

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

Volume 21, No. 3

March 2002

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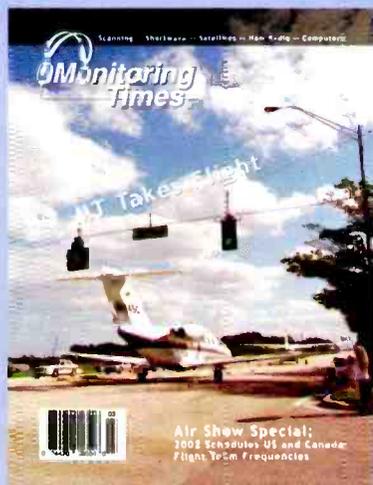
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Monitoring Times

Vcl. 21, No. 3

March 2002



Lead Story

Monitoring Canadian Air Shows

By John David Corby

The season may be shorter than in the US, but Canadians love their airshows all the more. Shows fall into three main types: large military demonstrations with ground displays, aerial displays at major events, and the local airfield fly-in. If you're lucky, you may also get to see antique or experimental aircraft in flight.

This article lists the major airshows and frequencies in Canada, starting on page 10. For information on airshows in the US, along with the equipment and frequencies to monitor them, see page 68.

On our cover: The main media-event for the 2001 Aircraft Owners and Pilots Association convention at Fort Lauderdale, Florida, included a "parade of planes" through the streets to the convention center. See page 28 for the story. Photo by Robert Wyrman.

Who's Who in the Spectrum: SW Broadcasters..... 14

By Larry Van Horn

Part Three in our series on radio spectrum assignments covers a segment familiar to MT readers – the shortwave broadcast bands. How are these bands used? Why do folks monitor them? Where do you listen and when? What equipment do you need? All this and more is found in this month's installment.

Listening In on India and Pakistan 18

By Dave White

On the heels of the military action in Afghanistan came a flare-up in relations between these two nuclear powers. We present frequencies and schedules for monitoring English-language shortwave broadcasts from the region, as well as the primary clandestine voice arguing for Kashmir independence.

Shortwave versus the Internet? 20

By John Figliozzi

In this final article reporting on the sixth Challenges for International Broadcasting conference sponsored by Radio Canada International, participants consider the usefulness and findings of audience research. They also discuss the use of new technologies, especially the internet and digital broadcast modes, and how they will impact the future of shortwave broadcasting.



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Reviews:

The new Alinco DJ-X3T portable wide band receiver shows a number of significant improvements over the previous model, especially in AM broadcast band reception, says Bob Parnass (see p.80).

In the glut of short-range personal radio service hand-helds, there are only a few stand-outs, and Jock Elliott just discovered one: the Cobra 900-DX GMRS hand-talkie. With the light weight and convenience of an FRS 2-way radio, but the power and distance of GMRS, Jock says the PR-500 gets his highest personal recommendation (p.86).

The Miracle Whip is intended primarily for use with low-power HF transceivers, but the ability to tune this whip reaps impressive results for reception, too. It can be used on VHF and UHF as well, using the telescoping whip and bypassing the tuner. See the review by Bob Grove on page 89.

Maybe you'd rather home-brew an antenna, or cut an antenna to a specific band. There are numerous computer programs that will make this easy, and they vary from free to quite reasonable cost. John Catalano looks at a few popular programs on page 82.

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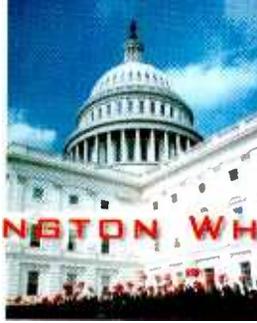
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FCC Acts to Yank Mitnick's Ham License

In a five-page order released December 21st, the FCC claims that 38-year-old convicted hacker Kevin Mitnick may not be morally fit to be a ham radio operator.

The Commission has begun a legal proceeding before an FCC Administrative Law Judge to determine whether the General Class operator/station license of Kevin D. Mitnick, N6NHG, should be renewed. Mitnick is a high profile computer hacker whose illegal activities have included the interception of electronic communications, computer fraud, wire fraud, and causing millions of dollars in damage to corporate computers.

The FCC said that based on their information "...Mitnick's criminal behavior raises a substantial and material question of fact as to whether he possesses the requisite character qualifications to be and remain a Commission licensee." And "Given his propensity to engage in criminal activities, particularly those involving fraud, we have serious reservations about Mr. Mitnick's ability to comply with our rules and regulations in the future."

◆ Background

Kevin Mitnick, N6NHG, a General Class licensee, has been licensed for twenty-five years. Kevin was first licensed at age 13 and became a phone phreaker (someone who breaks into telephone networks) at 16. On August 9, 1999, Mitnick was convicted in federal court of participating in various computer hacking offenses over 2-1/2 years.

Mitnick admitted that he broke into a number of computer systems and stole proprietary software belonging to Motorola, Novell, Fujitsu, Sun Microsystems and other companies. He committed these crimes using "social engineering" (trickery to gain access to a computer system), cloned cellular telephones (obtaining the electronic serial number of a cellular phone to obtain free service), using "sniffer" programs (to obtain confidential information such as passwords), and various hacker software programs.

Mitnick also acknowledged altering the programming of computer systems belonging to the University of Southern California and using these computers to store programs that he had misappropriated. He also admitted that he stole e-mails, monitored computer systems and impersonated employees of victim companies, including Nokia Mobile Phones, Ltd., in his attempt to secure software that was being developed by those companies.

"According to the United States Department of Justice, Mr. Mitnick's prolific and damaging hacking career made him the most wanted computer criminal in United States history," FCC said.

As a result of his August 9, 1999, conviction, Mitnick was sentenced to forty-six months in federal prison. He had previously been sentenced to

twenty-two months in prison for possessing cloned cellular phones after his arrest in North Carolina in 1995 and for violating terms of his supervised release imposed after his conviction for unrelated computer fraud in 1989.

Further, he admitted to violating the terms of supervised release by hacking into PacBell voice mail and other systems and by associating with known computer hackers. Mitnick is currently on probation following his release from federal prison in January 2001.

◆ Hearing ordered

In December 1999, Mr. Mitnick applied to routinely renew his General Class Operator License. The FCC believes that "...evidence of any conviction for misconduct constituting a felony will be relevant to our evaluation of an applicant's or licensee's character." Such evidence is pertinent because it assists the FCC in determining whether a licensee will "...deal truthfully with the Commission and comply with our rules and policies."

Mitnick was convicted after pleading guilty to four counts of wire fraud, two counts of computer fraud, and one count of illegally intercepting a wire communication. The offenses for which he was convicted were indeed felonies involving fraudulent activities. In addition, the misconduct involved, in part, the telecommunications industry over which the FCC has regulatory authority.

Mitnick's loss of his ham radio license is probable, but not automatic. On Dec. 11th, the FCC started the process off by designating Mitnick's General Class license for a hearing to: (a) determine the effect of his criminal convictions on his qualifications to be and remain a Commission licensee; (b) determine whether Kevin Mitnick is qualified to be and remain a licensee and (c) to determine whether the Amateur Radio license renewal filed by Kevin Mitnick should be granted. Appeals go to the full commission and from there to the federal courts.

◆ Mitnick's current activity

Mitnick is on parole until January 2003 under extremely restrictive parole release conditions. His parole officer has allowed him to use a cell phone (which Mitnick suspects might be used to track his whereabouts), but he is prohibited from using a computer or traveling outside central California.

As a condition of his supervised release, he also is barred from discussing the specifics of his case or from making any profit from telling his story for seven years.

In the meantime, he enjoys near hero status in computer circles and has been getting a lot of writing, speaking, radio and TV show job offers. (He reportedly is represented by the United Talent

Agency in Beverly Hills ...one of the world's largest agencies.) But his options are severely limited by the fact that he can't use a computer or travel outside central California.

In addition to appearing on local network news programs, his on-line resume says he "...has made appearances on *Court TV*, *Good Morning America*, *60 Minutes*, CNN's *Burden of Proof*, *Street Sweep*, *Headline News*, *Talkback Live*, *Canada AM*, *Marketplace*, and National Public Radio. Kevin has also keynoted at numerous industry events most recently at Giga Information Group's Infrastructures for EBusiness Conference, the Software Developers Expo 2000 Conference and the DEFCON security conference. He has written for *Time Magazine*, *Newsweek*, *U.K. Guardian*, *SecurityFocus.com*, and *2600: The Hacker Quarterly*. Up until recently (Dec. 10th), he hosted a talk radio show on KFI 640 AM Los Angeles which focused on technology and Internet related issues."

According to *Entertainment Weekly*, Kevin recently appeared as a guest star on ABC-TV's hot spy thriller *Alias*. Mitnick played the part of Agent Burnett, a CIA computer whiz who joins forces with double-agent Sydney Bristow (Jennifer Garner). The show producer, J.J. Abrams, had to write a letter to Mitnick's probation officer, explaining that he would only be working with prop computers on *Alias*. The *EW* writeup said Mitnick received rockstar treatment on the set. "I had him sign my iMac with a Sharpie," Abrams said. "But I was a little nervous that federal agents were going to burst through the door and see that he was almost touching a computer."

And on Wednesday, December 19th, Kevin Mitnick was a guest speaker on Art Bell's nationally syndicated overnight *Coast-to-Coast* talk radio show.

