intl 11955as	13685as		
0900	1000		Canada, CFRX Toronto ON	6070do		
0900	1000		Canada, CFVP Calgary AB	6030do		
0900	1000		Canada, CKZN St John's NF	6160do		
0900	1000		Canada, CKZU Vancouver BC	6160do		
0900	1000		China, China Radio Intl	15210pa	17490va	
			17690va			
0900	1000		Costa Rica, University Network	5030am	6150am	
			7375am 9725sa	11870am	13750na	
0900	1000		Eqt Guinea, Radio Africa	15184af		
0900	1000		Germany, Deutsche Welle	6140eu	21675af	
0900	1000		Guyana, Voice of 3290do	5950do		
0900	1000	vl/as	Italy, IRRS 13840va			
0900	1000		Malaysia, Radio Malaysia	7295do		
0900	1000		Malaysia, Voice of 15295as			
0900	1000	DRM	Netherlands, Radio 9815eu			
0900	1000		New Zealand, Radio NZ Intl	9885pa		
0900	1000		Nigeria, Radio Enugu	6025do		
0900	1000		Nigeria, Radio/Ibadan	6050do		
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do	
0900	1000		Nigeria, Radio/Lagos	3326do	4990do	
0900	1000		Nigeria, Voice of 7255af	15120af		
0900	1000	vl	Pakistan, Radio 15100eu	17835eu		
0900	1000		Palau, KHBN 15725as			
0900	1000		Papua New Guinea, Cath Radio Network		4960va	
0900	1000		Papua New Guinea, NBC	4890do		
0900	1000		Singapore, Mediacorp Radio	6150do		
0900	1000	vl	Solomon Islands, SIBC	5020do	9545do	
0900	1000	s	UAE, Radio UNMEE 21460af			
0900	1000		UK, BBC World Service	6195as	9605as	
			9740as 11760me 12095eu	15190ca	15310as	
			15360as 15485eu	15575me	17640me	
			17760as 17790as	21660as		
0900	1000		USA, AFRTS 4319usb	5446usb	5765usb	
			6350usb 7507usb	10320usb	12133usb	
			13362usb			
0900	1000		USA, KAIJ Dallas TX 5755va			
0900	1000		USA, KTBN Salt Lake City UT	7505na		
0900	1000		USA, KWHR Naalehu HI	11565as	17780as	
0900	1000		USA, WBCQ Kennebunk ME	5105na	7415na	
0900	1000		USA, WBOH Newport NC	5920am		
0900	1000		USA, WEWN Birmingham AL	5825na	7425na	
			11875na			
0900	1000		USA, WHRA Greenbush ME	11730na		
0900	1000		USA, WHRI Noblesville IN	7315am	7535am	
0900	1000		USA, WJIE Louisville KY	7490am	13595am	
0900	1000		USA, WRMI Miami FL	9955am		
0900	1000		USA, WTJC Newport NC	9370na		
0900	1000		USA, WWCR Nashville TN	5070na	5770na	
			5935na 9475na			
0900	1000		USA, WYFR Okeechobee FL	5950na		
0900	1000	vl	Vanuatu, Radio 4960do	7260do		
0900	1000		Zambia, Radio Christian Voice	9865af		
0910	0930	s	Armenia, Voice of 4810eu	15270as		
0930	1000		Georgia, Radio Georgia	11910me		
0930	1000	smwhfa	Greece, Voice of 9420eu	15630eu	15650af	

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

1000	1029		Germany, Deutsche Welle	15190as	15350as	
			17820as			

1000	1030		Guam, AWR/KSDA	11560as	11930as	
1000	1030		Mangalia, Voice of	12085as		
1000	1030		UK, BBC World Service	6195as	9605as	
			9740as 15310as	15360as	15360as	17760as
			17790as	21660as		
1000	1059		New Zealand, Radio NZ Intl	9885pa		
1000	1100		Anguilla, Caribbean Beacon	11775am		
1000	1100		Australia, ABC NT Alice Springs	2310da	4835irr	
1000	1100		Australia, ABC NT Katherine	2485da		
1000	1100		Australia, ABC NT Tennant Creek	2325da		
1000	1100		Australia, HCJB	11750pa		
1000	1100		Australia, Radio	5995pa	6020pa	6035va
			9475as 9560as	9580va	9590as	11880va
			12080as	13630pa		
1000	1100		Australia, Voice Intl	11955as	13685as	
1000	1100		Canada, CFRX Toronto ON	6070da		
1000	1100		Canada, CFVP Calgary AB	6030do		
1000	1100		Canada, CKZN St John's NF	6160do		
1000	1100		Canada, CKZU Vancouver BC	6160do		
1000	1100		China, China Radio Intl	6040na	17490va	
			17690va			
1000	1100		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
1000	1100		Eqt Guinea, Radio Africa	15184af		
1000	1100		Guyana, Voice of	3290da	5950da	
1000	1100		India, All India Radio	13695as	15020as	
			15260as	15410as	17510au	17800as
			17895as			
1000	1100	vl/as	Italy, IRRS	13840va		
1000	1100		Japan, Radio	6120ca	9695as	11730as
			17585eu	17720va	21755va	
1000	1100	vl	Libya, Voice of Africa	21695af		
1000	1100		Malaysia, Radio Malaysia	7295da		
1000	1100		Malaysia, Voice of	15295as		
1000	1100	DRM	Netherlands, Radio	9815eu		
1000	1100		Netherlands, Radio	9785au	12065as	13710as
			13820as			
1000	1100		Nigeria, Voice of	7255af	15120af	
1000	1100		North Korea, Voice of	3560as	11710am	
			11735na	13650as	15180as	
1000	1100		Palau, KHBN	15725as		
1000	1100		Papua New Guinea, Cath Radio Network		4960va	
1000	1100		Papua New Guinea, NBC	4890da		
1000	1100		Singapore, Mediacorp Radio	6150da		
1000	1100	vl	Solomon Islands, SIBC	5020da	9545da	
1000	1100		South Africa, Channel Africa	11825af		
1000	1100		UK, BBC World Service	6190af	11940af	
			12095eu	15485eu	17885af	21470af
1000	1100	as	UK, BBC World Service	15190ca	15400af	
			17830af			
1000	1100	DRM/ m	UK, Christian Voice	9760eu		
1000	1100		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
1000	1100		USA, KAIJ Dallas TX	5755va		
1000	1100		USA, KTBN Salt Lake City UT	7505na		
1000	1100		USA, KWHR Naalehu HI	9930as	11565as	
1000	1100		USA, WBCQ Kennebunk ME	5105na		
1000	1100		USA, WBOH Newport NC	5920am		
1000	1100		USA, WEWN Birmingham AL	7425na	7520na	
			11875na			
1000	1100		USA, WHRI Noblesville IN	7315am	7535am	
1000	1100		USA, WINB Red Lion PA	9320am		
1000	1100		USA, WJIE Louisville KY	7490am	13595am	
1000	1100		USA, WRMI Miami FL	9955am		
1000	1100		USA, WTJC Newport NC	9370na		
1000	1100		USA, WWCR Nashville TN	5070na	5770na	
			5935na	15825na		
1000	1100		USA, WYFR Okeechobee FL	5950na	9755sa	
1000	1100	vl	Vanuatu, Radio	4960do	7260do	
1000	1100		Zambia, Radio Christian Voice	9865af		
1010	1020		Israel, Kol Israel	15640va	17535va	
1015	1100		Guam, TWR/KTWR	9865as		
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110da	9704do
1030	1057		Czech Rep, Radio Prague Intl	9880eu	11615eu	
1030	1100	mt hfa	Guam, AWR/KSDA	11900as		
1030	1100		Iran, Voice of the Islamic Rep	15600as	17660as	
1030	1100		UAE, Radio Dubai	13675va	15370va	15395va
			21605eu			
1030	1100	t	UAE, Radio UNMEE	21550af		
1030	1100		UK, BBC World Service	6195as	9740as	
			15310as	17760as	17790as	
1030	1100		Vatican City, Vatican Radio	5890eu		

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

1100	1104	vl	Pakistan, Radio	15100eu	17835eu	
1100	1115	mtwhfa/ vl	Vanuatu, Radio	4960do	7260do	
1100	1127		Iran, Voice of the Islamic Rep	15600as	17660as	
1100	1128		Vietnam, Voice of	7285as		
1100	1130		Tibet, Xizang PBS	4920as	6110as	9490as
1100	1130	t	UAE, Radio UNMEE	21550af		
1100	1130		UK, BBC World Service	6190af	11940af	
			15190ca	15400af	17790ca	17830af
			17885af	21470af		
1100	1200		Anguilla, Caribbean Beacon	11775am		
1100	1200		Australia, ABC NT Alice Springs	2310da	4835irr	
1100	1200		Australia, ABC NT Katherine	2485da		
1100	1200		Australia, ABC NT Tennant Creek	2325da		
1100	1200		Australia, HCJB	15425as		
1100	1200		Australia, Radio	5995pa	6020pa	6035va
			9475as 9560as	9580va	9590as	11880va
			12080as			
1100	1200		Australia, Voice Intl	13685as		
1100	1200		Canada, CFRX Toronto ON	6070da		
1100	1200		Canada, CFVP Calgary AB	6030do		
1100	1200		Canada, CKZN St John's NF	6160da		
1100	1200		Canada, CKZU Vancouver BC	6160do		
1100	1200		China, China Radio Intl	6040am	11750ca	
			17490am	17650am		
1100	1200		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
1100	1200		Ecuador, HCJB	12005va	21455am	
1100	1200		Germany, Deutsche Welle	15105as	17820as	
			21650as	21820as		
1100	1200	vl/as	Italy, IRRS	13840va		
1100	1200	f	Italy, IRRS	15665af		
1100	1200		Japan, Radio	6120na	9695as	11730as
			17585eu			
1100	1200	vl	Libya, Voice of Africa	15610af	17695af	
			21675af	21695af		
1100	1200		Malaysia, Radio Malaysia	7295do		
1100	1200		Malaysia, Voice of	15295as		
1100	1200		Netherlands, Radio	11675na		
1100	1200		New Zealand, Radio NZ Intl	9885pa		
1100	1200		Papua New Guinea, Cath Radio Network		4960va	
1100	1200		Papua New Guinea, NBC	4890do		
1100	1200		Singapore, Radio Singapore Intl	6080as	6150as	
1100	1200		South Africa, Channel Africa	11825af		
1100	1200		Taiwan, Radio Taiwan Intl	7445as		
1100	1200		UK, BBC World Service	6195va	9740as	
			12095eu	15310as	15485eu	17760as
			17790as			
1100	1200		Ukraine, Radio Ukraine Intl	15415eu		
1100	1200		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
1100	1200		USA, KAIJ Dallas TX	5755va		
1100	1200		USA, KTBN Salt Lake City UT	7505na		
1100	1200		USA, KWHR Naalehu HI	9930as	11565as	
1100	1200		USA, WBCQ Kennebunk ME	5105na		
1100	1200		USA, WBOH Newport NC	5920am		
1100	1200		USA, WEWN Birmingham AL	7425na	7520na	
			11875na			
1100	1200		USA, WHRI Noblesville IN	7315am	7535am	
1100	1200		USA, WINB Red Lion PA	9320am		
1100	1200		USA, WJIE Louisville KY	7490am	13595am	
1100	1200		USA, WRMI Miami FL	9955am		
1100	1200		USA, WTJC Newport NC	9370na		
1100	1200		USA, WWCR Nashville TN	5070na	5770na	
			5935na	15825na		
1100	1200		USA, WYFR Okeechobee FL	5850na	5950na	
			6015na	6155na	7355na	9755na
			11855na			
1100	1200		Zambia, Radio Christian Voice	9865af		
1130	1200		Belgium, Radio Vlaanderen Intl	9940as		
1130	1200		Bulgaria, Radio	11700eu	15700eu	
1130	1200		UK, BBC World Service	6190af	11940af	
			15190ca	17830af	17885af	21470af
1130	1200	f	Vatican City, Vatican Radio	15595va	17515va	
1145	1155		Rwanda, Radio	6055do		

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

1200	1215	vl	Cambodia, National Radio	11940as		
1200	1230		Australia, HCJB	15425as		
1200	1230		France, Radio France Intl	17815af	25820af	
1200	1230	vl	Libya, Voice of Africa	15610af	17695af	
			21675af	21695af		
1200	1230		Malaysia, Voice of	15295as		
1200	1230		UAE, AWR Africa	15135as		
1200	1230		Uzbekistan, Radio Tashkent Intl	7285as	9715as	
			15295as	17775as		
1200	1259		Canada, Radio Canada Intl	9660am	15190as	
			13655am	15190as	17800am	
1200	1259		New Zealand, Radio NZ Intl	9885pa		
1200	1259		Poland, Radio Polonia	9525eu	11820eu	
1200	1300		Anguilla, Caribbean Beacon	11775am		
1200	1300		Australia, ABC NT Alice Springs	2310do	4835irr	
1200	1300		Australia, ABC NT Katherine	2485da		

1200	1300		Australia, ABC NT Tennant Creek	2325do		
1200	1300		Australia, Radio	5995pa	6020pa	6035va
			9475as 9560as	9580as	9590as	11880as
1200	1300		Australia, Voice Intl	13685as		
1200	1300		Canada, CBC Northern Service	9625da		
1200	1300		Canada, CFRX Taranto ON	6070do		
1200	1300		Canada, CFVP Calgary AB	6030do		
1200	1300		Canada, CKZN St John's NF	6160do		
1200	1300		Canada, CKZU Vancouver BC	6160do		
1200	1300		China, China Radio Intl	9730as	9795va	
			11760pa	11980po	15415as	17490va
			17650va			
1200	1300		Costa Rica, University Network	9725am	11870am	
			13750am			
1200	1300		Ecuador, HCJB	12005va	21455am	
1200	1300		Greece, Voice of	9420eu	15630eu	15650af
1200	1300		Malaysia, Radio Malaysia	7295do		
1200	1300		Papua New Guinea, Cath Radio Network	4960va		
1200	1300		Papua New Guinea, NBC	4890do		
1200	1300		Singapore, Radio Singapore Intl	6080as	6150as	
1200	1300		South Korea, Radio Korea Intl	9650ca		
1200	1300		Taiwan, Radio Taiwan Intl	7130as		
1200	1300		UK, BBC World Service	6195va	9740as	
			12095eu	15190ca	15310as	15485eu
			17760as	17790as		
1200	1300		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
1200	1300		USA, KAIJ Dallas TX	13815va		
1200	1300		USA, KTBN Salt Lake City UT	7505na		
1200	1300		USA, KWHR Naalehu HI	9930as	11565as	
1200	1300		USA, Voice of America	6160va	9645va	
			9760va	15240va		
1200	1300		USA, WBCQ Kennebunk ME	9330na	17495nc	
1200	1300		USA, WBOH Newport NC	5920am		
1200	1300		USA, WEWN Birmingham AL	7425na	7520na	
			9355na	13615na		
1200	1300		USA, WHRI Noblesville IN	7315am	11670am	
1200	1300		USA, WINB Red Lion PA	13570am		
1200	1300		USA, WJIE Louisville KY	7490am	13595am	
1200	1300		USA, WRMI Miami FL	15725na		
1200	1300		USA, WTJC Newport NC	9370na		
1200	1300		USA, WWCR Nashville TN	7465na	9985na	
			13845na	15825na		
1200	1300		USA, WWRB Manchester TN	9320na	12170na	
1200	1300		USA, WYFR Okeechobee FL	5850na	5950na	
			6015na	6155na	13695na	17750na
1200	1300		Zambia, Radio Christian Voice	9865af		
1205	1230	mtwhf	Austria, Radio Austria Intl	6155eu	13730eu	
			17715va			
1215	1300		Egypt, Radio Cairo	17670as		
1230	1258		Vietnam, Voice of	9840va	12020va	
1230	1300		Australia, HCJB	15405as		
1230	1300		Bangladesh, Bangla Betar	7185as	9550as	
1230	1300	vl	Libya, Voice of Africa	21675af	21695af	
1230	1300		Sri Lanka, SLBC	6005as	11930as	15745as
1230	1300		Sweden, Radio	13580va	15240na	15735va
1230	1300		Thailand, Radio	9855va		
1230	1300		Turkey, Voice of	15225va	15535eu	
1230	1300	a	UK, Wales Radio Intl	17745au		
1235	1245	as	Austria, Radio Austria Intl	6155eu	13730eu	
			17715va			
1245	1300		Austria, Radio Austria Intl	6155eu	13730eu	
			17715as			

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

1300	1329		Czech Rep, Radio Prague Intl	13580eu	21745af	
1300	1330		Australia, HCJB	15405as		
1300	1330	DRM	Canada, Radio Canada Intl	9815eu		
1300	1330		Ecuador, HCJB	12005va	21455am	
1300	1330		Egypt, Radio Cairo	17670as		
1300	1330		Turkey, Voice of	15255va	15535eu	
1300	1356		Romania, Radio Romania Intl	11830eu	15105eu	
1300	1400		Anguilla, Caribbean Beacon	11775am		
1300	1400		Australia, Radio	5995pa	6020pa	9475as
			9560as 9580va	11660as		
1300	1400		Australia, Voice Intl	13685as		
1300	1400		Canada, CBC Northern Service	9625do		
1300	1400		Canada, CFRX Toronto ON	6070do		
1300	1400		Canada, CFVP Calgary AB	6030do		
1300	1400		Canada, CKZN St John's NF	6160do		
1300	1400		Canada, CKZU Vancouver BC	6160do		
1300	1400		Canada, Radio Canada Intl	9515am	13655am	
			17800sa			
1300	1400		China, China Radio Intl	7405am	9570am	
			9795va	11760pa	11980as	15180as
			17490va	17650va		
1300	1400	DRM	China, China Radio Intl	7250va	11810vc	
1300	1400		Costa Rica, University Network	9725am	11870am	
			13750am			
1300	1400		Germany, Deutsche Welle	6140eu		
1300	1400		Germany, Overcomer Ministries	6110eu	13810eu	
1300	1400		Jordan, Radio	11690eu		
1300	1400	vl	Libya, Voice of Africa	21675af	21695af	
1300	1400		Malaysia, Radio Malaysia	7295do		
1300	1400		New Zealand, Radio NZ Intl	6095pa		
1300	1400		North Korea, Voice of	4405as	9335eu	
			11710na	13760eu	15245am	
1300	1400		Papua New Guinea, Cath Radio Network	4960va		
1300	1400		Papua New Guinea, NBC	4890da		
1300	1400		Singapore, Radio Singapore Intl	6080as	6150as	
1300	1400		South Korea, Radio Korea Intl	9570as	9700as	
1300	1400		Sri Lanka, SLBC	6005as	11930as	15745as
1300	1400		UK, BBC World Service	6190af	6195va	
			9740as 11940af	12095eu	15190af	15310as
			15420af	15485eu	17760as	17790as
			17830af	17885af	21470af	
1300	1400		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
1300	1400		USA, KJES Vado NM	11715na		
1300	1400		USA, KNLS Anchor Point AK	9690as		
1300	1400		USA, KTBN Salt Lake City UT	7505na		
1300	1400		USA, KWHR Naalehu HI	9930as	11565as	
1300	1400		USA, Voice of America	9645va	9760va	
1300	1400		USA, WBCQ Kennebunk ME	9330na	17495na	
1300	1400		USA, WBOH Newport NC	5920am		
1300	1400		USA, WEWN Birmingham AL	7425na	7520na	
			9355na	13615na		
1300	1400		USA, WHRA Greenbush ME	17560na		
1300	1400		USA, WHRI Noblesville IN	11670am	15105am	
1300	1400		USA, WINB Red Lion PA	13570am		
1300	1400		USA, WJIE Louisville KY	7490am	13595am	
1300	1400		USA, WRMI Miami FL	15725na		
1300	1400		USA, WTJC Newport NC	9370na		
1300	1400		USA, WWCR Nashville TN	7465na	9985na	
			13845na	15825na		
1300	1400		USA, WWRB Manchester TN	9320na	12170na	
1300	1400		USA, WYFR Okeechobee FL	6155na	11560na	
			11830as	11865as	11970na	13695na
			17750na			
1300	1400		Zambia, Radio Christian Voice	9865af		
1315	1330	o	Russia, TWR	9485eu		
1330	1400	s	Australia, HCJB	15405as		
1330	1400	s	Guam, AWR/KSDA	11980as		
1330	1400	mtwhfa	Guam, AWR/KSDA	15275as		
1330	1400		India, All India Radio	9690as	11620as	
			13710as			
1330	1400		Laos, National Radio	7145as		
1330	1400		Sweden, Radio	15240na	15735va	
1330	1400		Uzbekistan, Radio Tashkent Intl	7285as	9715as	
			15295as	17775as		

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

1400	1415		Russia, FEBA	9495as		
1400	1430		Thailand, Radio	9830as		
1400	1459	as	Canada, Radio Canada Intl	9515as		
1400	1500		Anguilla, Caribbean Beacon	11775am		
1400	1500		Australia, Radio	5995pa	6080pa	7260as
			9475as 9590as	11660as	11750as	
1400	1500		Australia, Voice Intl	13685as		
1400	1500		Canada, CBC Northern Service	9625do		
1400	1500		Canada, CFRX Toronto ON	6070do		
1400	1500		Canada, CFVP Calgary AB	6030do		
1400	1500		Canada, CKZN St John's NF	6160do		
1400	1500		Canada, CKZU Vancouver BC	6160do		
1400	1500		China, China Radio Intl	7405am	9610va	
			9795va	11675as	11765af	13685am
			13680af	15125am	17490am	17650am
1400	1500		Costa Rica, University Network	9725am	11870am	
			13750am			
1400	1500		France, Radio France Intl	7175as	9580as	
			11610as	17515as	17620as	
1400	1500		Germany, Deutsche Welle	6140eu		
1400	1500		Germany, Overcomer Ministries	6110eu	13810eu	
1400	1500		India, All India Radio	9690as	11620as	
			13710as			
1400	1500		Japan, Radio	7200as	11730as	11840pa
1400	1500		Jordan, Radio	11690eu		
1400	1500	vl	Libya, Voice of Africa	21675af		
1400	1500		Netherlands, Radio	9890as	11835as	12075as
1400	1500		New Zealand, Radio NZ Intl	6095pa		
1400	1500		Oman, Radio	15140eu		
1400	1500	DRM	Russia, Voice of	15780va		
1400	1500		Russia, Voice of	7390eu	9745eu	12055as
			15605as	17645as		
1400	1500		Singapore, Mediacorp Radio	6150do		
1400	1500		South Africa, Channel Africa	11825af		

1400	1500		Sri Lanka, SLBC	6005as	11930as	15745as
1400	1500		Taiwan, Radio Taiwan Intl		15265as	
1400	1500		UK, BBC World Service		6190af	6195as
			7105os 9740as	11940af	12095eu	15190ca
			15310as	15485eu	15565me	15575me
			17790as	17830af	17885af	21470af
			21660af			
1400	1500		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
1400	1500		USA, KJES Vado NM		11715na	
1400	1500		USA, KTBN Salt Lake City UT		7505na	15590na
1400	1500		USA, KWHR Naalehu HI		9930as	11565as
1400	1500		USA, Voice of America		6160va	7125va
			9760va	15160va	15425va	
1400	1500		USA, WBCQ Kennebunk ME		7415na	9330na
			17495na			
1400	1500		USA, WBOH Newport NC		5920am	
1400	1500		USA, WEWN Birmingham AL		7425na	7520na
			9355na	9955na		
1400	1500		USA, WHRA Greenbush ME		17560na	
1400	1500		USA, WHRI Noblesville IN		11670am	15105am
1400	1500		USA, WINB Red Lion PA		13570am	
1400	1500		USA, WJIE Louisville KY		7490am	13595am
1400	1500		USA, WRMI Miami FL		15725na	
1400	1500		USA, WTJC Newport NC		9370na	
1400	1500		USA, WWCR Nashville TN		7465na	9985na
			13845na	15825na		
1400	1500		USA, WWRB Manchester TN		9320na	12170na
1400	1500		USA, WYFR Okeechobee FL		6155na	11560as
			11830na	11970na	11750na	
1400	1500		Zambia, Radio Christian Voice		9865af	
1415	1430		Nepal, Radio	3230as	5005as	6100as
			7165as			
1430	1500		Australia, HCJB	15390as		
1430	1500	a	Germany, Pan American BC		15650eu	
1430	1500		Myonmor, Radio	5040do	5985do	

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

1500	1515	w s	Germany, Pan American BC		15650me	
1500	1528		Vietnam, Voice of	7285va	9840va	12020vo
1500	1530	s	Hungary, Radio Budapest		6025eu	9715eu
1500	1530		Mongolio, Voice of	12085eu		
1500	1530		Sri Lanka, SLBC	6005as	11930as	15745os
1500	1530		Turkmenistan, Turkmen Radio		5030as	
1500	1530		UK, BBC World Service		6190of	11860af
			11940af	15400af	15420af	17830af
			21470af	21490af	21660af	
1500	1557		Canada, Radio Canoda Intl		15455as	17720as
1500	1559	os	Canoda, Radio Canada Intl		9515am	13655am
			17800am			
1500	1600		Anguillo, Caribbean Beocon		11775am	
1500	1600		Australia, HCJB	15390as		
1500	1600		Australia, Radio	5995pa	6080po	7260as
			9475as 9590as	9805as	11660as	11750as
1500	1600		Australia, Voice Intl	13685as		
1500	1600		Canada, CBC Northern Service		9625do	
1500	1600		Canada, CFRX Toronto ON		6070do	
1500	1600		Canada, CFVP Calgary AB		6030do	
1500	1600		Canado, CKZN St John's NF		6160do	
1500	1600		Canodo, CKZU Vancouver BC		6160do	
1500	1600		China, China Radio Intl		7160as	9610va
			9785as 11940af	13685am	13640af	15125af
			17490vo	17650va		
1500	1600		Costa Rica, University Network		9725am	11870am
			13750am			
1500	1600		Germany, Deutsche Welle		6140eu	
1500	1600		Guam, TWR/KTWR	12105as		
1500	1600		Japan, Radio	6190as	7200am	9505as
			11730va			
1500	1600		Jordon, Rodio	11690na		
1500	1600		Myanmar, Radio	5040do	5985do	
1500	1600		New Zealand, Radio NZ Intl		6095pa	
1500	1600		North Korea, Voice of		4405eu	9335eu
			11535me	13760eu	15245om	
1500	1600		Russio, FEBA	7350as		
1500	1600		Russia, Voice of	4940me	4975me	7325me
			7390me	11500as	11985as	
1500	1600		Seychelles, FEBA	7365os		
1500	1600		Singapore, Mediacorp Radio		6150do	
1500	1600		South Africa, Channel Africa		17770af	
1500	1600		UK, BBC World Service		5975os	6195as
			7105os 9740as	12095eu	15190ca	15310as
			15485eu	15565me	17790as	
1500	1600		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
1500	1600		USA, KJES Vado NM		11715na	
1500	1600		USA, KTBN Salt Lake City UT		15590na	
1500	1600		USA, KWHR Naalehu HI		9930as	11565as
1500	1600		USA, Voice of America		6160af	7125va
			9590af 9760af	9845af	12040af	15550af
1500	1600		USA, WBCQ Kennebunk ME		7415na	9330na
			17495na			
1500	1600		USA, WBOH Newport NC		5920am	
1500	1600		USA, WEWN Birmingham AL		9955na	11530na
1500	1600		USA, WHRA Greenbush ME		17650na	
1500	1600		USA, WHRI Noblesville IN		13760am	15105am
1500	1600		USA, WINB Red Lion PA		13570am	
1500	1600		USA, WJIE Louisville KY		7490am	13595am
1500	1600		USA, WRMI Miami FL		15725na	
1500	1600		USA, WTJC Newport NC		9370na	
1500	1600		USA, WWCR Nashville TN		9475na	12160na
			13845na	15825na		
1500	1600		USA, WWRB Manchester TN		9320na	12170na
1500	1600		USA, WYFR Okeechobee FL		6280na	6155na
			11830na	17750na		
1500	1600		Zambia, Radio Christian Voice		9865af	
1505	1530	as	Austria, Radio Austria Intl		13755ca	
1515	1550		Vatican City, Vatican Radio		12065va	13765va
			15235va			
1530	1545		India, All India Radio		9910as	
1530	1600		Georgia, Radio Georgia		6180me	
1530	1600		Iran, Voice of the Islamic Rep		9635as	11650as
1530	1600		UAE, AWR Africa	15225os		
1530	1600		UK, BBC World Service		6190af	11940af
			15400af	17830af	21470af	21660af
1540	1555		Austria, Radio Austria Intl		13775ca	
1545	1600	a	Germany, Bible Voice Broadcasting			15680me
1545	1600	s	Germany, Pan American BC		15650me	
1555	1600	as	Austrio, Radio Austria Intl		13775ca	

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

1600	1615		Pakistan, Radio	11570va	11850va	15070va
			15725va			
1600	1627		Czech Rep, Rodio Prague Intl		5930eu	17485af
1600	1627		Iran, Voice of the Islamic Rep		9635as	11650as
1600	1628		Vietnam, Voice of	7220as	9550os	11630va
			13740va			
1600	1630		Guam, AWR/KSDA	15235as		
1600	1630		Jordon, Radio	11690na		
1600	1630		UK, BBC World Service		6190of	11940af
			15400af	17830af	21470af	21660af
1600	1700		Anguilla, Caribbeon Beacon		11775om	
1600	1700		Australio, Radio	5995pa	6080pa	7220as
			7260as 9475as	11660as		
1600	1700		Australia, Voice Intl	13685as		
1600	1700		Canado, CBC Northern Service		9625do	
1600	1700		Canada, CFRX Toronto ON		6070do	
1600	1700		Conada, CFVP Calgary AB		6030do	
1600	1700		Conada, CKZN St John's NF		6160do	
1600	1700		Canada, CKZU Vancouver BC		6160do	
1600	1700	DRM	China, China Radio Intl		17510va	
1600	1700		China, China Radio Intl		9440af	9570af
			9795af 11900af	11940af	11965va	13640va
			17490va	17650va		
1600	1700		Costa Rica, University Network		11870am	13750am
1600	1700		Ethiopia, Radio	5990af	7110af	7165af
			9560af 9704af	11800af		
1600	1700		France, Radio Fronce Intl		6010af	6170af
			9730af 11615af	15160af	15605af	
1600	1700	a	Germany, Bible Voice Broadcasting			15680me
1600	1700	DRM	Germany, Deutsche Welle		3980eu	4010eu
1600	1700		Germany, Deutsche Welle		6180as	7225as
			17595as			
1600	1700	a	Greece, Voice of	7475eu	9420eu	15630eu
			17705na			
1600	1700	vl	Libya, Voice of Africa		15660af	17695af
1600	1700		New Zealand, Radio NZ Intl		6095pa	
1600	1700		North Korea, Voice of		3560me	9975af
			11535me			
1600	1700		Russia, Voice of	5945me	9405as	11985af
			12055vo			
1600	1700		South Korea, Rodio Korea Intl		5975va	9870va
1600	1700		Taiwan, Radio Taiwan Intl		11550as	
1600	1700		UK, BBC World Service		3915as	5975as
			6195as 7160as	9410va	12095va	15190co
			15310as	15485eu	15565me	17790as
1600	1700		USA, AFRTS	4319usb	5446usb	5765usb
			6350usb	7507usb	10320usb	12133usb
			13362usb			
1600	1700		USA, KTBN Salt Lake City UT		15590na	
1600	1700		USA, KWHR Naalehu HI		9930as	
1600	1700		USA, Voice of America		6160va	7125va
			9700va	9760va	9850af	12080af
			13600af	15205af	15225af	15255va

			15410af 15580af	17895af	
1600	1700		USA, WBCQ Kennebunk ME	9330na	17495na
1600	1700		USA, WBOH Newport NC	5920am	
1600	1700		USA, WEWN Birmingham AL 15745va	11530va	13615va
1600	1700		USA, WHRA Greenbush ME	17650na	
1600	1700		USA, WHRI Noblesville IN	13760am	15105am
1600	1700		USA, WINB Red Lion PA	13570am	
1600	1700		USA, WJIE Louisville KY	7490am	13595am
1600	1700		USA, WMLK Bethel PA	9465eu	
1600	1700		USA, WRMI Miami FL	15725na	
1600	1700		USA, WTJC Newport NC	9370na	
1600	1700		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na
1600	1700		USA, WWRB Manchester TN	9320na	12170na
1600	1700		USA, WYFR Okeechobee FL 11830na 11865na 18980eu 21455va	6085as 15130eu 21525va	6280na 17750eu
1600	1700		Zambia, Radio Christian Voice	4965af	
1615	1630		Vatican City, Vatican Radio	15595va	
1630	1645		Turkmenistan, Turkmen Radio	4930as	
1630	1700		Egypt, Radio Cairo 9855af		
1630	1700		Guam, AWR/KSDA 11975as	15235as	
1630	1700		Slovakia, Radio Slovakia Intl	5920eu	7345eu
1630	1700		UK, BBC World Service 15400af 15420af 21660af	6190af 17830af	11940af 21470af
1630	1700	as	UK, BBC World Service	11860af	21490af
1645	1700		Tajikistan, Radio 7245irr		