This is what the Art Bell website had to say about Mitnick. It said little about his criminal background. Quite the contrary. It made him out to be a security expert.

"As the world's most famous hacker, Kevin has been the subject of countless news and magazine articles published throughout the world. With more than fifteen years of experience in exploring computer security, Kevin Mitnick is a largely self-taught expert in exposing the vulnerabilities of complex operating systems and telecommunications devices. His hobby as an adolescent consisted of studying methods, tactics, and strategies used to circumvent computer security, and to learn more about how computer systems and telecommunication systems work."

Mitnick promotes his speaking engagements through his "Free Kevin" website which, of necessity, is run by someone else. There is even a countdown feature that keeps track of the years, months, days, hours, minutes and seconds until when his parole is over.

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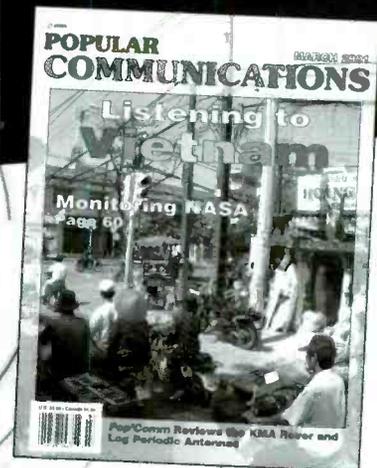
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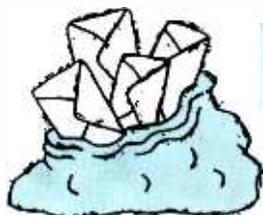
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LETTERS TO THE EDITOR

Antenna Oddity

The last time Richard Ashley posed an antenna conundrum, two of our readers were able to identify it quite accurately. Are you up to another challenge?

"Almost every time I have discovered 'unusual' antenna arrays, it seems that they are usually located in remote areas or somewhat off the beaten path. In this case I was on my way to Columbus, New Mexico, from Truth or Consequences, New Mexico, on Highway 26. This array is not readily visible from Highway 27 southbound because of the terrain, but can be seen from the northbound side.



"No one I spoke with in Nutt knows the purpose of the antenna. The restaurant owner only knew that on rare occasions someone came out and 'inspected' the site.

"The antenna structure itself is located on federal Bureau of Land Management or State of New Mexico public land at approximately 107 degrees 27 minutes West and 32 degrees 31 minutes North. The tower supporting the HF LPFA is about 175 feet high.

"Perhaps someone can explain why the LPDA is in a vertical plane and what the loop on the opposite arm is. It appears to me that it, too, is an antenna similar to the Isotron type loop antennas. The antennas are on a rotator and there also appears to be a trap type wire antenna on the boom as well.

"When I passed by the array several weeks later on the afternoon of September 11th, I took special notice that the antenna was pointed in a northeasterly direction. The day I took this photo on August 14th, it was pointed in a southwesterly direction, bearing 225 degrees."

— Richard Ashley, N5IZC

Praise for Satellite Radio

This letter takes exception with Ken Reitz's somewhat skeptical look at satellite radio in the January issue:

"I recently purchased XM satellite radio for my car. What impresses me the most is the absolute clarity of sound. The signal is without static, noise or fading, and the fidelity is incredible. As for reception, I get excellent reception even inside my garage.

"The second thing that impresses me is the variety of programming channels available. I love news and classical music, and the channels devoted to these types of programming are first rate. You haven't fully experienced radio until you hear the BBC World Service via digital radio.

"As a consumer, ham radio operator, and an ex-broadcaster, I have been enjoying the radio hobby for many years, and I am very impressed with what satellite radio has to deliver. Would I spend an extra \$5 or more per month (over the current \$10) on programming? Yes I would. Satellite radio simply delivers on what it promises. I only wish the positives of satellite radio would have been covered in the article half as well as the negatives."

— Jeff Weinberg

"P.S.: I was also one of the first to get DBS service. I read a lot of negatives about it, too. But, I tried it, and liked it. Thankfully, others did also. Hopefully, satellite radio will have the same chance to succeed as DBS did."

More on Military use of FRS

In the December Communications, your editor made the statement that "The military is prohibited from using civilian frequencies." The sentence was misleading; it should have read: "The military is prohibited from using *the* civilian frequencies," meaning the Family Radio Service frequencies.

Craig Leventhal has some additional observations on the subject: "If you had the chance to watch any of the coverage of the conflict in the Balkans, you would have noticed the presence of the Motorola 'Talkabout' radios in plain sight. They disappeared from view after several reports were broadcast stateside showing them clearly and in actual use. After that, only an occasional antenna sticking out of a pocket was to be seen.

"As far as the military goes, the U.S. army has selected the ICOM F3S as its 'soldier intercom' at the platoon level. The military has for some time been using its 'off the shelf procurement' program to acquire communications equipment. The SI, as it is known, is provided to the soldier with an AA battery holder in place of the usual rechargeable battery pack, a nylon carry holster(case), a rubber flexible antenna, and a headset. The radios have the ability to incorporate various encryption options inside the radio itself. These radios are identical to the units sold by authorized ICOM land mobile dealers, thus

keeping the procurement costs in line. The radios retail for around \$400 each versus \$2000-5000 for the old PRC-77 or \$1800-2500 for the PRC-126.

"Actually, the amateur radio frequencies are off limits as well as FRS. Several years ago a local bruhaha came to a boil when it was discovered that the squadron frequency (52.50 MHz) of a local ANG wing was being retransmitted on 53.50 MHz by a nearby amateur repeater. The squadron commander was adamant that it had been the squadrons' frequency since 1947, etc., and how dare the hams use it! He was unaware that amateurs had been granted primary/exclusive status on freqs between 50-54 MHz. The military stateside was supposed to vacate: obviously this guy didn't get the word. I have heard other instances of similar issues with the military, especially the army, since their radio gear all covers the 50-54 MHz band."

— Craig Leventhal

Radio Prague

"Bill Bergadano's January article on Radio Prague brought to mind what I heard during the Soviet crackdown on the Dubcek government in 1968. I was a newly-arrived Electronics Technician 3rd Class at U.S. Naval Radio Station (Transmitters), Guardamar del Segura (Alicante), Spain. Using my Zenith T-O and the station's R-390A, Radio Prague was heard on the evening of August 21 transmitting on 11990 kHz continuously in French, German, Italian, Czech, and English, and also on 6051 kHz (which had moved from 6055 to avoid jamming). The next day they had gone underground, identifying as 'Radio Free Prague, the legitimate voice of occupied Czechoslovakia'!

"These transmissions were also heard on 5930 kHz during the week following the invasion, with patriotic Czech music and appeals for support. The interval signal was changed from the *Forward Left* trumpet fanfare to the opening bar of *Vysehrad* by Smetana, played on a harp, which I believe was used for the home service from Bratislava. This was evidence that the clandestine broadcasts probably originated from that location.

"The last entry in my log was for August 30. It was exciting listening; I had the feeling of what it must have been like tuning around in the opening days of World War II."

— John H. Cobb, Jr., Roswell, GA

We welcome your ideas, opinions, corrections, and additions in this column. Please mail to **Letters to the Editor**, PO Box 98, Brasstown, NC 28902, or email meditor@grove-ent.com. Letters may be edited for length and clarity. Happy monitoring!

— Rachel Baughn, KE4OPD, editor

BULLETIN BOARD

March 2:

Alaska Special Event Station

The 30th Iditarod Sled Dog Race from Anchorage to Nome. The Matanuska ARA, KL7JFU, will sponsor a Special Event Station. Special event QSL cards will be sent for verified contacts on the 160-6 meter bands. SASEs requested.

March 2:

Cave City, KY

26th Annual Mammoth Cave ARC Hamfest at Cave City Convention Center (I-65, Exit 53), 7:30a.m.-2p.m. CST; adm \$6. Dealers, tailgating, VE testing, forums, prizes. 3.960 MHz meeting. Talk-in 146.94/34. Contact Jim Erskine, KD4GNN at mail@chirotoons.com or PO Box 187, Canmer, KY 42722.

March 3:

Waukesha, WI

Sewfars Swapfest March 3rd, 2002 Waukesha Co Expo Ctr 8am - 2pm. See <http://www.sewfars.com> or email sewfars@hotmail.com

March 9, March 16, March 23: St Louis County, MO

Skywarn Weather Observation free training sessions (Level 1, a.m., Level 2, p.m.), various locations. Call the Severe Weather Information Line - 314-615-7857 for locations and taped information. Certification for RACES and SKYWARN. Participation open to all.

March 9-10: Charlotte, NC

Charlotte Hamfest sponsored by Mecklenburg ARS at Charlotte Merchandise Mart, 2500 E Independence Blvd (US 74 at Briar Creek), 8:30am-5pm Sat, 8:30am-2pm Sun, Adm \$8, Talk-in 145.29(-600). Dealers, flea market, walk-in VE testing, forums. For info call 704-948-7373 or visit <http://www.w4bfb.org>

March 9: Harrison, AR

N Arkansas ARS Hamfest, Boone County Fairgrounds (Hwy 65B), 8am to 2 pm; adm \$5. Tailgating, forums, VE testing, prizes. Contact Bill Rose, N5VKF, 1007 North Maple, Harrison, Arkansas 72601; billrose@cox-internet.com; <http://www.qsl.net/naars/hamfest/index.html>

March 9: West Fargo, ND

Hamfest, Red River Valley Fairgrounds, 8 am - 3 pm; Adm: \$7. VE testing on site. <http://www.rrra.org>

March 8-9: Kulpsville, PA

SWL Winterfest sponsored by North American Short Wave Association (NASWA) at Best Western - The Inn at Towamencin (215-368-3800). Full registration \$50 until March 7 (includes seminars and meals only). Check <http://SWLfest.com/> for details or write SWL Winterfest, PO Box 4153, Clifton Park, NY 12065.

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HamTest.com is your complete resource for getting your ham radio license. You can study the entire question pools for the new amateur radio license exams, find an upcoming test location, get help on our message board, or even take a simulated test on-line to check your progress. If you already have a ham radio license, you can study for an upgrade, or check out our Restructuring FAQ to see what the new license system means to you!

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Radio Honor Roll

Tulsa Amateurs Restore Dispatching

Volunteers from the Tulsa Amateur Radio Club helped to restore police and fire dispatching service in nearby Collinsville, Oklahoma, after flames destroyed the city's radio gear and disrupted 9-1-1 service on Dec. 1, 2001. The early-morning fire badly damaged the 88-year-old Collinsville City Hall, which housed the community's police and fire departments and other offices. Even the antenna was lost. Collinsville arranged to set up its dispatching center in the Collinsville Rural Fire Station.

Area radio amateurs alerted to the devastating fire quickly responded to help. Tim Diehl, KB5ZVC; American Radio Relay League Oklahoma Section Manager Charlie Calhoun, K5TTT; TARC Public Service Liaison Dan Lamoreaux, WG5Z; Gregg Wonderly, W5GGW; Dave Smith, KD5OIJ; and Tom Roininen, KB5HMZ, brought the club's portable repeater system, which had been built using commercial radio equipment converted for amateur use. The amateurs reprogrammed the repeater for the police and fire departments to use as an emergency dispatch radio. By 9 p.m., all systems were totally operational, and police and fire dispatching was being handled though the club's loaned radio equipment.

— ARRL Letter and Mobile Radio Technology

Old Technology for New Emergencies

Los Altos Hills, a high-tech community on the outskirts of Palo Alto, decided in the mournful aftermath of Sept. 11 that it has a modern-day communications problem. Homes are separated by acres of sprawling countryside and ensconced behind protective gates. The two sheriffs are on assignment from the county. The mayor wondered how the town, with a staff of 21, could warn people if they were in danger?

Since then, the community has tapped its resources, both high-tech and low, to bring itself up to speed with its Information Age surroundings. Town officials sent postcards to every household asking for e-mail addresses and fax and phone numbers, although fax machines and computers require electricity and working telephone systems, which are easily overwhelmed in times of crisis.

That's why Scott Overstreet, chairman of the town's emergency communications committee, and a handful of other ham radio buffs have moved to resurrect the town's shortwave

network. "I'm trying to build a small group of dedicated operators around the equipment, and then bring in those who are somewhat interested to be available if something really big should happen," he said. "If we could expect them to come on the radio in an emergency, we might have an eyes and ears system throughout the town."

Bill Walters of San Jose, president of the Santa Clara Valley Repeaters Society, recalled the 1989 Loma Prieta earthquake, when tens of thousands of residents were without power for days.

"To the extent they have e-mail and cell phones, people will use them to communicate," Walters said. "If they're not available, people will use what they have, and sometimes what they have is amateur radio."

— from the LA Times

Work in Progress

"We all want the same thing — the best possible emergency response service," said Salt Lake County Mayor Nancy Workman. "Joining Valley Emergency, I believe, is the way we can best do this."

Monitoring Times has been covering the evolution of this system for more than a year. The Salt Lake County Fire Department is a charter member of the agency, which dispatches police and fire calls for every city in the county except Salt Lake City. Former county commissioners agreed to complete the merger by integrating sheriff's dispatchers into VECC. However, Workman and the council have been at odds on the VECC issue for months. After the issue came to a head in January, VECC was able to satisfy Council concerns about being able to link with Salt Lake City's dispatching system and allay fears about projected costs. The head of the VECC board also offered that VECC would be willing to extend the negotiating window until June and allow the county to bail out at year's end if a deal isn't done.

— from the Salt Lake Tribune

A Familiar Ring?

In connection with the 1996 phone call that refuses to hang up, a federal court panel recently ruled that Rep. John A. Boehner (R-Ohio) can amend and go forward with his complaint against Rep. Jim McDermott (D-Wash). The lawsuit stems from the public release of a conversation regarding then-House Speaker Newt Gingrich, which was intercepted and recorded by a Florida couple listening to a scanner. The couple pled guilty to unlawfully intercepting the call and paid \$500 each.

Boehner accused McDermott of violating a federal wiretapping law, and McDermott claimed First Amendment rights to disclose the information. A federal judge dismissed the case in 1998, but an appeals court reinstated it a

year later. McDermott appealed to the Supreme Court, who sent the case back to the appeals court. Meanwhile, the Supreme Court took up a Pennsylvania case in which it ruled that private citizens have a right to leak the tape of a private phone conversation even if they have reason to believe it was recorded illegally. In light of this decision, the appeals court is allowing Boehner to re-argue his case providing he introduces new facts.

— from The Washington Post

MARS Snubs Ute Listeners

If you happen to hear a phone patch expedited by an amateur radio operator participating in the US Army Military Affiliate Radio System (MARS), don't expect to get a verification (QSL) of your reception. James E. Banks, Western Area Coordinator for MARS sent the following notice in December to system operators:

SUBJECT: WAMC 62-01 (SHORT-WAVE MONITOR QSL REQUEST)

1. SEVERAL MEMBERS HAVE CALLED AND EMAILED THIS OFFICE INDICATING THAT THEY ARE RECEIVING LETTERS FROM SHORT-WAVE RADIO MONITORS REQUESTING QSL CARDS. THESE REQUEST ARE FROM INDIVIDUALS WHO ARE MONITORING ARMY MARS NETS. THE MEMBERS AMATEUR CALLSIGN AND HOME ADDRESS IS ALSO BEING OBTAINED BY THE SHORT-WAVE MONITOR FROM SOURCES THAT WE HAVE NOT YET DETERMINED.
2. IF ANY MEMBER RECEIVES A LETTER REQUESTING A QSL CARD FOR THEIR PARTICIPATION IN ANY ARMY MARS NET, I ASK THAT YOU NOT RESPOND TO THESE REQUESTS FOR OPSEC REASONS.

Navy Sonar at Fault

The mysterious mass stranding of 16 whales in the Bahamas in March 2000 was caused by Navy tests in which intense underwater sounds were generated for 16 hours, according to a newly released government report compiled by civilian and military scientists.

The report's conclusions mark the first time underwater noise other than from an explosion has been shown to cause fatal trauma in marine mammals. The military's acknowledgment of responsibility also marks a sharp departure from earlier statements by the Navy, which had denied responsibility for the Bahamian beachings and other mass strandings of marine mammals that coincided with sonar exercises.

Bulletin Board on page 7

The report concludes that the Navy should "put into place mitigation measures that will protect animals to the maximum extent practical" during peacetime training and research efforts.

- from *The Washington Post*

Chinese Presidential Plane Bugged

This story reads like a spy novel: Last August delivery was made to China of a new Boeing 767-300ER which had been manufactured and refitted in the U.S. to serve as China's presidential aircraft. President Jiang was supposed to take his maiden voyage in the jet to attend the summit of the Asia-Pacific Economic Cooperation forum in Shanghai in October. Instead, the plane sits, largely dismantled, on the ground.

Chinese military communications experts reportedly discovered numerous high-tech listening devices planted inside the plane. A Chinese source said that as of mid-January, 27 listening devices had been found, including devices in the presidential bathroom and in the headboard of the presidential bed. Western sources said they were told the devices were designed to be triggered by satellite.

The plane was refitted at the San Antonio International Airport by several aircraft main-

tenance firms, under round-the-clock guard by Chinese security. The work was performed during tense U.S.-Chinese relations following the collision between a U.S. reconnaissance aircraft and a Chinese jet off the coast of southern China.

However, this incident is being downplayed by China, perhaps in anticipation of Pres. Bush's visit to China in February. No formal mention has been made of the bugs by either government. A Chinese security expert said "This kind of thing is to be expected ... Even if our relations were excellent, we would still spy on each other."

Twenty Chinese air force officers and two officials involved in negotiations for the jet are being investigated by China, not only for negligence but also for corruption - the \$10 million refitting job cost China \$30 million.

- from *The Washington Post*

Newsbytes

- At midnight, January 21, Russia's last major independent television news channel lost its year-long battle for survival when the government pulled the plug and substituted a sports channel. Since the station was profitable, few question the motives were political.

- December 18, 2001, NASA shut down the Deep Space 1 probe, launched in 1998 to test the ion propulsion engine and other new technologies. In 2001 it captured the best-yet views of a comet's core and surprised everyone by surviving the encounter.

- January 15 was the date set for Russia to begin dismantling their listening station at Lourdes, Cuba. Three An-124 planes were to transport the center back to Russia, ending 40 years of Russian military presence on the island.