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

1700	1715		Israel, Kol Israel 9435na	17535va	
1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485af
1700	1728		Vietnam, Voice of 9725au		
1700	1730		Azerbaijan, Voice of 6110me		
1700	1730		France, Radio France Intl	15605af	17605af
1700	1730	DRM	Germany, Deutsche Welle	3980eu	4010eu
1700	1745		UK, BBC World Service 6190af 9630af 15400af 21470af	3255af 15420af	6005af 17830af
1700	1750		New Zealand, Radio NZ Intl	6095pa	
1700	1759		Poland, Radio Polonia	7265eu	7285eu
1700	1800		Anguilla, Caribbean Beacon	11775am	
1700	1800		Australia, Radio 5995pa 7260as 9475as 11880as	6080pa	7220as
1700	1800		Australia, Voice Intl 13685as		
1700	1800		Canada, CBC Northern Service	9625do	
1700	1800		Canada, CFRX Toronto ON	6070do	
1700	1800		Canada, CFVP Calgary AB	6030do	
1700	1800		Canada, CKZN St John's NF	6160do	
1700	1800		Canada, CKZU Vancouver BC	6160do	
1700	1800		China, China Radio Intl 11900af 11940af 15150af	9570af 13640af	11670va 13830af
1700	1800	DRM	China, China Radio Intl	17510va	
1700	1800		Costa Rica, University Network	11870am	13750am
1700	1800		Egypt, Radio Cairo 9855af		
1700	1800		Eqt Guinea, Radio Africa	7189af	15184af
1700	1800	a	Germany, Bible Voice Broadcasting		15680me
1700	1800		Germany, Overcomer Ministries	17550na	
1700	1800		Japan, Radio 9535am	11970eu	15355af
1700	1800	vl	Libya, Voice of Africa 17695af 17880af	15660af	17635af
1700	1800		Russia, Voice of 7350as 11510af 11985af	9405eu	9890af
1700	1800	as	Russia, Voice of 11675as		
1700	1800		South Africa, Channel Africa	15265af	
1700	1800	DRM	Sweden, Radio 5955eu		
1700	1800		Taiwan, Radio Taiwan Intl	11550as	
1700	1800		UK, BBC World Service 6195as 7160as 9410eu 15310as 15485eu	3915as 9510as	5975as 12095va 15565me
1700	1800		USA, AFRTS 6350usb 7507usb 13362usb	4319usb 10320usb	5446usb 5765usb 12133usb
1700	1800		USA, KTBN Solt Lake City UT	15590na	
1700	1800		USA, KWHR Noalehu HI	9930as	
1700	1800		USA, Voice of America 7125vo 9640va 9850af 15255va 15410af	6020va 9700va 15580af	6160vo 9760va
1700	1800		USA, WBCQ Kennebunk ME	9330na	17495na
1700	1800		USA, WBOH Newport NC	5920am	
1700	1800		USA, WEWN Birminghom AL 15685va 15745va	11530va	13615va
1700	1800		USA, WHRA Greenbush ME	17650no	
1700	1800		USA, WHRI Noblesville IN	13670am	15665am
1700	1800		USA, WINB Red Lion PA	13570am	
1700	1800		USA, WJIE Louisville KY	7490am	13595am
1700	1800		USA, WMLK Bethel PA	9465eu	
1700	1800		USA, WRMI Miami FL	15725na	
1700	1800		USA, WTJC Newport NC	9370nc	
1700	1800		USA, WWCR Nashville TN 13845na 15825na	9475na	12160na
1700	1800		USA, WWRB Manchester TN	9320nc	12170na
1700	1800		USA, WYFR Okeechobee FL 21455eu	17795eu	18980eu
1700	1800		Zambia, Radio Christian Voice	4965af	
1715	1730		Vatican City, Vatican Radio 7250va 9645va	4005va	5890va 15595va
1730	1745	mtwhf	UK, United Nations Radio 17810af	7170af	15495me
1730	1800		Belgium, Radio Vlaanderen Intl	9925eu	11640eu
1730	1800		Bulgaria, Radio 9500eu	11500eu	
1730	1800		Georgia, Radio Georgia	11910eu	
1730	1800		Guam, AWR/KSDA 9385me		
1730	1800		Liberia, ELWA 4760do		
1730	1800	vl	Philippines, Radio Pilipinas 17720me	11720me	15190me
1730	1800		Swaziland, TWR 3200af	9500af	
1730	1800	mtwhfa	Sweden, Radio 6065eu		
1730	1800	mtwhf	USA, Voice of America	11975af	17895af
1730	1800		Vatican City, Vatican Radio 17515af	13765af	15570af
1735	1745	vl/th	Paraguay, Radio Nacional	9739sa	
1745	1800		Bangladesh, Bangla Betar	7185me	9550me
1745	1800		India, All India Radio 9950eu 15075af	7410eu 11620eu 15155af	9445af 11935af 13605af 17670af
1745	1800		UK, BBC World Service 15400af	3255af 15420af	6190af 17830af 21470af
1751	1800		New Zealand, Radio NZ Intl	9845pa	

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

1800	1810		Zanzibar, Voice of Tanzania	11734do	
1800	1828		Vietnam, Voice of 11630va	13740va	
1800	1830		Egypt, Radio Cairo 9855af		
1800	1830	a	Germany, Bible Voice Broadcasting		15680me
1800	1830	s	Germany, Universal Life	15675af	
1800	1830		South Africa, AWR Africa 12130af	3215af	3345af
1800	1830		UK, BBC World Service 6190af 6195eu 15310me 21470af	3255af 9410eu 15400af	5975as 9510as 12095me 15420af 17830af
1800	1850		New Zealand, Radio NZ Intl	9845pa	
1800	1856		Romania, Radio Romania Intl	11940eu	15380eu
1800	1859		Canada, Radio Canada Intl 13730af	9530af 15255as	11770af
1800	1900		Anguilla, Caribbean Beacon	11775am	
1800	1900	mtwhf	Argentina, RAE	9690eu	15345eu
1800	1900		Australia, Radio 6080pa 7260as 9475as 11880as	7220as	7240va
1800	1900		Australia, Voice Intl 6115as		
1800	1900		Canada, CBC Northern Service	9625do	
1800	1900		Canada, CFRX Toronto ON	6070do	
1800	1900		Canada, CFVP Calgary AB	6030do	
1800	1900		Canada, CKZN St John's NF	6160do	
1800	1900		Canada, CKZU Vancouver BC	6160do	
1800	1900		China, China Radio Intl 13640va 13760va	11670va 15150af	11940va
1800	1900	DRM	China, China Radio Intl	17510va	
1800	1900		Costa Rica, University Network	11870am	13750am
1800	1900		Eqt Guinea, Radio Africa	7189af	15184af
1800	1900		Germany, Overcomer Ministries	17550na	
1800	1900		Greece, Voice of 17705eu	7475eu	9420eu 15630eu
1800	1900		India, All India Radio 9950eu 15075af	7410eu 11620eu 15155af	9445af 11935af 13605af 17670af
1800	1900		Liberia, ELWA 4760do		
1800	1900	vl	Libya, Voice of Africa 17635af 17695af		15205af 15660af
1800	1900		Netherlands, Radio 6020af	9895af	11655af
1800	1900	vl	Philippines, Radio Pilipinos 17720me	11720me	15190me
1800	1900		Russia, Voice of 9890eu	9480af 11510af	9745eu 9820eu
1800	1900		Sierra Leone, Radio UNAMSIL	6137af	
1800	1900		Swaziland, TWR 3200af	9500af	
1800	1900		Taiwan, Radio Taiwan Intl	3965eu	
1800	1900		USA, AFRTS 6350usb 7507usb 13362usb	4319usb 10320usb	5446usb 5765usb 12133usb
1800	1900		USA, KJES Vado NM	15385na	
1800	1900		USA, KTBN Solt Lake City UT	15590no	
1800	1900		USA, Voice of America 9770vo 15580af	6040va 9850af 17895af	9760va 11975af 15410af

1800	1900		USA, WBCQ Kennebunk ME	9330na	17495na
1800	1900		USA, WBOH Newport NC	5920am	
1800	1900		USA, WEWN Birmingham AL	11530va	13615va
			15685va 15745va		
1800	1900		USA, WHRA Greenbush ME	17650na	
1800	1900		USA, WHRI Noblesville IN	13760am	15665am
1800	1900		USA, WINB Red Lion PA	13570am	
1800	1900		USA, WJIE Louisville KY	7490am	13595am
1800	1900		USA, WMLK Bethel PA	9465eu	
1800	1900		USA, WRMI Miami FL	15725na	
1800	1900		USA, WTJC Newport NC	9370na	
1800	1900		USA, WWCR Nashville TN	9475na	12160na
			13845na 15825na		
1800	1900		USA, WWRB Manchester TN	9320na	12170na
1800	1900		USA, WYFR Okeechabee FL	13700eu	17795eu
			18980eu		
1800	1900		Yemen, Rep of Yemen Radio	9780me	
1800	1900		Zambia, Radio Christian Voice	4965af	
1815	1900		Bangladesh, Bangla Betar	7185eu	9550eu
			15520eu		
1830	1900		Georgia, Radio Georgia	11760eu	
1830	1900		Nigeria, Voice of 7255af	15120af	
1830	1900		Serbia & Montenegro, Intl Radio	6100eu	
1830	1900		Slovakia, Radio Slovakia Intl	5920eu	6055eu
1830	1900		South Africa, AWR Africa	12130af	
1830	1900		Turkey, Voice of 9785eu		
1830	1900		UK, BBC World Service	3255af	6055af
			6190af 9630af 15400af	15420af	17820af
			21470af		
1845	1900		Congo, RTV Congolaise	4765af	5985af
1851	1900		New Zealand, Radio NZ Intl	11725pa	

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

1900	1915		Congo, RTV Congolaise	4765af	5985af
1900	1920		Turkey, Voice of 9785eu		
1900	1925		Israel, Kol Israel	11605eu	15615eu 17535eu
1900	1928		Vietnam, Voice of 11630va	13740va	
1900	1930	s	Germany, Universal Life	13820me	
1900	1930	mtwhfa	Hungary, Radio Budapest	3975eu	6025eu
			11720eu		
1900	1930	vl	Philippines, Radio Pilipinas	11720me	15190me
			17720me		
1900	1945		India, All India Radio	7410eu	9445af
			9950eu 11620eu	11935af	13605af
			13620af 15075af	15115af	17670af
1900	2000		Anguilla, Caribbean Beacon	11775am	
1900	2000		Australia, Radio 6080pa	7220as	7240va
			9500as 11650as 11880as		
1900	2000		Australia, Voice Intl 6115as		
1900	2000		Canada, CBC Northern Service	9625do	
1900	2000		Canada, CFRX Toronto ON	6070do	
1900	2000		Canada, CFVP Calgary AB	6030do	
1900	2000		Canada, CKZN St John's NF	6160do	
1900	2000		Canada, CKZU Vancouver BC	6160do	
1900	2000		Canada, Radio Canada Intl	17765am	
1900	2000		China, China Radio Intl	7145af	9430af
			9585af 11940af 13760va		
1900	2000	DRM	China, China Radio Intl	12080va	
1900	2000		Costa Rica, University Network	11870am	13750am
1900	2000		Eqt Guinea, Radio Africa	7189af	15184af
1900	2000		Germany, Deutsche Welle	13590af	15545af
			17770af		
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do
1900	2000	vl/asmtwh	Italy, IRRS 5755va		
1900	2000		Liberia, ELWA 4760do		
1900	2000	vl	Libya, Voice of Africa	15205af	15315af
1900	2000		Malaysia, Radio Malaysia	7295do	
1900	2000		Namibia, Namibian BC Corp	3270af	3290af
			6060af		
1900	2000		Netherlands, Radio 7120af	9895af	11655af
			17810af		
1900	2000	as	Netherlands, Radio 15315na	17660na	17735na
1900	2000		New Zealand, Radio NZ Intl	11725pa	
1900	2000		Nigeria, Radio/Enugu	6025do	
1900	2000		Nigeria, Radio/Ibadan	6050do	
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do
1900	2000		Nigeria, Radio/Lagos	3326do	4990do
1900	2000		Nigeria, Voice of 7255af	15120af	17800af
1900	2000		North Korea, Voice of	4405eu	11535me
			13760eu 15245eu		
1900	2000		Papua New Guinea, Cath Radio Network		4960va
1900	2000		Russia, Voice of 7310eu	7440eu	9890eu
1900	2000		Sierra Leone, Radio UNAMSIL	6137af	
1900	2000	vl	Sierra Leone, SLBS 3316do		
1900	2000	vl	Solomon Islands, SIBC	5020do	9545do
1900	2000		South Africa, Channel Africa	3345af	
1900	2000		South Korea, Radio Korea Intl	5975va	7275eu
1900	2000	a	Sri Lanka, SLBC 6010eu		
1900	2000		Swaziland, TWR 3200af		
1900	2000		Thailand, Radio 7155eu		
1900	2000	vl	Uganda, Radio 4976do	5026do	7196do
1900	2000		UK, BBC World Service	3255af	6005af
			6190af 6195eu 9410eu	9630af	12095af
			15310me 15400af	17830af	17885af
1900	2000		USA, AFRTS 4319usb	5446usb	5765usb
			6350usb 7507usb	10320usb	12133usb
			13362usb		
1900	2000		USA, KAIJ Dallas TX 13815va		
1900	2000		USA, KTBN Salt Lake City UT	15590na	
1900	2000		USA, Voice of America	4950af	6040va
			9760va 9770af	9850af	11975af
			13670af 15410va	15445af	15580af
			17895af		
1900	2000	mtwhf	USA, Voice of America	5965va	9840va
			11720va 11970va	13725va	15205va
1900	2000		USA, WBCQ Kennebunk ME	7415na	9330na
			17495na		
1900	2000		USA, WBOH Newport NC	5920am	
1900	2000		USA, WEWN Birmingham AL	11530va	13615va
			15685va 15745va		
1900	2000		USA, WHRA Greenbush ME	17650na	
1900	2000		USA, WHRI Noblesville IN	13760am	15665am
1900	2000		USA, WINB Red Lion PA	13570am	
1900	2000		USA, WJIE Louisville KY	7490am	13595am
1900	2000		USA, WMLK Bethel PA	9465eu	
1900	2000		USA, WRMI Miami FL	15725na	
1900	2000		USA, WTJC Newport NC	9370na	
1900	2000		USA, WWCR Nashville TN	9475na	12160na
			13845na 15825na		
1900	2000		USA, WYFR Okeechobee FL	6085af	7350eu
			15130eu 17750eu	17795va	17845va
			11890va		
1900	2000	vl	Vanuatu, Radio 4960do	7260do	
1900	2000		Zambia, Radio Christian Voice	4965af	
1900	2000	vl	Zimbabwe, ZBC Corp	5975do	
1915	1925		Rwanda, Radio 6005do		
1930	2000	t h	Belarus, Radio Belarus Intl	7105eu	7210eu
1930	2000		Belgium, Radio Vlaanderen Intl	9925eu	
1930	2000	vl	Georgia, Radio Georgia	11760me	
1930	2000	mtw	Germany, AWR 15175eu		
1930	2000		Iran, Voice of the Islamic Rep	9800af	11750eu
1930	2000		Papua New Guinea, NBC	4890do	
1930	2000		Sweden, Radio 6065va		
1930	2000		USA, Voice of America	7260me	9680me
			13635me		
1935	1955		Italy, RAI Intl 5970eu	9605eu	
1945	2000	mtwhfa	Albania, Radio Tirana Intl	6115eu	7210eu
1945	2000	mtwhfa	Armenia, Voice of 4810eu	9960eu	

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

2000	2027		Czech Rep, Radio Prague Intl	5930eu	11600va
2000	2027		Iran, Voice of the Islamic Rep	9800af	11750eu
2000	2030	f	Germany, Universal Life	5775va	
2000	2030	vl/asmtwh	Italy, IRRS 5775va		
2000	2030	vl	Libya, Voice of Africa	11635af	15315af
2000	2030		Mongolia, Voice of 12015eu		
2000	2030		Papua New Guinea, Cath Radio Network		4960va
2000	2030		USA, Voice of America	4950af	6040va
			6095va 9760va	9770va	9850af
			11855af 11975af	13670af	15410af
			15445af 17745af		
2000	2030		Vatican City, Vatican Radio	9660eu	11625eu
			13765eu		
2000	2030		Vietnam, Voice of 7220as	9550as	
2000	2045		Swaziland, TWR 3200af		
2000	2050		New Zealand, Radio NZ Intl	11725pa	
2000	2059		Canada, Radio Canada Intl	5850eu	7235eu
			11690af 13700eu	17870eu	
2000	2059	mtwhf	Spain, Radio Exterior Espana	9570va	15290va
2000	2100		Anguilla, Caribbean Beacon	11775am	
2000	2100		Australia, ABC NT Alice Springs	2310do	4835irr
2000	2100		Australia, ABC NT Katherine	2485do	
2000	2100		Australia, ABC NT Tennant Creek	2325do	
2000	2100		Australia, Radio 6080pa	7220as	9500as
			11650as 11880as		
2000	2100		Australia, Voice Intl 6115as		
2000	2100		Canada, CBC Northern Service	9625do	
2000	2100		Canada, CFRX Toronto ON	6070do	
2000	2100		Canada, CFVP Calgary AB	6030do	
2000	2100		Canada, CKZN St John's NF	6160do	
2000	2100		Canada, CKZU Vancouver BC	6160do	
2000	2100		Canada, Radio Canada Intl	17765am	
2000	2100		China, China Radio Intl	7145eu	9440eu
			9600eu 11640va	11940af	13630af
			13760af		
2000	2100	DRM	China, China Radio Intl	12080va	
2000	2100		Costa Rica, University Network	13750am	
2000	2100		Eqt Guinea, Radio Africa	7189af	15184af

2000	2100	DRM	Germany, Deutsche Welle	3980eu	4010eu	
2000	2100		Germany, Deutsche Welle 15205af	7130af	13820af	
2000	2100	vl	Ghana, Ghana BC Carp	3366da	4915do	
2000	2100		Indonesia, Voice of	9525as	11785as	15150ol
2000	2100		Liberia, ELWA	4760do		
2000	2100		Malaysia, Radio Malaysia	7295da		
2000	2100		Namibia, Namibian BC Carp 6060af	3270af	3290af	
2000	2100	mtwhf	Netherlands, Radio 17810af	7120af	9895af	11655af
2000	2100	as	Netherlands, Radio	15315na	17660na	17735na
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	4990da	
2000	2100		Nigeria, Voice of	7255af	15120af	17800af
2000	2100		Papua New Guinea, NBC	4890da		
2000	2100		Russia, Voice of	7310eu	11980eu	
2000	2100		Sierra Leone, Radio UNAMSIL	6137af		
2000	2100	vl	Sierra Leone, SLBS	3316do		
2000	2100	vl	Solomon Islands, SIBC	5020do	9545do	
2000	2100		South Africa, AWR Africa	7170af		
2000	2100	vl	Uganda, Radio	4976do	5026da	7196do
2000	2100		UK, BBC World Service 6190af 6195eu 15400af	9410eu	3255af 9630af 17830af	6005af 12095af
2000	2100		USA, AFRTS 6350usb 13362usb	4319usb 7507usb	5446usb 10320usb	5765usb 12133usb
2000	2100		USA, KAIJ Dallas TX	13815va		
2000	2100		USA, KTBN Salt Lake City UT	15590na		
2000	2100		USA, KWHR Naalehu HI	11565as		
2000	2100		USA, WBCQ Kennebunk ME 17495na	7415na	9330nc	
2000	2100		USA, WBOH Newport NC	5920am		
2000	2100		USA, WEWN Birmingham AL 15745va	11530va	13615va 17595va	
2000	2100		USA, WHRA Greenbush ME	17650na		
2000	2100		USA, WHRI Noblesville IN	13760am	15665am	
2000	2100		USA, WINB Red Lion PA	13570am		
2000	2100		USA, WJIE Louisville KY	7490am	13595am	
2000	2100		USA, WMLK Bethel PA	9465eu		
2000	2100		USA, WRMI Miami FL	15725na		
2000	2100		USA, WTJC Newport NC	9370na		
2000	2100		USA, WWCR Nashville TN 13845na	9475na	12160na 15825na	
2000	2100		USA, WWRB Manchester TN	9320na	12170na	
2000	2100		USA, WYFR Okeechobee FL 17750eu	7350sa 17795eu	17575eu 17845eu	18980eu
2000	2100	vl	Vanuatu, Radio	4960do	7260da	
2000	2100		Zambia, Radio Christian Voice	4965af		
2000	2100	vl	Zimbabwe, ZBC Corp	5975da		
2005	2100		Syria, Radio Damascus	12085eu	13670eu	
2025	2045		Italy, RAI Intl	6185af	9570af	11880af
2030	2045		Thailand, Radio	9680eu		
2030	2055		Vietnam, Voice of 13740va	9725va	11630va	11775va
2030	2100	t h	Belarus, Radio Belarus Intl	7105eu	7210eu	
2030	2100		Cuba, Radio Havana	9505ca	11760na	
2030	2100		Egypt, Radio Cairo	15375af		
2030	2100	vl	Libya, Voice of Africa	11635af		
2030	2100		Turkey, Voice of	7170as		
2030	2100	f	UK, Wales Radio Intl	7150eu	7325eu	
2030	2100	os	USA, Voice of America 11975af 17745af	13670af	4950af 15410af	9850af 15445af
2030	2100		USA, Voice of America	11835as		
2030	2100		Uzbekistan, Radio Tashkent Intl 11905eu	5025eu	9545eu	
2040	2100	mtwhfa	Armenia, Voice of	4810eu	9960eu	
2040	2100		Vatican City, Vatican Radio	6185eu		
2045	2100		India, All India Radio 9910au	9950au	7410eu 11620eu	9445eu 11715au
2050	2100		Vatican City, Vatican Radio 7250eu		4005eu	5890eu
2051	2200		New Zealand, Radio NZ Intl	15720pa		
2055	2100	DRM	Vatican City, Vatican Radio	9800eu		

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

2100	2115	DRM	Chino, China Radio Intl	12080va		
2100	2120		Turkey, Voice of	7170as		
2100	2130		Australia, ABC NT Katherine	2485do		
2100	2130		Australia, ABC NT Tennant Creek	2325do		
2100	2130		Australia, Radio 11650as	7220as 11880as	9500as 17715pa	9660po 21740as
2100	2130		China, China Radio Intl	11640af	13630af	
2100	2130		Cuba, Radio Havana	9505ca	11760na	
2100	2130	mtwhfa	Hungary, Radio Budapest	6025va	11830va	
2100	2130		Serbia & Montenegro, Intl Radio	6100eu		
2100	2130		South Korea, Radio Korea Intl	3955eu		
2100	2130	DRM	Vatican City, Vatican Radio	9800eu		
2100	2157	DRM	Netherlands, Radio	15150eu		
2100	2159	DRM	Canada, Radio Canada Intl	9800na		
2100	2159	as	Spain, Radio Exterior Espana	9570eu	9640eu	
2100	2200		Anguilla, Caribbean Beacon	11775am		
2100	2200		Australia, ABC NT Alice Springs	2310da	4835irr	
2100	2200		Austria, AWR Europe	15130af		
2100	2200		Bulgaria, Radio	5800eu	7500eu	
2100	2200		Canada, CBC Northern Service	9625da		
2100	2200		Canada, CFRX Toronto ON	6070do		
2100	2200		Canada, CFVP Calgary AB	6030do		
2100	2200		Canada, CKZN St John's NF	6160da		
2100	2200		Canada, CKZU Vancouver BC	6160do		
2100	2200		Costa Rica, University Network	13750am		
2100	2200		Egypt, Radio Cairo	15375af		
2100	2200		Eqt Guinea, Radio Africa	7189af	15184af	
2100	2200	DRM	Germany, Deutsche Welle	3980eu	4010eu	
2100	2200		Germany, Deutsche Welle 15205af	9440af	11865af	
2100	2200	vl	Ghana, Ghana BC Carp	3366do	4915do	
2100	2200		Guyana, Voice of	3290do	5950do	
2100	2200		India, All India Radio 9910au	9950au	7410eu 11620eu	9445eu 11715au
2100	2200		Japan, Radio 11855af	6035pa 17825pa	6055eu 21670pa	6180eu
2100	2200		Liberia, ELWA	4760do		
2100	2200		Malaysia, Radio Malaysia	7295da		
2100	2200		Namibia, Namibian BC Corp 6060af	3270af	3290af	
2100	2200		Nigeria, Radio/Enugu	6025do		
2100	2200		Nigeria, Radio/Ibadan	6050da		
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do	
2100	2200		Nigeria, Radio/Lagos	3326do	4990do	
2100	2200		Nigeria, Voice of	7255af	15120af	17800af
2100	2200		North Korea, Voice of 15245eu	4405eu	13760eu	
2100	2200		Papua New Guinea, NBC	4890do		
2100	2200		Sierra Leone, Radio UNAMSIL	6137af		
2100	2200	vl	Sierra Leone, SLBS	3316do		
2100	2200		Syria, Radio Domoscus	12085eu	13610eu	
2100	2200		UK, BBC World Service 5975ca 6195va 17830af	6005af 9410eu	3255af 6110as 12095ca	5965as 6190af 15400af
2100	2200		Ukraine, Radio Ukraine Intl	7420eu		
2100	2200		USA, AFRTS 6350usb 13362usb	4319usb 7507usb	5446usb 10320usb	5765usb 12133usb
2100	2200		USA, KAIJ Dallas TX	13815va		
2100	2200		USA, KTBN Salt Lake City UT	15590na		
2100	2200		USA, KWHR Naalehu HI	11565as		
2100	2200		USA, Voice of America 13670af	15410af	11835af 15445af	11975af
2100	2200		USA, WBCQ Kennebunk ME 9330na	17495na	5105na	7415na
2100	2200		USA, WBOH Newport NC	5920am		
2100	2200		USA, WEWN Birmingham AL 15745va	17595va	11530va	13615va
2100	2200		USA, WHRA Greenbush ME	17650na		
2100	2200		USA, WHRI Noblesville IN	13770am	15665am	
2100	2200		USA, WINB Red Lion PA	13570am		
2100	2200		USA, WJIE Louisville KY	7490am	13595am	
2100	2200		USA, WMLK Bethel PA	9465eu		
2100	2200		USA, WRMI Miami FL	15725na		
2100	2200		USA, WTJC Newport NC	9370na		
2100	2200		USA, WWCR Nashville TN 13845na	9475na	12160na 15825na	
2100	2200		USA, WWRB Manchester TN	9320na	12170na	
2100	2200		USA, WYFR Okeechobee FL 17595sa 18980va	6155sa 17795eu	7350eu 17845va	18930va
2100	2200	vl	Vanuatu, Radio	4960do	7260do	
2100	2200		Zambia, Radio Christian Voice	4965af		
2100	2200	vl	Zimbabwe, ZBC Corp	5975do		
2115	2130		UK, BBC World Service	11675ca	15390ca	
2115	2200		Egypt, Radio Cairo	9990eu		
2125	2130		Libya, Voice of Africa	11635af		
2130	2145	tf	UK, BBC World Service	11680ca		
2130	2156		Romania, Radio Romania Intl 11750eu	15285eu	7285eu	9725eu
2130	2200		Australia, ABC NT Katherine	5025do		
2130	2200		Australia, ABC NT Tennant Creek	4910da		
2130	2200		Australia, Radio 12080va	9660pa 17715po	11650as 17585pa	11880va 21740as
2130	2200		Guam, AWR/KSDA	11850as	11980as	
2130	2200		Sweden, Radio	6065va	9880va	
2130	2200		Uzbekistan, Radio Tashkent Intl 11905eu	5025eu	9545eu	

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

2200	2205		Syria, Radio Damascus	12085eu	13610eu
2200	2229		Canada, Radio Canada Intl	5960am	13785am
			15170am		
2200	2230		Belgium, Radio Vlaanderen Intl	11635na	
2200	2230	vl	Croatia, Croatian Radio	9925sa	
2200	2230		Germany, Deutsche Welle	9800na	
2200	2230		India, All India Radio	7410eu	9445eu
			9910au 9950au	11620eu	11715au
2200	2230		Liberia, ELWA 4760do		
2200	2230	smtwhf	Serbia & Montenegro, Intl Radio	7230pa	
2200	2230		USA, Voice of America	11835af	
2200	2245		Egypt, Radio Cairo 9990eu		
2200	2245		New Zealand, Radio NZ Intl	15720pa	
2200	2250		Turkey, Voice of 9830va		
2200	2257	DRM	Netherlands, Radio 15525na		
2200	2300		Anguilla, Caribbean Beacon	6090am	
2200	2300		Australia, ABC NT Alice Springs	2310do	4835irr
2200	2300		Australia, ABC NT Katherine	5025do	
2200	2300		Australia, ABC NT Tennant Creek	4910do	
2200	2300		Australia, Radio 11880va	13620pa	15320pa
			17715pa 17585pa	21740as	
2200	2300		Canada, CBC Northern Service	9625do	
2200	2300		Canada, CFRX Toronto ON	6070do	
2200	2300		Canada, CFVP Calgary AB	6030do	
2200	2300		Canada, CKZN St John's NF	6160do	
2200	2300		Canada, CKZU Vancouver BC	6160do	
2200	2300		China, China Radio Intl	9880eu	
2200	2300		Costa Rica, University Network	13750am	
2200	2300		Eqt Guinea, Radio Africa	7189af	15184af
2200	2300		Germany, Bible Voice Broadcasting		5925me
2200	2300	DRM	Germany, Deutsche Welle	3980eu	4010eu
2200	2300		Germany, Deutsche Welle	7115as	9720as
2200	2300	vl	Ghana, Ghana BC Corp	3366do	4915do
2200	2300		Guyana, Voice of 3290do		
2200	2300		Malaysia, Radio Malaysia	7295do	
2200	2300		Namibia, Namibian BC Corp	3270af	3290af
			6060af		
2200	2300		Nigeria, Radio/Enugu	6025do	
2200	2300		Nigeria, Radio/Ibadan	6050do	
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do
2200	2300		Nigeria, Radio/Lagos	3326do	4990do
2200	2300		Nigeria, Voice of 7255af	15120af	17800af
2200	2300		Papua New Guineo, NBC	4890do	
2200	2300		Sierra Leone, Radio UNAMSIL	6137af	
2200	2300	vl	Sierra Leone, SLBS 3316do		
2200	2300	vl	Solomon Islands, SIBC	5020do	9545do
2200	2300		Taiwan, Radio Taiwan Intl	15600eu	
2200	2300		UK, BBC World Service	5965as	6195va
			7105as 9605as 9740as	11955as	15400af
			17830af		
2200	2300		USA, AFRTS 4319usb	5446usb	5765usb
			6350usb 7507usb	10320usb	12133usb
			13362usb		
2200	2300		USA, KAIJ Dallos TX 13815va		
2200	2300		USA, KTBN Salt Lake City UT	15590na	
2200	2300		USA, KWHR Naolehu HI	17510as	
2200	2300		USA, Voice of America	7215va	15185va
			15290va 15305va	17740va	17820va
2200	2300		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na 17495na		
2200	2300		USA, WBOH Newport NC	5920am	
2200	2300		USA, WEWN Birmingham AL	9355no	9975af
			13615na 15745na		
2200	2300		USA, WHRA Greenbush ME	17650na	
2200	2300		USA, WHRI Noblesville IN	9495am	13770am
2200	2300		USA, WINB Red Lion PA	13570am	
2200	2300		USA, WJIE Louisville KY	7490am	13595am
2200	2300		USA, WMLK Bethel PA	15265eu	
2200	2300	mtwhf	USA, WRMI Miami FL	6870na	15725na
2200	2300	as	USA, WRMI Miami FL	9955am	
2200	2300		USA, WTJC Newport NC	9370na	
2200	2300		USA, WWCR Noshville TN	5050na	7465na
			9475na 12160na	13845na	
2200	2300		USA, WWRB Manchester TN	5050na	5085na
			6890na		
2200	2300		USA, WYFR Okeechobee FL	11740na	15695na
			15770na		
2200	2300	vl	Vanuatu, Radio 4960do	7260do	
2200	2300		Zambia, Radio Christian Voice	4965af	
2205	2230		Italy, RAI Intl 11895as		
2229	2259		Canada, Radio Canada Intl	9525as	11810as
			12035as		
2230	2257		Czech Rep, Radio Prague Intl	7345na	9415na
2230	2300	mtwhfa	Albania, Radio Tirana Intl	7130eu	
2230	2300		USA, Voice of America	11935as	
2230	2300	as	Australia, HCJB 15525as		
2245	2300		India, All India Radio	9705as	9950as
			11620as 11645as	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	4910do	
2300	0000	as	Australia, HCJB 15525as		
2300	0000		Australia, Radio 9660pa	12080va	13620as
			15320as 17585pa	17715pa	17750as
			17795as 21740as		
2300	0000		Bulgaria, Radio 9700na	11700na	
2300	0000		Canada, CBC Northern Service	9625do	
2300	0000		Canada, CFRX Toronto ON	6070do	
2300	0000		Canada, CFVP Calgary AB	6030do	
2300	0000		Canada, CKZN St John's NF	6160do	
2300	0000		Canada, CKZU Vancouver BC	6160do	
2300	0000		China, China Radio Intl	5990na	6145am
			13680ca		
2300	0000		Costa Rica, University Network	13750am	
2300	0000		Egypt, Radio Cairo 11725na		
2300	0000		Germany, Bible Voice Broadcasting		5925me
2300	0000	DRM	Germany, Deutsche Welle	3980eu	4010eu
2300	0000		Germany, Deutsche Welle	7115as	9890as
			15135as		
2300	0000	vl	Ghana, Ghana BC Corp	3366do	4915do
2300	0000		Guyana, Voice of 3290do		
2300	0000		India, All India Radio	9705as	9950as
			11620as 11645as	13605as	
2300	0000		Malaysia, Radio Malaysia	7295do	
2300	0000		Namibia, Namibian BC Corp	3270af	3290af
			6060af		
2300	0000		New Zealand, Radio NZ Intl	17675pa	
2300	0000		Papua New Guinea, NBC	4890do	
2300	0000		Sierra Leone, Radio UNAMSIL	6137af	
2300	0000	vl	Sierra Leone, SLBS 3316do		
2300	0000		Singapore, Mediacorp Radio	6150do	
2300	0000	vl	Solomon Islands, SIBC	5020do	9545do
2300	0000		USA, AFRTS 4319usb	5446usb	5765usb
			6350usb 7507usb	10320usb	12133usb
			13362usb		
2300	0000		USA, KAIJ Dallos TX 13815va		
2300	0000		USA, KTBN Salt Loke City UT	15590na	
2300	0000		USA, KWHR Naalehu HI	17510as	
2300	0000		USA, Voice of America	9725as	11965as
			12055as 13755as	15145as	
2300	0000		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
2300	0000		USA, WBOH Newport NC	5920am	
2300	0000		USA, WEWN Birmingham AL	9355na	9975af
			13615na 15745na		
2300	0000		USA, WHRA Greenbush ME	7580va	
2300	0000		USA, WHRI Noblesville IN	9495am	13770am
2300	0000		USA, WINB Red Lion PA	9320am	
2300	0000		USA, WJIE Louisville KY	7490am	13595am
2300	0000		USA, WTJC Newport NC	9370na	
2300	0000		USA, WWCR Nashville TN	5050na	5070na
			7465na 9475na	13845na	
2300	0000		USA, WWRB Manchester TN	5050na	5085na
			6890na		
2300	0000		USA, WYFR Okeechobee FL	5985va	11740na
			11855na 15255na	17750na	
2300	0000	vl	Vanuatu, Radio 4960do	7260do	
2300	0000		Zambia, Radio Christian Voice	4965af	
2300	2306		Nigeria, Radio/Lagos	3326do	
2300	2315		Cuba, Radio Havana	9550ca	
2300	2330	vl	Crootia, Croatian Radia	9925sa	
2300	2330		UK, BBC World Service	3915as	5965as
			6195as 9605as 9740as	11945as	11955as
			15280as		
2300	2330		USA, Voice of America	11935as	
2300	2356		Romania, Radio Ramania Intl	7280au	9590au
			9645au 11940au		
2300	2359		Canada, Radio Canada Intl	5960am	13785am
2305	2330		Austria, Radio Austria Intl	9870sa	
2330	0000		Lithuania, Radio Vilnius	9875na	
2330	0000		UK, BBC World Service	3915as	5965as
			6035as 6195as 9605as	9740as	11945as
			11955as 15280as		
2330	0000		USA, Voice of America	7225as	7260as
			11805as 11965as	11995as	12055as
			13725as 15145as	15205as	
2330	2358		Vietnam, Voice of 9840as	12020as	
2330	2359	DRM	Sweden, Radio 9800na		
2335	0000	as	Austria, Radio Austria Intl	9870sa	

Headnotes:

1. Reception of Deutsche Welle's 0400, 0500, 0600, 1600, 1900, 2000 and 2100 broadcasts have proven generally reliable for at least some North American listeners, so we list the programs available at these time. Consult the frequency section of the SWG for channels to try. An enhanced antenna suitable to your receiver will help in some cases.
2. **Listings for US-based independent shortwave broadcasters are limited to general interest** programming that departs from their largely primary formats of religious and political fare.
3. BBCWS stream abbreviations: (am)=Americas; (eas)=East Asia; (eaf)=East Africa; (me)=Middle East; (waf)=West Africa. During the hours when the (am) stream is unavailable, we've identified the streams and frequencies that may provide acceptable reception for some North American listeners. As with reception of DW, an enhanced antenna will often help.
4. Radio Sweden spent the summer suggesting that significant changes were in the offing for its programs and schedule in the fall. At press time (late September), no specific announcements had been made. The schedule herein is the one in effect at press time.
5. While every effort is made to ensure maximum accuracy, please note that all times are approximate and all schedules and programs are subject to change. **The editor of this program listings service welcomes corrections, updated schedules and constructive criticism. Send to: johnfigliozzi@monitoringtimes.com**

0000 UTC / 7pm E / 4pm P - Page 45 Freqs

BBC WORLD SERVICE (am)

0000 D News; 0006 S Pick of the World (BBC's best), M Documentary, T-A Outlook (magazine); 0032 M Quiz or 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 Inside Out (Pacific views); 0010 M AWAYE! (Aboriginal culture), T The Science Show, W The National Interest (Australian politics), H Background Briefing (documentary), F Hindsight (Australian history); 0045 A Ockham's Razor (science opinion).