Communications is compiled by editor Rachel Baughn from news and clippings from our readers. Thanks to this month's reporters: Anonymous, Albany, NY; Jim Moore, Portland, OR; Doug Robertson, Oxnard, CA; Brian Rogers, Melvindale, MI; George Speck, Fort Worth, TX; Matthew Stanley, New York, NY; The SETI League, Robert Thomas, Bridgeport, CT. Via email: Chiguy, Ed Cummings, Nick Leggett, Hank Lichte, James MacDonald, Ed Muro, Doug Smith, Jon Van Allen, Larry Van Horn, Wilson, Robert Wyman.

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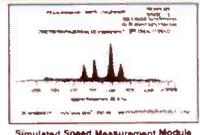
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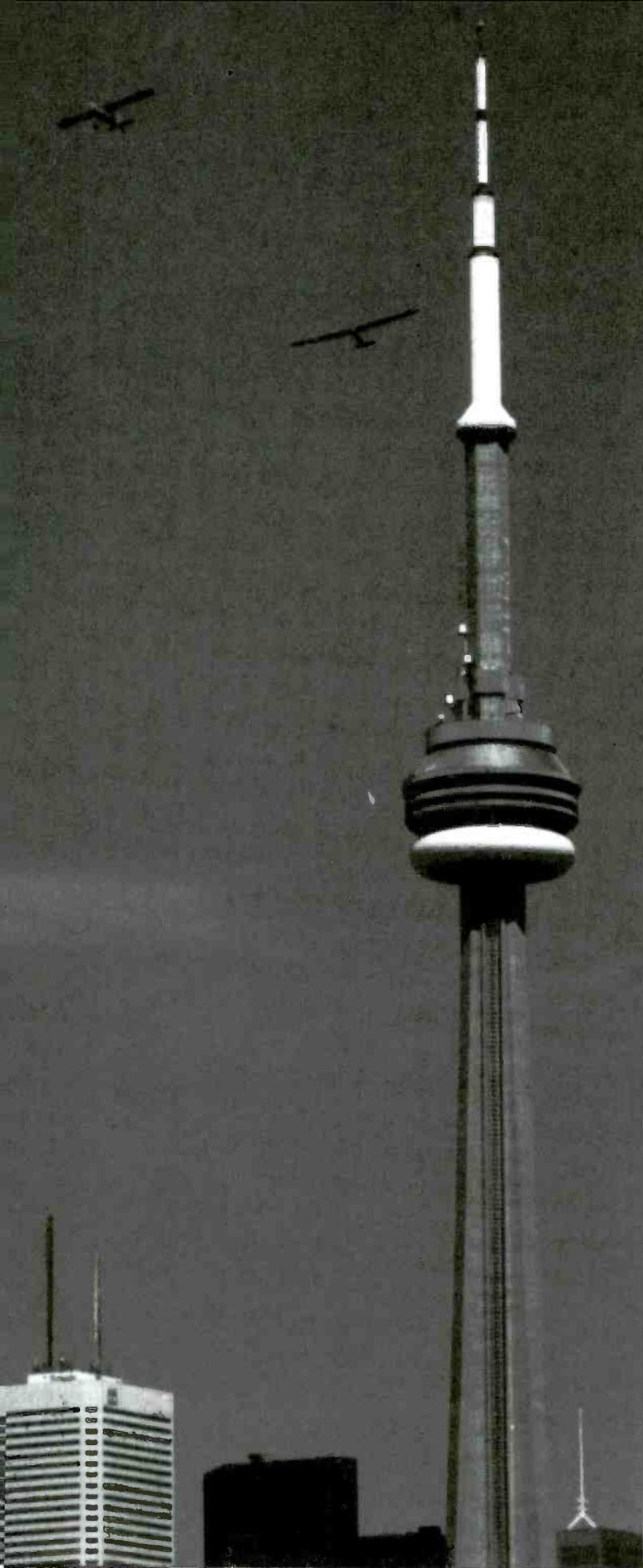
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Monitoring Canadian Air Shows

By John David Corby, VA3KOT

Ah, those hot summer days, the smell of aviation gas, smoke and hot dogs; the crowds, the traffic pile-ups waiting to get in, the bumpy drive across rough perimeter fields and the soft, muddy ground on which to park. Yes, it's air show season once more.

Air shows are one of the best opportunities to blow the winter cobwebs of a couple of scanners and get out into the fresh air and sunshine. Sure, you can get by with just a single radio if that's all you have, but I like to go into the field heavily armed with receivers. You will probably want to take along a good set of headphones as well. Forget those flimsy, fashionable things the kids wear to listen to their music. You are going to need headphones with substantial ear pads to shield the noise as jet fighters make vertical ascents, with afterburners roaring, right over your head.

Canadians love their air shows. Our season is a little shorter than in the United States, but when there is an air show happening in town, the roads fill up, necks are craned toward the sky, and excitement fills the air.

Air Shows Large and Small

Our air shows fall into three main categories. The biggest events take place at airports or military bases. At these events there is usually a static, ground or "flightline" display. For me, the ground displays are even better than the flying displays. I remember sitting in the left seat of the cockpit of the famous "Hanoi Taxi," the very aircraft that was the last to leave Hanoi carrying evacuees at the end of the Vietnam War.

The next category of air shows includes aerial displays accompanying major events, but where there is no ground display. In Canada, a good example of this type of event is the annual Canadian International Air Show (CIAS), also known as the CNE (Canadian National Exhibition) air show, held every Labour Day weekend in Toronto. In past years CIAS has included a flightline display at Toronto's Pearson International airport, but a major expansion taking place at Pearson airport has curtailed this part of the event in recent years.

In the third category is the local airfield "fly-in." These events do not always feature major attractions, but are always very enjoyable nonetheless. I attended one such event in 2001 at which the Snowbirds appeared. There was no line-up to get into the airport, and the small appreciative crowd had a great afternoon watching

Rounding the CN Tower in Toronto – CIAS 2001

the aerial and ground displays. The Snowbirds were actually performing at a fall fair a few miles away, and were using this airport as a staging point. The crowd, including myself, was enthralled when the Snowbirds performed a flyover of the airfield as they returned from their main event.

Real aviation buffs know of a fourth category of air show in Canada. I count myself among the cognoscenti in this field. We are the type of people for whom an aircraft is not just a fast means of transport, but a work of art. We crave the opportunity to be among these winged wonders, and get a shiver up the spine whenever a rare, or unusual, airplane flies over. We like to hang out at aircraft museums. Some of the best of these museums keep their aircraft in flying condition and they like to get them up in the air at every opportunity.

The Canadian Warplane Heritage Museum

The finest of the finest of these museums is the "Canadian Warplane Heritage Museum," located adjacent to the John C. Munro International Airport in Hamilton, Ontario. What causes such adulation and praise to be accorded to this facility? The simple explanation is that the Canadian Warplane Heritage Museum's exhibits are not rusting relics of bygone glory; they are live, restored, flying aircraft.

Table 2 lists the museum's exhibits. These aircraft are housed in a modernistic museum building on Airport Road in Mount Hope (the village near Hamilton where the airport is located). Every weekend during the flying season, the museum brings one or more of its collection outside the building and flies it over Hamilton. It is not unusual to be driving in the general Hamilton area and see an Avro Lancaster of World War 2 vintage take to the skies.

The museum's aircraft make regular appearances at other air shows in Canada, too. I remember an air show in Ontario, that I had driven three hours to visit, hosted an appearance of that same Avro Lancaster. I made a point of standing behind it as it fired up its four mighty propeller engines to leave at the end of the show. The air blast from the engines blew the hat right off my head and nearly left me sitting in the mud. I was in ecstasy. OK, I already declared my membership of the slightly maladjusted airplane fanatic society. I recover my composure during the winter months, and by springtime I am almost normal – really. Check out the museum's website at <http://www.warplane.com> for more details about this spectacular facility.

The Great War Flying Museum

There are other examples of the fourth category of air show all across Canada. The Toronto area is particularly replete with them. Just northwest of the city is the Brampton Flying Club. Apart from being Canada's

largest private flying club, and a very fine, well-equipped airfield, it is host to, and home of, the Great War Flying Museum. This quite modest museum is the focal point for a group of airplane enthusiasts that spend their evenings and weekends restoring, building and maintaining real, live flying examples of allied and axis powers biplanes and triplanes from the Great War. This museum's exhibits also make regular appearances at local air shows, and may be seen in the skies north west of Toronto quite regularly in the summer months.

Restoring the Avro Arrow

Other groups are involved with devotion to Canada's near claim to international aviation fame, the Avro Arrow. This warplane was designed and built by Canadians in the 1950s, but was so advanced that it would still be considered leading edge technology today. To the chagrin of many aviation buffs the project was cancelled by the federal government before production was started. Five flying prototypes were built, and destroyed.

There are persistent rumours of a secret society of Avro Arrow enthusiasts who smuggled drawings and parts out the factory when the program ended. Pieces of this aircraft keep appearing at various locations, and support for it continues to grow to this day. One group seeks to recover the one-fifth scale flight test models that were fired into Lake Ontario atop Nike rockets back in the 1950s. Remember you read it first in *Monitoring Times*; this enthusiast predicts that a full scale working model of the Avro Arrow will be flying at air shows in Canada within the next few years. Mark my words.

There is another excellent museum just outside the Canadian Armed Forces base at Trenton, Ontario. Here the aircraft do not fly,

A display from the Canadian International Air Show 2001

but they do remain as a well-restored and protected memorial to the sacrifices made by Canada's pilots in the wars of the twentieth century. The indoor part of the museum contains a large collection of artifacts from the two world wars of the last century.

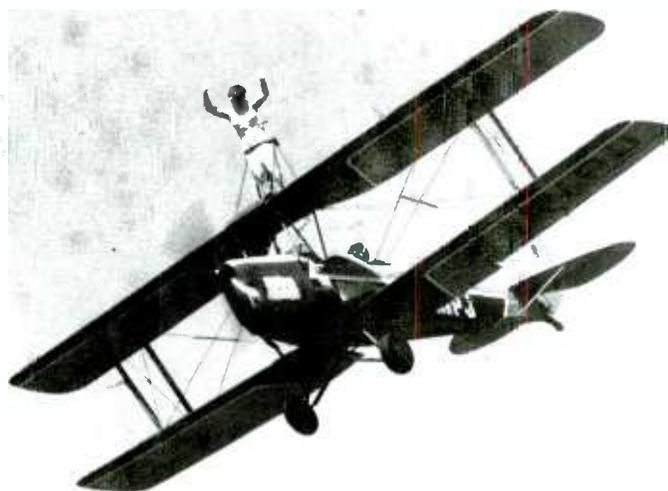
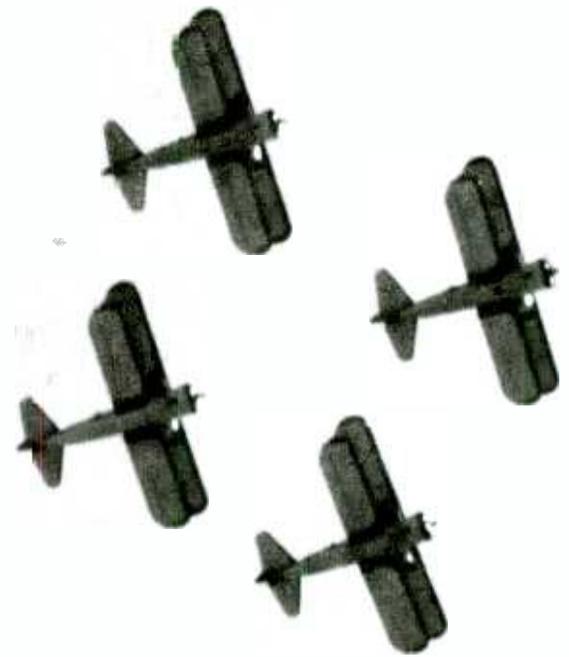
What to see and do?

There are usually plenty of choices for activities at Canada's air shows. Visit the ground displays and climb aboard the gentle giants of the air. Suck up the atmosphere and dream of the glories that the aircraft have enjoyed in missions or battles past. Visit the booths and grab a handful of souvenirs. If the military is present go check them out. I was attracted by a large VHF antenna on a pole alongside an olive green tent last year. I went into the tent and asked questions – especially about frequencies, and to my surprise, I got answers!

Watch out for the blue uniforms of the Royal Canadian Air Cadets. These fine young people are outstanding examples of all that is good about youth, and they are often present at Canada's air shows demonstrating their gliders. Show your support with a small donation to help them fund their air training activities.

Helicopter rides are often offered; a pricey but rare treat if your budget will stretch to it. Sometimes, there are other rides too. The Canadian Warplane Heritage museum may be offering rides in its historic aircraft. Or better yet, as you can see here, some people like to take a ride on a biplane; that's right, not *in* a biplane, *ON* a biplane!

Oh, and by the way, don't forget to look up every now and again. Air shows are, after all, about flying displays, and there are none finer than the ones you'll see above our nation's runways every summer.



Don't fly in a plane, fly on a plane

What to Monitor?

So off you go to your local airshow, scanners in your backpack, fresh batteries in a side pocket and a good pair of headphones. Now, what should you listen to? Tip number one: turn on your scanner on the way to the air show and scan the aviation band. Even before the show starts aircraft will be arriving and talking to the local control center and tower controllers. In fact, if you live near to where the air show is going to take place, it is even worth monitoring the aviation band (108-136 MHz) for a day or two before the event to listen out for early arrivals. Air show exhibits are often mustered at a local airfield during the days before the event – especially if they are going to be a part of the ground display.



Frequency finding isn't always hard

Table 1 lists the tower frequencies at the host airports for the major airshows scheduled to take place in Canada in 2002 (comprehensive at the time of writing). The tower controls all movements on the runways, whether those movements are scheduled air traffic, or air show traffic. Monitoring the tower frequencies will let you hear when aircraft are departing or returning from their performance. You may also want to monitor the ground controller frequencies to get a "heads-up" when a performer is moving toward a runway for take-off. A scan of the aircraft band will quickly reveal what frequencies are being used by ground controllers – often not the regular ground frequencies, especially if scheduled air traffic is continuing during the show.

Sometimes the task of finding a frequency to punch into your scanner is not so hard, as figure 3 shows: some smaller airports post their frequency on a sign for pilots to see when entering the apron area.

There is one other important frequency that you will want to have keyed in to your scanner: that is the frequency for the director of flight operations, usually called the "Air Boss." You can also find this frequency very quickly by scanning the aircraft band, or be bold and ask an official.

The Air Boss is in overall control of the sequence of performances in the air show. You will often hear some very interesting chat on this frequency. I remember hearing dis-

cussion about some rather severe technical problems with a European jet fighter at one air show last year. The problems were resolved minutes before its performance, but left me wondering whether it was safe to remain in the area while the plane was performing.

And, of course, you will remember the feature article in last month's *MT* about the Snowbirds. The Snowbirds leader cockpit to cockpit commands can be heard on 272.1 MHz – a frequency that many low-priced scanners cannot receive. So, if you want to monitor the Snowbirds, make sure you get a scanner that covers the military aviation band. The Snowbirds command frequency is sometimes relayed over the public address system at major air shows, but you can't always depend on that.

The Snowbirds are usually the last performance at Canadian air shows. When the Snowbirds finish their performance, the show usually ends and it is time for the long walk across the perimeter fields back to the parking lot, and the bumpy drive back out into the traffic jams leaving the show. But is it worth it? You betcha!



Snowbirds in close formation! CF Photo

Table 1: Major Canadian Air Shows in 2002

Date	Location	Tower Frequency
20 May	Leamington, ON	n/a
25-26 May	Muskoka, ON	122.3
28 May	Barrie, ON	122.7
1-2 June	Winnipeg, MB	118.3, 125.4
12 June	Stephenville, NF	122.3
15-16 June	Ottawa, ON	118.8, 120.1
19 June	Mont-Joli, QC	122.1, 126.7
27 June	Cobourg, ON	n/a
28-30 June	London, ON	119.4
1 July Canada Day	Ottawa, ON	118.8, 120.1
6-7 July	Moose Jaw, SK	126.2
13-14 July	Edmonton, AB	118.3
27 July	Yellowknife, NT	118.5
28 August	Peace River, AB	130.27
3-4 August	Lethbridge, AB	121.0, 122.5, 126.7
7 August	Esquimalt, BC	n/a
9-11 August	Abbotsford, BC	119.4, 121.0
17-18 August	Saskatoon, SK	118.3
24-25 August	Thunder Bay, ON	118.1
28 August	Branford, ON	123.0

31 August-2 Sept	Toronto, ON	118.2, 119.2
7-8 Sept 12 Wing	Shearwater, NS	126.2, 119.0
11 September	Bathurst, NB	122.8
14-15 Sept	Sarnia, ON	n/a

Note: "n/a" indicates the air show is not held at a Canadian airport.

Table 2: The Canadian Warplane Heritage Museum's Collection

This fine collection of planes contains many flying exhibits that can be seen in Canada's skies at air shows across the country.

Fairey Firefly MK 5
 Supermarine Spitfire MK XVI
 Hawker Hurricane
 Avro Anson IV
 Beech D18S Expeditor
 Cessna 150 Crane
 Douglas DC-3 Dakota
 Grumman G-44A Widgeon
 Canadair CF-104 Starfighter
 Lockheed T-33 Silver Star
 deHavilland Vampire
 Lockheed CF-104D Starfighter
 Hawker Hunter