RADIO AUSTRIA INTERNATIONAL

0005 S/M Week in Review; 0010 T-A Report from Austria; 0025 S/M Listener Letters; 0035 S/M Week in Review; 0040 T-A Report from Austria; 0055 S/M Listener Letters.

RADIO BULGARIA

0000 D News; 0010 S/M Views Behind the News, T-A Events and Developments; 0020 S Keyword Bulgaria (Bulgaria and things Bulgarian), M Folk Studio (Bulgarian folk music), T Sports, W Magazine Economy, H The Way We Live, F History Club; 0030 S Answering Your Letters, M-F Keyword Bulgaria, A Radio Bulgaria Calling (for radio hobbyists); 0040 M Walks and Talks (interesting places), T-F Timeout for Music; 0045 S/A Timeout for Music

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 at 2330]; 0030 H Dispatches (world events in Canadian 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; 0017 T-A Spain Day-by-Day (feature magazine); 0035 S Radio Waves, M Radio Club (letters), W Entremeses (food & tourism), F American Chronicles, A Food in Spain; 0040 W History Notes, F Culture Notes, A Africa Today; 0045 T-A A Language Without Bounds (Spanish lesson).

RADIO JAPAN - NHK WORLD

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

RADIO NETHERLANDS

0000 S Wide Angle (in-depth), M Europe Unzipped; T-A Newsline; 0022 S The Week Ahead (on RN), M Insight (commentary); 0030 S Amsterdam Forum (conversations), M Vox Humana (culture, T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO NEW ZEALAND INTERNATIONAL

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

WBCQ, Maine

5105 kHz.: 0000 D Radio Six International (independent/small label music).
7415 kHz.: 0000 , S The Real Amateur Radio Show, M Le Show (satire/entertainment), H Off the Hook (public telecommunications issues), F Goddess Irene I Music Show; 0030 , S Fred Flintstone Music Show, W Duhh News, F Steppin' Out of Babylon (progressive views).
9330 kHz.: 0000 M The Voice of Reason.

WHRA, Maine

7580 kHz. 0030 T-A Radio Weather.

WHRI, Indiana

9495 kHz.: 0030 S DXing with Cumbre.
13770 kHz.: 0030 S Radio Weather.

WWCR, Tennessee

9475 kHz.: 0045 S Ask WWCR.

0100 UTC / 8pm E / 5pm P - Page 45 Freqs

BBC WORLD SERVICE (am)

0100 D News; 0106 S Top of the Pops (British music charts), M Everywoman, T/H Documentaries, W Masterpiece (artistic ideas), F Assignment, A Sports International; 0132 M Westway Omnibus, T Music Feature, W White Label (new music), 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 CRI Roundup; 0130 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

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

RADIO CANADA INTERNATIONAL

0100 S/M The World This Weekend (news magazine), T-A The World at Six (domestic main evening newscast); 0130 S Madly Off in All Directions (comedy/satire), M Maple Leaf Mailbag (w/CIDX report bimonthly), T-A As It Happens (interviews w/ newsmakers).

RADIO HABANA CUBA

0100 D International News; 0110 M Weekly Review, T-S National News; 0115 T-S Viewpaint; 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 JAPAN - NHK WORLD

0100 D News; 0110 S Pop Joins the World, M-F Songs for Everyone, A Hello from Tokyo (listener contact); 0115 M-F 44 Minutes (magazine).

RADIO NETHERLANDS

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

RADIO NEW ZEALAND INTERNATIONAL

0100 D RNZ News; 0105 S Feature, M-F In Touch with New Zealand (music, interviews, variety), A Eureka (science)*; 0130 A Health Matters [or] Environment Matters*.
[*may be preempted by live sport]

RADIO PRAGUE

0100 D News; 0105 S Magazine, M Mailbox, T-A Current Affairs; 0110 S Letter from Prague, M ABC of Czech (the language), W Czech Science, A The Arts; 0115 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Business Report, A Stepping Out (Prague nightlife).

RADIO ROMANIA INTERNATIONAL

0100 D Radio Newsreel; 0110 S The Week, M Focus, T-A Commentary; 0115 S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate), A Challenge for the Future; 0120 S RRI Encyclopedia, T Political Flash, W European Horizons, A Business Update; 0125 S Roots (culture/traditions), T Business Update, W Visual Arts, F Listeners' Letterbox, A Practical Guide; 0130 S Radio Pictures, M Romanian Itineraries, H Visit Romania, A Cultural Survey; 0135 S Romanian Itineraries, M Listeners' Letterbox, T Pages of Romanian Literature, W Talking Points or Living Romania [programs alternate], H Partners in a Changing World, F Guest at the Microphone, A Over Coffee (with artists); 0140 S Romanian by Radio, M/F The Skylark (folk music), H Stage and Screen, A Off Bucharest; 0145 S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Folk Music Box; 0150 M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

RADIO SLOVAKIA INTERNATIONAL

0100 D News; 0105 S Front Page Review (Slovak press), M Weekly Newsreel T-A Topical Issue; 0110 S Various features, M Listeners' Tribune (letters, magazine, Slovak music), T Insight Central Europe, 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 Ukraine, T-A Ukraine Today (magazine); 0118 S The Whole World on the Radio Dial (DX program); 0135 S Hello From Kiev (listener letters/music), M Roots (culture & education); 0145 T-A Closeup (current issues).

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

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

WBCQ, Maine
5105 kHz.: 0100 S Jean Shepherd (stories/humor), M Firesign Theatre Hour (classic satire), A Allan Weiner Worldwide.
7415 kHz.: 0100 S The Peacock Project (1st A: Old Time Radio, 2nd: Voice of Savage Henry, 3rd: Tim Gaynor from Australia, 4th: A Different Kind of Oldies Show, 5th: The Hollow-State Hound), M Radio New York International, F Odin Lives (Norse legends), A Allan Weiner Worldwide.
9330 kHz.: 0100 M The Voice of Reason.

WHRA, Maine
7580 kHz.: 0105 S Turn Your Radio On (southern gospel music).

WHRI, Indiana
7315 kHz.: 0130 S DXing with Cumbre.

0200 UTC / 9pm E / 6pm P - Page 46 Freqs

BBC WORLD SERVICE (am)
0200 D News; 0206 S Play of the Week (radio theatre), M The Ticket (global arts survey), T Health Matters, W Go Digital, H Discovery (science), F One Planet (ecology), A Science in Action; 0232 T Quiz or panel game, W Music Review, H/A Westway, 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 Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only.]

RADIO AUSTRIA INTERNATIONAL
0205 S/M Week in Review; 0210 T-A Report from Austria; 0225 S/M Listener Letters; 0235 S/M Week in Review; 0240 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-F Hungary Today (current events magazine), A The Week; 0220 A DX Corner.

RADIO CANADA INTERNATIONAL
0200 S Global Village (world music), M Writers & Co. (books), T-A As It Happens (cont'd); 0230 H Dispatches (world events from Canadian perspective).

RADIO HABANA CUBA
0200 D International News; 0210 M From Habana (Cuban musicians), T-S National News; 0215 T-S Reports and music; 0230 M The Jazz Place or Top Tens, T-S News Bulletin; 0235 S World of Stamps, T-A Reports and music; 0250 S Cuban music.

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

RADIO NEW ZEALAND INTERNATIONAL
0200 S/A* RNZ News, M-F In Touch with New Zealand (cont'd); 0205 S RPM (documentaries)*, A Home Grown (NZ music)*; 0230 A Musical Chairs (artist spotlight)*.
[*may be preempted by live sport]

RADIO PRAGUE
0200 D News; 0205 S Magazine, M Mailbox, T-A Current Affairs; 0210 S Letter from Prague, M ABC of Czech (the language), W Czech Science, A The Arts; 0215 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Business Report, A Stepping Out (Prague nightlife).

RADIO TAIWAN INTERNATIONAL
0200 D News; 0210 S News Talk, M Taiwan Economic Journal, T Kaleidoscope (society), W On the Job, H Trends, F Politics Today, A Bookworm; 0220 S Taipei Magazine, M Discover Taiwan, T Mailbag Time, W Jade Bells & Bamboo Pipes (traditional music), H People, F Culture Express, A Stage, Screen & Studio; 0230 M Asia Pacific (from R. Australia), A Groove Zone; 0235 S Sound Postcard, H Wisdom.com, F New Music Lounge; 0240 S Hakka World (indigenous culture), T Sound Postcard; 0245 T Let's Learn Chinese, W Life Unusual (the offbeat), H Instant Noodles (the weird).
[This schedule also airs at 0700 for western North America.]

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

RADIO SWEDEN
0230 S Network Europe (Europe magazine-1st week)/ Sweden Today (2nd)/Spectrum (arts magazine-3rd)/ Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); 0245 T Sports Scan, W Close Up (profiles of Swedes-1st), F Nordic Lights (1st)/ Green Scan (ecology-2nd)/Heart Beat (health-3rd)/ The S-Files (things Swedish-4th), A Review of the Newsweek.

WBCQ, Maine
5105 kHz.: 0200 S Firesign Theatre Hour (classic satire), A Tasha Takes Control.
7415 kHz.: 0200 S Marion's Attic (vintage recordings), M Radio New York International (cont'd), T The Secular Bible Study, A Tasha Takes Control.
9330 kHz.: 0200 M World of Radio.

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

WWCR, Tennessee
5070 kHz.: 0245 S Ask WWCR.

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

0300 UTC / 10pm E / 7pm P - Page 46 Freqs

BBC WORLD SERVICE (am)
0300 S/A News, M-F The World Today; 0332 S The Interview (trends), 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 on Developing Countries; 0315 A Cutting Edge (sci/tech); 0320 S CRI Roundup; 0330 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA
0300 D News; 0305 S Australian Express (magazine), A Rural Reporter; 0310 M-F Regional Sports Report; 0320 M-F Life Matters (social issues); 0330 S Music Deli (diverse), A Australian Country Style; 0354 Heywire (young rural Australian opinion).
[Special service: 0305 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only.]

RADIO BULGARIA
0300 D News; 0310 S/M Views Behind the News, T-A Events and Developments; 0320 S Keyword Bulgaria (Bulgaria and things Bulgarian), M Folk Studio (Bulgarian folk music), T Sports, W Magazine Economy, H The Way We Live, F History Club; 0330 S Answering Your Letters, M-F Keyword Bulgaria, A Radio Bulgaria Calling (for radio hobbyists); 0340 M Walks and Talks (interesting places), T-F Timeout for Music; 0345 S/A Timeout for Music.

RADIO HABANA CUBA
0300 D International News; 0310 M Weekly Review, T-S National News; 0315 T-S Viewpoint; 0330 M Reports & Music, T-S News Bulletin; 0335 T-A Time Out (sports); 0340 S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; 0350 M Breakthrough (science report).

RADIO NEW ZEALAND INTERNATIONAL
0300 S/A* RNZ News, M-F Pacific Regional News; 0305 S Sunday Drama* (radio plays); 0308 M-F Dateline Pacific; 0330 M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent, A Home Grown* (cont'd).
[*may be preempted by live sport]

RADIO TAIWAN INTERNATIONAL
0300 D News; 0310 S News Talk, M Taiwan Economic Journal, T Kaleidoscope (society), W On the Job, H Trends, F Politics Today, A Bookworm; 0320 S Taipei Magazine, M Discover Taiwan, T Mailbag Time, W Jade Bells & Bamboo Pipes (traditional music), H People, F Culture Express, A Stage, Screen & Studio; 0330 M Asia Pacific (from R. Australia), A Groove Zone; 0335 S Sound Postcard, H Wisdom.com, F New Music Lounge; 0340 S Hakka World (indigenous culture), T Sound Postcard; 0345 T Let's Learn Chinese, W Life Unusual (the offbeat), H Instant Noodles (the weird).
[This schedule also airs at 0700 for western North America.]

VOICE OF AMERICA, Africa Service
0300 M-F Daybreak Africa (morning newsmagazine);

0330 M-F News Headlines; 0333 M-F Business Report; 0345 M-F Dateline (documentary); 0355 M-F Opinion Roundup.

VOICE OF RUSSIA
0300 D News; 0211 M Sunday Panorama, T-S News & Views; 0330 D News in Brief; 0332 S Songs from Russia, M/F Russian by Radio, T Kaleidoscope (Russian events), W Musical Portraits, H Moscow Yesterday & Today, A Audio Book Club (Russian lit.); 0346 S You Write to Moscow; 0354 S/W Russia: People & Events.

WBCQ, Maine
5105 kHz.: 0300 S Tesla's Ear, A Lost Discs Radio Show (obscure singles).
7415 kHz.: 0300 S Pan Global Wireless, M Radio New York International (cont'd), A Lost Discs Radio Show (obscure singles).

WRMI, Florida
6870/7385 kHz: 0330 S Voice of the NASB (US sw broadcasters consortium), M World of Radio.

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

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-F Hungary Today (current events magazine), A The Week; 0350 A DX Corner.

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

0400 UTC / 11pm E / 8pm P - Page 47 Freqs

BBC WORLD SERVICE (am)
0400 S World Briefing, M-A News; 0406 M Talking Point (phone-in)[taped S 1406], T-F Outlook (magazine), A Pick of the World (BBC's best); 0432 S Global Business; 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 CRI Roundup; 0430 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

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

RADIO AUSTRALIA
0400 D News; 0405 S The Europeans, A Books & Writing; 0410 M-F Bush Telegraph (rural life); 0430 S The Chat Room (interviews); 0435 A Book Talk; 0455 M-F Perspective (commentary).
[Special service: 0405 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only.]

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

RADIO NETHERLANDS
0400 S Wide Angle (in-depth), M Europe Unzipped, T-A Newsline; 0422 S The Week Ahead (on RN), M Insight (commentary); 0430 S Amsterdam Forum (conversations), M Vox Humana (culture), T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO NEW ZEALAND INTERNATIONAL
0400 S/A RNZ News; M-F Checkpoint; 0410 S Religion feature or series, A Tagata O Te Moana (Pacific magazine); 0440 S Jazz Spotlight.

RADIO PRAGUE
0400 D News; 0405 S Magazine, M Mailbox, T-A Current Affairs; 0410 S Letter from Prague, M ABC of Czech (the language), W Czech Science, A The Arts; 0415 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Paint (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Business Report, A Stepping Out (Prague nightlife).

RADIO ROMANIA INTERNATIONAL
0400 D Radio Newsreel; 0410 S The Week, M Focus, T-A Commentary; 0415 S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate), A Challenge for the Future; 0420 S RRI Encyclopedia, T Political Flash, W European Horizons, A Business Update; 0425 S Roots (culture/traditions), T Business Update, W Visual Arts, F Listeners' Letterbox, A Practical Guide; 0430 S Radio Pictures, M Romanian Itineraries, H Visit Romania, A Cultural Survey; 0435 S Romanian Itineraries, M Listeners' Letterbox, T Pages of Romanian Literature, W Talking Points or Living Romania [programs alternate], H Partners in a Changing World, F Guest at the Microphone, A Over Coffee (with artists); 0440 S Romanian by Radio, M/F The Skylark (folk music), H Stage and Screen, A Off Bucharest; 0445 S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Folk Music Box; 0450 M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

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 M-F News & Reports; 0415 M-F Focus (a topic in-depth); 0423 M-F Sports; 0430 M-F Daybreak Africa (morning newsmagazine).

VOICE OF RUSSIA
0400 D News; 0411 S Music & Musicians, M This is Russia, T Musical Portraits, W/A Moscow Mailbag, H Science Plus, F Newmarket; 0430 D News in Brief; 0432 M Moscow Calling, T/H/A The River of Time, W Guest Speaker, F Russian history/culture; 0447 W Ladies of Character.

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.

WBCQ, Maine
5105 kHz.: 0400 A Squad 51 (musical menagerie).
7415 kHz.: 0400 S Michael Ketter Show (satire/free form), M Radio New York International (cont'd).
9330 kHz.: 0400 S World of Radio, 0430 S The RMF Show (extreme lyrics).

WHRI, Indiana
7315 kHz.: 0402 S 20 The Countdown Magazine (Christian rock charts); 0430 M DXing with Cumbre.
7535 kHz.: 0400 S Powersource Top 20 (Christian rock music)

WRMI, Florida
6870/7385 kHz.: 0400 S DX Partyline (from HCJB), M Wavescan (for DXers from AWR); 0430 S/M World Radio Network.

WWCR, Tennessee
5070 kHz.: 0400 S Radio Weather; 0430 S DX Radio School.

0500 UTC / 12am E / 9pm P - Page 47 Freqs

BBC WORLD SERVICE (am)
0500 D World Briefing; 0520 D Sports Roundup; 0532 S Reporting Religion, M-F The World Today, A People & Politics.

CHANNEL AFRICA, South Africa
0500 D News; 0515 S Inner Voice (African spirituality), M Nepod Focus, T-F Africa Rise & Shine (current affairs), A 37 Degrees (health & medicine); 0540 M UN Chronicle.

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

DEUTSCHE WELLE
0500 News; 0505 S Religion & Society, M Hard to Beat (sport), T-A Newslink Africa; 0515 S German by Radio, M Inspired Minds; 0530 S Africa This Week, M Hits in Germany [or] Melody Time, T A World of Music, W Arts on the Air, H Living in Germany, F Cool (youth culture), A Focus on Folk; 0545 H Europe in Capitals.

RADIO AUSTRALIA
0500 D News; 0505 S All in the Mind (the brain), A Australian Express (magazine); 0510 M-F Pacific Beat (Pacific islands magazine w/sports @ 0530); 0530 S The Ark (religious history), A All in the Mind; 0535 M-F On the Mat (regional issues);

0549 S The Pulse (Aussie music now).
[Special service: 0505 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only.]

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

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

RADIO NEW ZEALAND INTERNATIONAL
0500 D RNZ News; 0507 S Mana Korero (Maori magazine), M-F Worldwatch & Pacific Report, A The Mix ('live' music acts); 0530 M Letter (from a global correspondent); 0545 M-F Storytime.

VOICE OF AMERICA, Africa Service
0500 M-F News & Reports; 0523 M-F Sports Report; 0530 M-F News Headlines; 0533 M-F Business Report; 0545 M-F Dateline (documentary); 0555 M-F Opinion Roundup.

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

WBCQ, Maine
7415 kHz.: 0500 S Tom & Darryl (electronic media), M-A Amos 'n Andy; 0515 T Odin Lives (old Norse myths/music); 0530 M World of Radio.

WHRI, Indiana
7315 kHz.: 0500 S 20 The Countdown Magazine (cont'd).

WRMI, Florida
6870/7385 kHz.: 0500 D World Radio Network.

WWCR, Tennessee
3210 kHz.: 0500 M Worldwide Country Radio.
5070 kHz.: 0500 S Cyberline (digital communications).

0600 UTC / 1am E / 10pm P - Page 48 Freqs

CHANNEL AFRICA, South Africa
0600 D News; 0615 S Our Heritage, M UN Chronicle, T-F Africa Rise & Shine (current affairs), A Tam Tam Express (governance in Africa).

DEUTSCHE WELLE
0600 D News; 0605 S Inside Europe, M Mailbag, T-A Newslink Africa; 0630 T Insight (international issues), W World in Progress (development), H Money Talks (business), F Living Planet (environment), A Spectrum (sci-tech); 0645 T Business German.

RADIO AUSTRALIA
0600 D News; 0605 S The Buzz (sci-tech), A Verbatim (oral histories); 0610 M-F Regional Sports Report; 0620 M Ockham's Razor (science opinion), T In Conversation (about science), W Lingua Franca (about language), H The Ark (religious history), F Inside Out (Pacific views); 0630 S Hit Mix (pop/rock), A Jazz Notes; 0635 M Hit Mix, T Music Deli (diverse world/folk),W Jazz Notes, H Australian Country Style.

[Special service: 0605 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only. (continues to 0800)]

RADIO HABANA CUBA
0600 D International News; 0610 M From Habana (Cuban musicians), T-S National News; 0615 T-S Reports and music; 0630 M The Jazz Place or Top Tens, T-S News Bulletin; 0635 S World of Stamps, T-A Reports and music; 0650 S Cuban music.

RADIO JAPAN - NHK WORLD
0600 D News; 0610 S Weekend Japanology (Japanese life), M-F Songs for Everyone, A Pop Joins the World; 0615 M-F Asian Top News (headlines from region's radio); 0625 M Japan Musicscape, T Basic Japanese for You, W Japan Music Travelogue, H Brush Up Your Japanese, F Music Beat; 0654 S Japan Music Scene.

RADIO NEW ZEALAND INTERNATIONAL
0600 D News; 0605 S One in Five (disability issues), M-F Checkpoint (repeat of 0405), A Saturday Night (variety); 0630 S The Week in Parliament.

VOICE OF AMERICA, Africa Service
0600 S/A News & Reports, M-F Daybreak Africa (morning newsmagazine); 0623 S/A Sports; 0630 S/A News Headlines; 0633 S/A Main Street (life in America).

WBCQ, Maine
7415 kHz.: 0600 S Juliet's Wild Kingdom.

WHRI, Indiana
7315/7535 kHz.: 0600 A DXing with Cumbre.

WRMI, Florida
6870/7385 kHz.: 0600 D World Radio Network.

WWCR, Tennessee
5070 kHz.: 0600 S Ken's Country Classics; 0630 S Country Crossroads, M-F Natural Health Clinic.

1100 UTC / 6am E / 3am P - Page 50 Freqs

BBC WORLD SERVICE (am)
1100 D World Briefing; 1105 M-F Caribbean Morning Report; 1110 M-F Sports Caribbean; 1115 M-F Caribbean Magazine; 1120 D British News; 1132 S Instant Guide (background), M-F World Business Report, A World Football; 1145 S-H Sports Roundup, F Football Extra.

BBC WORLD SERVICE (eas)
1100 S Play of the Week (cont'd from 1032), M-A News; 1106 M-F Outlook (magazine), A The Ticket (global arts survey); 1132 S Reporting Religion; 1145 M-F Off the Shelf (book readings).

CHINA RADIO INTERNATIONAL
1100 D Real Time Beijing (world/national/city news, business, sports, press, sci-tech, culture, show-biz, music, features); 1115 S China Beat (popular music), A China Roots (traditional music).

HCJB ECUADOR
1100 S Let My People Think, M-F Insight for Living, A Down Gilead Lane; 1130 S Renewing Your Mind, M-F Family Life Today, A Adventures in Odyssey.

RADIO AUSTRALIA
1100 D News; 1105 S Sunday Profile (current events), M-A Asia Pacific (regional current affairs); 1130 S Speaking Out (Aboriginal affairs), M Innovations (new products), T Earthbeat (environment), W Rural Reporter, H Smart Societies (social challenges), F The Chat Room (interviews), A All in the Mind (the brain).

RADIO JAPAN - NHK WORLD
1100 D News; 1110 S Hello from Tokyo (listener contact), M-F Songs for Everyone, A Pop Joins the World; 1115 M-F Asian Top News (headlines from region's radio); 1125 M Japan Musicscape, T Basic Japanese for You, W Japan Music Travelogue, H Brush Up Your Japanese, F Music Beat.

RADIO NEW ZEALAND INTERNATIONAL
1100 S/A RNZ News, M-F Pacific Regional News; 1105 S/A Forces Programme (for NZ personnel serving in PNG & E. Timor); 1108 M-F Dateline Pacific; 1130 M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.

WWCR, Tennessee
15825 kHz.: 1100 M-F Worldwide Country Radio; 1115 S Ask WWCR.
5070 kHz.: 1115 S A View from Europe; 1130 A World of Radio

1200 UTC / 7am E / 4am P - Page 50 Freqs

BBC WORLD SERVICE (am)
1200 D Newshour; 1205 M-F Caribbean Business; 1210 M-F Caribbean Morning Report 2nd Edition; 1220 M-F Caribbean Magazine; 1230 M-F Newshour (cont'd.).

BBC WORLD SERVICE (eas)
1200 D Newshour.

HCJB ECUADOR
1200 S Moody Presents, M-F Morning in the Mountains, A Hour of Decision; 1215 M-F Proclaim; 1230 S The Living Word, M-F Renewing Your Mind, A DX Partyline.

RADIO AUSTRALIA
1200 D News; 1205 S The Spirit of Things (spiritual matters), M-H Late Night Live (discussion & interviews), F Sound Quality (innovative music), A The Music Show; 1255 S The Pulse (Aussie music now).

RADIO KOREA INTERNATIONAL
1200 D News; 1210 S Korean Pop Interactive (requests), M-F News Commentary, A Worldwide Friendship (letters, DX news); 1215 M-F Seoul Calling (magazine); 1230 S Korean Pop Interactive (cont'd), M-F Seoul Calling (cont'd), A Worldwide Friendship (cont'd); 1245 M Korea Today & Tomorrow (peninsula issues), T Korean Kaleidoscope (Korean society), W Wonderful Korea (tourism), H Seoul Report (interviews).

RADIO NETHERLANDS
1100 S Wide Angle, A Europe Unzipped;; M-F Newsline; 1122 S The Week Ahead, A Insight (comment); 1130 S Vox Humana (culture), M Research File (science) T EuroQuest (Europe in context), W Weekly Documentary, H Dutch Horizons, F The Good Life (development issues), A Amsterdam Forum (conversations).

RADIO NEW ZEALAND INTERNATIONAL
1200 S-F RNZ News, A Forces Programme (cont'd.); 1205 S Sportsworld (recap magazine), M-F Late Edition.

WWCR, Tennessee
15825 kHz.: 1210 A A View from Europe.

1300 UTC / 8am E / 5am P - Page 51 Freqs

BBC WORLD SERVICE (am)
1300 D News; 1306 S From Our Own Correspondent (background), M-F Outlook (magazine), A Pick of the World (BBC's best); 1332 S In Praise of God; 1345 M-F Off the Shelf (book readings), A Write On (letters).

Shortwave Guide

BBC WORLD SERVICE (eas)
1300 D News; 1301 A In Concert (performances); 1306 S From Our Own Correspondent, M Age of Empire (America in the modern world), T Masterpiece (arts ideas), W Passport Please (national identity-1/21, 28; 2/4)/ Documentaries (2/11, 18, 25), H Assignment, F Sports International; 1332 M-F British News; 1345 S Reporting Religion, M-H Sports Roundup, F Football Extra.

CHINA RADIO INTERNATIONAL
1300 D News & Reports; 1310 S Report on Developing Countries; 1315 A Cutting Edge (sci/tech); 1320 S CRI Roundup; 1330 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA
1300 D News; 1305 S Encounter (religion in Australia), M-F The Planet (diverse music from around the world), A The Music Show (cont'd); 1355 S Perspective (commentary).

RADIO CANADA INTERNATIONAL
1300 M-F News; 1305 M-F The Current (current affairs-joined in progress).

RADIO NEW ZEALAND INTERNATIONAL
1300 S/A RNZ News, M-F Pacific Regional News; 1305 S Tagata o te Moana, A New Music Releases; 1308 M-F Dateline Pacific; 1330 M Mailbox (letters & DX news) or RNZI Talk (station info), T Tradewinds (Pacific commerce), W The World in Sport, H Pacific Correspondent, F Sports Story.

RADIO SWEDEN
1330 S In Touch with Stockholm (listener contact-1st)/ Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/ Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); 1345 M Sports Scan, T Close Up (profiles of Swedes-1st), H Nordic Lights (1st)/ Green Scan (ecology-2nd)/Heart Beat (health-3rd)/ The S-Files (things Swedish-4th), F Review of the Newsweek.

WHRI, Indiana
9495 kHz.: 1300 A Radio Weather; 1330 A DXing with Cumbre.

WRMI, Florida
15725 kHz.: 1300 S Viva Miami (magazine), M-A World Radio Network; 1330 S Voice of the NASB (US private sw consortium).

1400 UTC / 9am E / 6am P - Page 51 Freqs

BBC WORLD SERVICE (am)
1400 D News; 1406 S Talking Point (live phone-in), M/W Documentaries, T Masterpiece (arts ideas), H Assignment, F Sports International, A Sportsworld (live action); 1432 M Music Feature, T White Label (new music), W Charlie Gillett (world music), H Music Biz, F John Peel (eclectic).

BBC WORLD SERVICE (eas)
1400 S/A News, M-F World Briefing; 1406 S Talking Point (live phone-in), A Sportsworld (live action); 1420 M-F World Business Report; 1432 M-F British News; 1445 M-F Sports Roundup.

CHINA RADIO INTERNATIONAL
1400 D News & Reports; 1410 S Report on Developing Countries; 1415 A Cutting Edge (sci/tech); 1420 S CRI Roundup; 1430 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA
1400 D News; 1405 S The Science Show, M-F PM (domestic early evening newscast), A Background Briefing (documentaries); 1455 S Business Weekend, M-F Perspective (informed opinion), A Correspondent's Notebook.

RADIO CANADA INTERNATIONAL
1400 D News; 1405 S The Sunday Edition, M-F Sounds Like Canada (Canadian magazine); A The House (Canadian politics).

RADIO NEW ZEALAND INTERNATIONAL
1400 D RNZ News; 1405 D Book Reading (in installments); 1430 M Bookmarks (NZ books/ writers), T What's the Word? (NPR quiz), H For a Smile (BBC comedy), F Auckland Issues; 1440 S The Week in Parliament, W Diversions, A Nga Taonga Korero (Maori program).

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), 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 M-A World Radio Network; 1430 S World Radio Network.

WWCR Tennessee
15825 kHz.: 1400 M-F Worldwide Country Radio.

1500 UTC / 10am E / 7am P - Page 52 Freqs

BBC WORLD SERVICE (am)(eas)
1500 D News; 1506 S Documentary, M Health Matters, T Go Digital, W Discovery (science), H One Planet (ecology), F Science in Action, A Sportsworld (live action from 1406); 1532 S In Praise of God (worship service), M Quiz [or] panel game, T Music Review, W/F Westway (drama serial), H The Word (writers & writing) [exc. last Fri., World Book Club (discussion)]; 1545 W Heart & Soul (beliefs & values), F What's the Problem? (advice).

CHINA RADIO INTERNATIONAL
1500 D News & Reports; 1510 S Report on Developing Countries; 1515 A Cutting Edge (sci/tech); 1520 S CRI Roundup; 1530 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA
1500 D News; 1505 S The National Interest, M-F Asia Pacific (regional current affairs), A Smart Societies (social challenges); 1530 M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor; 1555 S Perspective (informed opinion), A Business Weekend.

RADIO CANADA INTERNATIONAL
1500 D News; 1505 S The Sunday Edition (cont'd.), M-F Sounds Like Canada (cont'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 (humor/music).

RADIO JAPAN
1500 D News, 1505 S Hello from Tokyo (letters), M-F Songs for Everyone, A Pop Joins the World; 1515 M-F Asian Top News (reports from region's radio); 1525 M Japan Musicscape, T Basic Japanese for You, W Japan Music Travelogue, H Brush Up Your Japanese, F Music Beat.

RADIO NEW ZEALAND INTERNATIONAL
1500 S/A RNZ News, M-F Pacific Regional News; 1505 S/A Forces Radio; 1508 M-F Dateline Pacific; 1530 M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.

WRMI, Florida
15725 kHz.: 1500 D World Radio Network.

1600 UTC / 11am E / 8am P - Page 52 Freqs

BBC WORLD SERVICE (am)
1600 S-F World Briefing, A News; 1606 A Sportsworld (live action from 1406); 1620 S-F British News; 1632 S World Business Review, M-F World Business Report; 1640 S The Instant Guide (background), M-F Sports Roundup; 1645 M/T/H/ F Analysis, W From Our Own Correspondent.

DEUTSCHE WELLE
1600 D News; 1605 S Mailbag, M-F Newslink Asia, A Hard to Beat (sport); 1615 A German by Radio; 1630 M Insight (international issues), T World in Progress (development), W Money Talks (business), H Living Planet (environment), F Asia This Week, A Cool! (youth culture); 1645 M Europe in Capitals (city profile).

RADIO AUSTRALIA
1600 D News; 1605 S Books & Writing, M-F Margaret Throsby (interview/music), A Hindsight (social history); 1635 S Book Talk.

RADIO AUSTRIA INTERNATIONAL
1605 S/A Week in Review; 1610 M-F Report from Austria; 1625 S/A Listener Letters; 1635 S/A Week in Review; 1640 M-F Report from Austria; 1655 S/A Listener Letters.

RADIO CANADA INTERNATIONAL
1600 D News; 1605 S The Sunday Edition (cont'd.), A Quirks & Quarks (science).

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

WHRI, Indiana
15105 kHz.: 1630 S DXing with Cumbre.
13760 kHz.: 1600 A DXing with Cumbre.

WRMI, Florida
15725 kHz.: 1600 D World Radio Network.

WWCR, Tennessee
12160 kHz.: 1600 A Golden Age of Radio.

1700 UTC / 12pm E / 9am P - Page 53 Freqs

BBC World Service (eaf) - 21470
1700 D News; 1706 D Focus on Africa; 1745 S-H Sports Roundup, F Football Extra.

BBC World Service (me) - 12095, 15565
1700 D World Briefing; 1720 D British News; 1732 S Instant Guide (backrounder), M-F World Business Report, A The Interview (trends); 1745 S-H Sports Roundup, F Football Extra.

CHANNEL AFRICA, South Africa
1700 D News; 1715 S/A Africa This Week, M-F Dateline Africa (current affairs).

RADIO AUSTRALIA
1700 D News; 1705 S Sound Quality (innovative music), M-F Australia Talks Back (phone-in), A The Spirit of Things (spiritual matters).

RADIO JAPAN - NHK WORLD
1700 D News; 1710 S Pop Joins the World, M-F Songs for Everyone, A Hello from Tokyo (listener contact); 1715 M-F 44 Minutes (feature magazine).

VOICE OF AMERICA, Africa Service
1700 S Reporters' Roundtable, M-A News; 1706 M-F Talk to America (global phone-in), A News & Reports; 1720 A Sports; 1730 S Music Time in Africa; 1733 A Press Conference USA.

VOICE OF GREECE
1700 A Hellenes Around the World (Greek popular & traditional music, letters).