Canadair CF-5 Freedom Fighter
 Avro CF-100
 Avro Lancaster
 Bristol Bolingbroke
 North American B25-J Mitchell
 Consolidated PBY 5A Canso
 Grumman CSF-2 Tracker
 Fairchild F-24R Argus
 Westland Lysander III
 Auster Beagle
 Boeing Stearman PT-27 Kaydet
 deHavilland DHC-1 Chipmunk
 deHavilland 82C Tiger Moth
 Fairchild PT-26B Cornell
 Fleet Finch
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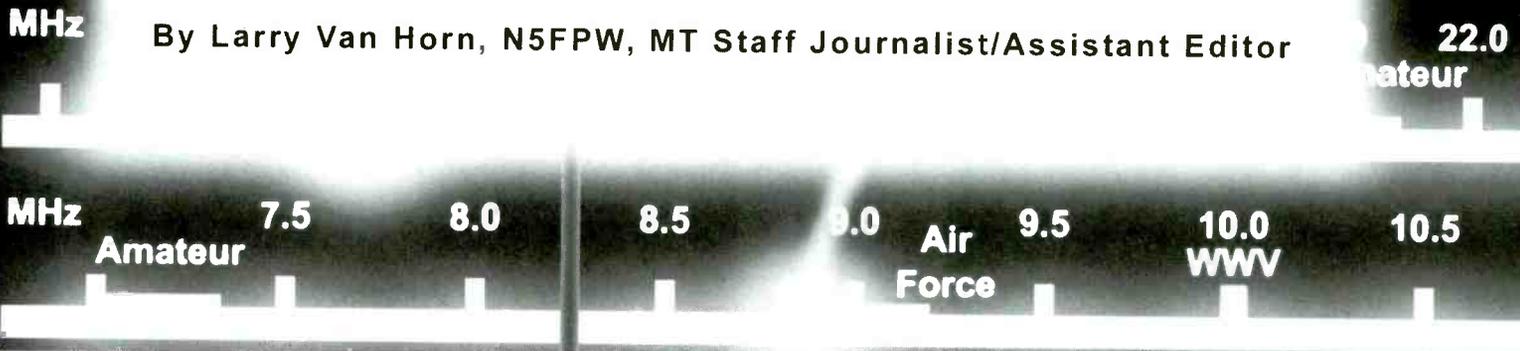
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Who's Who in the Radio Spectrum (Part 3) Shortwave Broadcasters – The World at Your Fingertips

By Larry Van Horn, N5FPW, MT Staff Journalist/Assistant Editor



I love to travel, and during my 25 year Navy career I got to visit some pretty exotic places around the world. Those days are past, but the desire to travel hasn't diminished one bit.

So how can one travel around the world without leaving home? The answer is simple. Jump on the shortwave bandwagon and let your radio bring the world to you.

Ask the average person what stations they think of when you mention the term "shortwave broadcasters" and what do you think the response would be? The average non-radio hobby person associates "shortwave broadcast radio" with stations like the British Broadcasting Company (BBC), Voice of America (VOA), or Deutsche Welle from Germany.

But shortwave broadcasting has much more to offer than the programming from these powerhouse international broadcasters. These bands are also noted for stations transmitting blatant propaganda (i.e., Radio Pyongyang in North Korea or Radio China International), to those noted for a more evenhanded treatment of world events (i.e. Swiss Radio International). You will hear a large variety of religious broadcasters such as HCJB out of Quito, Ecuador, or the more controversial WWCW broadcasting from Nashville, Tennessee. There are also domestic shortwave broadcasters that will give you a very unique prospective on their local events, music and culture if you understand the local language.

In a nutshell, shortwave radio is your window to the world.

Why Monitor Shortwave Broadcasts?

What are the advantages of listening to broadcasts in the shortwave spectrum instead of your local AM, FM or TV stations?

In a word, "variety." You will hear news stories from around the world that never make

it to the evening network TV or your local radio station newscast. You will receive all sorts of exotic music programs from around the world that you will surely not hear on any of your local radio stations. Programming from international shortwave broadcasters will run the full gamut from international business reports to overseas sporting events. Even unique science, religious and political programming can be heard in the shortwave broadcast bands. The variety is truly amazing.

The disadvantages? Well, there are a few. Stations change frequencies literally at a drop of the hat. Unlike AM/FM or TV broadcasters which rarely, if ever, change their transmit frequencies, shortwave broadcasters are under no such restrictions and do so quite readily to accommodate the changing ionospheric conditions. That is one of the reasons that, every month, this magazine produces its renowned *English Language Shortwave Radio Guide* with all of the latest English language shortwave broadcasts broken down by hour and by station.

Other disadvantages include fading, static, and natural or man-made interference on shortwave broadcast signals. Shortwave radio is *not* a high fidelity medium, and when a solar storm occurs and your favorite station disappears from the dials, even the best of shortwave receivers and antenna combinations cannot pull in what mother nature has decided to take away. But, for many, the advantages far outweigh any of the disadvantages, and shortwave broadcasters have developed a loyal and faithful following over these many years.

The predominant mode used by shortwave broadcasters is AM (amplitude modulation) and the frequency spacing in these bands is nominally 5 kHz between stations.

You will notice that each of the frequency ranges in Table One is referred to in "meters" and "kHz" or kilohertz. "Meter Bands" is a carry-over from the early days of radio and re-

fers to the wavelength of the radio waves in that particular frequency range. Experienced radio hobbyists still use this "meter band" terminology as a convenient shorthand of sorts. Some find it easier to say "25 meters" instead of "11500-12160 kHz."

So let's explore each of these shortwave bands and see what we can expect to hear and when we should be listening.

The Tropical Bands

The 60, 90 and 120 meter frequency ranges are known as the "tropical bands." Domestic stations located between the Tropic of Capricorn and Tropic of Cancer are the predominant users of these frequencies. These bands were established in the shortwave spectrum because static on the AM broadcast band (see last month's *Who's Who Part 2*) is often so heavy in the tropics that reception outside their immediate vicinity is difficult or impossible. So by putting a domestic shortwave station on the air in one of the "tropical bands," greater range and less interference is experienced by the intended audience of these stations.

These "tropical bands" are favorites of SWLs (shortwave listeners who monitor a station for its programming content) and DXers (radio hobbyists listening for the sole purpose of intercepting distant radio stations) alike. But none of the stations broadcasting in these bands

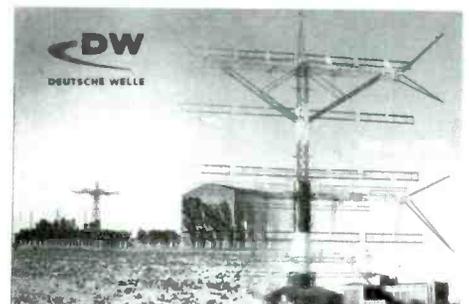


Table One: The Shortwave Broadcast Spectrum

Shortwave broadcasters occupy 14 separate bands of frequencies in the high frequency or HF spectrum (1.7-30.0 MHz). These bands are:

120 meters	2300-2498 kHz*	Band shared with other services
90 meters	3200-3400 kHz*	Band shared with other services
75 meters	3900-3950 kHz	ITU Region 1 Aeronautical/Region 2 Amateur Radio/Region 3 Broadcast
	3950-4000 kHz	ITU Region 1 and 3 Broadcast/Region 2 Amateur Radio
60 meters	4750-5060 kHz*	Excluding 4995-5003 kHz. This band is shared with other services
49 meters	5730-5900 kHz**	
	5900-5950 kHz	WARC-92 assignment
	5950-6200 kHz	Exclusive assignment
	6200-6295 kHz**	
41 meters	6880-6990 kHz	
	7100-7300 kHz	ITU Region 1 and 3 Broadcast/Region 2 Amateur Radio
	7300-7350 kHz	WARC-92 assignment
	7350-7600 kHz**	
31 meters	9250-9400 kHz**	
	9400-9500 kHz	WARC-92 assignment
	9500-9900 kHz	Exclusive assignment
25 meters	11500-11600 kHz**	
	11600-11650 kHz	WARC-92 assignment
	11650-12050 kHz	Exclusive assignment
	12050-12100 kHz	WARC-92 assignment
	12100-12160 kHz**	
22 meters	13570-13600 kHz	WARC-92 assignment
	13600-13800 kHz	Exclusive assignment
	13800-13870 kHz	WARC-92 assignment
19 meters	15030-15100 kHz**	
	15100-15600 kHz	Exclusive assignment
	15600-15800 kHz	WARC-92 assignment
18 meters	17480-17550 kHz	WARC-92 assignment
	17550-17900 kHz	Exclusive assignment
15 meters	18900-19020 kHz	WARC-92 assignment
13 meters	21450-21850 kHz	Exclusive assignment
11 meters	25670-26100 kHz	Exclusive assignment

Spectrum notes:

* Indicates a tropical broadcast band.

** Broadcasters have a secondary assignment in this frequency range and must operate on a non-interference basis with primary HF non-broadcast services

WARC-92 Band will be available for broadcast use in 2007. Frequency range is shared with other HF services until that year.

ITU Region 1 Europe/Africa

ITU Region 2 Americas

ITU Region 3 Asia

are easy to hear. Keep in mind that, unlike the major international broadcasters such as the BBC or VOA, these domestic stations cater to an audience that is local in nature. Most of these stations transmit with lower power levels than their big international cousins. And you won't hear much English in these bands, since the stations will be transmitting in the language of their intended audience.

Numerous domestic broadcasters in these bands can be heard from Central and South America throughout the evening and into the night here in North America. Under the right conditions several stations in Africa can also be heard, even on this side of the Atlantic. Perhaps the most exotic (i.e., rare) listening of all comes from stations located in Asia and the Pacific. Some of the more highly prized targets to hear from that region are the domestic broadcasters transmitting from Indonesia. Brazilian and Chinese domestic and regional stations are also highly prized targets for "tropical band" DXers.

Unlike the higher radio frequencies in the shortwave spectrum, these bands are not noticeably affected by the current sunspot count. What does affect their reception is the diurnal pattern of light/darkness at one's receive location. During daylight hours you will only be able to hear stations out to about 500 miles. But as on medium wave frequencies, recep-

tion changes from about two hours before sunset until two hours after sunrise. Long distance reception (a range of 1000 miles or more) is possible on paths that are in complete darkness.

One major drawback in listening to these bands is still the lightning-induced static noise level. While static levels in the "tropical bands" are lower than those in the medium wave spectrum, they are still fairly high and can make reception extremely difficult on the low power domestic stations transmitting here, especially during the late spring, summer and early fall months in North America.

One other minor broadcast band deserves a mention here before we move on to higher frequencies, and that is the 75 meter band. One of the first things you will notice about this band is that it shares frequency space with amateur radio operators here in the Americas. If you're tuning around in the AM mode, you can't miss the Donald Duck type modulation associated with the single side-band stations operated by amateur radio operators.

In fact, some of my less-informed ham radio friends have been heard night after night bitterly complaining over the airwaves about those "illegal broadcasters invading our ham bands." Please note: These stations are not illegal, and the ham radio community is going to have to learn to deal with this situation as best they can. The shortwave broadcasters, under international law, have as much right to be on these frequencies as the hams in this hemisphere do. More about this will be presented shortly.

The Continental Band

Quite a few of us "old timers" remember the days when the 49 meter frequency range was called the "continental band." Even today, this band is still widely used by a variety of international and even some domestic broadcasters from all around the world.

Like the tropical bands mentioned above, distant stations are best heard during the evening and overnight hours. With a little careful listening throughout the North American evening hours, English language broadcasts from much of Europe can be monitored. During daylight hours, depending upon your location in North America, you may be able to hear a few low-powered Canadian broadcast relay stations in this frequency range.

The Mess on 41 Meters

There probably is no bigger mess in the shortwave spectrum than the 41/40 meter shortwave/ham bands. After many years of working hams in that band and also listening to shortwave broadcasters, I have come to one conclusion: Somebody is going to have to go if order is to be restored to this portion of the shortwave spectrum. The frequency range from 7100-7300 kHz is an absolute mess. Shortwave listeners bitterly complain about the hams, and amateurs bitterly complain about the broadcasters.

The American Radio Relay League here in the U.S. has called for an exclusive international assignment to amateur radio of 300 kHz in this frequency range (see the editorial and background information on the ARRL website at <http://www.arrl.org/announce/regulatory/WRC-03/ISTU-0800.pdf>). This issue is scheduled to be addressed at the next World Administrative Radio Conference (WARC) in 2003. This should prove to be an interesting conference for all parties involved.



UNA VOZ
DE AMISTAD
QUE
RECORRE
EL MUNDO



Reliable Bands for International Broadcasts

31 and 25 meters are both good shortwave listening bands, with a fine mixture of large international broadcasters and smaller DX targets mixed in. According to one source, 72 percent of all the world's shortwave broadcast transmissions in 2002 will occur on frequencies 12 MHz and below. During daylight hours transmissions can be heard from stations 500-1,500 miles in distance. At night both bands can be used to receive transmissions on a worldwide basis. If you want to rack up a large number of countries in your reception logbook, these two bands will help you do just that.

The Higher Frequencies

One of my very simple rules for radio listening is that, the higher the frequency, the higher the sunspot count needed for radio signals to propagate there. In 2002, as we come off the peak of our current 11-year sunspot cycle, 22, 19, 16, 15 and 13 meters will still host quite a bit of international broadcast traffic. These frequencies are primarily daytime-only bands. However, the lower frequency ranges of 22, 19, and 16 meters can support communications well into local evening hours from stations to the receiving location's west. This is especially true in the late fall to early spring months of the year. When the sunspot count is up as high it is now, these bands do provide good, high quality signals from all over the world.

Finally, the 15 meter band is not supposed to be in widespread use until 2007 (see Table One), but quite a few international broadcasters have already been observed using this portion of the radio spectrum in the last couple of years. An occasional swing through 18900 to 19020 kHz might net you a new one or two for your logbook.

Shortwave Propagation in a Nutshell

Shortwave broadcasts are available 24 hours a day. Transmissions on 11-31 meters are heard during daylight hours; 25-41 meters has activity in the early morning and afternoon through late evening hours. The 49 through 120 meter bands

are for nighttime listening.

Remember that to hear long-distance signals in the tropical bands, a path of darkness must exist between the transmitter and receiver. (See page 25 for more on propagation.)

Equipment

If all you want to do is listen to the BBC and VOA, then that little \$49.95 portable down at Honest Cal's Discount Radio Emporium will do just fine. But, on the other hand, if you are really interested in

hearing a wide range of stations, especially those transmitting in the "tropical bands," a communications receiver is almost a must. The key words here are receiver sensitivity and selectivity. As you move up in price you get more of each of these important specifications. These more expensive radios will be able to pull in the weaker signals without interference. (See the *SWL Primer* on page 84 for more advice on buying shortwave radios.)

Antennas are another story. A receiver cannot demodulate a transmitted signal unless something is there to begin with. For hearing the real "big gun international stations," the built-in whip of a portable receiver or a short hunk of wire will do. One of the better all-around performers is the venerable random long wire antenna (the longer and higher the better).

Another excellent choice is the Grove Skywire antenna. I use one not only for shortwave reception but also for transmitting on the ham bands using a tuner. It has exhibited excellent performance in both instances.

If you intend to listen to only one or two bands, a dipole antenna cut for those bands would be indicated. The antenna you choose should be designed to fill your specific needs.

Of course, you shouldn't forget to add a ground system. And remember, no device added to your antenna will protect you from a close or direct lightning strike. Your best protection is to unplug your outdoor antenna from the radio anytime you're not using the radio.

Reference Material and Internet Web Sites

In addition to a subscription to this magazine for your shortwave information, I have two other reference recommendations to make.

The king of the annual shortwave books is the *World Radio and TV Handbook (WRTH)*. Now in its 56th year of publication, the *WRTH* is considered by many to be the bible for the shortwave broadcast listener.

The second reference is a relative newcomer to the block, with not quite as long a lineage as the *WRTH*, but nonetheless

a very devoted following of the style and content contained in its pages. The *Passport to World Band Radio* is in its 17th year of publication and contains not only shortwave frequency/schedule information presented in a graphic style, but condensed receiver and accessory reviews. Both the *WRTH* and *Passport* publications are available from Grove Enterprises.

On the Internet there are a couple of web sites you should bookmark. Willi Passmann, DJ6JZ, *Radio-Portal* website will help you find just about anything radio related on the internet. Point your browser to <http://www.radio-portal.org/>.

The other extremely useful website for the shortwave broadcast enthusiast is Hermod Pedersen and Risto Kotlampi's *Hard-Core DX* web site. This one is chock full of the latest information about new stations, propagation conditions, QSL (verification) signers, and what has been heard lately on the bands. Check out this useful reference at <http://www.hard-core-dx.com/>.

I have also included a listing of easy to hear shortwave stations in Table Two below. If you successfully log all of the stations listed, you will have put 35 countries in your logbook and be well on your way to becoming a seasoned SWL. But you do need to keep in mind that our list is subject to change. Most shortwave stations change their broadcast schedules/frequencies twice a year in November and March. This is done to compensate for the difference in propagation condition between the winter and summer months. If you use an annual publication like *Passport* or the *WRTH*, make sure you get a subscription to *Monitoring Times*. Our exclusive *English Language Shortwave Radio Guide* will help keep your annual publications up-to-date as the frequency changes occur.

Finally

In recent times I have had more than my share of phone calls asking me if shortwave is dead. With newer technologies some fear that shortwave radio has outlived its usefulness. To that I say "nonsense." Go back to Table One and look at all the existing and new spectrum devoted to broadcasting. Dying services do not need additional frequency spectrum space. Shortwave radio is here to stay and I don't see any major changes in the foreseeable future.

So despite the great advances we have made in the last few years in electronic media, nothing beats a shortwave radio for the diversity of information and programming you will receive on its bands. If you are truly interested in what is happening around the world, then owning a shortwave radio is just the ticket to armchair travel from the comfort of your home.



Table Two: Your First 35 Countries on Shortwave

Courtesy of Gayle Van Harn and Mark Fine

All times are UTC and all frequencies are in kHz. Schedules and frequencies are subject to change.