ALL INDIA RADIO
1745 M Light Music, T Karnatak Instrumental Music, W Folk Songs, H-S Devotional Music.

WHRA, Maine
13760 kHz.: 1730 A Radio Weather

WRMI, Florida
15725 kHz.: 1700 S/A World Radio Network.

WWCR, Tennessee
15825 kHz.: 1700 S Latin Catholic Mass, M-F Worldwide Country Radio.

1800 UTC / 1pm E / 9am P - Page 53 Freqs

ALL INDIA RADIO
1800 D News; 1810 D Commentary; 1815 W Instrumental Music—Old Masters, H-T Hindustani Classical Vocal Music; 1830 S Sports Roundup (1st wk)/Feature (2nd)/Film Story (3rd)/Discussion (4th), M Faithfully Yours (letters), T Cultural Talk, W Book Review (1st)/Window on Science (2nd/4th)/Times & Lives (biography-3rd), H General Talk, F Focus (magazine-1st)/Horizon (literature-2nd/4th)/Music (3rd), A For Youth (1st)/Indian Classics (books-2nd)/From the Archives (3rd)/Quiz Time (4th); 1840 M DXers Corner (2nd/4th), T Film Songs of Yesteryears, W Hits from Films, H Light Karnatak Music, F Light Instrumental Music; 1850 M Film Songs, F Light Music.

BBC WORLD SERVICE (eaf) - 21470
1800 S/A News, M-F World Briefing; 1806 S From Our Own Correspondent, A The Ticket (global arts revue); 1820 M-F British News; 1832 S Global Business (trends), M/F Fast Track (African sport), T Postmark Africa (answers), W Africa Live (phone-in), H Artbeat.

BBC WORLD SERVICE (me) - 12095
1800 D News; 1806 S Pick of the World (BBC's best), M/W Documentaries, T Masterpiece (cultural ideas), H Assignment (one topic), F Sports International (magazine); 1832 M Music Feature, T White Label (new music releases), W Charlie Gillett (world music), H The Music Biz, F John Peel (electic music); 1845 S Write On (letters).

RADIO AUSTRALIA
1800 D News; 1805 S-H Pacific Beat (Pacific islands magazine), F Pacific Review, A Best of 'Late Night Live' (interviews); 1830 F Country Breakfast (rural life); 1835 M-F On the Mat (regional issues).

VOICE OF AMERICA, Africa Service
1800 S/A News & Reports, M-F Africa World Tonight; 1805 S On the Line (US foreign policy), A Our World (science magazine); 1830 S/A News Headlines, W Straight Talk Africa (continental phone-in); 1833 S/A On the Line (US foreign policy); 1855 S/A Government Editorial.

WRMI, Florida
15725 kHz.: 1800 S/A World Radio Network.

WWCR, Tennessee
15825 kHz.: 1815 H Ask WWCR; 1830 T Old Record Shop (vintage recordings).

1900 UTC / 2pm E / 9am P - Page 54 Freqs

ALL INDIA RADIO
1900 D News; 1905 D Press Review; 1910 S Women's World, M/W/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interviews-2nd/4th), H Panorama of Progress, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); 1920 S/M/W/F Film Songs, T Light Classical Music, H Light Instrumental Music, A Karnatak Classical Music; 1930 D Commentary; 1935 S/H/F Film Songs, M Karnatak Vocal Music, T Folk Songs, W/A Light Music.

BBC WORLD SERVICE (eaf) - 12095
1900 D News; 1901 A In Concert; 1906 S Top of the Pops (British music charts), M-F Focus on Africa; 1932 M-F World Business Report; 1945 MTHF Analysis, W From Our Own Correspondent.

BBC WORLD SERVICE (waf) - 15400, 17830
1900 S/A World Briefing, M-F News; 1906 M-F Focus on Africa; 1920 S/A Sports Roundup; 1932 S The Interview (trends), M-F World Business Report, A Voices from the Market (drama series); 1945 MTHF Analysis, W From Our Own Correspondent.

DEUTSCHE WELLE
1900 News; 1905 S Hard to Beat (sport), M-F Newslink Africa, A Religion & Society; 1915 S Inspired Minds, A German by Radio; 1930 S Hits in Germany [or] Melody Time, M A World of Music, T Arts on the Air, W Living in Germany, H Cool (youth culture), F Focus on Folk, A Africa This Week; 1945 W Europe in Capitals.

RADIO AUSTRALIA
1900 D News; 1905 F Rural Reporter, A Earthbeat (environment); 1910 S-H Pacific Beat (regional magazine w/Sport @ 1929); 1930 F Australian Country Style (music), A The Makers (artists & performers); 1935 M-F The Best of 'Bush Telegraph' (rural life); 1945 A Health Bits.

RADIO NETHERLANDS
1900 S Documentary, A Vox Humana (culture); 1930 S/A News; 1935 S Wide Angle (in-depth), A Europe Unzipped; 1955 S The Week Ahead (on RN), A Insight (commentary).

VOICE OF AMERICA, Africa Service
1900 S News & Reports, M-F News, A Hip Hop Connections (music); 1906 M-F Border Crossings (music—exc. *T Housecall (medical info)*); 1923 S Sports; 1930 S Music Time in Africa (part 2), M-F World of Music, A News Headlines; 1933 A Press Conference USA.

WBCQ, Maine
7415 kHz.: 1945 M-F Planet World News
9330 kHz. 1945 M-F Planet World News
17495 kHz.: 1900 M-F Old Time Radio Theatre; 1945 M Planet World News

WHRI, Indiana
15665 kHz.: 1905 S Pat Boone (variety).

WRMI, Florida
15725 kHz.: 1900 S/A World Radio Network.

WWCR,Tennessee
12160 kHz.: 1900 M-F Natural Health Clinic; 1930 M-F Stairway to Health.

2000 UTC / 3pm E / 9am P - Page 54 Freqs

BBC WORLD SERVICE (eaf)(waf) - 12095, 15400, 17830
2000 D Newshour.

DEUTSCHE WELLE
2000 D News; 2005 S Mailbag, M-F Newslink Africa, A Inside Europe; 2030 M Insight (international issues), T World in Progress (development), W Money Talks (business), H Living Planet (environment), F Spectrum (sci-tech); 2045 M Business German.

RADIO AUSTRALIA
2000 D News; 2005 F Pacific Review, A Australia All Over; 2010 S-H Pacific Beat (regional magazine w/Sport @2029), 2030 F The Buzz (technology).

RADIO CANADA INTERNATIONAL
2000 D CBC News; 2005 S Tapestry (spiritual matters), M-F Richardson's Roundup (variety), A Definitely Not the Opera (popular culture).

RADIO NETHERLANDS
2000 S Vox Humana (culture), A Amsterdam Forum (conversations); 2030 S/A News; 2035 S Wide Angle (in-depth), A Europe Unzipped; 2055 S The Week Ahead (on RN), A Insight (commentary).

VOICE OF AMERICA, Africa Service
2000 S/A Nightline Africa (weekend magazine), M-F Africa World Tonight.

ALL INDIA RADIO
2045 D Press Review; 2050 S/T Instrumental Music, M/F Folk Songs, W Light Music, H Classical Indian Vocal Music, A Regional Indian Devotional Music.

WHRI, Indiana
15665 kHz.: 2030 A DXing with Cumbre.

WRMI, Florida
15725 kHz.: 2000 S/A World Radio Network.

WWCR, Tennessee
15825 kHz.: 2000 A U.S. Presidential Radio Address/Democratic Response; 2030 W Ask WWCR.

2100 UTC / 4pm E / 1pm P - Page 55 Freqs

ALL INDIA RADIO
2100 D News; 2105 D Commentary; 2111 S Regional Film Songs, M/A Classical Indian Vocal Music, T Karnatak Vocal Music, W/H Instrumental Music, F Orchestral Music; 2120 S Sports Roundup (1st wk)/Feature (2nd)/Film Story (3rd)/Discussion (4th), M Faithfully Yours (letters), T Cultural Talk, W Radio Newsreel, H Panorama of Progress, F Focus (magazine-1st wk)/Horizon (literature-2nd/4th)/Indian Music (3rd), For Youth (1st)/Indian Classics (books-2nd)/From the Archives (3rd)/Quiz Time (4th); 2130 M DXers Corner (2nd/4th), T/W Film Songs, H Classical Half-Hour, A Old Film Songs; 2140 F Film Songs; 2145 M Film Songs; 2150 S Karnatak Vocal Music.

BBC WORLD SERVICE (am)
2100 D Newshour*.
[*Special service to the Caribbean on 5975, *11675, 15390 kHz.*: 2115 M-F Caribbean Report. Special service to the Falklands on *11680 kHz.*: 2130 T/F Calling the Falklands.]

DEUTSCHE WELLE
2100 News; 2105 S Hard to Beat (sport), M-F Newslink Africa, A Religion & Society; 2115 S Inspired Minds, A German by Radio; 2130 S Hits in Germany [or] Melody Time, M A World of Music, T Arts on the Air, W Living in Germany, H Cool (youth culture), F Focus on Folk, A Africa This Week; 2145 W Europe in Capitals.

Shortwave Guide

RADIO AUSTRALIA
2100 D News; 2105 F Verbatim (oral history), A Australia All Over; 2110 S-H AM (morning news magazine ; 2130 S Country Breakfast (rural life), M-F RNZI Pacific Dateline; 2145 A Asia Sunday.

RADIO CANADA INTERNATIONAL
2100 D CBC News; 2105 S Cross Country Checkup (national phone-in), M-F Richardson's Roundup (cont'd), A Definitely Not the Opera (cont'd).

RADIO JAPAN - NHK WORLD
2100 D News; 2110 S Pop Joins the World, M-F Songs for Everyone, A Weekend Japanology; 2115 M-F Asian Top News (headlines from region's radio); 2125 M Japan Musicscape, T Basic Japanese for You, W Japan Music Travelogue, H Brush Up Your Japanese, F Music Beat; 2154 A Japan Music Scene.

RADIO ROMANIA INTERNATIONAL
2130 D Radio Newsreel; 2140 S The Week, M Focus, T-A Commentary; 2145 S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate), A Challenge for the Future; 2150 S RRI Encyclopedia, T Political Flash, W European Horizons A Business Update.

VOICE OF AMERICA, Africa Service
2100 M-F News; 2106 M American Gold, T Roots and Branches, W Classic Rock, H Top 20, F Country Hits.

WBCQ, Maine
5105 kHz.: 2100 M-F The Voice of Reason
7415 kHz.: 2100 T The Last Roundup (classic radio).
9330 kHz.: 2100 S/A Radio Weather; 2130 S Northern Lights
17495 kHz.: 2100 M-F Radio Caroline; 2130 A World o Radio.

WHRA, Maine
17650 kHz.: 2100 F DXing with Cumbre.

WHRI, Tennessee
13760 kHz.: 2130 S DXing with Cumbre.

WRMI, Florida
15725 kHz.: 2100 A World Radio Network.

WWCR, Tennessee
15825 kHz.: 2100 M DX Radio School, H DX Partyline, F Real Radio; 2130 H World of Radio, F Ask WWCR.
12160 kHz.: 2100 S Worldwide Country Radio; 2130 A World of Radio.

2200 UTC / 5pm E / 2pm P - Page 56 Freqs

ALL INDIA RADIO
2200 D News; 2210 D Commentary; 2215 S Women's World, M/F Radio Newsreel, T Of Persons Places & Things (1st/3rd wk)/Our Guest (interview-2nd/4th), W Book Review (1st)/Window on Science (2nd/4th)/Times & Lives (biography-3rd), H General Talk, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); 2225 D Film Tune.

BBC WORLD SERVICE (am)
2200 D News; 2201 A Play of the Week; 2206 S Everywoman (magazine), M Health Matters, T Go Digital, W Discovery, H One Planet, F Science in Action; 2232 S Westway Omnibus, M Quiz or 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 Saturday AM (morning news magazine), A Music Deli (international); 2240 S-H Australia Wide (national report); 2254 A-H Perspective (commentary).

RADIO CANADA INTERNATIONAL
2200 S/A The World This Weekend, M-F The World at 6; 2230 S Maple Leaf Mailbag (w/CIDX Report fortnightly), M-F As It Happens (interviews with newsmakers), A Madly Off in All Directions (comedy/satire).

RVi, Belgium
2200 S Radio World, M-F News, A Music from Flanders; 2204 M-F Flanders Today (incl.press review, reports & 'CD of the Week'); 2208 S Tourism in Flanders; 2214 S Brussels 1043 (letters).

WBCQ, Maine
5105 kHz.: 2200 M-F Radio Caroline.
7415 kHz.: 2200 S CW Junction (country music concerts), M Jean Shepherd (stories/humor), T The Last Roundup (classic radio), F Frankie V Radio Show; 2230 H The Last Roundup, F Pab Sungenis Project.
9330 kHz.: 2230 S Science Rocks.

WHRI, Indiana
9495 kHz.: 2230 A DXing with Cumbre.

WRMI, Florida
15725 kHz.: 2200 A World Radio Network; 2230 S Voice of the NASB (consortium of US private sw broadcasters).

2300 UTC / 6pm E / 3pm P - Page 56 Freqs

BBC WORLD SERVICE (am)
2300 D The World Today; 2332 F People & Politics, A The Interview (trends).

CHINA RADIO INTERNATIONAL
2300 D News & Reports; 2310 A Report on Developing Countries; 2315 F Cutting Edge (sci/tech); 2320 A CRI Roundup; 2330 S People in the Know (China's leading personalities), M Biz China, T China Horizons (China outside Beijing), W Voices from Other Lands, H Life in China, F Listeners' Garden, A In the Spotlight (cultural magazine).

RADIO AUSTRALIA
2300 D News; 2305 F Country Breakfast (rural life), A The Europeans; 2310 S-H Asia Pacific (regional current affairs); 2330 S Verbatim (oral history), M The Europeans, T Rural Reporter, W The Arts on RA, H The Buzz (technology issues), F Hit Mix (pop/rock), A Innovations (new products).

RADIO CANADA INTERNATIONAL
2300 S/A The World This Weekend, M-F The World at 6; 2330 S Maple Leaf Mailbag (w/CIDX Report fortnightly), M-F As It Happens (interviews with newsmakers), A Madly Off in All Directions (comedy/satire).

RADIO NEW ZEALAND INTERNATIONAL
2300 F/A News, S-H Midday Report; 2312 F Focus on Politics, A The Week in Parliament; 2333 F The Sampler (latest CDs), A Spectrum (life in NZ).

RADIO PRAGUE
2330 D News; 2335 S Mailbox, M-F Current Affairs, A Insight Central Europe (regional magazine); 2340 S ABC of Czech (the language), T Czech Science, F The Arts; 2345 S Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), M Talking Point (Czech issues), T One on One (interview), W Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), H Business Report, F Stepping Out (Prague nightlife).

RADIO ROMANIA INTERNATIONAL
2300 D Radio Newsreel; 2310 S Focus, M-F Commentary, A The Week; 2315 S Sunday Studio, M Pro Memoria (history), T Business Club, W Society Today, H Cards on the Table (debate), F Challenge for the Future, A World of Culture; 2320 M Political Flash, T European Horizons, F Business Update, A RRI Encyclopedia; 2325 M Business Update, T Visual Arts, H Listeners' Letterbox, F Practical Guide, A Roots (culture/traditions); 2330 S Romanian Itineraries, W Visit Romania, F Cultural Survey, A Radio Pictures; 2335 S Listeners' Letterbox, M Pages of Romanian Literature, T Talking Points or Living Romania [programs alternate], W Partners in a Changing World, H Guest at the Microphone, F Over Coffee (with artists), A Romanian Itineraries; 2340 S/H The Skylark (folk music), W Stage and Screen, F Off Bucharest, A Romanian by Radio; 2345 M Romanian Hits, W Romanian Musicians, F Folk Music Box, A DX Mailbag; 2350 S Romanian Folk Music At Its Best, M Sports Roundup, T Athlete of the Week, W Sports Club, H Football Flash, F Sports Weekend.

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 Past to Present, W Turkey's Off the Beaten Track Sites, H The Culture Parade, F The Travel Itinerary of Anatolia, A Turkish Arts.

WBCQ, Maine
5105 kHz.: 2300 S Allan Weiner Worldwide.
7415 kHz.: 2300 M Radio Weather, W World of Radio, H Planet World News Roundup, F Pab Sungenis Project (cont'd), A Radio Timtron Worldwide; 2330 W The Music Download Scene, H Uncle Ed's Musical Memories, F Wanton Display of Control & Disruption (audio animation).
9330 kHz.: 2300 S Allan Weiner Worldwide, A The Country Music Hour.
17495 kHz.: 2300 W World of Radio.

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D'Angelo, *NASWA Flash Sheet*; *DX Listening Digest*, Anker Petersen, Adrian Sainsbury-*R. NZ Intl; DX Window;* ODXA/DX Ontario; Prime Time SW, Larry Van Horn N5FPW, MT Asst. Editor; Loyd Van Horn W4LVH, Sylva, NC; *BCL News; Cumbre DX; Hard Core DX; NASWA Journal;*

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Monitoring the HF Action Bands

One of the more common requests we have here at *MT* headquarters is, "Where can I catch military communications in the shortwave spectrum?"

Fortunately for the radio listener we do not have to search the whole HF spectrum to hear our military forces in action. If you look inside what is known as the Aeronautical Off Route sub-bands, you will find the quite a bit of action in a small amount of frequency space.

Several years ago these frequencies were reorganized with 3 kHz spacing between channels. The predominant voice mode you will see used here is upper sideband (USB). Each frequency has a primary military department (US Air Force, US Navy or US Coast Guard) which is assigned each of the frequencies, but you will find other military agencies which share these frequencies, especially from countries overseas. And, there are a few surprises, as you will see in table one.

So where in the shortwave band are these action bands? Here are the frequency ranges you need to tune through for activity. Again, most of the activity will be spaced at 3 kHz increments, but you will find some that do not conform to the standard bandplan.

AERONAUTICAL OFF ROUTE SUB-BANDS
3025.0-3155.0 kHz
3800.0-3950.0 kHz (ITU Region 1 only)
4700.0-4750.0 kHz
4750.0-4850.0 kHz (ITU Region 1 only)
5450.0-5480.0 kHz (ITU Region 1/3 only)
5680.0-5730.0 kHz
6685.0-6765.0 kHz
8965.0-9040.0 kHz
11175.0-11275.0 kHz
13200.0-13260.0 kHz
15010.0-15100.0 kHz
17970.0-18030.0 kHz
23200.0-23350.0 kHz

Some of the major military communications systems used worldwide are located in these bands. Table one lists some of these systems and more active frequencies.

So fire up that HF rig, give a twirl of your tuning knob and check out the military action bands.

❖ Frequency Changes

Milcom regular, Jack NeSmith, checks in with the following frequency changes from official records.

Fort Rucker/Knox AHP
HUB AO Hawk/Blue Springs 367.350 MHz

Tallahassee Regional
Approach Control 254.300/354.100 MHz

Twentynine Palms MCAGCC
ATIS 386.350 MHz
Ground Control 363.350 MHz

Tyndall AFB
Approach Control 119.750 MHz changed to 132.625 MHz
VHF discrete 119.350 MHz changed to 136.400 MHz

❖ FAA Spectrum Holes Found

And Jack also reports hearing activity on the following frequencies from our FAA spectrum hole list in the August 2004 edition of this column: 354.075 379.125 385.525 385.625 MHz

❖ Military Trunk Systems Update

And to conclude this month's column, here are some updates on selected military trunk radio systems from around the nation.

You will find the most comprehensive list of military trunk system information available anywhere on our new *Grove Military Frequency Directory*, 2nd edition, now available at the Grove Bookstore. And if you are monitoring a trunk system, how about sending in your updates to the Milcom column? We look forward to hearing from you.

Patuxent River Naval Warfare Aircraft Center, Maryland
System: Motorola Type II Smartnet, Motorola
System ID: 2305
Base Frequency: 406.350 MHz, Spacing: 25-kHz, Offset: 380
Frequencies: 406.350 410.150 411.325 412.050 412.750

System Talkgroups:

848	Police/Security Main
2417	Unknown user/usage
2448	Fire Department Operations/Main
2544	Fire Department TAC 1
2768	Fire Department Dispatch/Operations
2800	Johnson Controls: Lawn Care/Building Services
2923	Unknown user/usage
2928	Taxi Control
19216	Unknown user/usage
26544	Base MP
29616	Taxi/Transportation
26959	Avionics Maintenance

Randolph AFB, San Antonio, TX

One of the newest sites in the San Antonio Military trunk systems is Randolph AFB. Here are the latest details for this system.

System: Motorola ASTRO 3600 baud (APCO 25 Mixed Mode)
Base Frequency: 407.8125 MHz, Spacing: 12.5-kHz; Offset: 380
Frequencies: 407.8125 409.025 409.3125 410.5625 410.7625

System Talkgroups:

56816	Base Operations
56832	Security Forces <Channel 1>
56848	Unknown user/usage - APCO-25
56864	Fire/Crash <Channel 1>
56880	Fire/Crash <Channel 2>
56912	Outside Agency Coordination
56928	Unknown user/usage - APCO-25
57032	Air Operations/Supervisor
57168	Aircraft Maintenance Operations

Camp Bullis, San Antonio,TX

Another part of the San Antonio Military trunk system is a stand-alone site north of the city at Camp Bullis. Here are some of the latest details for that part of the system.

System: Motorola ASTRO 3600 Baud (APCO 25 Mixed Mode)
Base Frequency: 406.000 MHz, Spacing: 25-kHz; Offset: 380
Frequencies: 408.050 408.100 408.175 408.950 409.100 409.375

System Talkgroups:

16528	Bullis Range Control <Channel 1>
16560	Bullis Range Control <Channel 2>
16976	Fire Department
19024	Base Operations <Channel 1>
19056	Base Operations <Channel 2>
27344	Training Net
27408	Unknown user/usage
49296	Unknown user/usage
49312	Unknown user/usage
49328	Security Training
49344	Unknown user/usage

Fort Campbell, Kentucky

An anonymous contributor has provided this update for Fort Campbell.

System: Motorola Type II ASTRO SmartZone (APCO-25 Compliant)
Base Frequency: 406.000 MHz, Spacing: 25 kHz
Frequencies: Site 0 (East Zone) B 407.300 407.950 408.150 408.350 408.550 408.750 408.950 409.150 409.550
Site 1 (West Zone) B 406.350 406.750 407.150 407.250 409.950

System Talkgroups:

336	Ranger Base
400	Staff Duty
848	Range Control

912	Small Arms Range Control
944	Range Control
1232	Motor Pool
1328	Base Public Works
1584	Public Works/Maintenance
1808	Military Police "Eagle Base" <Channel 1>
1840	Military Police "Eagle Base" <Channel 2>
1872	Military Police "Eagle Base" <Channel 3>
1904	Military Police Base Events "Eagle Base@ <Channel 4>
1936	Military Police "Eagle Base" <Channel 5>
2000	Military Police
2032	Criminal Investigation Division (Investigators)
2160	Base EMS Dispatch
2992	Base Fire Department Dispatch
3664	Range MOC
3792	Base Taxi
3888	Cobra/Dragon Operations

Note: Fort Campbell currently consists of an analog, wideband, multi-site, secure net, SmartZone 2.0.3 system trunk system. This system supports both type I and digital encryption standards. Fort Campbell is in the process of an engineering redesign of the system to convert it to a digital, narrowband compliant system.

In a related note, the US Air Force Air Education and Training Command (AETC) has let a contract for new narrowband trunk systems at several of their major facilities. Milcom listeners near the following bases need to watch for new narrowband digital trunk activity in the 380.0-399.9 and 406.0-420.0 MHz portions of the spectrum at the following bases.

Altus AFB, Oklahoma	No frequency information yet.
Goodfellow AFB, Texas	No frequency information yet.
Lackland AFB, Texas	Will replace their current 10 channel system in operation.
Laughlin AFB, Texas	No frequency information yet.

MaxwellAFB/
Gunter Annex, Alabama
Site-1: 406.1625 407.9625 409.7125 410.7625
Site-2: 406.4125 406.8125 407.0125 407.6125
Also assigned: 406.1125 406.3625 408.7625 410.3625

Tyndall AFB, Florida Expanding to new system from current seven channel system
New Narrowband Frequencies: 406.1625/415.1625 406.3625/415.3525 406.5625/415.5625 406.9525/415.9625 407.3625/416.3525 407.7625/416.7625 408.1525/417.1625 408.5625/417.5625 408.7625/417.7625 408.9525/417.9625 409.3625/418.3625 409.7625/418.7625 410.1625/419.1625 410.5625/419.5525 410.7625/419.7625

And with that, time to close up shop for another month. Until next time, 73 and good hunting.

Table One: HF Worldwide Action Bands

Australia/New Zealand Military
3032 5687 5711 6685 6754 6760 8965 8971 8974 8977 9007 9025 9031 11178 11199 11205 11208 11217 11220 11235 11247 11250 13206 15085 18012

Belgium Air Force
3131 4727 4745 5720 6748 8971 8989 9010 11187 11211 11268 13227 13257 15010 18006 18021

Brazilian Air Force
17982

Canadian Forces
3047 3092 4703 4739 5699 5717 6694 6706 6715 6745 6754 8989 8992 9007 9010 11187 11205 11214 11232 11265 11271 13206 13257 15031 15034 17994 18000 18012

Czech Republic Air Force
6745

Danish Air Force
3149 4703 8992 11217 11244 15043

Danish Coast Guard
3053 6730

DISA Non-secure Internet Protocol Router Net (NIPR)
3068 4721 4745 5684 5708 8965 9025 11181 11199 11226 13242 17973

DISA Secure Internet Protocol Router Net (SIPR)
5702 6715 6721 8968 11199 17976

DoD Nighwatch Airborne Command Post Net
3068 3116 3134 3143 4745 5705 6715 6757 9016 11181 11229 13242 13245 15046 15094 15097 17973 18006 18024 18027

Dutch Navy
3128 5705 8971 11178

Estonian Army
3800 3803 3806 3809 3823 3900

Finnish Air Force
8992

French Air Force
4721 6688 6712 8992 13236 18012

French Navy
3038 3044 3107 4721 5708 5714 6718 6754 6760 9007

German Air Force
3107 3143 3903 4721 5687 5717 6700 6715 6730 6751 8965 9025 11217 11265 13203 13233 15073 17973 17991 18012

German Navy
3056 3116 4742 4745 5714 6727 6730 6739 9031 11205 11235 11256 13257 15031 17994

Irish Air Corps
8974

Israeli Air Force
4700

Italian Air Force
6730 8977

Italian Navy
3146 4721 4745 6688 6727 6730 6733 6748 13254

Japanese Military
6727 6751 8977 9022 11184 13209 15076 17994

Mexican Army
9025

NASA Cape Radio
3041 5711 5717 6724 6751

NATO AWACS Net
3089 3900 5690 6700 6760 8971 8980 15016 18009

Norwegian Navy
3038 4736 6685 6727

Portuguese Air Force
5687 6685 8992 9007

Russian Air Defense Forces
5696 8992

Spanish Air Force
3137 3933 5702 6715 6724 6730 8974 9001 9022 11211 11235 11262 13215 13245 15016 15073 18000 18018

Swedish Air Force
5690 8992 11202 13224 15025 18024

UK Royal Air Force
3038 3092 3095 3101 3110 3119 3125 3131 3149 3915 3930 3945 4706 4709 4718 4724 4739 4742 4745 5684 5693 5699 5702 5714 5720 6691 6697 6715 6724 6736 6739 6742 6748 6754 6757 6760 8971 8980 8983 8989 8998 9001 9010 9022 9031 9034 9037 11175 11181 11184 11205 11208 11217 11235 11241 11247 11253 11259 11268 13206 13218 13236 13248 13257 15013 15025 15031 15040 15046 15061 15064 15076 15091 17970 17979 17982 17988 18000 18009 18018 18024

UK Royal Navy
3921 4706 4718 5696 6688 6739 8977 9010

Ukrainian Navy
5726

US Air Force High Frequency Global Communications System (HF-GCS)
4715 (Discrete) 4724 4739 (Discrete) 6712 6715 (Discrete) 6739 8965 (Discrete) 8992 9016 (Discrete) 11175 11181 (Discrete) 11217 (Discrete) 11220 (Discrete) 11229 (Discrete) 11232 (Discrete) 11244 (Discrete) 11250 (Discrete) 11271 (Discrete) 13200 13218 (Discrete) 13242 (Discrete) 15016 15091 (Discrete) 15094 (Discrete) 15097 (Discrete) 17973 (Discrete) 18006 (Discrete) 18015 (Discrete) 18027 (Discrete)

US Air Force Miscellaneous
5711 6727 6730 6751 (Command Post/JStars) 8968 8989 9019 (JStars) 9022 11178 11181 (JStars) 11214 (Command Post/JStars) 11217 (Command Post) 11226 11247 13206 13212 13215 (JStars) 15091 (Command Post) 18024 18027

US Air Force Scope Command ALE Network
3137 4721 5708 6721 9025 11226 13215 15043 18003 23337

US Army National Guard
4745 6760 9025

US Army
4721 5708 6700

US Coast Guard
3122 4730 5690 5693 5696 8980 8983 11178 11184 11199 11202 13221 15088 17988

US Lockheed Radio Flight Test
5708 13212

US Navy
3050 3101 3125 4700 4739 5699 5708 5726 6691 6694 6697 6742 6748 8971 8980 8998 9004 9010 9037 11187 11205 11256 11259 13254 15025 15049 17982

US SHARES SCN
5711 11217 13242 15094

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Air Traffic Control for the Hobby Listener

Airplanes falling from the sky and smoldering piles of aluminum rubble on the ground are bad things! Air Traffic Controllers make every effort possible, in collaboration with the pilots, to keep all the aircraft separated both in the air and on the ground.

Controllers, who seek to keep planes apart and maintain orderliness in the sky and on the ground, work at different types of Air Traffic Control (ATC) facilities and have different responsibilities. To make listening to aircraft communications enjoyable, we need to understand how this works, so let's take a look.

❖ Visual Flight Rules (VFR)

A common example of a VFR flight is a private pilot taking a small plane up for a few hours on a nice day from an airport with no Control Tower. Within certain limitations, the pilot can fly around much as he pleases and does not have to communicate with Air Traffic Controllers, but he can be heard self-announcing on Unicom frequencies at uncontrolled (no Tower) airports. For more info on this, see *Monitoring Times* July 2004 – "Exploring Your Aero World."

Pilots flying VFR can optionally contact controllers for various reasons, but depending on where they are flying, it can be mandatory. If a pilot leaves from or arrives at an airport with an operating Control Tower or enters controlled airspace, such as around the larger airports, he must be in contact with an Air Traffic Controller.

A pilot flying VFR may also contact an Air Traffic Controller and request "Flight Following." Depending on the workload, the controller will provide radar surveillance to "keep an eye on" the VFR aircraft, help with navigation if needed, and offer information similar to that which is offered to IFR (Instrument Flight Rules) aircraft – such as reports of other aircraft or weather of concern in the area as seen on radar. Without Flight Following, the controller simply sees VFR aircraft on his screen, but doesn't know their intentions.

For additional info on Flight Following, see the nice thirteen-page pdf document at: **http://www.vansairforce.net/articles/FlightFollowing.pdf** .

The flat panel Secondary Surveillance Radar (SSR) / ATCRBS antenna can be seen above the primary radar antenna. Both rotate together. (Courtesy FAA)

❖ Instrument Flight Rules (IFR)

An IFR flight is far more formal in terms of its planning, since the pilot is required to file a Flight Plan in which there must be an accurate description of the intended route.

Airliners, business jets, and many military aircraft fly IFR. Actually, all flights above 18,000 feet (Flight Level one eight zero, or FL180) require an IFR clearance and an Instrument Rated pilot (additional training and certification), even when the weather is perfect. When the weather is not good, the pilot must depend upon instruments in the cockpit to a greater extent to fly the plane and must depend upon information provided by controllers via radio, as opposed to looking out the windows to visually gain that needed information.

For interesting info on the Instrument Rating that can help aircraft listeners as well, see: **http://www.pilotage.com/features/church0898.htm** . And, for more-technical VFR and IFR details, see: **http://www.ivao.org/training/tutorials/Ipack/Files/L1-VFR-IFR.htm** .

❖ What do IFR flights mean to us?

They mean that IFR aircraft must remain in contact with Air Traffic Controllers via radio for their entire flights. More importantly for us, we can follow them frequency by frequency, from before they start to taxi until they land and are again taxiing.

Of course, in reality, each listener can only follow that part of a flight that is within his reception range. But please note that you do not have to live near an airport! Aircraft can be acquired at any point during their flights and followed.

❖ Squawk Codes

As an ATC radar antenna rotates, another antenna rotates with it on the same structure. This second antenna sends out interrogation pulses that all aircraft with operational transponders receive and automatically reply to.

The primary information in the transponder's reply is the "squawk code," "beacon code," or otherwise known as the Air Traffic Control Radar Beacon System (ATCRBS) code which is assigned by ATC to each IFR flight and to VFR flights requesting Flight Following.

The pilot is asked "to squawk" the assigned code. When the ATC computer sees the transponder reply from the plane, it then updates an information "data block" that accompanies the plane as it moves across the controller's radar screen. The ATC computer also provides an enhanced "target" on the screen for each plane that is squawking. This is much easier for controllers to deal with than simply "primary returns" – unrefined "blips" on the radar screen.

A VFR flight will usually squawk 1200 so controllers will know that the plane is flying VFR. When a pilot cancels his IFR Flight Plan and continues VFR, or when proceeding VFR from a controlled airspace boundary, or when Flight Following is discontinued, you will hear, "Radar service terminated, squawk 1200."

ATC surveillance radar cannot determine an aircraft's altitude; the radar only offers azimuth and distance information. To resolve this, the barometric altimeter on the aircraft inputs the altitude information into the transponder's reply. The altitude information becomes part of the data block on the controller's screen for a given aircraft. Occasionally, you will hear a controller say: "I'm not receiving your Mode C," which means that the altitude component of transponder's reply is missing.

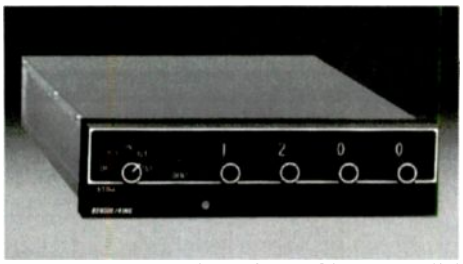
You may hear a controller say, "Squawk 2345 (or whatever code) and IDENT." This will cause the plane to stand out on a busy scope presentation so the controller can spot it quickly.

For the inquiring mind, here is some good additional transponder / squawk code info: **http://web.mit.edu/6.933/www/Fall2000/mode-s/atcrbs.html** and **http://www.airsport-corp.com/modec.htm** and **http://www.faa.gov/atpubs/ATC/Chp5/atc0502.html#5-2-1** .

❖ Handoffs

Airspace is divided up into odd-shaped, three-dimensional chunks. These are called "sectors" – some low altitude and some high altitude. Each sector has its own controller and its own VHF and UHF frequencies – in simulcast pairs. For helpful information on this subject, see *Monitoring Times* February 2004 issue – *Air Traffic Control Simulcasting*.

During the progression of an IFR flight,



KT 76A Transponder – Squawking "VFR" / 1200 (Courtesy Honeywell Bendix/King Avionics)

an aircraft will traverse numerous sectors and will communicate with many controllers on many different frequencies. When controllers pass the control of an aircraft off to the controller of the next sector, it is called a "handoff." It might sound something like, "Alaska 890, contact Oakland Center 125.85." The pilot will read back the frequency to the controller.

This read-back is very important to aircraft listeners who are following an aircraft from sector to sector. If the ground transmitter is within your reception range, you will hear the controller assigning the frequency, but if the distance is too great to hear the ground side, the listener can hear the pilot read back the frequency at far greater distances. This allows the listener to go to the next frequency along with the aircraft. Handoffs begin on the ground, so let's now follow the progression of an IFR flight.

◆ Clearance Delivery

Most large airports and military air bases have a Clearance Delivery frequency, and if you happen to live within reception range of such an airport, this is absolutely *the* starting place to pick an aircraft to follow from frequency to frequency until it's out of range.

During the fast-paced Clearance Delivery exchange, *before* the plane begins to taxi, you will hear information that is useful to you for following the aircraft on the first part of its flight. The clearances follow this general format: Aircraft identification, clearance limit, departure procedure, flight route, assigned altitude, departure frequency, and squawk code assignment. If you miss any details and you are able to monitor the aircraft on the ground, the pilot will give a read-back and you can confirm or pick them up then.

Sometimes the Clearance Delivery is conducted on the Ground Control frequency or simulcast with Ground Control. Go to **http://www.airnav.com/airport/** and enter your city or use another search to see what frequencies are listed for airports near you.

The clearance may include a published Departure Procedure which is available to both controller and pilot. A plane leaving from Sacramento International Airport may be instructed to use the "FROGO Six Departure." To see this example, go to: **http://www.naco.faa.gov/d-tpp/0408/05490FROGO.PDF** . To see Departure and Arrival procedures for other airports, go to: **http://www.naco.faa.gov/digital_tpp.asp?** and click on "Digital Terminal Procedures" under "Product."

◆ Ground Control

Ground controllers give taxi instructions to aircraft moving on the ground – as well as to vehicular traffic on the taxiways and runways. For departing aircraft, Ground Control directs planes from the gates to the runway where they are handed off to the Tower controller.

For large airports, controlling aircraft on the ground can be complex and busy. Bad weather and reduced visibility can make this a tricky process. Common frequencies for Ground Control are: 121.6, 121.7, 121.8, and 121.9, but there are others, so check any airport in question at the above AirNav link.

◆ Control Tower

Control Towers exist to keep aircraft traffic flow safe and orderly in the area of the airport. Any aircraft flying within the control area of an airport must be in contact with the Tower. On departure, the Tower directs the aircraft to the edge of its airspace where it is handed off to Departure Control.

When the Tower instructs the departing pilot to "contact Departure," he probably won't call out the departure frequency, the one you want next. That frequency will be passed on to the pilot during the Clearance Delivery phase, so take notes at that time, since large airports can have more than one departure frequency to accommodate different departure routes.

The frequency bands available to Control Towers are: 118.000-121.400, 121.600-121.925, 123.600-128.800, and 132.025-135.975 MHz.

◆ Terminal Radar Approach Control (TRACON)

In the U.S., there are 185 TRACON facilities. They are located in areas of higher aircraft traffic and airport densities and handle both departures from and arrivals to airports within the TRACON service area. Towers hand off departing IFR aircraft to Departure Control – a TRACON sector for that airport and particular departure route.

When the aircraft has climbed to near the TRACON boundary, it will then be handed off to an Air Route Traffic Control Center (ARTCC) sector controller where the aircraft begins the "en route" phase of its flight.

In the other direction, ARTCCs hand off arriving aircraft to Approach Control, a TRACON sector controller serving the Approach function – who will, in turn, hand off the aircraft to the Tower of the destination airport.

◆ Air Route Traffic Control Centers (ARTCCs)

ARTCCs (Centers), for the most part, handle IFR flights that have climbed to altitude and are on the "en route" phase of their flights. Much of this traffic is airliners, but it also includes military aircraft. ARTCCs have both high and low altitude sectors, each with its own controller. Centers control airspace up to FL (flight level) 600 and sometimes higher for certain military high altitude aircraft like the U-2.

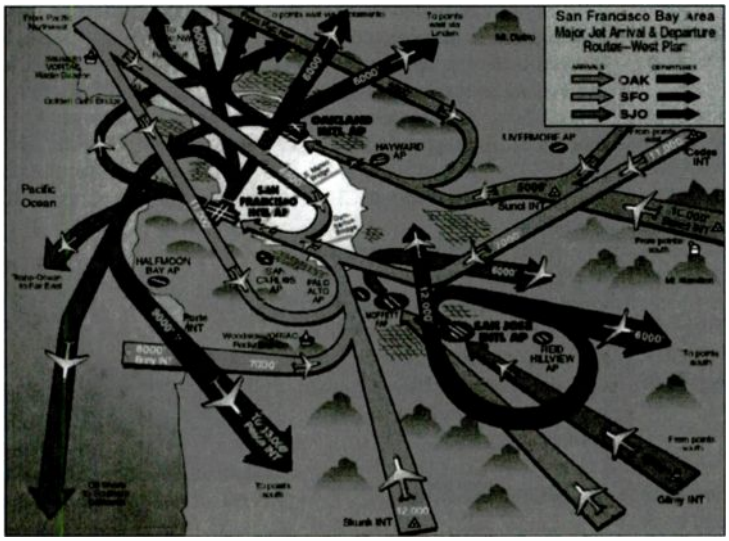
The site, **http://microvoltradio.com/ARTCC/ARTCC.htm** shows a map of the ARTCCs in the contiguous United States along with frequency lists for each. ARTCCs have both names and three-letter identifiers (sometimes preceded by a "K"). The following interactive map may be of interest as well: **http://tfr.faa.gov/tfr/jsp/tfrmap.jsp** .

The ARTCC controllers try not only to keep the planes from crashing into each other by maintaining vertical and horizontal separation, but try to sequence them for TRACONs so they will arrive in a manageable and uniform pace for the Tower controllers at busy airports. You may hear something like, "American 580, reduce speed to 260 knots for spacing."

◆ Recapping an IFR Flight Sequence

The first communication from a departing aircraft is with Clearance Delivery (sometimes carried out on Ground Control); then to Ground Control for taxiing to near the takeoff position; then to the Tower for taxiing into position, takeoff, and departure to the edge of the airport's airspace; then to Departure Control (a TRACON function); and finally to an ARTCC sector. From there, it's sector to sector and Center to Center.

When nearing the destination airport, the aircraft begins its descent and is handed off from Center to the appropriate TRACON Approach Control sector, then to Tower, and finally to Ground Control. Every step along the way is a different frequency. So set yourself a challenge to see how far you can track and monitor flights.



San Francisco Bay Area Major Jet Arrival and Departure Routes (Courtesy FAA)

Doug Smith, W9WI
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Reading Material

There are two new National Radio Club publications out this month, and a member of the International Radio Club of America offers a free download of a valuable publication for West Coast DXers.

❖ AM Radio Log

The NRC's annual *AM Radio Log* is out again. As always, this is an invaluable reference for the AM Dxer. It contains all the technical information available on online sources like **http://www.fcc.gov**. It also contains a variety of information *not* easily available online. Station mailing addresses (necessary if you want that QSL!), phone numbers, slogans, and programming formats are listed. This year's *Log* contains a new section, listing stations broadcasting in AM Stereo. (I fear this will be a short-lived feature... in a few years there likely will be no more stereo stations to list...)

The *AM Radio Log* is $25.95 in the U.S., cheaper if you're a NRC member. You can order with a check to NRC Publications Center, P.O. Box 164, Mannsville NY 13661-0164; or by PayPal at **http://www.nrcdxas.org** (A great site to visit even if you aren't looking to buy anything!)

❖ Pacific Asian Log

West Coast listeners can occasionally hear foreign stations. Hawaii, Australia, Japan, eastern Russia, Korea are all possible. With a large antenna, more exotic countries can be heard.. Identifying what you're hearing, on the other hand, can be a serious problem! The *World Radio-TV Handbook* has not proven particularly accurate for medium-wave stations, and most of these countries don't have online databases.

Bruce Portzer has compiled the "Pacific Asian Log" (PAL). It's a 123-page publication listing nearly 4,000 stations in Asia and the Pacific Ocean. Listings include frequency, station name, location, power, and language. DXing stations in unfamiliar languages can be a problem; the PAL addresses this problem by listing shortwave simulcasts of many Asian AM stations.

Best of all, this publication is free! There are two .pdf files available – one sorted by country, the other by frequency – on **http://www.qsl.net/n7ecj**.

❖ Antenna Reference

Finally, a second NRC publication is the *Antenna Reference Manual*. This 123-page book provides how-to information on a number of interesting AM DX antennas including the pennant and flag designs; information on phasing antennas to achieve adjustable nulls; and preamplifier designs for use with small AM receiving antennas. The *Manual* is $16.95 from the same address as the NRC Log.

❖ Bye Bye, Licenses, Part 3

Last month, I reported the "unrenewal" of the license of CHOI-98.1 Quebec City. After repeated complaints of abusive broadcasts, the Canadian Radio-television and Telecommunications Commission (CRTC) refused to renew CHOI's license. This license was to expire at the end of August.

CHOI has received a temporary reprieve. A Federal Court of Appeal has ruled that the station can continue operating until March, when they expect to decide whether to overturn the CRTC's decision. CHOI officials believe the court's final decision may take much longer (as much as a year) and additional temporary reprieves may be necessary. Many Canadians, including leaders of both opposition parties, felt the CRTC's move was too heavy-handed. CHOI would be the first Canadian broadcast station to lose its license because of the content of their spoken-word programming.

❖ Temporary renewal

Another Canadian station has received a short-term renewal. Nobody's complained about the programming on CHEV-1610. (Not likely, as DXers haven't reported even *hearing* the station in quite some time!) But their operation is that of a "...low-power undertaking..." which "...is authorized on an unprotected basis..." CHEV is a 99-watt station authorized to broadcast at various special events around Toronto.

In April 2003, a new ethnic station was authorized in Toronto on 1610. The new station is a protected service, authorized for 1,000 watts day and night. It will displace CHEV from the 1610 channel.

CHEV's license has been renewed for five years, with the condition that the station will have to cease broadcasting when the new ethnic station begins operation, and will be required to seek permission to move to another frequency.

❖ More IBOC

Last month, I also reported Clear Channel has laid plans to phase in IBOC digital broadcasting at many of their stations. This month, Patrick Griffith reports one of his locals *dropping* digital operation. Patrick received a QSL from KNRC-1150 Englewood, Colorado, for their first day with a new (independent rock) format. The letter notes KNRC operated with IBOC for the grand total of *five days* before turning it off. There was too much interference to KJJD-1170 in Windsor. Incidentially, if you receive KNRC-1150, you can get a QSL from Rodger Tighe, 1201 18th St., Suite 250, Denver, Colorado 80202.

❖ Interesting format in Colorado

Another one of Patrick's locals is planning an interesting format change. It's no secret that most talk radio on the air these days comes from a right-of-center political viewpoint. A few American cities are still hotbeds of left-of-center political thought, though – Cambridge, Massachusetts; Madison, Wisconsin; Boulder, Colorado; and Berkeley, California, are all widely associated with "alternative" politics. Many of these cities are also home to non-commercial "community" radio stations – like WORT, KGNU, and KPFB – which reflect these values. To date, these "community" stations have all been FM.

KGNU-88.5 is located in Boulder, Colorado. This is close enough to Denver for Denver citizens to be aware of it – but too far for the station's 1,300-watt signal (and short tower) to reach. KGNU officials say Denver residents have been asking for years for KGNU to find a way to improve its signal in the capital. The crowded FM dial has prevented any move.

Now, KGNU has found a way. They've purchased former Spanish-language AM outlet KJME-1390 for $4.1million. In late August, the Denver AM station began simulcasting KGNU's Boulder FM signal. KGNU's format of left-of-center politics and unusual music will really stand out on the AM dial!

KGHL-790 Billings, Montana, is one of the Treasure State's most commonly-logged stations.

'Til next month

We're getting into the heart of the DX season. If you haven't overhauled your antenna, updated your reference material, and dug out your logbook, it's time to get cracking! Heard anything interesting? 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

George Zeller
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Radio Moshiach and Redemption on Web

Veteran DXer Harry Helms sends in word that the orthodox Jewish **Radio Moshiach and Redemption** has posted a web site. The station's URL is *http://www.radiomoshiach.org/* on the internet. This one appears to be the medium wave pirate often misidentified by pirate DXers as **Lubavitcher Radio**.

The station lists both a postal address and an e-mail address on their web site. They say that they have plans for shortwave broadcasts, assuming that they can raise $1 million. Their web site contains streaming audio, so if you can't hear them on AM medium wave, you can now tune them in via the internet. If you hear them, the address for reception reports is Radio Moshiach and Redemption, 383 Kingston Avenue, Suite 94, Brooklyn NY 11213. If you prefer e-mail, then you should use *radiomoshiach@erols.com* to contact them. Either of these addresses would be worth a try if you hear the alleged "Lubavitcher Radio" around 1710 kHz.

Meanwhile, Larry Magne of *Passport to World Band Radio* points out that the FCC has denied the appeal filed by Rev. Yvon Louis of Calvary Tabernacle in Brooklyn, NY, another alleged Brooklyn pirate. Louis was fined $10,000 for operating on 93.7 MHz FM with a "part 15" transmitter that exceeded allowable power limits, according to the FCC. The FCC denied Louis' appeal and gave him 30 days to pay.

Voice of National Salvation Gone

Several DX sources, including Brend Ttrutenau in *DXplorer*, have noted that the former clandestine **Voice of Salvation** beamed from North Korea to South Korea has disappeared. The former transmitters utilized by this clandestine station now carry regular North Korean international broadcasting. The clandestine formerly was a prolific distributor of propaganda newsletters to DXers who contacted the station with reception reports.

Minivan Radio

Not all political clandestine shortwave stations have left the air. During the late summer there was considerable interest in a new clandestine that beams its programming to the Maldives Islands. **Minivan Radio,** using an identification of "Mee Dhivehi Minivan Radio," started broadcasting from a European relay on 11525 kHz for about an hour before 1730 UTC. The ID translates as Maldives Independent Radio, and has nothing to do with minivan automobiles.

The broadcasts are being widely heard in North America, despite the fact that the Maldives Islands are the target area. Most speculation, including that from the BBC Monitoring Service, suggests that the relay transmitter was initially located in Bulgaria, but the station appears to have shifted its relay to the Jülich, Germany, transmitter site. Programming is in the Dhivehi language.

The frequency from Germany is now 13855 kHz, normally during a time slot around 1630 UTC similar to what they used from Bulgaria. The station has announced plans to also use 9985 and 11535 kHz at times, but we had no loggings of those frequencies this month by *MT* readers.

The station maintains a web site, with the *http://www.friendsofmaldives.co.uk* URL. That site also announces an e-mail address of *admin@friendsofmaldives.co.uk* for reception reports. According to on-air announcements they have a transmitter broker arrangement through **Radio Miami International.**

Sudan

Another relatively new clandestine in a prominent world hot spot is the **Voice of Sudan,** using 7999 kHz for a half hour at 1530 UTC. BBCMS speculates that the transmitter for this one may be in Eritrea.

Clandestine Web Sites

Given the importance of the new clandestine radio activity that we report this month, it is a good time for a reminder of the excellent Clandestine Radio Com web site at *http://www.clandestineradio.com/* This web site endured a bout of reconstruction during the summer, so *MT* readers interested in Martin Schoech's excellent Clandestine Radio Watch newsletter, may also wish to check that newsletter at Martin's direct URL of *http://www.schoechi.de/crw.html*

Not all unlicensed broadcasting web sites are from clandestine stations. Europirate **Radio Nova** informs *MT* that their *http://www.listentoradionova.com* internet web site has also been updated. When you get there, you will find a QSL gallery including their current QSL that we see here, as well as other QSL designs from the station's past history.

What We Are Hearing

Monitoring Times readers heard only a dozen North American shortwave pirate broadcasters this month. Pirate radio stations use sporadic schedules, but shortwave pirate broadcasting increases noticeably on weekends and during major holiday periods. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but the primary North American pirate frequency of 6925 kHz, plus or minus 30 or 40 kHz remains the best place to scan for the pirates. More than 90% of all North American shortwave pirate broadcasts are heard on or near 6925 kHz.

Captain Morgan- With a slogan of "you're in the pirate zone," the Captain's rock music is continually heard. (None, says to send reports to ACE, and has QSLed lately)

Crazy Wave Radio- This Europirate has been sending out QSLs via their European maildrop. Operations are usually around 6275 kHz. (Eisenach)

Grasscutter Radio- They still play rock music during their shows, which often are followed by attempts at two-way QSO communications with other pirates. (Uses *grasscutterradio@yahoo.com* e-mail)

KIPM- Alan Maxwell produces the most complex drama programming on shortwave radio today. (Elkhorn)

Radio First Termer- This old documentary about psychedelic radio voices in Viet Nam during the war is still appearing via an unknown relay on the pirate bands. They promise risqué QSLs, but none have arrived in DXers' mailboxes. (None)

Radio Free Speech- Bill O. Rights programs rock music, pirate radio commentary, and strong advocacy for individual rights. He offers a free copy of the USA constitution with QSLs. (Belfast)

Sunshine Radio- The announcer on this rock music pirate is apparently a young boy with a southern accent. Sometimes he comments on the weather. (None, but some replies have resulted via the *grasscutterradio@yahoo.com* e-mail address)

Undercover Radio- Dr. Benway still usually blends rock music with pirate radio humor. (Merlin)

WBNY- Commander Bunny of the Rodent Revolution is back on the air with a new series of programs discussing modern pirate radio operators. But, he seldom gives identifications as such. (none)

continued on page 73

SATELLITE SERVICES

MT TRANSPONDER GUIDE *www.monitoringtimes.com/mtssg.html*

All Frequencies MHz

Robert Smathers
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SES Americom Americom-1

C-Band - 103 degrees West longitude

1(H)	3720	Data Transmissions
2(V)	3740	SES Americom (digital)
		Deutsche Welle TV
		Deutsche Welle Radio 1 (German)
		Deutsche Welle Radio 2 (English)
		Deutsche Welle Radio 7 (French and other languages)
		La Cadena de Milagro
		Sports Max
		XY.TV
		SES Demo
3(H)	3760	Public Broadcasting Service (PBS) (digital)
4(V)	3780	RNC Fox Sports Net (digital)
		Fox Sports Net Ohio
		Fox Sports Net Chicago
		Fox Sports Net New England
		Fox Sports Net Florida
		Fox Sports Net Alternates
5(H)	3800	Globecast TV (digital)
		Gol TV
		Wizebuys TV
		KBEH-TV 63 Oxnard, CA – Spanish-language variety
		German TV
		The X Channel
		Gem and Jewelry Network
		Latin Broadcasting Corp. radio
		WACC-AM Miami – Radio Paz
		Deutsche Welle Radio
		La Gran Cadena radio
6(V)	3820	WNBC-TV New York – Primetime 24 NBC affiliate (VC2+)
7(H)	3840	PAX Television (digital)
		PAX Television – East
		PAX Television – Mountain
		PAX Television – Pacific
		The Worship Network
		Praise TV
		Faith Television
8(V)	3860	In-Demand PPV (digital)
9(H)	3880	Occasional video
10(V)	3900	WKRN-TV Nashville, TN – Primetime 24 ABC affiliate (VC2+)
11(H)	3920	Univision feeds (digital)
12(V)	3940	Wisdom Television, Wisdom Radio (digital)
13(H)	3960	In-Demand PPV (digital)
14(V)	3980	In-Demand PPV (digital)
15(H)	4000	Total Living Network (digital)
		WCFC-TV 51 Rockford, IL – TLN affiliate
		KEEN-TV 17 North Las Vegas, NV – TLN affiliate
		KTLN-TV 68 Novato/San Francisco, CA – TLN affiliate
		WCLF-TV 22 Tampa Bay, FL – Christian Television Network (digital)
16(V)	4020	Occasional video
17(H)	4040	TuTV (digital)
18(V)	4060	RNC Fox Sports Net (digital)
		Fox Sports Net New York
		Fox Sports Net Bay Area
		MSG Network
		Fox Sports Net
		Fox Sports Net Alternates
19(H)	4080	Direct-to-Sailor Network (digital) / Liberty Channel (digital) / Data Transmissions
20(V)	4100	Occasional video
21(H)	4120	Telefutura (digital)
22(V)	4140	WSEE-TV Erie, PA – Primetime 24 CBS affiliate (VC2+)
23(H)	4160	Occasional video
24(V)	4180	Occasional video

SES Americom Americom-1

Ku-Band - 103 degrees West longitude

1(H)	11720	Data Transmissions
2(V)	11740	Data Transmissions
3(H)	11760	NBC Network (digital)
4(V)	11780	Data Transmissions
5(H)	11800	Data Transmissions
6(V)	11820	Data Transmissions
7(H)	11840	NBC Network (digital)
8(V)	11860	Data Transmissions
9(H)	11880	NBC Network (digital)
10(V)	11900	Data Transmissions
11(H)	11920	Data Transmissions
12(V)	11940	Microspace Velocity; WCPE-FM 89.7, Raleigh, NC – The Classical Station (digital)
13(H)	11960	Data Transmissions
14(V)	11980	Data Transmissions
15(H)	12000	NBC Network (digital)
16(V)	12020	Data Transmissions
17(H)	12040	NBC Satellite Newsgathering feeds (digital)
18(V)	12060	Data Transmissions
19(H)	12080	NBC Satellite Newsgathering feeds (digital)
20(V)	12100	Pentagon Channel (digital)
21(H)	12120	NBC Satellite Newsgathering feeds (digital)
22(V)	12140	Microspace Velocity (digital)
23(H)	12160	NBC Satellite Newsgathering feeds (digital)
24(V)	12180	FedEx Business Television (digital)

SES Americom Americom-2

C-Band - 105 degrees West longitude
(C-band Portion is turned off per FCC rulemaking)
SES Americom Americom-2
Ku-Band – 105 degrees West longitude

1(V)	11720	DISH Network Local Ch. (dig.)
2(H)	11740	DISH Network Local Ch. (dig.)
3(V)	11760	DISH Network Local Ch. (dig.)
4(H)	11780	DISH Network Local Ch. (dig.)
5(V)	11800	DISH Network Local Ch. (dig.)
6(H)	11820	DISH Network Local Ch. (dig.)
7(V)	11840	DISH Network Local Ch. (dig.)
8(H)	11860	DISH Network Local Ch. (dig.)
9(V)	11880	DISH Network Local Ch. (dig.)
10(H)	11900	DISH Network Local Ch. (dig.)
11(V)	11920	DISH Network Local Ch. (dig.)
12(H)	11940	DISH Network Local Ch. (dig.)
13(V)	11960	DISH Network Local Ch. (dig.)
14(H)	11980	DISH Network Local Ch. (dig.)
15(V)	12000	DISH Network Local Ch. (dig.)
16(H)	12020	DISH Network Local Ch. (dig.)
17(V)	12040	DISH Network Local Ch. (dig.)
18(H)	12060	DISH Network Local Ch. (dig.)
19(V)	12080	DISH Network Local Ch. (dig.)
20(H)	12100	DISH Network Local Ch. (dig.)
21(V)	12120	DISH Network Local Ch. (dig.)
22(H)	12140	DISH Network Local Ch. (dig.)
23(V)	12160	DISH Network Local Ch. (dig.)
24(H)	12180	DISH Network Local Ch. (dig.)

Telesat Canada Anik F1

C-Band - 107.3 degrees West longitude

1A(H)	3720	Occasional video
S1A(H)	3720	South-American Beamed Transponder
1B(V)	3740	Data Transmissions
2A(H)	3760	Canadian Broadcasting Corporation (digital)
S2A(H)	3760	South-American Beamed Transponder
2B(V)	3780	Tele-Quebec, Blue Bonnet, Radio Mutual, Radio Magneotheque, RDS, Canal Nouvelle, The Green Channel, Classic – audio (digital)
3A(H)	3800	Data Transmissions
S3A(H)	3800	South-American Beamed Transponder
3B(V)	3820	Occasional video
4A(H)	3840	Occasional video
S4A(H)	3840	South-American Beamed Transponder
4B(V)	3860	Occasional video
5A(H)	3880	Occasional video
S5A(H)	3880	South-American Beamed Transponder
5B(V)	3900	Cancom (digital)
6A(H)	3920	Radio Canada (digital)
S6A(H)	3920	South-American Beamed Transponder
6B(V)	3940	Cancom (digital) / Aboriginal People's Television Network (digital)
7A(H)	3960	CBFT-TV Montreal (digital) / CBC Radio (digital)
S7A(H)	3960	South-American Beamed Transponder
7B(V)	3980	Cancom (digital)
8A(H)	4000	Occasional video
S8A(H)	4000	South-American Beamed Transponder
8B(V)	4020	Occasional video
9A(H)	4040	CBC feeds (digital)
S9A(H)	4040	South-American Beamed Transponder
9B(V)	4060	Meteo Media, TV5, RDI, Musique Plus, Musimax (digital)
10A(H)	4080	Data Transmissions
S10A(H)	4080	South-American Beamed Transponder
10B(V)	4100	CTV Television, Newsworld International, The Weather Network (digital)
11A(H)	4120	Occasional video
S11A(H)	4120	South-American Beamed Transponder
11B(V)	4140	Occasional video
12A(H)	4160	CBC feeds (digital)
S12A(H)	4160	South-American Beamed Transponder
12B(V)	4180	CTV Television (digital)

Telesat Canada Anik F1

Ku-Band - 107.3 degrees West longitude

T1(V)	11714	Star Choice DBS (digital)
T2(V)	11744	Star Choice DBS (digital)
T3(V)	11775	Star Choice DBS (digital)
T4(V)	11807	Star Choice DBS (digital)
T5(V)	11836	Star Choice DBS (digital)
T6(V)	11867	Star Choice DBS (digital)
T7(V)	11897	Star Choice DBS (digital)
T8(V)	11928	Star Choice DBS (digital)
T9(V)	11960	Star Choice DBS (digital)
T10(V)	11990	Star Choice DBS (digital)
T11(V)	12020	Star Choice DBS (digital)
T12(V)	12051	Star Choice DBS (digital)
T13(V)	12081	Star Choice DBS (digital)
T14(V)	12113	Star Choice DBS (digital)
T15(V)	12140	Star Choice DBS (digital)
T16(V)	12172	Star Choice DBS (digital)
T17(H)	11725	Star Choice DBS (digital)
T17S(H)	11725	South-American Beamed Transponder
T18(H)	11756	Star Choice DBS (digital)
T18S(H)	11756	South-American Beamed Transponder
T19(H)	11786	Star Choice DBS (digital)
T19S(H)	11786	South-American Beamed Transponder
T20(H)	11817	Star Choice DBS (digital)
T20S(H)	11817	South-American Beamed Transponder
T21(H)	11850	Star Choice DBS (digital)
T21S(H)	11850	South-American Beamed Transponder
T22(H)	11880	Star Choice DBS (digital)
T22S(H)	11880	South-American Beamed Transponder
T23(H)	11910	SRC feeds (digital)
T23S(H)	11910	South-American Beamed Transponder
T24(H)	11940	CBC feeds (digital)
T24S(H)	11940	South-American Beamed Transponder
T25(H)	11971	Star Choice DBS (digital)
T25S(H)	11971	South-American Beamed Transponder
T26(H)	12002	Star Choice DBS (digital)
T26S(H)	12002	South-American Beamed Transponder
T27(H)	12033	Star Choice DBS (digital)
T27S(H)	12033	South-American Beamed Transponder
T28(H)	12063	Star Choice DBS (digital)
T28S(H)	12063	South-American Beamed Transponder
T29(H)	12094	Star Choice DBS (digital)
T29S(H)	12094	South-American Beamed Transponder
T30(H)	12124	Star Choice DBS (digital)
T30S(H)	12124	South-American Beamed Transponder
T31(H)	12155	Star Choice DBS (digital)
T31S(H)	12155	South-American Beamed Transponder
T32(H)	12180	Star Choice DBS (digital)
T32S(H)	12180	South-American Beamed Transponder

Telesat Canada Anik F2

C-band - 111.1 degrees West longitude

1A(H)	3720	Occasional video
1B(V)	3740	Occasional video
2A(H)	3760	Data Transmissions
2B(V)	3780	Data Transmissions
3A(H)	3800	Data Transmissions
3B(V)	3820	Occasional video
4A(H)	3840	Data Transmissions
4B(V)	3860	Tele-Quebec, Blue Bonnet, Radio Mutual, Radio Magneotheque, RDS, Canal Nouvelle, The Green Channel, Classic – audio (digital)
5A(H)	3880	Data Transmissions
5B(V)	3900	Data Transmissions
6A(H)	3920	Occasional video
6B(V)	3940	Occasional video
7A(H)	3960	Occasional video
7B(V)	3980	Occasional video
8A(H)	4000	Occasional video
8B(V)	4020	Occasional video
9A(H)	4040	Data Transmissions
9B(V)	4060	Data Transmissions
10A(H)	4080	Data Transmissions
10B(V)	4100	Data Transmissions
11A(H)	4120	Data Transmissions / Analog SCPC Audio Services
		1036.65 63.35 Wal-Mart In-Store Network (Canada)
		1037.00 63.00 Wal-Mart In-Store Network (Canada)
		1037.45 62.55 Wal-Mart In-Store Network (Canada)
11B(V)	4140	Data Transmissions
12A(H)	4160	Data Transmissions
12B(V)	4180	Data Transmissions

Before I power down the uplink...

WCPE-FM 89.7, The Classical Station from Raleigh, NC, has just commenced a digital DVB Ku-band feed for those who cannot access their Galaxy 5 C-band, transponder 15 service at 5.58 and 6.12. The Ku-band digital feed is on AMC-1, transponder 12 vertical polarization, 11940 MHz downlink frequency, 20000 symbol rate, 3/4 FEC using decimal PID 5417 decimal (or 1529 hex). For those with 4DTV receivers that can tune analog subcarriers, the Galaxy 5 feed for WCPE-FM has been mapped to 4DTV channel G5 958.

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Long Wave Challenges

Well, here we are. Another fall-winter DX season has arrived, and with it, we can expect superb conditions on the frequencies below 500 kHz. With things getting into high gear, it's time to think about how you'll spend your listening time this season. This month, I've thrown out some suggestions for challenges you might want to try.

Hams have numerous awards they can shoot for, but with few exceptions, listeners do not have these same opportunities. Nevertheless, there's nothing to stop you from setting *your own* goals and working toward them with the same aggressiveness as any ham contester. Below are some ways to gain that feeling of accomplishment faster than you can say "CQ Contest"!

Worked All Ten—This is a twist on the well-known Worked All States (WAS) award from the ARRL. The goal is to log beacons from 10 states or provinces in a set period of time, which you determine. Feeling even more ambitious? How about 20 states, or even 30? You can simply record them in your log, or try to get QSL confirmation for each intercept.

Word Game—Do you enjoy word games? How many beacon IDs can you log that spell a word found in the dictionary? IDs such as ACE, BUN, DRY, and HOT come to mind immediately, but there are dozens of others out there. How many can you pull in?

Twin IDs—Looking through the cross-reference for the *BeaconFinder II* directory, I see that there are numerous instances of duplicate IDs for different beacons. In some cases, even the frequencies are surprisingly close. How many of these duplicate IDs can you log?

Miles per watt—Hearing standard a 25-watt beacon at 100 miles is one thing; Hearing it at 1,000 miles is quite another feat. When you log a station, divide the number of miles by the wattage of the station to determine the "DX factor." (Examples: 25W/1,000 = 40 miles per watt, 50W/1,000 = 20 miles per watt.) I will include the "miles per watt" figures whenever they are furnished with logs sent to *Below 500 kHz*.

Classic Rig Night—Many of us use modern rigs with signal-enhancing features we often take for granted. How about dusting off your oldest rig for a night of "vintage" DXing? Hams have a "Straight Key Night" and we can do the same sort of thing by firing up an old classic and putting it to the test. It will show you what longwave DXing was like years ago. One MT reader makes a point of operating old receiving gear. We'll hear from him later in this column.

"Dueling" Beacons—When the surf's up on longwave, it's not unusual to hear two, three, or even four beacons pounding away on one frequency. It takes a good ear and a lot of concentration to sort them all out, but it can be done. Often, you'll have to listen through several cycles of an ID before you can copy it correctly due to overlapping with other beacons. Who will be the first to decipher *five* IDs on one frequency?

Above 500 kHz—We usually think of beacons operating below 500 kHz, but there are a sizable number of North American stations (roughly 30 at last count) that operate between 500 and 530 kHz. How many of these stations can you hear? Many DXers got their start from hearing "fringe beacons" while tuning around the bottom edge of the AM broadcast band.

I've given you a few suggestions to try this season. Perhaps you have your own goals or ambitions to achieve on longwave. How about dropping a line to *Below 500 kHz* with your ideas, or letting us know that you achieved your goal? Good luck and happy DXing. Now, onto the mailbag...

Time Warp

The following is an excerpt from a letter sent by Ward Kremer (TN), who enjoys using *very* early wireless gear on longwave. Here, he details his recent experience hunting beacons with a Wireless Specialty model IP-500 receiver, circa 1918.

"I had a rather amazing experience the other day and thought I'd share it with you. I was working with the IP-500 and logged four NDBs at one spot. Needless to say it was a little bit trying to get the four Morse code signals separated from each other. The slightly different tones and rhythms did make for positive ID, though. Check this out: Using your *BeaconFinder* directory, I was able to log CZM/330 Cozumel, Mexico; FIS/332 Key West, FL; HEG/332 Jacksonville, FL; and last but certainly not least, QT/332, Thunder Bay, Ontario, Canada! Not bad for a 90 year old radio! This rig uses a 112A detector operating on ONE VOLT! This goes into one stage of audio using 67 volts. Antenna is 100 foot North/South wire coupled to a 60 foot East/West wire. The station is grounded to a 530 foot well!"

"Best Bet" Beacons

Newcomers often ask what the best beacon targets are for a particular area in the US. I can cite a number of widely reported stations, but it makes more sense to give listings for beacons that operate above the usual 25 or 50-watt power level. In general, these are the stations that are going to be heard over a wider range than their lower-powered companions.

Until now, a convenient list of such stations has been hard to come by, but thanks to Kriss Larson (CA), we now have such a resource in the form of a map. Being a surveyor by profession, Kriss used his skills to produce a map showing all 100-watt or higher stations in the US (see Figure 1). He used the map as a handout for a recent talk on longwave, but also wanted to share it with *MT* readers. Kriss maintains other useful beacon maps and information on his website at: **http://members.aol.com/trekkspill/aerobcn.html**.

Happy Thanksgiving to all, and I'll see you next month.

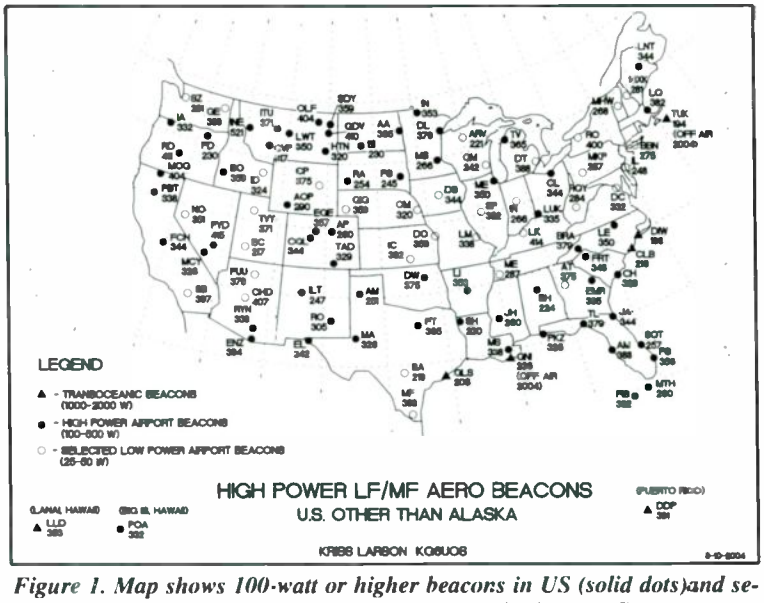

Figure 1. Map shows 100-watt or higher beacons in US (solid dots) and selected low power beacons (clear dots). Courtesy Kriss Larson, CA

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I Get By with a Little Help from My Friends

As any of you who read this column regularly know, I always have a lot to say about how great the amateur radio hobby is. The list of reasons why someone should consider joining in all the fun is nearly endless for a ham radio zealot like myself. But even though I have already said so much on the subject, let me toss yet another reason out on the table for all you yet-to-be-licensed folks to consider. That being – Hams have a great time sharing ideas with each other.

I've said many times that I am not an engineer or RF expert. My *booklearning* took me down the path of social service and metaphysics. I am quite proud, however, of the technical skills I have built up over the years in the radio hobby world. These skills came to me mainly from paying attention to the ideas of those much more skilled than I. As my skills developed, I moved on from being a student in all areas radio related to being a peer of others in some and even a teacher to a new generation of hams in a few areas of expertise.

This is not about blowing my own horn, but rather, to point out that the education I have received in RF electronics and amateur radio came from other hams who were patient and willing to teach me.

My ham radio education began by reading the magazine columns of folks such as Bob Grove W8JHD, Wayne Green W2NSD and the late great Doug DeMaw W1FB (back then he was W1CER). Who would have thought that a guy like me, who back then couldn't remember the resistor color code, would go on to write his own articles and build his own radios?

But along the way there were dozens of local hams as well. When I wanted to see how to put together a Heathkit transceiver, I went over to Bill WB2LCC's house and watched him work at it. When I wanted to learn the right way to put up an antenna system, I got together with Bob N2SB, who was not just a ham but did tower work as a professional. When I wanted to get involved with ARES and RACES in my area, I talked with George K2QIJ and Boyd W2HOB and they taught me net procedures. When I wanted to learn how things were done in the old days, I went over to Harvey W2FFU's house to hear about the pioneer days of amateur radio. I could name dozens of folks who taught me theory and practice, each in their own way, each from their own area of expertise.

And there is nothing in the world quite as much fun as a group of hams working together to solve a problem. I can't begin to list the number of rigs I have diagnosed, debugged, and repaired with a copy of the *ARRL Handbook* in one hand and a mike keyed to my local 2 meter repeater in the other. There is almost always someone out there who has had the same problem, knows the fix and, most importantly, can explain the solution to you so you grow in your understanding of the radio art.

❖ Taking Ideas on the Road

Part of this excitement can be seen when hams share their ideas and others go on to either improve upon the idea or come up with a new twist on things. For example... You may recall in the September issue of *MT*, I mentioned my good friend John N4RVR and his idea about using stationery-store-bought *literature holders* as excellent stands for handheld radios. Alan Bosch KO4ALA took N4RVR's idea on the road.

Alan came up with the idea to use a couple of literature holders as drop-in mobile mounts in his motor vehicles. He makes use of these mounts for his HT's and for his Mirage 2m/440 amplifier. He has successfully experimented with using Velcro™ and screws to mount the literature holders in convenient locations. The holders he found at his local "Container Store" had holes in the bottom allowing for antenna and power cables to be threaded into the holders.

KO4ALA's tidy 'stationery store' drop-in handheld mobile mount.

It looks like it may be a good idea to shop around a bit. The holders I found locally required me to drill my own holes. Cutting and drilling hard plastic can be a bit tricky. Alan also discovered that he could sleeve down the literature holders with foam weather stripping to allow for a snug fit around several of his handhelds. This is yet another example of hams taking each other's ideas and finding neat new ways that work for them.

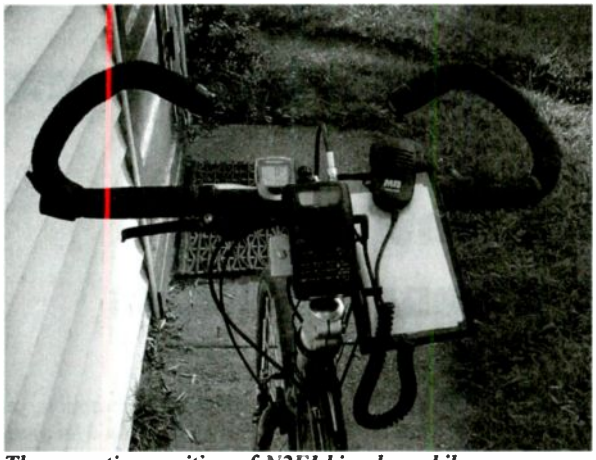
It's interesting to think back on when I was just starting out in the hobby, I would look at a design or idea and, for some strange reason, think that the only way I could get from point A to point B in any effort was to follow the original idea to the letter. It took a while, but finally some very patient ham friends helped me realize that adapting someone else's ideas usually worked best when mixed with your own ideas. That and figuring out how to use what was at hand in your junk box instead of running down to the local electronics store for everything. Adapting ideas may be the highest form of ham flattery.

While we're on the subject, I was also rethinking some ideas about mobile mounting that I got from Ed K2EPM. Eddie has been known to build some neat mobile mounts using items found in auto parts stores. Auto parts places have all manner of cell phone and cup holder devices on their shelves. Running with the notion while I was at my local parts purveyor picking up oil change supplies, I swung by the accessory isle to see what I might find. I came across a handy dandy cup holder that attached to the air conditioning grillwork on my dashboard. Combining this device with Alan KO4ALA's weather stripping support idea, I now have a mount in my Mazda that is perfect for my Yaesu RD-50 (and I can switch that out for my Radio Shack Pro-96 Scanner as well).

Get the idea? One ham comes up with an idea. Another modifies it for his or her personal use. Yet another combines a couple of ideas to come up with yet another way to skin the ham radio cat. How many other hobbies support such a free exchange of ideas?

❖ Biking Ideas

Another example of tossing ideas back and forth came from my *MT* colleague Doug Smith W9WI. Doug saw the picture posted of me on my bicycle in the September issue and that got us talking a bit. It turns out that Doug also does quite a bit of bike riding when he is not hammering out his *American Bandscan* column. In addition to a lot of e-mails discussing matters more suited for the pages of a biking magazine, Doug served as my sounding board while I worked through some notions about the best way to set my bike up for carrying two meters on long dis-



The operating position of N2EI bicycle mobile.

tance rides.

Another *MT* staffer Ken Reitz KS4ZR tossed in some of his experiences with bicycle radio activities as well. The conversation about antennas, radios and their mounting helped me come up with the hot setup for radio-enabled Century Rides. (That's 100 miles in one shot to you non-two wheeled types).

Riding 100 miles (for a middle-aged desk jockey like me) takes a bit over 6 hours. Checking normal use power consumption curves showed me that my trusty Yaesu RD-50 (Yep, the one that goes in that aforementioned cupholder) would do the job if I carried a spare battery pack. If you recall some of what I mentioned in the September article, weight is the enemy of any cyclist. Given my own riding style, each additional pound could be counted on to slow me down by around 1/2 mile per hour. That's a number that adds up over 100 miles.

While a rubber duckie antenna would be good for riding around town, any long distance ride would more than likely take me to some fringe areas of repeater coverage. Here I got some excellent advice from Russ W3CH. Russ has coordinated ham radio support efforts for years for the Philadelphia area MS-150 two day bike-a-thon. Russ also knows a thing or two about antennas.

Russ reminded me that bikes make fairly poor ground planes. The solution, if I wanted to get out a good signal from the seat of my well traveled Jamis Coda Sport, would be to go with a 1/2 wave antenna. This works out to about 40 inches on 2 meters. Any other length, such as the more common 1/4 and 5/8 wave designs would be highly inefficient when used on a bicycle. I found two commercial antennas in this class and a number of home brew designs as well.

After another round of discussions with my bike-oriented ham friends, I set about fabricating antenna and radio mounts that could be quickly added or removed from my bike. I took the radio/bike out for an initial 30 mile shakedown ride and was more than pleased. The RD 50 mounted on the handlbars had more than enough audio to be heard even in traffic. I made use of an MFJ-295 hand mike when I needed to talk. Note: I always pulled over to the side of the road to talk. The last thing you want to be doing is transmitting from the position of a hood ornament on someone's automobile!

I've come up with a fun way to combine my two favorite hobbies, thanks in large part to the ideas exchanged with fellow hams.

◆ Take Your Ideas a Step Further

So how can you go about encouraging the exchange of ideas in ham radio? How about waking up your local 2 meter repeater by getting on and starting a discussion about a new antenna you're thinking about using? Or maybe you can get a few people to meet on frequency once a week to talk about basic theory in order to review for that license upgrade you've been promising to work on. (You thought I forgot about that, huh?)

How about, at your next ham club meeting, when it comes to coffee and donuts time, get a few folks to talk about looking into a new mode that none of you have tried before, such as ATV or satellite communication. We wouldn't be hams if we didn't enjoy talking to one another! Go for it!

I am only the ham I am today because of all those hams who helped me along the way. I never forget this and I will always work to keep the exchange of ideas going. That's where a lot of the ham radio fun can be found.

I'll see you at the bottom of 40 meters.

UNCLE SKIP'S CONTEST CORNER

ARS Spartan Sprint
Nov 2, 0200 UTC - 0400 UTC

ARRL Sweepstakes Contest (CW)
Nov 6, 2100 UTC - Nov 8, 0300 UTC

ARRL Sweepstakes Contest (SSB)
Nov 20, 2100 UTC - Nov 22, 0300 UTC

NA Collegiate ARC Championship (SSB)
Nov 20, 2100 UTC - Nov 22, 0300 UTC

CQ Worldwide DX Contest (CW)
Nov 27, 0000 UTC - Nov 28, 2400 UTC

Outer Limits continued from page 69

WBMR- Mike O'Farad's Black Mountain Radio still has a rock music format. (Uses *wmbrradio@hotmail.com* e-mail)

WHYP- They remain one of the most active shortwave pirates in North America. The station memorializes James Brownyard, the operator of a small licensed station in North East, PA. Broadcasts often feature pirate radio parodies, mixed with Brownyard's old weather reports for Lake Erie cities. (Providence)

WMPR- This techno rock "dance party" pirate always gives plenty of IDs, and is frequently active. But their QSLs remain relatively rare because they do not solicit reception reports. (None)

QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 69, Elkhorn, NE 68022; PO Box 28413, Providence, RI 02908; PO Box 293, Merlin, Ontario N0P 1W0; and SRS Germany, PO Box 101145, D-99801 Eisenach, Germany.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for submitting pirate loggings for a potential QSL remain *The ACE* ($2 US for sample copies via the Belfast address above) and the e-mailed *Free Radio Weekly* newsletter, still free to contributors via *niel@ican.net*. The Free Radio Network web site, another outstanding source of content about pirate radio, is found at *http://www.frn.net*, and a few pirates will occasionally QSL a report left on the FRN.

Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; Rich D'Angelo, Wyomissing PA; John Figliozzi, Halfmoon, NY; Harold Frodge, Midland, MI; David R. Gibson, Monroeville, PA; Harry Helms, Wimberly, TX; Ed Kusalik, Coaldale, Alberta; Chris Lobdell, Stoneham, MA; Larry Magne, Penn's Park, PA; Greg Majewski, Oakdale, CT; Lee Reynolds, Lempster, NH; Fred Roberts, Germany; Martin Schoech, Eisenach, Germany; Brend Ttrutenau, Lithuania; John Sedlacek, Omaha, NE; and Niel Wolfish, Toronto, Ontario. Our congratulations to David Gibson, who sent in his first pirate logging (WHYP), heard on a Grundig YB400PE.

Clem Small, KR6A
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In Search of the Ideal Antenna:
Part 3 - Practical Transmitting Considerations

In part one of this three-part series, we looked at the relative value of various antenna characteristics. In part two, we considered various practical approaches to achieving those characteristics. With that background, we'll specifically focus this month on antennas for transmitting.

The ideal transmitting antenna will deliver energy to a distant receiving antenna at sufficient levels for successful communication. The antenna-reciprocity principle tells us that basic parameters such as gain, feed-point impedance, radiation resistance, and performance pattern are the same for an antenna whether it is transmitting or receiving. Nevertheless, for some applications, there are important differences between the ideal receiving antenna and ideal transmitting antenna. Let's look at some of those differences now.

❖ Directivity and Gain

In many applications an important transmitting-antenna function is the ability to direct signal energy in specific directions. This function is known as "directivity." In some applications, antennas with non-directional radiation patterns are essential – for example, when broadcasting or when communicating with mobile vehicles.

On the other hand, directivity is often useful for point to point communications, or where communications with specific areas are desired. This focusing of the antenna's energy toward a specific direction multiplies the effect of the power fed to the antenna – a characteristic known as "gain." For instance, if the antenna's energy is focused such that there is ten times more energy directed toward the distant receiving antenna than would be true without directivity, then communications can be accomplished with a tenth of the power that would be required without directivity.

Vertical directivity is similarly important, and launching signals at an angle appropriate to complete a communication-propagation circuit is essential in many applications. Thus, the ideal transmitting antenna will have a radiation pattern with major lobes at the correct direction and vertical angle to deliver maximum signal strength to the desired distant receiving antenna.

Earlier in this series we discussed how increases in gain usually don't improve quality of reception at HF and lower frequencies. However, for transmitting antennas at any frequency increases in gain which result from appropriately-directed directivity allow placing more signal into the desired, distant, receiving antenna. This improves signal to noise ratio, which improves quality of reception.

❖ Directivity and Reduction of Interference

Unfortunately, there is always some energy transmitted in directions other than those which are desirable. Thus, a directional antenna's radiation pattern may deliver signal energy to antennas other than the desired distant receiving antenna. This not only wastes RF energy, it may also cause interference at receiving stations other than the intended ones.

You will recall that the nulls (directions of minimal response) in a receiving antenna's response pattern can be used to reject interference. On the other hand, a transmitting antenna's nulls can be designed to reduce the amount of signal energy launched in directions where it would otherwise cause interference. Unfortunately, the antenna's nulls may not necessarily be in locations appropriate for both transmitting and receiving. For example, fig. 1 shows the radiation pattern of an antenna which is satisfactory for reception, yet causes interference problems when used for transmitting.

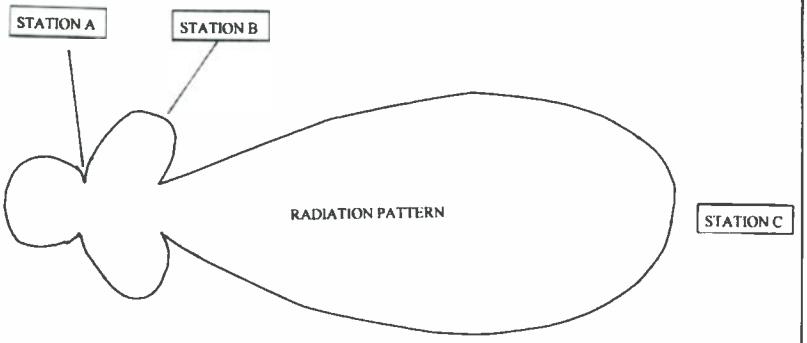

Fig. 1. Here is the pattern of an antenna which is used to communicate with station C. A null produces a desired reduction in received-interference from station A; however, during transmitting a minor lobe sends significant-unwanted interference toward station B.

❖ Impedance Matching

Impedance matching between antenna, feed line, and receiver assures routing maximum signal *from* the antenna to the receiver, or from transmitter to antenna. However, for reception at HF and lower frequencies, this matching is usually relatively unimportant. This is because at those frequencies the quality of reception is dominated by level of received noise, not strength of the desired signal.

On the other hand, getting the maximum signal into the transmitting antenna by impedance matching, particularly between the transmitter and feed line, is desirable at any frequency.

❖ Antenna-System Selectivity

An antenna together with its feed line and any matching circuits is known as an "antenna system." Resonant antennas, which are the most common kind of antenna, are tuned circuits. But, compared to the selectivity of most receivers, antennas and antenna systems offer relatively little selectivity.

We do find that intermodulation distortion problems can sometimes be reduced through the use of a selective (resonant) antenna, but generally, the ability of a receiving antenna system to reject signals at frequencies other than that to which it is tuned is not a concern in receiving-antenna selection.

On the other hand, when transmitting, selectivity of the overall antenna system can sometimes be of concern, due to potential interference caused by radiation of harmonics or other spurious signals coming from the transmitter. Tuners and/or filters can be added to the system to reduce this problem.

❖ High-Voltage Problems

If sizable amounts of power are to be transmitted, then the diameter of elements for the antenna may need to be larger than is true for a receiving antenna. When an antenna has high-voltage points at the end of an element, then some protection against arcing (such as a corona ball) may be needed.

Antenna insulators also must be able to withstand the high voltages produced when transmitting. Otherwise, the resulting leakage currents not only waste power, they can also lead to destruction of the insulator and subsequent failure of the antenna.

This Month's Interesting Antenna-Related Web site:

Here is a site with a great deal of information on various facets of radio communications: **http://www.tpub.com/content/neets/14189/index.htm**

The following site is a Navy course on signal propagation, transmission lines, and antennas. **http://www.cs.tcd.ie/Stephen.Farrell/ipn/background/US-Navy-NEETS/Module10-14182.pdf**

❖ High-Current Problems

Feed lines for transmitting antennas have limits to the amount of power they can handle without overheating, resulting in potential arcing and self-destruction. A high feed-line standing-wave ratio (SWR) presents no danger to feed lines during receiving. High transmitter feed-line SWR may even be tolerated in many applications, especially with open-wire line and vacuum-tube transmitters.

On the other hand, high SWR coupled with high transmitted-power levels has the potential to cause "hot spots" in the line. This can lead to arcing, shorts, and even self destruction of the line.

Very small wire, even as small as 30 gauge or so, can often be satisfactorily used for receiving antennas. However, the higher levels of current present when transmitting may destroy small-diameter elements. Similarly, the conductors in loading coils and components in multi-band traps must be able to handle any higher currents present during transmitting.

❖ Transmit - Receive Installations

Due to antenna reciprocity the same antenna can often be satisfactorily utilized for both transmitting and receiving. This is economical and convenient. However, as mentioned above, sometimes the need for null placement in the antenna's radiation pattern is different for receiving from that for transmitting. This can lead to the installation of completely different antennas for transmitting and for receiving.

Other practical considerations can also require separate transmitting and receiving antennas. For example, the nulls in the response pattern of table-top loop antennas and the high degree of directivity of the Beverage antenna help in reducing the noise found on MF and lower frequency bands. Table-top loops and active antennas are both much easier to install than most antennas. Due to such features, the loops, Beverage, and active antennas are popular receiving antennas on those lower-frequency bands. However, small loops and the Beverage are both low-gain antennas and are limited in their ability to support useful transmitting. The active antennas consist of a very-low-gain antenna element fed to an in-line, receiving-type, RF amplifier. Thus they cannot be used for transmitting.

When utilizing the receiving antennas just mentioned, a separate transmitting antenna must also be used. At these low frequencies a transmitting antenna with directional properties comparable with the loop or the Beverage would be of impractical size and cost for most installations. In such applications a more easily-installed solution is a vertical, non-directional transmitting antenna.

❖ And So:

For some applications the selection of an appropriate transmitting antenna is simple: often the same antenna used for receiving can satisfactorily be used also for transmitting. But as we've seen, the demands of other applications may be more complex and may require separate antennas for transmitting and for receiving.

There are many more antenna designs available than the common ones mentioned in this series. Good sources of data on antenna designs which you can build yourself are: *The ARRL Antenna Book*, Bill Orr's series on antennas, Joe Carr's *Practical Antenna Handbook*, and my own *The Antenna Handbook*. A very useful source of practical information on antennas and their radiation patterns is found in L. B. Cebik's series *Antennas from the Ground Up*.

RADIO RIDDLES

Last Month:

I asked: "Obviously, antenna directivity can be quite useful in many situations. Can an antenna ever be too directional?"

Well, for one example, let's consider ionospheric skip communication on HF. The ionosphere is not a stable layer, and it undergoes moment to moment changes. These changes can cause the signal arriving in the vicinity of the receiving antenna to wander a bit in both angle of arrival and place of arrival. When a transmitting or receiving antenna is very directive, then its beam width is very narrow and a signal's wandering may move it entirely out of the receiving antenna's aperture or signal-capture area. This will cause the signal to fade completely out. More on this below.

This Month:

So, as just discussed above, the signal wanders out of the receiving antenna's aperture. What can be done to reduce this fading? Yes, we could use designs that would result in wider beam widths for the transmitting and/or receiving antenna. What other solutions are available?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Marc Ellis
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Visiting a Major Antique Radio Meet

This has been another period in which I haven't been able to manage much workbench time. After attending the Antique Wireless Association Annual Conference (August 17-21), I immediately had to go in for some long-delayed surgery. While it wasn't really a serious procedure, recuperation was painful enough that I didn't feel much like working for several days. Now that I am in shape to work, I find myself facing missed deadlines for both this column and the AWA quarterly bulletin, *The OTB*, which I edit.

Casting about for a column topic that wouldn't require me to advance our ongoing NC-57 receiver restoration, I eventually came to a conclusion that should have been staring me in the face all along. Why not share with you the experience of attending a major antique radio meet? The AWA Annual Conference is one of the foremost, if not *the* foremost such gathering in this country. But first let's look at some reasons why you might want to spend time attending a radio meet.

❖ The Flea Market

It's true that there are now growing opportunities to buy, sell or trade vintage radio parts and equipment over the internet. And this is reflected in the diminished size of the flea markets at many of our important meets. But most are more than ample enough to enjoy. And there's nothing quite like strolling in the fresh air on a (hopefully) sunny day past myriad offerings of parts, materials and equipment related to this fascinating hobby of ours. Chances are you'll go home with many of the items on your want list, a number of things you didn't realize you needed until you saw them on or under someone's table, and a couple of components required for a specific restoration that you thought you'd never find.

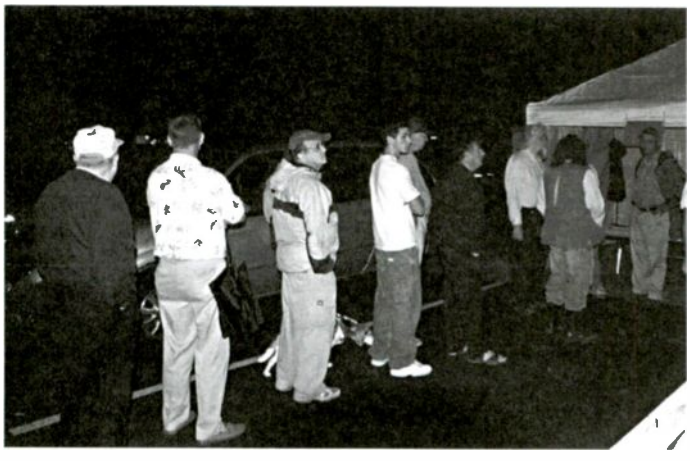
All of this buying and selling is done in a relaxed, good-humored atmosphere. Friendly haggling is both expected and part of the fun. Many of the vendors are enthusiastic hobbyists like yourself. They'll be interested in what you are purchasing and how you're going to use it. Some will share their expertise with you if they feel they can give you a helping hand. Such conversations can often lead to long-term friendships.

❖ The Auctions

Most larger radio meets include one or more formal auctions and sometimes, also, an impromptu "donation auction" held in the flea market on the last day. At the formal auctions, the items being offered will be laid out on tables for advance viewing and study by potential buyers. Once the auction starts, the suspense begins. And the suspense is part of the fun. You might be able to buy an interesting item for an amazingly low price simply because there happened to be nobody else in the room with the same interest. Conversely, you might have to drop out of the bidding because the price was soaring to a level well beyond what you expected to pay.

The lots that make up the donation auction are usually unsold flea-market items that are given to the organization sponsoring the meet by sellers who don't want to carry them home. Any profits help to defray the cost of the meet. Much of the stuff is junk, but it can be interesting or useful junk! Typically both the auctioneer and the potential buyers stand around next to the pile of stuff as they rapidly conduct the business. The pile melts away quickly and most of the items sell for just a few dollars. Sometimes there are exciting finds to be made. As they say, "One man's trash is another man's treasure."

In discussing the flea market and auctions, I've been speaking to you as a buyer. But you can also very easily be a seller. Flea market spaces are usually available at a nominal cost, so don't hesitate to set up yourself if you have surplus items you'd like to dispose of. Entering a piece in the auction is a simple as filling out a short form. Of course, the sponsoring club or organization will receive a reasonable percentage of your proceeds.



Hard-core collectors line up to wait for 6 a.m. flea-market opening.

Radio Daze, one of the commercial vendors at the flea market, offered restoration supplies and reference books at its large booth.

❖ Learning Opportunities

Another feature common in antique radio meets of any size is the contest. The contest provides participants with the opportunity to show off their prized collectibles and gives viewers the opportunity to study, enjoy, and learn from artifacts that they might not otherwise ever see. The items to be entered must fit into categories that are announced in advance. Typical categories might be "Battery Sets of the 1920s," "Horn and Cone Speakers," or "Crystal sets." Some of the larger meets might have a specific theme – often honoring a specific radio manufacturer. This theme will also be represented by a contest category.

Entries are judged by such standards as rarity, condition, completeness, depth of research as evidenced by the included documentation, and the attractiveness and creativity of the display itself. Typically there is a first, second and third prize for each category, so there are plenty of winners among the entrants. Sometimes there are awards of cash, or perhaps a tool or a book, but usually the prize is simply the honor of receiving the ribbon.

Visitors study vintage equipment at the museum annex. Transmitter in foreground once belonged to prominent radio manufacturer James Millen.

At the larger meets you'll find many other opportunities to expand your knowledge of our hobby. These come both informally through the personal contacts you'll be able to make with very experienced people and formally through attendance at the talks and forums that may be offered. These are generally given or run by acknowledged experts in their fields. Listen and learn – and don't hesitate to ask questions! Most presenters will be happy to discuss their material with you.

The AWA Annual Conference Gets Underway

With the introductory stuff taken care of, let's pretend we are now attending the Antique Wireless annual conference – which actually took place in mid August. This conference is organized in a Tuesday through Saturday time slot. It begins at 5 p.m. on Tuesday when the registration desk opens and flea market vendors may park in their spaces and set up. However, no selling is permitted at this time because conference attendees are still arriving and it wouldn't be fair if the relatively few early birds got their pick of the best goodies.

However, one advantage of arriving early is the opportunity to attend the members' mixer, which also opens at 5 p.m. Attendees can visit with old friends and meet new ones. There are hors d'oeuvres and a cash bar. Open as well is the book fair, where private sellers, as well as AWA itself, offer new and vintage books and publications for sale. It's located close next to the mixer area and will remain open throughout the conference. Another treat for the early arrivals is the first conference seminar, held at 7 p.m. This year it is a review of the wireless interception and decoding conducted by the British during World War II.

Activities Day by Day

The conference gets off to a running start on **Wednesday** with the 6 a.m. opening of the flea market. The die-hard collectors are lined up at the gate, some with flashlights, ready to swarm over the booths in the pre-dawn darkness. The flea market, too, will remain open throughout the contest, though activity usually tapers off on Friday when vendors and browsers alike begin to think about attending the auctions.

Among the other activities on Wednesday are forums to discuss member issues, restoration techniques, and key and telegraph equipment. There's also a talk on researching and writing publications on radio history. Evening bus trips are offered to AWA's world-class Electronic Communication Museum and museum annex.

There are three more talks on **Thursday** morning and early afternoon. One deals with the work of West Coast broadcasting pioneer Charles Herrold. A second covers the development of a pioneering European vacuum tube, the circa 1910 LRS Relay Tube. Both of these talks happen to be given by college professors, one from the US and one from Austria. The final talk of the day offers a detailed look at the development of early (pre-electronic) radio detectors.

Mid-day events include a luncheon for any "radio widows" who might have accompanied their husbands to the event as well as a meeting of the Tube Collectors Association of America, an organization that frequently schedules its meetings in tandem with ours.

During the afternoon and evening, items to be sold at the three auctions are checked into the auction room and arranged on tables for pre-auction viewing (which begins directly after check-in). Meanwhile, contest entrants are checking into the contest room and setting up their exhibits. The first auction (vacuum tubes) is held beginning at 8 p.m.

On **Friday** morning the judges begin evaluating the contest entries and the paper collectibles auction is also held. By 10 a.m., the big general auction begins and continues into the afternoon with just a one-hour break for lunch. By 11 a.m. the judges have awarded the ribbons and the contest room is opened for viewing. The big room is overflowing with entries in the 18 contest categories, which include six representing various aspects of radio broadcasting, the conference theme.

Later that afternoon, a forum for the discussion of amateur radio activities takes place. By 7 p.m. the members have changed from jeans and Reeboks to suits and ties and, with their smartly gowned wives, are entering the former auction room, now transformed into a banquet hall.

In conjunction with this event, major awards in the form of handsome plaques, are presented for excellence in historical research, publication, preservation of artifacts, and service to AWA. Winners of the various on-the-air ham radio contests are also honored. The after-dinner entertainment is a multi-piece orchestra belting out room-filling renditions of favorite numbers from the big band era.

The conference closes down on **Saturday,** but not before a full morning schedule. This includes a showing of "The British Receiver," a documentary on a joint meet held by the AWA and the British Vintage Wireless Society, and the "Pre-1912 Apparatus" forum, a popular activity in which members bring in ancient electrical artifacts for show-and-tell and group discussion. The finale luncheon begins at noon. It provides an opportunity for final good-byes and for also for honoring the winners of the contest.

Does this event sound like something you'd enjoy? To learn more about AWA and its conference, visit **http://www.antiquewireless.org** To look for similar events or radio clubs that might be located in your area, visit the *Antique Radio Classified* web site at **http://www.antiqueradio.com** and click on both "Radio Club List" and "Event Calendar."

Thanks to AWA board member Richard Neidich for allowing me to select these meet photos from his extensive digital files.

These contest displays were entered in one of the amateur radio categories.

Bob Parnass, AJ9S
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http://www.parnass.org

ICOM IC-R20 Portable Receiver

The ICOM IC-R20 is a new product which fits into the category of superhandheld. Other superhandhelds include the older ICOM IC-R10, AOR AR8200, and Yaesu VR-500. They are distinguished from other portable models by their shortwave coverage, SSB/CW detectors, and full numeric keypad.

❖ The Basics

The IC-R20 covers 150 kHz to almost 3305 MHz. The USA version omits the 800 MHz range cellular phone bands. Like ICOM's USA version IC-R5 (July 2003 *MT*), the USA version IC-R20 cannot receive 822 - 824, 849 - 851, 867 - 870, and 894 - 896 MHz, even though these bands are not allocated to cellular telephony. The wider gaps are troublesome to those of us who monitor the conventional and trunked systems in those ranges.

Reception modes include USB, LSB, CW, AM, WFM, and FM. Narrow FM is not available, though it would be useful for monitoring lower bandwidth MURS and land mobile signals.

A built-in RF gain control can be used to reduce the IC-R20's SSB and CW sensitivity. The IC-R20 also has an attenuator which can be used in all modes, and I measured 22 to 31 dB of attenuation during spot checks at various frequencies.

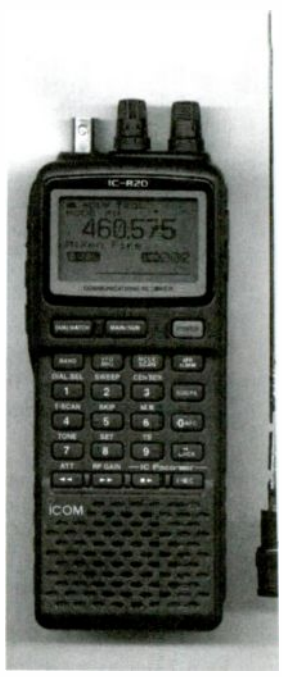
❖ Furnished as Standard

The IC-R20 comes with a BP206 3.7 volt, 1650 mAH lithium ion battery and wall wart charger. A small plastic tray is included which permits the radio to be powered using three AA batteries of your choice instead of the BP206.

The antenna jack is a good, old-fashioned BNC connector. For VHF/UHF reception, ICOM supplies a 23 inch, telescoping antenna which has two hinged joints near the connector. You can lay the radio flat on its back while changing the antenna orientation.

Speaking of antennas, an internal bar antenna may be selected for AM BCB reception and the earphone cord can be used for FM broadcast reception.

A spring loaded, plastic belt clip is furnished, though I didn't use it. The IC-R20's display is not recessed and this could make it easier to scratch the display if brushed up against something while wearing the radio on a belt.



❖ Dual Frequency Reception

The Dual Watch feature sets the IC-R20 apart from other portable receivers. During Dual Watch, the display is split into two parts (A and B) and the IC-R20 becomes two receivers, each with its own volume and squelch settings.

The flexibility is extraordinary. You can listen to two different signals simultaneously. You can tune a VFO or sit on a memory channel using the A receiver while the B receiver scans memories.

Text labels and tone indicators are displayed for both A and B receivers. In Dual Watch mode, the IC-R20 fits twice the amount of information on the display by using a smaller font size. This makes the display more difficult to read, of course.

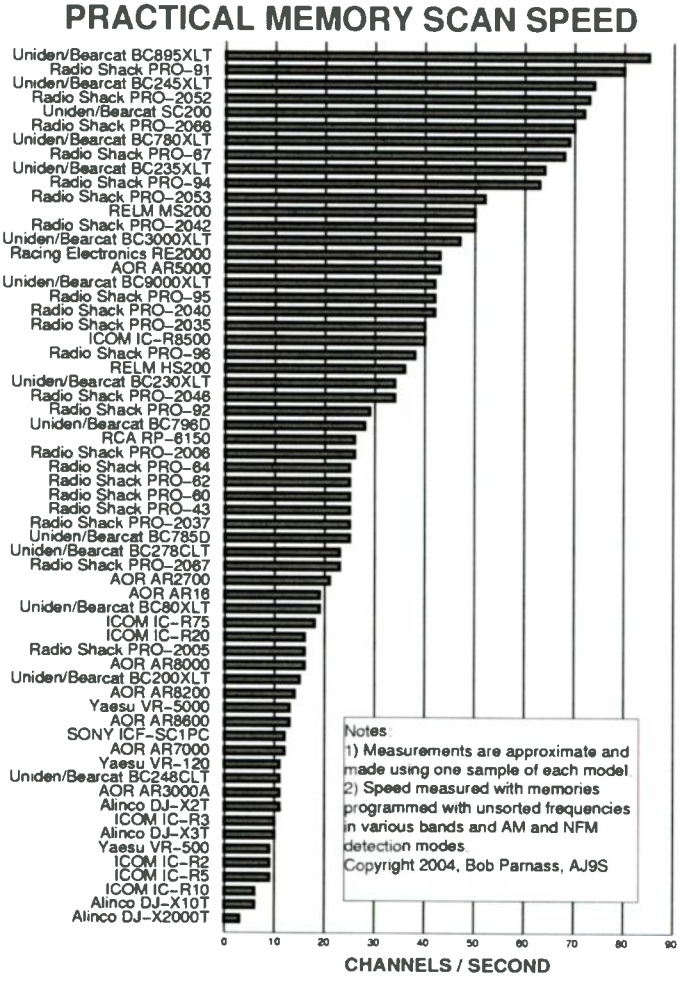
❖ Memories, VFO, and Scanning

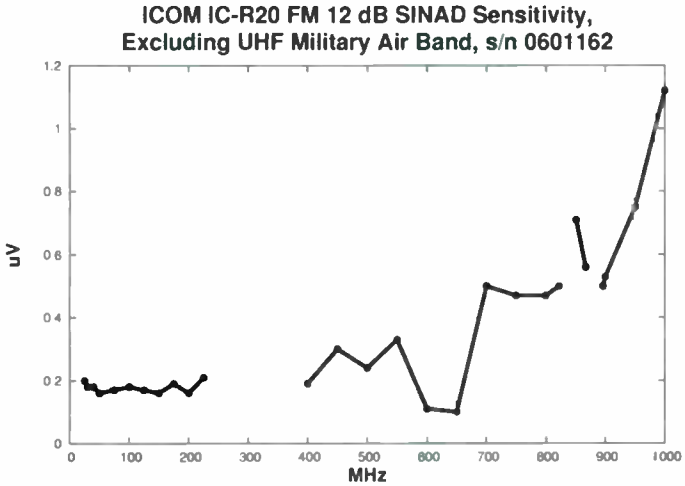
You can program frequencies into 1000 memory channels, numbered 0 to 999. Each channel may be set with an optional CTCSS or DCS squelch code and an offset amount, used chiefly for monitoring repeater inputs. Each channel may be assigned to 1 of 26 memory banks. Up to 100 channels may be assigned to the same bank.

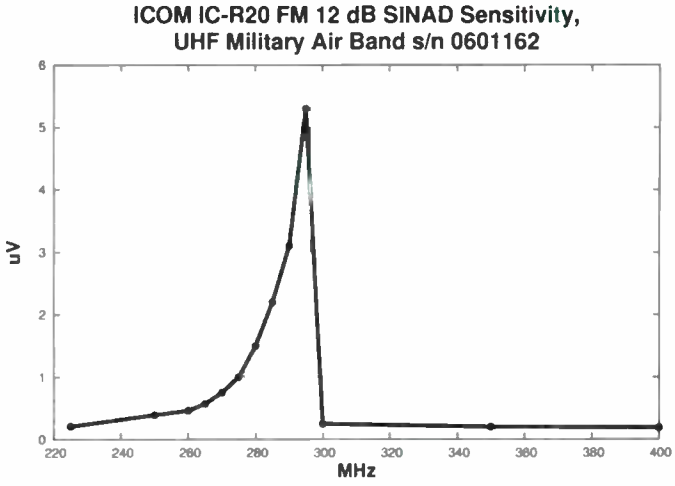
An 8-character label can be entered for each channel and bank. You can select whether the IC-R20 displays the bank or memory labels, but not both simultaneously.

At 16 channels per second, the IC-R20 scans memories considerably faster the IC-R2, IC-R5, and the IC-R10 I measured.

A VFO is provided which permits tuning across bands independent of the memory chan-







nels. A second VFO may be used in Dual Watch mode. Frequencies may be entered directly via the numeric keypad or you can press the BAND key and use the multipurpose knob atop the radio.

You can search between frequency limits, and 25 pairs of registers are set aside for defining them. Most of the IC-R20's other scan types are the same as the prior ICOM models, with an important exception: the IC-R20 can scan multiple memory banks in any combination. For example, you can choose to scan banks A, B, and N if you link them together using one of the setup menus.

❖ Other Features

ICOM's optional CS-R20 software lets you configure the radio settings using a PC running Microsoft Windows. An extra cost OPC-1382 is required to connect the radio to the PC's USB port. I use Linux, not Windows, and didn't try the CS-R20 software.

The IC-R20 can be computer controlled via a CI-V connection to its earphone jack. ICOM documents the interface commands in the IC-R20 instruction manual, but does not offer control software.

An internal audio recorder lets you record signals when the squelch is open, and this an excellent feature. Three audio quality levels are available and I use the Normal (middle) setting. You can record up to 260 minutes using the low quality setting. Recordings are played back through the IC-R20. The CS-20 software can transfer the recordings to and from a PC, but not play them on the PC.

I am impressed with the Band Scope's operation. You can listen to signals as the band scope sweeps. The sweep step size is selectable (1 to 100 kHz) and directly determines the sweep width (28 kHz to 2.8 MHz).

❖ Sensitivity

With one exception, the sample IC-R20 is very sensitive below 700 MHz and fairly sensitive below 900 MHz. It is insensitive in the 280 to 295 MHz range, and I graphed the UHF military air band sensitivity separately to provide a more detailed view.

Portable scanners are designed to work best on VHF/UHF when connected to small antennas, but I often connect them to a rooftop antenna and observe the results. Most handhelds experience overload and intermodulation when connected to a full size, roof mounted antenna, and the sample IC-R20 is no exception. NWR weather transmissions and television audio is heard while searching portions of the UHF military air and VHF-high bands.

You will have to experiment to find an antenna suitable for shortwave reception. I hear just a few shortwave signals when using ICOM's supplied telescoping antenna and reception is very weak. Shortwave reception improves when I clip a short length (10 ft.) of wire to the antenna.

The IC-R20's variable RF gain control is useful in mitigating interference from intermod and overload. The control provides finer adjustment than merely engaging the attenuator. The idea is to find an RF gain setting which eliminates the interference but not the desired signals, a balance which is sometimes elusive when using a large outdoor antenna.

The IC-R20 is able to receive aero beacons reliably below 500 kHz when connected to a 132 foot wire dipole antenna by using my homemade broadcast band rejection filter and activating the IC-R20's attenuator. Both filter and attenuator are required to prevent AM BCB stations from overloading this IC-R20.

❖ Other Notes

The radio powers up in the same condition it was when last turned off, e.g., scanning memory, limit searching, etc. The rubber pushbuttons have a firm feel and provide tactile feedback. The audio is quite good – on par with the IC-R2.

I am impressed with the IC-R20's features and overall VHF/UHF performance. It's fun to use, has a flexible battery arrangement, and is decently constructed. I wish it had an internal preamp feature which would permit the telescoping antenna to be effective below 30 MHz.

❖ Goodbye for Now

I have chosen to make this my final monthly *Scanner Equipment* column after a 10 year stint. I want to devote more time to riding recumbent bicycles, metal detecting, radio monitoring, woodworking, computing, walking, reading, and discovering new interests.

Thanks for reading the column. Writing it has been a wonderful experience. I've had an opportunity to test the finest equipment as well as some mediocre gear and to tell you about both candidly. Thanks to Bob Grove and editor Rachel Baughn for giving me the freedom to write with honesty.

The ICOM IC-R20 (stock code SCN20) is available from Grove Enterprises for $519.95 (plus shipping).

John Catalano, PhD
johncatalano@monitoringtimes.com

AirNav Systems Live Flight Tracker 3

With Microsoft about to release their next generation of Windows operating system, I thought it was about time to move out of the old Windows 98 second edition and replace it with the now tried and tested Windows XP.

The general approach in this column is always to be frugal and not to use the latest and most expensive PC to run radio software. Most of the past programs we have reviewed (with the exception of DRM) were run on either a 233 MHz Pentium I or a 366 MHz Pentium II. Both systems have around 190 MB of RAM and ran on the Windows 98 second edition. But alas, I fear these systems are just not up to today's computing tasks. So from this point on, we will use a new PC test bed.

Did I hear someone say a 2.4 GHz Pentium 4? Nice, but not quite sticking with the "don't break the bank" and "feed your family first" approach of this author! The "new," but modestly priced radio software test PC for this column will be a 500 MHz Pentium III with 256 MB of RAM running the latest Windows XP. This system is based around an IBM 300 GL, which was picked up at a Ham flea market for $25. Another $35 was invested in RAM and processor updates, plus the added cost of the XP operating system.

So, for around $140 we have a very modest, but capable platform on which to try out radio oriented software. The first product we will try is the new offering from AirNav Systems, Live Flight Tracker 3. This program will be of interest to all aviation radio monitors and enthusiasts. So, darken the lights in your computer room and get ready to hunch over your radar screens.

Figure 1 - AirNav Systems Live Flight Tracker 3 Displaying All USA and Canadian Commercial and General Aviation Flights in the Air in "Real-Time"

Your Own ATC Center

In its most basic use, Live Flight Tracker 3 provides you with a radar screen-like presentation of the map positions of all the USA and Canadian commercial and private aircraft in the air. This is not a simple static display: It is updated frequently, approximating real-time. See Figure 1. And that is just the beginning of what this program provides the user.

What is the cost? What do you need to run it? What can it do? How well does it work? Any problems? Good questions, so let's try to answer them.

What's the cost of running your own air traffic control center? Live Flight Tracker 3, a 21 Meg file, is quite large and takes a while to download using a dial-up internet connection. The demo is free, but limited in operation. Downloadable registration codes cost $79.95 and convert the demo into the operational program we used. This cost includes 60 hours of necessary flight data server usage per month for six months. Another six month server subscription fee of $79.95 is required after the initial six month period. Not inexpensive.

On the other hand, if you want or need the features of Live Flight Tracker 3, they are *not* available from any other program at *any* price!

Pre-Flight Requirements

Since the "real-time" information is provided via the internet, an internet connection is essential. In the "boonies" where I live, neither cable-modem nor DSL phone service is available. The local telephone is monopolistically controlled by a small company that charges outrageous prices and thinks that "high tech" is waxing the string between the juice cans!

Since I live on a private street, the cable company refuses to offer me service. Therefore, I live in the age of slow dial-up connection. For Live Flight Tracker 3 this means that the data updates are not quite real-time but occur every few minutes. I'm sure that a high speed internet connection would be a great improvement. Oh well – maybe I'll see it sometime this century!

What PC Is Needed?

Although I have read all the information on the AirNav Systems website **http://www.airnavsystems.com** I have yet to find a minimum PC system configuration. In fact, the site claims that it works with "any version" of Windows.

I tried it first on the trusty old Pentium I system that I outlined above. Let's just say that the program ran slow. So slow that in some situations almost ten minutes elapsed before system would respond to keyboard or mouse commands of any kind. A few times I had to power off the PC to unlock it. (Now you know one of my motivations in the move to the "new" system!)

On the 500 MHz Pentium III with 256 MB RAM running Windows XP, AirNav Live Flight Tracker 3 started working just fine. Be prepared for periods of up to a minute where the PC becomes totally unresponsive while the program does its thing. This may be due the slow dial-up connection, or a combination of that and 500 MHz microprocessor speed. (More on this later.)

Live Flight Tracker 3 uses Microsoft Internet Explorer for a number of tasks, so I suggest that you have a current copy operational on your PC.

What Can It Do?

As we can see from Figure 1, this program performs the amazing task of graphically tracking *ALL* airline and general aviation flights in the boundaries of the USA and Canada. Each of the dots on the map represents an aircraft in flight. For meaningful information we have to zoom in on a geographic region or airport as we have done in Figure 2. This shows the air traffic around Boston Logan airport in the state of Massachusetts.

Placing the cursor over a flight, results in the program placing a circle around the flight and displaying a line which shows its path from origin to destination. For example, we have focused in on flight COM626, as seen in the upper right of the map in Figure 2.

Live Flight Tracker 3 then brings up an information window seen at the bottom of Figure 2. Here, specific flight details are presented, including aircraft's tail number (for general aviation) or flight number (for commercial), company, flight origin and destination. In addition, real-time information such as altitude, heading, speed, distances, and latest METAR and other weather related information is included if available.

Just consider the number of databases and resources that the program is tapping for all this information: FAA registration database, current METAR airport status, FAA Flight Plan database and a few others. A data interface challenge!

Right clicking on a flight gives the user a convenient method of accessing frequently used

Figure 2 - Details of Flight COM 626 Shown By Hover Cursor Over Aircraft Map Location. Notice Track Line and Flight Data Box At Bottom of Screen

commands as seen in Figure 3. Selecting the "Follow this Flight" menu item makes the map move along with the selected flight as it flies towards its destination. Tracking a flight was never easier and never provided this wealth of easily viewed information.

Other Right Click commands include:

- Displaying the flight plan route (if one was filed) on the map.
- Finding Flights from the same origin or destination or airline or aircraft type.
- Add the specific flight to your "Watch List" so it will be highlighted when it is in flight.
- Show photo of the aircraft being tracked by automatically going to airliners.net website via Internet Explore.
- Displaying a variety of information about the destination and originating airports by choosing the "Airport Information" command.

That's not all. We will discuss more modes of operation later.

User Impressions

Having spent many hours in the control room of an Air Traffic Control (ATC) facility, I can say that AirNav Live Flight Tracker 3 is the real deal. It is just like having your own ATC facility, only better, since you are not limited to a geographic region.

What it can do is nothing short of amazing! Although we have covered the major operations, the program provides other features, such as access to a database that provides details of navigational aids such as VOR (VHF Omi-Directional Range), NDB (Non Directional Beacons) and imaginary "Fix" or traffic intersection locations.

Watching it in operation is a joy to behold. The amount of information displayed and its level of detail is staggering.

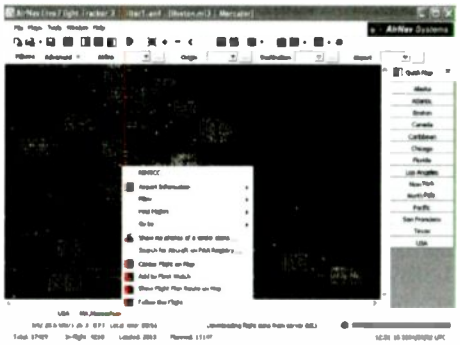


Figure 3 - Just a Right Click Away! The Very Useful Right Click Command Menu

Storm Clouds Ahead?

As I said, I am using a dial-up internet connection and a 500 MHz Pentium III. Neither of these are highlighted as a problem on the AirNav Live Flight Tracker 3 website. However, I did experience a recurring operational problem. There were a number of times that the program went into a constant "busy" state with a perpetual "busy" hour glass displayed. This usually, if not always, occurred after I had made a menu choice and during a "Processing flight data, please wait" period. The condition required me to close the program using the "X" at the top right of the display. The Windows XP message then came up "Anlv.exe Program Not Responding."

Closing down the program allowed me to continue with other Internet operations, such as Email. Therefore, I don't believe the problem lies with my connection ... not directly. It may be a problem between the AirNav server and my Internet Provider. Since the problem first surfaced, I have run hours of tests on my system without any indication of an operating system or hardware problem.

Hardware, Software or Internet Issue?

Live Flight Tracker 3 is a quantum leap in flight tracking programming. As such, it deserves to have a thorough analysis of the problem I encountered. Based on the excellent quality of other AirNav Systems programs I have used, I'm reluctant to put the blame on the software without factual data.

Right now it could be either of the three, or a combination. To me the dial-up seems to be somehow involved in the problem.

Sorry to leave you like this, but be assured that by the time we meet next month, many capable and experienced resources (I have sent an email asking for help to AirNav Systems) will have been working to identify the problem. This one is too important to leave to speculation. Next time I hope to report the outcome of the study, present the "fix" and highlight other unique and useful features of AirNav Systems Live Flight Tracker 3. Now, where is my computer resources telephone book?

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network which appeared a few months ago. The Army is the main arm of the Estonian Defense Forces and has capability to participate in missions outside the national borders and in co-operation with allies in addition to its normal role of protecting Estonia.

The Army is organized as a single infantry brigade and a homeland security unit. NATO requirements mean that it is quite likely that the Army will also add deployable infantry battalion tactical groups and some other groups in the future.

The identifiers heard so far include:

KUPERJANOVIYJP	Single Infantry Battalion, Kuperjanovi
PARNUYJP	Single Infantry Battalion, Paarnu
ROK	Peace Operations Center
YSP	Single Signals Battolion

Frequencies on which this network can be heard include:

3800 3803 3806 3809 3823 3850 3900 4850 4883 4910 4930 4950 4995 5005 5060 5789 5792 5800 kHz USB

That's all for this month; enjoy your HF I's and 0's and please keep the letters and emails rolling in. We're always happy to answer your questions, either through the column or privately.

Resources

Brazilian Navy
http.//www.mar.mil.br
World Meteorological Organization
http://www.wmo.ch
Estonian Defense Forces
http://www.mil.ee

MT REVIEW

WiNRADiO's G313i Receiver

By Lee Reynolds

Australia – "Oz" as it is often called – is renowned for kangaroos, Bondi beach, strapping great sheepherders with beards like rhododendron bushes and Foster's Lager. Nowadays, to the radio hobbyist community, it's also known for the WiNRADiO line of receivers and accessories that are targeted at both the consumer and the NGO/government/alphabet agency markets. Until the advent of the G303i PC/receiver card, these were often purchased more for their excellent VHF/UHF capabilities and software than with HF reception in mind.

The WiNRADiO HF-only G303i receiver appeared a few years ago, sporting excellent specifications, software, and (most importantly) performance, quickly establishing itself as one of the best price/performance computer-based HF receivers available to the hobbyist, and making WiNRADiO into a very serious contender in our listener's market.

Since then, these latter-day Wizards of Oz have been working on expanding their line of offerings (the rumored G303e(xternal) should be out before too long) and coming up with an act good enough to follow the G303i – the G313i! So, what is it? Does it offer enough in the way of improved performance and new features to justify buying it, rather than the G303i? How good is it? Let's see...

❖ What is it?

The G313i is a computer-controlled HF receiver built on a two-thirds length PCI card that's plug'n'play compatible with your PC and any reasonably current version of Windows. In the basic version there are only two connections on it – an SMA connector for the antenna and a mini stereo socket for audio out (to either your sound card or amplified speakers.)

Brief Specifications:
Frequency Range: 9kHz – 30MHz
Tuning Resolution: Variable down to 1Hz
Modes: AM, Synchronous AM, USB, LSB, DSB, ISB, CW, FM
Filter Bandwidth: User definable, variable from 1Hz – 15kHz
Frequency Stability: 0.5 ppm
Minimum Discernible Signal (MDS): -137dBm
Spurii-free Dynamic Range: 95dB
Sensitivity: AM (1.5-30MHz) 0.35 uV
USB/LSB (1.5-30MHz) 0.25 uV
CW (1.5-30MHz) 0.07 uV
FM (1.5-30MHz) 0.32 uV

Observations:

These specs are pretty decent and generally represent improvements over the specs for the earlier G303i. MDS (minimum discernible signal), sensitivity, Dynamic Range and stability are all improved upon in the G313i. They're not bad compared to anything else, either.

❖ What's new?

All preceding G303i capabilities exist in the G313i in one form or another, plus –

The G313i's predecessor (G303i) needed to use the host computer's sound card for intermediate frequency (IF) and audio conversion functions. The G313i has its own built-in IF digital signal processing (DSP) section that handles all IF to audio conversion tasks. (This means that you get regular audio out of the barefoot G313i audio jack, unlike the 303, and initial setup of the radio is much simpler.)

- Improved receiver specifications *(see above)*
- User selectable display of frequency in MHz or kHz *(someone at WiNRADiO was listening to user feedback!)*
- Four Variable Frequency Oscillators for easy frequency switching
- Automatic Frequency Control (AFC)
- Receiver Incremental Tuning (RIT)
- Tune to Peak *(tunes to the signal peak within the IF passband)*
- Improved real time spectrum scope with user selectable low pass filtering and the ability to zoom in from 20kHz to 4kHz bandwidth to observe a signal more closely
- Notch Filter *(frequency and bandwidth user-configurable)*
- Noise Blanker
- Passband Tuning *(IF Shift)*
- Integrated Audio or IF signal recording *(The audio recording is nice and conveniently integrated with the receiver GUI or on-screen visual interface. Being able to record the IF-level signal and play it back allows you to play back that interesting signal while trying different bandwidths, modes, etc.)*
- Test and Measurement *(This fires up a number of little tools for measuring FM deviation, AM modulation amplitude, and frequency errors between tuned and received frequency. Useful for digital types or het chasers on the AM broadcast band, an audio spectrum analyzer will let you measure a signal's frequency spectrum distribution and power peaks.)*

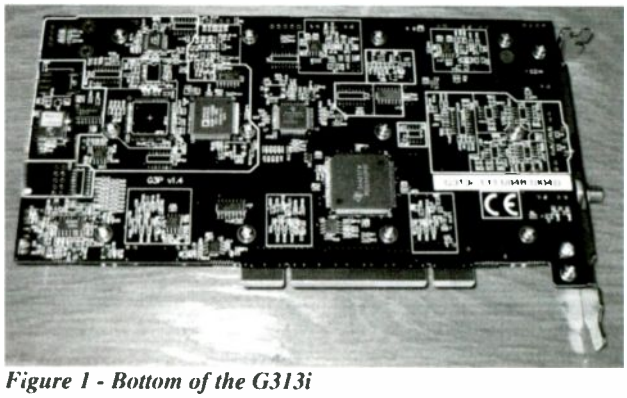

Figure 1 - Bottom of the G313i

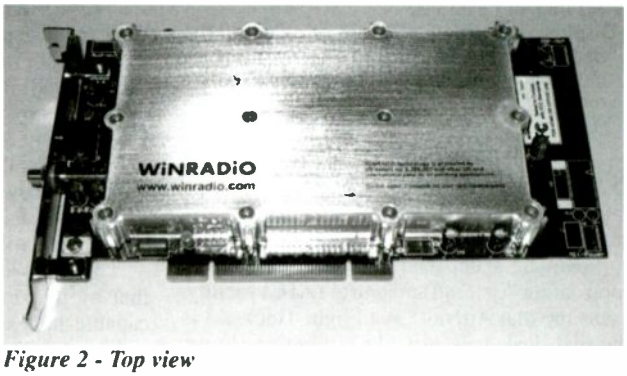

Figure 2 - Top view

The S-Meter now also handles dynamic display of maximum and minimum values for a signal "Range mode" and signal level as a floating averaged value for a user settable interval (1-99 seconds) "Average mode."

Improved spectrum analyzer – as well as the smaller spectrum analyzer that G303i owners will be familiar with. The G313i now has available a larger full screen display (that replaces the normal receiver control display). The large spectrum display has been set up so that all receiver control functions are accessible within it (a nice ergonomic touch) and there are new or improved functions added to both such as – 15.6Hz finest tuning stepping, low pass filtering, smoothing of the spectrum display and trace averaging.

❖ How did it do?

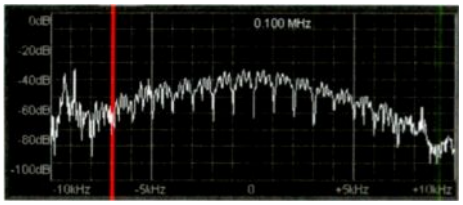

Figure 3 - LORAN spectrum on G313i

I wanted to be able to get a fair estimate of how the new G313i compared to its older sibling, so I ran them both concurrently in the same test bed (P4 2.4GHz system with 1GB RAM running Windows XP Professional) and fed them from the same antenna via a Stridsberg multicoupler. Just to be sure the audio wasn't inadvertently compromised, each receiver was fed into its own Logitech Z340 amplified speaker system.

This receiver comes with a CD-ROM containing the drivers for the card and the application that controls the receiver. Also supplied are an audio cable, 84 page *User's Guide*, SMA-BNC adaptor and a small indoor antenna to get you started – same complement as the G303i.

Before I installed the beast, I gave it a thorough looking-over and compared it to the 303' – they use a common PCB template (see figure 1) that is laid out identically, so any differences between the two must be either in the software or inside the heavily shielded RF section (see figure 2).

I was planning to pop the lid and take photographs, but discovered that the lid of the RF section has a clear plastic shield glued to it that prevents you from easily opening it up. The temptation was strong, but, seeing as I don't own it, the insides will have to remain a mystery for a little longer. (Maybe I'll abuse *my* 303' and take a peek in there instead!) Installation was simple and posed no problems. No system restart was necessary, either.

The first thing that struck me at starting up the software was the real time spectrum display's speed – the built-in IF DSP is *fast!* I was running the G313i against the 303' in real time and the G313i made the 303's display look leisurely by comparison while showing far greater detail (see figure 3) The next thing to hit me was the fact that the audio from the G313i was being heard about a quarter of a second ahead of the audio from the 303' – again, evidence that the DSP section in the G303i is running ahead of the G303i's DSP via the sound card.

A quick check of the XP Task Manager's Performance display indicated that the G313i was consuming about 22% of the system's 2.4GHz CPU as opposed to a more modest 10% for the G303i. Tuning the radio up and down in frequency caused much higher CPU cycle consumption spikes, but this effect is common to both models. Basic checks of the setup indicated that the twin radio installations weren't causing problems to each other and that the G313i was able to satisfactorily run a number of third party XRS plug-in programs that you can obtain from the XRS radio web site.

On-screen radio interface ergonomics are good (see figure 4), but, in my opinion, are beginning to approach the limits of what can comfortably be displayed and handled in such a layout.

Figure 4 - 1230 kHz with no spectrum display

◆ On the air –

So, the radio's installed and working properly – how well does it play? First check is how well the DSP bandwidth filters work. I have a local 10kW AM station about a mile from where I live that puts 9 or 10 millivolts of signal into my antenna. That does a reasonable job of trying to blast through any filters I throw at it.

I ran a quick comparison between my ICOM R-8500 (fed from that same antenna/multicoupler) and the G313i. Good results from both radios, but I was delighted to see that the G313i was able to get a couple of kHz closer to the target signal than the '8500 at various (matching) filter bandwidths before AGC pumping and audio blowby became apparent. (I'd say that IF-level DSP bandwidth filtering techniques have matured nicely, and perhaps those vertical filter skirts we see portrayed for such filters in general are a reality at last.)

Next, we take a look at general reception ability from LF up to the high end of HF. The LORAN beacon network comes in nicely at 100kHz, no perceptible difference between the G313i, G303i or R-8500. Various aeronautical and DGPS beacons in the 200-350kHz range, ditto. It's interesting to watch their signals on the real time spectrum display, because you can see the modulation on the sidebands of the signal appear and disappear as the beacon sends its CW i.d.

Actually, you can use this facility to watch any signal and see if it displays any oddities – I always thought that CHU on 3330kHz was a full AM signal until I saw the second's tone modulation appearing only on the upper sideband of the signal. That led me to CHU's web page, looking up its signal specs and then using the G303i's "Study" feature to check how it identified signal components – it did quite well, as a matter of fact, by tagging the 1kHz and 2.25kHz signal components. The much faster and more detailed spectrum display of the G313i made it a lot easier to recognize such signal components even when compared to the G303i.

On AM I sampled local and distant broadcasters with good results, and checked out the synchronous AM detection which is *not* sideband-selectable, but which seems to be much improved over the G303i's version of it by providing a better lock on marginal signals.

Roaming HF from 1710 to 30000 kHz yielded consistently good results on signals ranging from major SW broadcasters to amateurs through digital utility stations. Monitoring of the G313i's frequency stability indicated that it was within manufacturer's specs. Sensitivity of the radio was good and usually exceeded that of the G303i by a small margin and equaled that of the '8500.

All the new features work properly with the possible exception of the Passband Tuning (PBT), which appears to be useful only for the AM modes in its present incarnation. WiNRADiO says that the PBT is still a work in progress and is awaiting user feedback.

The IF recording ability is solid. You can do quite a bit of post-reception processing on the captured sample by switching modes, using the RIT facility to tune across the signal and spectrum segment (20kHz wide), and varying bandwidths or other settings. It's not quite a true spectrum VCR (yet), but you can do a heck of a lot more processing of the received signal than you can with just an audio-level recording. The improved spectrum analyzer works well and offers improved tools for understanding and evaluating what you're seeing.

◆ But wait, there's more!

Some people have asked on the 'net about the G313i and DRM – are there plans to have it handle DRM? I asked WiNRADiO about this and they kindly provided some beta code for me to play with – yes, the G313i *will* handle DRM. You'll still have to pay for a DRM license for the decoder (via the **http://www.drmrx.org** web site), but the application does exist.

The decoder implementation is as well integrated into the interface of the G313i as that of the G303i is and is cosmetically very similar. I tested both decoders ('303 and '313) against each other on Bonaire, Sackville and Kuwait transmissions in real time, and performance was, for all practical purposes, identical. There was perhaps a decibel or so difference in performance with the advantage going to the G313i. Subsequent scrutiny of the log statistics confirmed this impression.

◆ To sum up –

This is just a brief look at the G313i – I could easily have filled two more pages. How do I like it? A lot! If I were choosing between the G303i and the G313i I would select the G313i as a no-brainer. If you're even slightly inclined towards the synergy of combining computers and radio receivers, this device is definitely a major contender for your dollars, as it's the most sophisticated radio of this type in the under-$1000 price class.

It will also give more expensive standalone radios a tight run for their money, too. There are no perceived lacks of performance or dislikes of *anything at all* on my part – a couple of very minor software bugs, a couple of "would be nice" features – but this is true of everything and is purely subjective. The G313i is a number of evolutionary steps above the G303i, offering great tools and signal analysis capabilities that the serious listener can make good use of – all in a single compact package.

Now I have to try to justify to myself buying yet another radio ...

This is your equipment page. Monitoring Times pays for projects, reviews radio theory and hardware topics Contact Rachel Baughn, 7540 Hwy 64 West, Brasstown, NC 28902; email editor@monitoringtimes.com.

FlexRadio Software Definable Radio

Now Available to the Public

By John Catalano

In a recent series of feature articles in *Monitoring Times* (See issues Aug, Sept. Oct. 2004) we gazed into the future and attempted to see where radio technology was headed. Although many new technologies are being developed, one that stands out as important to all facets of radio communications – military, cellphone, professional, emergency, law enforcement, aircraft and ham – is SDR, the Software Definable Radio.

Military and government agencies have had access to this developing technology for a while. However, FlexRadio Systems has produced an SDR that it is selling to the public. As far as I can determine, this is the *world's first* SDR that anyone off the street can buy.

Before we launch into the FlexRadio System's product, let's do a quick review of the SDR technology. If some of the following looks familiar it is because much of what we will cover here is distilled from the series of feature articles, "Radio in the 21st Century."

Software Definable Radios

SDR is as important to 21st century radio communications as the superheterodyne was to the 20th century radio. Simply put, SDR moves radio design from dedicated analog-based circuit hardware to software configurable digital data processing. This shift to the digital world allows all signal manipulation to be performed as math transforms. In theory, the radio can be anything we want it to be, just by loading new math functions without any new hardware! From a single channel to a spread spectrum transceiver – Just think of the possibilities!

The ideal requirements for a complete SDR as seen in Figure 1 are:

- Digitize the RF signal right from the antenna to the speaker.
- Make ALL functions of the transceiver, including frequency range, frequency agility, mode of operation, modulation methods, encryption (if any), and display, totally software controllable and definable.
- Hardware independent of system-level programming methodologies.

When these conditions are met, the ultimate SDR goal of one radio that does it ALL – military, cellphone, professional, emergency, law enforcement, aircraft and ham communications – will be a reality. We are closer to that day than you might think.

Basic SDR Pieces in Place

Today we have the benefit of a number of technical developments, which make SDR a viable reality. First, we now have gigahertz speed digital integrated circuits, microprocessors, and high levels of complex circuit integration on a chip. This allows for whole systems to be built on a single chip (System On Chip). Secondly, semiconductor manufacturers are producing radio frequency integrated circuits at low cost commodity prices. So now SDR-enabling technologies exist at affordable prices.

Today's SDR Crowd

Although the military applications for SDR are pretty tough, many feel that the cellphone industry presents the greater design challenge. First they have to be backwards compatible with all existing formats: CDMA, CDMA-2000, GSM, D-AMPS to name a few.

A group called the SDR Forum **http://www.sdrforum.org** is steadily gaining membership among the hundred plus companies working on SDR. The forum's members include military communications, cellphone and professional communications companies. All are working to break down radio communications paradigms of the 20th century.

SDR Egg Hunt

In GNU Radio's own words, "GNU Radio is a collection of software that, when combined with minimal hardware, allows the construction of radios where the actual waveforms transmitted and received are defined by software." The minimal hardware referred to is not exactly a simple one chip printed circuit board. It is, as expected, a sophisticated collection of high speed Analog to Digital and Digital to Analog converters (ADCs and DACs) and programmable logic.

The GNU radio's goal is transceiver operation in all ham bands – HF, VHF and UHF up to 2.4 GHz. Currently, the hardware's maximum bandwidth is 6 MHz with a capability of extracting up to four separate channels simultaneously.

From their website **http://www.gnu.org/software/gnuradio**, the project appears to be in the early beta-testing phase of the hardware/software interfacing of the main board with other required modules which are in various phases of development from concept to testing. The GNU project is a great SDR ground-floor learning experience. It requires building and testing various hardware boards, gathering the software as it becomes available, and lots of patience.

Enter FlexRadio Systems

Now what about those of us who are not part of the defense industry or do not want to wait and hunt for the SDR pieces? Is there a company providing an "out of the box" software definable radio? The answer is yes. FlexRadio Systems has released an SDR transceiver model SDR-1000. (Contact information: FlexRadio systems, 8900 Marybank Drive, Austin, TX 78750; 512-250-8595; sales@flex-radio.com, **http://www.flex-radio.com**).

The cost of the SDR-1000A ASM/TR is $875 plus shipping. A receive-only version, the SADR-1000A ASM/RO, costs $676 plus shipping. Keep in mind that, right now, you cannot get another SDR on the consumer market at *any* price.

What Does An SDR-1000 Do?

The SDR-1000 Software Defined Radio transceiver comes with all the hardware and software that currently allows it to perform as an 11

DSP : Block Diagram
Digital Radio (Generic)

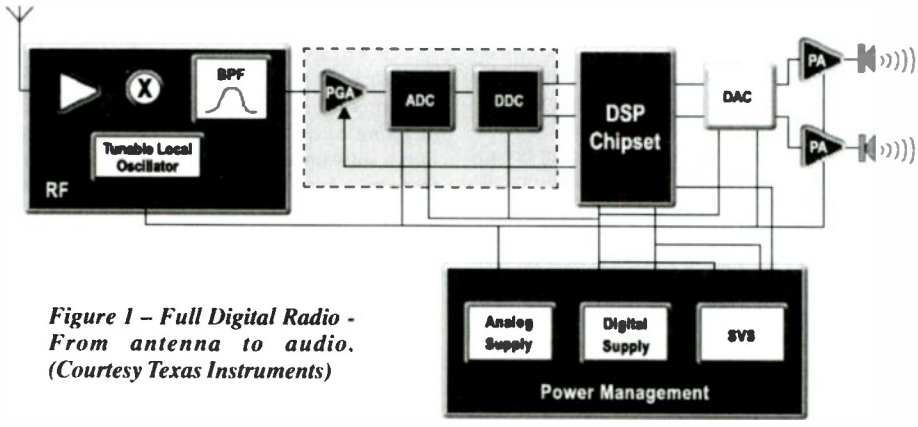

Figure 1 – Full Digital Radio - From antenna to audio. (Courtesy Texas Instruments)

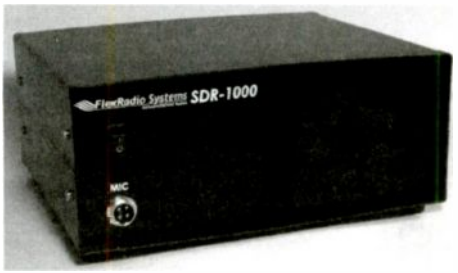

Figure 2 – SDR NOW! The Front Panel of the SDR-1000. Not much to look at.

kHz - 65 MHz general coverage receiver. Currently implemented are the following receive modes: AM, Sync AM, USB, LSB, DSB, CW and FM narrow. Filtering for DRM mode is included; however, the commercially available DRM software is required for decoding. A transmitter function that covers the 160 meter to 6 meter ham bands with a 1 watt peak envelope power (PEP) output in the common ham modes is also included.

Remember, the functions of an SDR are defined in software, so they can be modified or added to much in the same manner that the BIOS in your PC can be updated to add new features. Of course the as-designed hardware must be capable of supporting the features.

In order to encourage software development, the SDR-1000 uses open source software code for programming the digital signal processing chip (DSP) and its control software. More about the downloadable software currently available later.

A True Black Box

The SDR-1000 is housed in a black metal enclosure (Figure 2) measuring 10"W x 81/2"D x 4"H (25.4cm x 20.8cm x 10.2cm). It requires a 13.8 vdc power supply capable of providing 1.25 amps. The higher current requirement is probably required by the 1 Watt transmitter section of the SDR-1000.

There is lots of space in the enclosure for future hardware upgrades such as a 100 watt transmitter linear amplifier, two meter transverter and automatic antenna tuning units. The square on the front panel is a vent for a future fan required when all the add-ons are in the box. The SDR-1000's front panel is simplicity itself with just an on-off switch.

How Does It Do It?

The simplified block diagram of the SDR-1000 can be seen in Figure 3. Starting from the antenna, it first consists of a band pass filter (BPF). We require amplification of input signals over a relatively wide range of frequencies (11 kHz to 65 MHz). Therefore, the BPF is designed to remove all input signals except those which lie near our tuned frequency.

Next in the signal processing chain is a key element, the Quadrature Sampling Detector. Very, very simply stated, the Quadrature Sampling Detector samples the incoming RF signal at four times the carrier frequency and directly converts the signal to a baseband (for the old timers, think IF) frequency. The direct digital synthesis chip (DDS) and the 200 MHz jitter clock oscillator provide the QSD with a wide frequency coverage with very low phase noise.

As the name implies, the circuit uses four capacitors to sample the RF signal at four different times in a cycle of the input signal. This occurs at 0, 90, 270 and 360 degree phases of the signal. This results in the RF carrier being mixed to baseband frequency.

Additional filtering results from the antenna impedance and the sampling capacitor, which form an "RC" filter (a high or low pass filter using resistance and capacitance). The four capacitors provide the detector with four (Quad) different phased outputs. Combining the 0 and 180 degree-phased signals results in the "I" output. Likewise when the 90 and 270 degree outputs are combined, the result is the "Q" output. See Figure 3. Believe it or not, these two signals contain *ALL* the demodulated signal information. This is where the PC's signal processing comes into play.

Mind Your "I"s and "Q"s

In order to provide the SDR receiver with a wide dynamic range, the output of the QSD must be matched to the input of the computer's sound card with a minimum of added noise. This is no simple matter, and it can greatly affect the performance of the SRD receiver. Figure 3's simple amplification blocks coupling the output of the QSD to the PC sound card belies the complexity of the problem.

With the addition of the RF Expansion Board (RFE), which is not shown in Figure 3 but is in our SDR-1000, Flex Radio claims an impressive 90dB, two-tone, third-order IMD dynamic range and -141dBm MDS in a 500Hz bandwidth. In order to achieve these specs, they must have gotten all the hardware subtleties right.

The "I" and "Q" outputs are connected to the computer via the left and right stereo Line In channels of the sound card, and the signal processing program running on the PC takes over. Be aware! As we shall see in the next part, not all sound cards are created equal nor are up to the SDR1000 requirements.

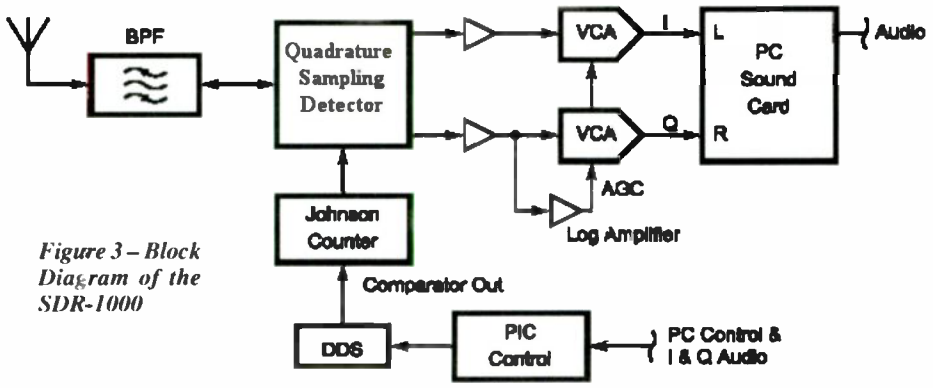

Figure 3 – Block Diagram of the SDR-1000

Hardware Requirements

The PC required by the SDR-1000 is not exactly a lightweight. First, from my experiences, it *must* be running a Windows XP operating system. The FlexRadio instructions say that Win 2000 is also supported but I did not try it. I did try Win98 SE and had all sorts of major problems that cleared up upon going to XP.

As for the PC hardware, an 800 MHz processor is suggested as the minimum. I have found that a 500 MHz Pentium III worked as well as a 1000 MHz Pentium 3. With the 500 MHz Pentium III, CPU usage while running the PowerSDR Console (Beta 0.1.2) program varied from 29% (Spectrum Display OFF) to 98% (Spectrum Display ON). You will need a minimum of 256 MB of RAM. Since the SDR1000 is controlled via the parallel port, your PC must have a full 23 pin parallel (printer) port.

Finally, the PC must have a "high quality" sound card. Remember, as we saw above, the dynamic range and distortion performance of the SDR-1000 is a function of the quality of the sound card. FlexRadio lists a number of cards which they have tested and verified work with their software. These include: Turtle Beach Santa Cruz (PCI), SoundBlaster: Audigy2 (PCI), Audigy2 ZS (PCI), Audigy2 LS (PCI), Extigy (USB), and MP3+ (USB). It is specifically noted that the Audigy2 NX USB is not supported.

Not all PCs have Line In jacks, especially the newer laptops. These require a USB sound system such as the SoundBlaster Extigy or MP3+.

The modified IBM 300 GL PC that we used had its sound card included on the motherboard. The bad news was that this proved to be totally unusable with the SDR1000 software. It resulted absolutely nothing but noise, much of it random and loud. All manners of mixer and driver settings were tried over a number of days without any success. But to be fair to Flex Radio, they warn SDR1000 users right up front that only certain soundcards work.

The good news is that the installation of an inexpensive Aureal Vortex PCI sound card, circa 1999, worked perfectly. First, however, the on-motherboard sound had to be disabled in the BIOS setup. Win XP recognized the Aureal sound card and loaded the required drivers. Then WWV s beautiful second ticks began streaming from my speakers!

Next Time in Part 2

In Part Two we will hook the SDR1000 to a PC and use the software that is currently available for the SDR1000, PowerSDR Console (Beta 0.1.2) We'll answer some questions I'm sure you have such as, "What's in the Box?" and give you some first-hand, on-air, user impressions. Stay tuned to what may be the biggest event in radio technology for the past 75 years.

Jock Elliott KB2GOM
jockelliott@monitoringtimes.com

Icom's Superb IC-V8

Okay, heads-up boys and girls, I have a newsflash. If you have ever thought about becoming an amateur radio operator – a ham – or if you already are a ham and you've been thinking about acquiring a 2-meter handitalkie, this just might be the best time *ever*.

Two things lead me to this conclusion. First, since I became a ham (back when they were first inventing electricity) the price of 2-meter handitalkies has been *dropping*, while the quality has been going *up*. For example, in 1983, to purchase an Icom IC-2AT – a classic 2-meter handitalkie with touchtone pad and *thumbwheels* to adjust the frequency and none of the cool, sophisticated stuff we expect now – would require forking over the princely sum of $219.95.

Second, check out what you can buy today for a fraction of the price. I recently tested the Icom IC-V8, a two-meter handitalkie with a typical street price of just under $129 that simply bristles with goodies and superb performance.

Check It Out

The IC-V8 measures 2-1/8" wide by 5-3/16" high by 1-3/8" deep (projections not included) and weighs a bit over 12 ounces with the standard battery pack. The front panel is molded of green polycarbonate wrapped around a die-cast aluminum chassis. The IC-V8, which comes standard with a drop-in trickle charger, includes a rechargeable BP-222 7.2 V, 600mAh battery pack that fastens to the back of the unit in a clamshell arrangement that seems extremely rugged.

At the extreme bottom of the IC-V8's front panel is a 16- button keypad for direct frequency input and a variety of other functions when the FUNC button has been pushed. Above the keypad are four additional buttons: FUNC, CALL (for call channel), MR (selects memory mode) and CLR (which selects VFO mode, aborts frequency input, cancels scanning, and so forth). Immediately above those four buttons is a backlit liquid crystal display that lets the user know what's going on with the IC-V8.

To the left of the LCD is a pair of UP/DOWN buttons. Channel selection, volume, squelch and subaudible tones can assigned these buttons or to the rotary selector on the top of the case, at the user's option. Immediately above the LCD is the speaker/microphone grill, and at the top of the case is the rotary selector and the antenna. On the left side of the case is a red power button, a push-to-talk button and a button to force the squelch open. On the right side of the case is a rubber cover that can be removed to plug in a speaker-microphone or the optional cloning cable.

The IC-V8 has 100 memory channels that store channel name, tone, output power, and duplex setting and one call channel. Other goodies include CTCSS and DTCS operation and a standard DTMF encoder and optional DTMF decoder for code squelch operation. The FM-only IC-V8 transmits from 144-148 MHz, receives from 136-174 MHz, and, for emergency purposes, can be readily modified to transmit on any frequency it receives. Another cool thing: a scanning speed of about 40 channels per second.

On the Air

But all the cool stuff in the world isn't worth two cents if the basic electrical operation of the radio isn't up to snuff. And that's where the IC-V8 really shines. On high power it puts out 5.5 watts (and even does so with the optional alkaline battery pack).

As long-time readers of this column know, every workday morning I run a 2-meter net for commuters in the Capital District of New York state. My usual radio of choice is an Icom IC-706MkIIG, which has buckets of power for bringing up the repeater. Whenever I try to use a handitalkie, the net participants always spot it: "Hey, are you running an HT? Your signal isn't so good." But for the past two weeks, I have run the net at will with the IC-V8, and no one noticed! (They wouldn't have known about it if I hadn't told them). That is high praise indeed.

The Icom IC-V8 delivers sparkling performance at a great price.

Another thing I really liked about the IC-V8 was the CSV8 cloning software and the OPC-478U cloning cable. Together, they allow you to pre-program all the memory channels on your PC and then download them at the click of a mouse to the IC-V8.

I can see two great uses for this. The first would be to rapidly set up all the radios on a team with the same configuration, and the second would be to save several different configurations for use on your personal radio. I also tried and liked the HS51 headset which has VOX capability and would be super handy anytime you need to talk on the radio and keep both hands free.

The Bottom Line

The IC-V8 is a superb two-meter monobander. It delivers sparkling performance at a great price. In my view, buying one of these is a no-brainer and gets my highest personal recommendation.

Here are the MSRPs for the stuff I tested (but shop around, street prices will likely be less) IC-V8, $152; OPC-478U cloning cable, $60; CS-V8 cloning software, $35; BP-208 Alkaline case, $18; HS-51 headset (includes VOX and PTT), $96; and UT-108 DTMF decoder with code squelch and pager operation, $35.

For more information, visit **http://www.icomamerica.com**.

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What's NEW

Tell them you saw it in Monitoring Times

Pro-2096 Trunk Tracker

Radio Shack has finally released their long awaited base/mobile scanner equivalent of the Pro-96 handheld. The Pro-2096 is a General Research of Electronics Inc (GRE) product, which was type accepted September 20. Here are the features as outlined in the Pro-2096 manual.

Features:

- 500 Channels – ten channel storage banks with 50 channels each.
- New 11-in-1 V-Scanner technology – eleven 500 channel Virtual Scanner folders. V-Scanner allows the user to build and store eleven separate configuration profiles, allowing the user to quickly reconfigure the scanner for use in different areas or applications.
- Phase 1 APCO-25 Digital Reception – automatic reception of digital voice modulation from conventional, trunked and mixed-mode networks.
- Intelligent Adaptive Digital Tracking – ensures optimal reception of digital signals.
- Digital AGC – automatically compensates for audio level variances in digital transmissions.
- Simultaneous Multi-System Trunking Operation – quickly tracks up to ten Motorola analog/digital, APCO-25 digital or M/A-COM EDACS analog trunking systems at the same time. Mix conventional channels and trunking systems in the same channel storage banks. Scan conventional frequencies and trunked systems simultaneously. Automatically detects Motorola 3600 bps or APCO-25 9600 bps control channel operation.
- Automatic Channel Tracking – automatically determines the trunking system frequencies for Motorola and APCO-25 trunking systems, using only the active system control channel.
- CTCSS and DCS Subaudible Encoded Squelch Modes – restricts conventional channel reception to transmissions using specified subaudible CTCSS tone or DCS data code when scanning or parked on a single channel. Code Search feature instantly displays the tone or code in use. Takes advantage of subaudible squelch tail elimination turn off codes when they are present.
- Ten ID List Banks – lets the user store 1500 IDs in ten ID banks, each with five ID sub-banks. 30 IDs are available in each ID sub-bank. ID text tags let you easily identify the user of a particular talkgroup ID code.
- SAME/FIPS Weather Alert – displays the weather event text for the specific cities or counties chosen by the user so you can see and hear the reason for the alert. While scanning, Weather Priority Alert automatically sounds an alarm tone when it detects the alert signal.
- Data Cloning – lets the user transfer the programmed data to another PRO-2096 (and PRO-96) scanner. Users can also upload or download the programmed data to or from a PC using an optional PC interface kit and application software.
- 12-Character, Four Line, Alpha-numeric Display – shows detailed operating information clearly.
- Triple Conversion Superheterodyne Receiver – virtually eliminates any interference from intermediate frequency (IF) images.
- Preprogrammed Frequency Ranges – lets the user search for transmissions within preset frequency ranges or within ranges you set, to reduce search time and select interesting frequencies more quickly.
- Hyperscan™ and Hypersearch™ – the scanner scans at up to 60 channels per second and searches up to 75 frequencies per second.
- Scan Delay – delays scanning for about two seconds before moving to another channel in conventional mode.
- Adjustable Trunking Delay – waits for reply activity on a trunking call for the amount of time specified by the user.
- Priority Channel – allows the user to configure the scanner to check one channel every two seconds.
- Attenuator – allows the user to set, by channel or globally, a 20 dB attenuator to reduce receiver overload and interference from nearby strong signals.
- Text Input – lets the user input a text label for each channel, talkgroup ID, channel storage bank, or other memory location.
- Memory Backup – keeps the channel frequencies stored in memory for an extended time even without battery power.
- The Pro-2096 receives these frequency ranges:

MHz	Step size
25.0–54.0	5 kHz
108.0–136.9875	12.5 kHz
137.0–174.0	5, 6.25 or 7.5 kHz
216.0025–225.0	5 kHz
406.0–512.0	6.25 kHz
806.0–823.9875	6.25 kHz
849.0–868.9875	6.25 kHz
894.0–960.0	6.25 kHz
1240.0–1300.0	6.25 kHz

- Audio Output Power (10% THD) 1.5 W
- Built-in Speaker 3 Inches 8-ohm Dynamic Type
- Power Requirement: 13.8 V
- Current Drain 600 mA
- Physical Dimensions (HWD) 2-1/4 × 7-1/4 × 5-5/16 inches

24 Hours, 5 Time Zones

MFJ has announced a new, 24-hour, world time, quartz clock which gives you five time zones in a single glance! Five dials display UTC, Local, Honolulu, Tokyo, and Moscow time.

Although the dials can be set independently, they are labeled with the assumption that the largest dial face will be set to UTC time, the top inset to local time, and the three other times set to the other three major zones of interest.

The 12-inch wall clock is easy-to-read, with a black outer trim, gold inlet stripe and gold hands on black numbers. A beautiful white face

makes it attractive for any hamshack or other room in your house.

All MFJ products are covered by their One year No Matter What™ limited warranty. The MFJ-135 is $39.95 from MFJ at 1-800-647-1800; or via the website **http://www.mfjenterprises.com**; or write MFJ Enterprises, Inc., 300 Industrial Park Road, Starkville, MS 39759.

Alinco DJ-C7T Pocket HT

Alinco is introducing the DJ-C7T 2m/70cm HT, a mini transceiver that succeeds its very popular Alinco DJ-C5. This new "pocket size" HT is small in size but big in added memories and modes.

One of the most noticeable improvements over the DJ-C5 is the audio quality, says the press release. With a completely redesigned internal speaker, the DJ-C7 delivers audio quality that rivals many bigger radios. The new model also offers an SMA antenna port and a two-way antenna system that allows the use of an optional earphone cable to monitor FM broadcast reception while using the SMA antenna port for the helical antenna (included) or a choice of other optional antennas.

The DJ-C7 can transmit up

What's NEW

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to 300mw output with the powerful lithium-ion battery which is included with the radio. Using optional external power, it can transmit up to 500mw output.

The new DJ-C7T has 200 memories, two way antenna systems, wide band receive including FM broadcast and AM aircraft bands, auto repeater setting, VFO, memory and scan modes and more. There are 39 CTCSS encode and decode settings (decode included as a standard feature) and four tone bursts that make the unit usable for repeater operations in many parts of the world.

The large display is easy to read and provides information to the user about a number of useful features. Alinco has added a split function and the ability to clone units by cable. Alinco DJ-C5T optional microphones/earphones are cross-compatible with the DJ-C7T.

Solar Powered Jacket

Regular readers know my fascination with the Scott eVest line of "Technology Enabled Clothing." But, every time I'm almost ready to purchase one of their products, they come up with a new gimmick. This time, it's a solar-powered jacket designed to carry, connect and charge portable devices.

The flexible solar panels are attached to SeV's signature all-weather jacket with removable sleeves and over 30 hidden pockets. The jacket features SeV's patent-pending Personal Area Network (PAN), which conceals wires associated with power sources and earbuds.

Global Solar's PowerFLEX™ solar panels consist of unique, flexible, thin-film photovoltaic material made from copper indium gallium diselenide (CIGS) sun-absorbing material placed onto a thin stainless steel substrate. The panels convert sunlight into electricity that charges a hidden battery pack about the size of a deck of cards. The battery pack in turn can charge any device compatible with Universal Serial Bus (USB) chargers, including cell phones, PDAs Game Boys, MP3 players and other mobile devices. Unfortunately, it sounds like most radios draw too much power to be included in the list.

The solar panels are removable and can be used separately from the jacket. Typical charge times in direct sunlight range from two to three hours, although direct sunlight is not required. The jacket's battery can begin powering devices almost immediately after the solar panels are exposed to sunlight. Once the battery is fully charged, the panels can be removed and portable electronic devices can tap into the stored power. When attached, the solar panels compliment the jacket's stylish, futuristic design.

"Global Solar is excited by the potential of applying our unique lightweight, high performance solar technology to innovative consumer products such as the SeV line of jackets. SeV compliments our line of portable power products for the consumer and military markets," said Michael S. Gering, President of Global Solar Energy.

You can order solar-powered SeV's for $425 at **http://www.SCOTTeVEST.com** or by calling 866-909-8378. The jackets are currently available in black, and more options will be available in the future. SeV also plans to offer a kit to retrofit some earlier SeV models with Global Solar's technology.

XACT Plug & Play Sirius Receiver

The latest innovation in satellite radio reception comes from XACT Communication. The palm-size XACT XTR1 "Stream Jockey" Sirius satellite receiver resembles a cellular phone. Like other satellite radio receivers, the Stream Jockey can be used in a variety of configurations, but unlike the others, it can also be a stand-alone receiver, connected to speakers or headphones. It also comes with an internal FM transmitter, for re-broadcast over a home or car stereo.

Other features include stereo output and headphone jack, satellite updated clock, 6-line display, remote control, program alert, 18 user presets, and parental control. The XACT Stream Jockey can search for music based on artist name, song title, or category.

When the XTR1 was introduced in September, it was available for $99.99; the universal docking station, which can be used in the car or at home, is $59.99; separate docking stations for car and home are $49.99 each. And, don't forget the subscription cost to receive the Sirius satellite radio signal.

Coming soon are three different boom boxes for use with the satellite receiver. The deluxe model will include MP3 CDs/CDRW player plus a digital AM/FM radio tuner – With all the shortwave services broadcast by WRN included in your Sirius subscription, you really can have it all in one radio!

Radio-Electronics Relaunch

Ian Poole, British electronics engineer and occasional writer for *Monitoring Times*, announces that he has relaunched his Radio-Electronics.Com website as resource of free information, data and tutorials for those in radio and electronics.

The site covers a variety of topics which currently includes: cellular telecommunications, private mobile radio (FRS in the US), wireless connectivity, radio receivers, radio propagation, test and measurement techniques, electronics components and more. Further areas of coverage are planned for the future and new information is being continually added in the existing areas.

The aim of the site is to provide information about the various technologies in an easy to understand and interesting style. In this way it will be a valuable resource for those in the engineering and marketing arenas as well as anyone wanting technical radio and electronics information. Time has been spent to ensure that the site is easy to navigate or to search. The site can be reached at **http://www.radio-electronics.com**

Books and equipment for announcement or review should be sent to " What's New?" c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to Rachel Baughn, editor@monitoringtimes.com

Lawrence Harris
lawrenceharris@monitoringtimes.com

Decoding APT by Ear

Correspondence about weather satellites (WXSATS) is always welcome. We received an enquiry from Brian in California which concerned decoding signals using sound-cards. He explained: "I just finished reading your weather article on page 90 of the August 2004 publication and I have one question. I have multiple scanners and ham radios capable of receiving the weather satellites, plus a new Dell with the latest sound card and software, but I am wondering what type of connection I need between the radio and PC?"

Brian was referring to the sound card decoding of APT wxsat signals that I mention occasionally because it is an economical method that uses facilities already available on the cheapest of computers. It only works effectively if you start with a suitable receiver and antenna, although some programs do a good job minimizing the problems caused by non-optimal receivers.

There is a DIN connector-sound cable that is (or was?) in common use, and this connects between the receiver (most wxsat receivers have more than one connection), and the red cable that connects to line-input on the computer's sound input. Alternatively, many receivers have a sound output that connects directly.

Let us look more closely at this audio signal. The Automatic Picture Transmission (APT) system originates from the AVHRR/3 instrument on the NOAA satellites. We get the full resolution images (actually a total of five image sets of the six available) from the HRPT data in the 1700 MHz band, and a reduced resolution data stream from the APT signal. Any two of the AVHRR channels can be chosen by ground command for conversion and output to the APT transmitter.

◆ HRPT to APT

To convert the original AVHRR instrument data from the two selected channels into an APT stream, the scanner's signal is AM (amplitude) modulated on to a 2400Hz subcarrier. Because 2400Hz is in the audio range, we can hear it; in fact we can hear quite a lot! The amount (degree) of modulation depends on the brightness of the scene below. The modulation does not reach extreme values; it is limited to a maximum of 92% to prevent the disappearance of the sub-carrier signal! This is what would sometimes happen with the Russian Meteor satellites that were not so optimally designed.

The APT image carries much more information than just adjacent pictures – see figure 1. Check the two sets of gray scale blocks – actually called wedges – along each of the video channels. These are numbered 1 to 16, of which, wedge number 8 shows maximum modulation. Listen to the sound of APT – the characteristic 'tick-tock'; you can count two sets per second, corresponding to 120 lines of data per minute. If you listen very carefully, you can gradually discern more of the components of the audio signal, especially if you can watch the signal being displayed as a picture at the same time.

Once a minute you hear a distinct set of high tones; these comprise four lines of data – two white and two black. When you have developed an ear to interpret these sounds, you eventually recognize that clouds (high frequency detail) impart a burst of sound akin to walking through snow; open seas (low frequency) produce a relatively dull sound. The AM modulated sub-carrier is used to frequency modulate the VTX transmitter operating in the 137 - 138 MHz band, to which the receiver tunes.

A visible channel is used to provide visible APT imagery during daylight, and one IR channel is used constantly (day and night). A second IR channel can be scheduled to replace the visible channel during the night-time portion of the orbit. The analog APT signal is transmitted continuously and can be received in real time by relatively unsophisticated, inexpensive ground station equipment.

Brian tuned his receiver to 137.62 MHz and added: "I can easily hear the 'tick-tock' of NOAA-17 as it crossed over Oregon and then through California, passing overhead. This is with my Uniden 780 receiver and a discone antenna mounted on the roof of my home. I was able to close the squelch so I could not hear the signal although at times throughout the transmission the signal was very strong." Brian used the 'J-track' tracking website to indicate when NOAA-17 would pass overhead.
http://science.nasa.gov/Realtime/JTrack/

◆ WXSAT motor fixed!

Last month I mentioned that my Yaesu elevation motor had failed to work properly despite some internal cleaning, and added that I expected to have to have it fixed by a local distributor. The estimated cost for this was horrendous so I requested help on the WXSAT forums. Three people very kindly responded, of whom one even offered to collect, investigate and return it! **Robert Finnis** duly collected it one weekend and did extensive servicing on the motor before returning it. To my delight, the unit has worked perfectly since then, so I am once more able to monitor HRPT.

Fig 1: NOAA-17 September 4, 1116UTC visible-light channel showing minute marker intervals on the left side and the calibration wedge blocks on the right, with the tone-burst signal on the far-right edge.

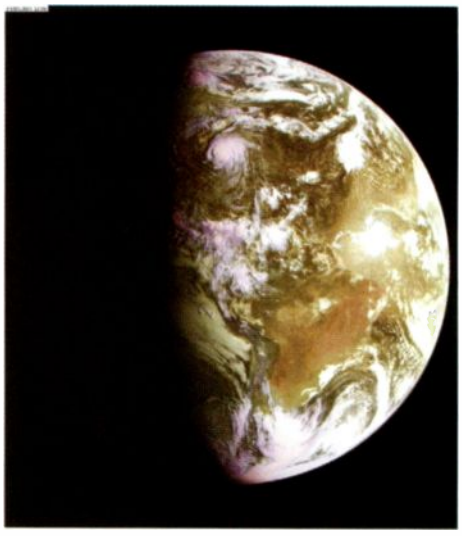

Fig 2: GOES-12 1200UTC September 4 showing hurricane Frances at upper middle of image

Frequencies - APT

NOAA-12 and -15 transmit APT on 137.50 MHz
NOAA-17 transmits APT on 137.62 MHz.

Frequencies - HRPT

NOAA-12 and NOAA-16 transmit HRPT on 1698.0 MHz
NOAA-14 transmits on 1707 MHz (no valid image data)
NOAA-15 transmits on 1702.5 MHz
NOAA-17 transmits on 1707 MHz
FENGYUN-1C (unsynchronized) and FY-1D transmit on 1700.5 MHz

GOES-10 (west) and GOES-12 (east) use 1691 MHz for WEFAX; GOES-E also transmits scheduled LRIT.

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WANTED: Standard AX-700/CCR-708 Receiver. Prefer to be in mint condition with its manuals and original shipping boxes. Randy Ballard, N5WV, 318-207-0459, n5wv@eastex.net

Closing Comments

Let's Hear it for the Hams!

By Bob Grove W8JHD

This year has been traumatic for Americans. We've seen devastating storms of historic proportions, watched news reports of accelerating losses from global terrorism, and have seen the country divided as casualties mount in Iraq.

But we also have a lot to be thankful for. Americans are resilient and they are resourceful. They respond when they are needed, and this was never more visible this year than during the hurricane season. Devastation wrought by such seemingly-benign names as "Charlie," "Francis," and "Ivan" destroyed vital communications, telephone and power systems. Overhead electrical and telephone lines were whipped into copper spaghetti, cell towers were rendered inoperable, and public safety communications were compromised.

Teams of hams from the Amateur Radio Emergency Service (ARES) of the American Radio Relay League (ARRL), as well as other licensed amateurs, immediately swung into operation, providing desperately-needed communications links to and from the affected areas.

During such vicious storms, the National Hurricane Center in Miami relies heavily on amateur radio to relay weather information as an assist to forecasting. It's a job any ham can perform if properly trained, and it's not necessary to be in the middle of the maelstrom to be of use. Floyd Soo, W8RO, of Oakland County, Michigan, is one of many volunteers who contribute their services to the Hurricane Watch Net on 14.325 MHz (USB). Because propagation during the storm prevented the Hurricane Center from receiving local reports, Floyd set aside his duties at his video production studios to go full-swing into passing weather information on the net during Hurricane Ivan.

Disasters such as we witnessed at the Twin Towers inevitably bring casualties, often at levels that overwhelm local health care facilities. The American Red Cross deserves its time-honored respect for response in such incidents. And once again, here we find amateur radio operators providing the backbone of life-saving communications. The ARRL has a working agreement with the Red Cross for supplying ham communications on an as-needed basis.

And then there's the long-heralded Salvation Army relief organization (Salvation Army Team Emergency Radio Network – SATERN), whose cadre of hams, also administrated through the ARRL, can be heard passing health and welfare messages to worried families and friends on 14.265 MHz (USB) every time a hurricane strikes land.

A Technical Resource

In the educational and international relations fronts, many of our astronauts are licensed hams who have been establishing communications with schools and individuals around the globe while orbiting in the International Space Station (call sign NA1SS).

At an on-going level, hams have also been responsible for verifying claims of radio interference from the new Broadband over Power Lines (BPL) computer interconnect systems. The emerging threat is exemplified by a recent case in which the ARRL asked the FCC to shut down a BPL system being tested in Cottonwood, Arizona. Radiation levels coming across the 1.8-30 MHz spectrum were so high (typically 60 dB over S9!) as to prevent any radio communications.

For decades, amateur radio operators have served as a technical resource for public safety, resolving deliberate and incidental radio interference problems with direction-finding equipment as well as providing skilled help in improving communications systems. Recently our local club was contacted by the sheriff's office to find out why some of their mobile units couldn't be contacted at specific locations in the county. We emulated their mobile installations using adjacent-spectrum ham frequencies, dispatched ourselves to the reported trouble spots, and presented our findings to the department for their resolution.

After a significant drop in numbers, amateur radio's ranks are now increasing, probably as a result of amended code requirements and the discovery of ham radio by technically-minded computer buffs. With the recognition that the computer age and electronics technology is the buzz of the future, ham radio may see renewed growth in the future.

We hope so, because whatever misfortunes the future may bring, we know we can depend on the hams to continue their time-revered legacy of sharing their technical skills to provide vital communications between the stricken area and the outside world.

The Spirit of Volunteerism

Of course, you don't have to be a ham to be a resource for your community. You don't even have to be able-bodied. There are plenty of men and women restricted to their homes who still perform a public service by listening to a scanner, citizens band radio, GMRS, FRS, or shortwave communications.

You do need some kind of training, however, to recognize and evaluate an emergency and to know what to do or whom to notify. Some of you have acquired your training the hard way – through experience, and some of you may want to look into the new CERT program (Community Emergency Response Team http://training.fema.gov/EMIWeb/CERT/), as Skip Arey recommended in his August *Ham Bands* column.

If direct involvement isn't something you feel you can do, you can support the ability of the amateur radio community to continue doing what it does: Write your congressman to support the Amateur Radio Spectrum Preservation Act the next time it is reintroduced. The work the hams do in a crisis is professional, effective and invaluable. The government could never afford to pay for the type of service it receives from amateur radio volunteers.

Most of us reading this magazine have been blessed, merely in having the wherewithal to own a radio of any kind. Most of us can also afford to donate a little time to ready ourselves for service to our community whatever the future may bring – And, we'll count ourselves truly fortunate if that service turns out to be simply directing traffic – or relaying traffic – at the annual Thanksgiving parade!

For additional information:

American Radio Relay League (225 Main Street, Newington, CT 06111-1494; http://www.arrl.org/ ; 860-594-0200 general; 860-594-0397 donations)

American Red Cross National Headquarters (2025 E Street, NW, Washington, DC 20006; http://www.redcross.org ; (202) 303-4498 general, (800) HELP-NOW donation

Hurricane Watch Net (Hurricane Watch Net, Inc., 10374-178th Ct. So., Boca Raton , Fl. 33498; http://www.hwn.org)

Salvation Army (P.O. Box 269, Alexandria, VA 22313; http://www.satern.org or http://www.salvationarmyusa.org; 1-800-SAL-ARMY)

This page is open to thoughtful opinions on radio-related topics. Views expressed on this page do not necessarily reflect the opinion of Monitoring Times or Grove Enterprises.

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500 kHz – 2.45 GHz* • AM, FM, WFM, AM-TV, FM-TV • 450 Alphanumeric Memories • CTCSS with Tone Scan • 4 Level Attenuator • Antenna with BNC Connector • 2" Color TFT Display with Video and Audio Output Jacks • Lithium Ion Power

IC-R5
Compact performance!

150 kHz – 1.3 GHz* • AM, FM, WFM • 1250 Alphanumeric Memories • CTCSS/DTCS Decode • Weather Alert • Dynamic Memory Scan • Icom's Hot 100 Preprogrammed TV & Shortwave Channels • Weather Resistant • AA Ni-Cds & Charger

Give & Receive This Holiday Season!

IC-R75
Pull out the weak signals!

30 kHz - 60.0 MHz* • AM, FM, S-AM, USB, LSB, CW, RTTY • 101 Alphanumeric Memory Channels • Twin Passband Tuning (PBT) • Synchronous AM Detection (S-AM) • Optional DSP with Noise Reduction Auto Notch Filter • Triple Conversion • Up to Two Optional Filters • Front Mounted Speaker • Large Display • Well Spaced Keys and Dials • PC Remote Control with Optional Icom RSR75 Software for Windows® • And Many Other Features

Free DSP! *1

programmable PC programmable

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