Station	Time (UTC)	Frequencies (kHz)	Station	Time (UTC)	Frequencies (kHz)
BBC World Service (UK)	0000-0500	5975	Radio Prague International	0100-0127	6200 7345
China Radio International	0100-0156	9580 9790		0200-0227	6200 7345
	0300-0356	9690		0400-0427	7345 7385 9435
	0400-0456	9560		2230-2257	7345
	1300-1356	9750		2330-2357	7345 9435
	1400-1456	7405	Radio Romania International	0200-0300	9550 11740 11830
Deutsche Welle (Germany)	0100-0145	6040 9640 9765 11985		0400-0500	9550 11830
	0300-0345	6020 6045 9700 9765 11985		0600-0700	9530 11830
	0500-0545	5960 6120 9670 11795	Radio Slovakia International	0100-0130	5930
Emirates Radio (UAE)	0330-0350	12005 13675 15400	Radio Sweden	0230-0300	9495
HCB, Quito (Ecuador)	0100-0600	9745 11840		0330-0400	9495
Radio Australia, Melbourne	0800-1500	9580		1230-1300	18960
Radio Austria International	0230-0300	7325	Radio Taipei International	0200-0300	15320 15465
	1630-1700	17865		0300-0400	5950 9680
Radio Budapest (Hungary)	0200-0230	9835		0700-0800	5950
	0330-0400	9835	Radio Tirana International (Albania)	0245-0400	6115 7160
Radio Bulgaria	0000-0100	7400 9400	Radio Ukraine International	1200-1300	11825 15520
	0300-0400	7400 9400	Radio Vilnius (Lithuania)	2330-2359	9875
Radio Cairo (Egypt)	0200-0330	9475	Radio Vlaanderen International (Belgium)	0400-0425	11985
Radio Canada International	0000-0100	5960 6175 9590 9755		2230-2255	13700
	1400-1600	9515 13655 17710	Radio Yugoslavia	0200-0230	7130
Radio Exterior España (Spain)	0000-0159	6055	RAI International (Italy)	0055-0115	9675 11800
	0500-0600	6055	Vatican Radio	0250-0310	7305 9605
Radio Finland (YLE)	1330-1359	15400 17660	Voice of America (U.S.)	1000-1100	5745 7370 9590
Radio Havana Cuba	0100-0500	6000 9820	Voice of the Islamic Republic of Iran	0030-0100	6135
Radio Japan	0000-0100	6145		0100-0130	6135
	0500-0600	6110	Voice of North Korea (Pyongyang)	1300-1356	9335 11710
	0600-0700	9835		1500-1556	9335 11710
Radio Korea International (South Korea)	0200-0300	7275 9560 15575	Voice of Russia (Moscow)	0200-0400	7180 7250 7335 12020 13655
	1130-1230	9650		0400-0600	7125 7180 7330 12010 12020
Radio Netherlands	0000-0125	6165 9845	Voice of Turkey	2300-2350	9655
	0430-0530	6165 9590	Voice of Vietnam	0100-0127	6175
				0230-0257	6175
				0330-0357	6175

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This list is updated frequently, visit often to catch outstanding bargains!



The snowy Himalayas run through Kashmir, as well as all the rest of the northern part of India, Nepal, and Tibet. Courtesy India Tourist Office.

The reports started coming in just as the last Taliban and al-Qaida troops were being flushed from the mountains on Afghanistan's border with Pakistan. While the world was busy watching America's war on terror unfold, troops from India and Pakistan were quietly massing on Pakistan's border with the Kashmir region of India.

India and Pakistan have gone to war three times in the last 50 years, and Kashmir has twice been at the center of the conflicts. Islamic elements in Kashmir want independence from India, to the extent of possibly even becoming part of Pakistan. Hindu-dominated India and overwhelmingly Muslim Pakistan are once again feuding over Kashmir, and with America's war on terrorism focused on nearby Afghanistan, their decades-old dispute is getting more attention than ever before. The fact that both are nuclear powers adds to international concern.

As with similar events all over the world, coverage by the broadcast and cable news networks is at the mercy of other news events that may be closer to home, or of more immediate significance. So, consistent coverage of news in the region can be elusive. Enter the shortwave broadcast voices of India, Pakistan, and their fellow members of SAARC – the South Asian Association for Regional Cooperation.



Shangrilla is nestled between lake and mountain in northern Pakistan. Courtesy Pakistan Tourism Development Corporation.

Listening In on India and Pakistan

By Dave White

Over the years, government sanctioned shortwave broadcasts have been used to help define the lines that divide nations. Thus it is that reports on a given diplomatic meeting or terrorist bombing will sound quite different on Radio Pakistan than on All India Radio. Neighboring voices – Bangladesh, Bhutan, Nepal, Sri Lanka – each with varying degrees of objectivity, all with a stake in the stability of the region, add additional flavor to the mix. The result is a feast of enough raw information to satisfy news junkies, DX addicts, or the casually curious.

Although none of the broadcasters in the region specifically targets the Americas with their external services, most are on enough frequencies, with enough power, that they are regularly heard in North America anyway.

(Times are UTC; frequencies are kHz; times and frequencies are B01 schedules, in effect until 3/24/02)

INDIA

All India Radio has been on the air since 1936, under the auspices of the Indian government's Ministry of Information and Broadcasting. AIR's radio arsenal includes 48 shortwave, 150 medium wave, and 128 FM transmitters. Daily English language shortwave broadcasts – about four hours' worth – are beamed to virtually every continent except the Americas.

ALL INDIA RADIO (AIR)

Time	Freq	Target
0000-0045 Daily	9705	SE Asia, Philippines, Indonesia
	9950	China, Korea, Japan
	13605	SE Asia, Philippines, Indonesia
	11585	China, Korea, Japan
1000-1100 Daily	13700	Australia, New Zealand
	15020	China, Korea, Japan, Australia, New Zealand
	15260	India, Pakistan
	17510	Australia, New Zealand



One of BBS's studios in operation. Courtesy Bhutan Broadcasting Service.



India's most recognizable landmark, the Taj Mahal, has stood for over 350 years. Courtesy India Tourism Office.

1330-1500 Daily	17800	China, Korea, Japan
	17895	Australia, New Zealand
1745-1800 Daily	11620	SE Asia, Philippines, Indonesia
	13710	SE Asia, Philippines, Indonesia
	7410	Europe

AIR's English programming includes news, commentary, Indian music, and occasional documentaries.

PAKISTAN

Pakistan's government initiated its external shortwave service in 1949, and it is operated today by the quasi-governmental Pakistan Broadcasting Corporation. Radio Pakistan employs 23 medium wave and shortwave transmitters to target domestic and external audiences. English language broadcasts are limited to two brief four-minute segments and a single 15-minute broadcast.

RADIO PAKISTAN

Time	Freq	Target
0800-0804 Daily	17520	Scandinavia, Europe, Russia
	21465	Scandinavia, Europe, Russia
1100-1104 Daily	17520	Scandinavia, Europe, Russia
	21465	Scandinavia, Europe, Russia
	11570	Africa
1600-1615 Daily	15100	Africa, Middle East
	15725	Africa
	17750	Africa

Radio Pakistan's English programming espouses the government's political positions, as well as depicting Pakistani culture, history, and way of life.

BANGLADESH

Bangladesh, which declared its independence from Pakistan in 1971, has the dubious distinction of being one of the world's most crowded



Sukkur, Pakistan, a major highway and railroad junction, is home to thousands of "urban squatters." Courtesy Pakistan Tourism Development Corporation.

countries. When it makes the evening news, it is usually because of famine, flood, or other natural disaster. Bangladesh Betar (Radio Bangladesh) offers 15- and 30-minute English broadcasts throughout the day.

RADIO BANGLADESH (BANGLADESH BETAR)

Time	Freq	Target
0200-0210 Daily	4882	India, Pakistan
1230-1300 Daily	7185	China, Korea, Japan
	9550	SE Asia, Philippines, Indonesia
	15520	Middle East, India, Pakistan, Afghanistan
1530-1545 Daily	4882	Middle East, India, Pakistan, Afghanistan
	15520	Middle East, India, Pakistan, Afghanistan
1545-1600 Su&Th	4882	Middle East, India, Pakistan, Afghanistan
	15520	Middle East, India, Pakistan, Afghanistan
1745-1900 Daily	7185	Europe
	7463	Europe
	9550	Europe
	15520	Middle East, India, Pakistan, Afghanistan

Radio Bangladesh was a clandestine station when the country was still part of Pakistan. Sadly, its English broadcasts, which are heavy on music and Islamic teachings, are consistently plagued by poor audio quality.

BHUTAN

The Bhutan Broadcasting Service maintains just one shortwave frequency, 6035 kHz, and its English broadcasts are intended for the immediate area. At 50kW, the broadcasts are not rare, but require some patience and persistence to log in North America. Although small and geographically isolated, Bhutan has had an international shortwave presence for nearly 30 years.

BHUTAN BROADCASTING SERVICE

Time	Freq	Target
0500-0600 M-F	6035	India, Pakistan
0800-0900 M-F	6035	India, Pakistan
1000-1130 So-Su	6035	India, Pakistan

BBS English fare includes news, music, and features on Buddhism, farming, and astrology.

NEPAL

Radio Nepal is one of the more difficult tar-

gets in the area. Its three daily English broadcasts are short, targeted regionally, and are confined to congested frequencies in the 90, and 41 meter bands.

RADIO NEPAL

Time	Freq	Target
0215-0220 Daily	3230	India, Pakistan
	7165	India, Pakistan
1115-1145 Daily	3230	India, Pakistan
	7165	India, Pakistan
1415-1420 Daily	3230	India, Pakistan
	7165	India, Pakistan

Radio Nepal's schedule includes a mixture of informational, educational, and entertainment programming.

SRI LANKA

The first experimental radio broadcast in Sri Lanka (then a British colony called Ceylon) was in 1924, prompted by the interest aroused by the licensing of the BBC a year earlier. Today SLBC (Sri Lanka Broadcasting Corporation) is active on frequencies throughout the shortwave spectrum, with several hours of English language broadcasts each day.

SRI LANKA BROADCASTING CORPORATION (SLBC)

Time	Freq	Target
0030-0430 Daily	6005	India, Pakistan
0030-1600 Daily	9770	India, Pakistan
	15425	India, Pakistan
0200-1000 Daily	6130	India, Pakistan
1000-0200 Daily	4940	India, Pakistan
1030-1130 Daily	11835	Indonesia, Australia
	15120	China, Korea, Japan
	17850	SE Asia, Philippines, Papua NG
1230-1600 Daily	6005	India, Pakistan
1900-2000 Sa	6010	Europe, Africa

Country music is often featured on SLBC's English broadcasts, along with news and commentary.

OTHER SOURCES

Both the BBC and the VOA target the region with local language broadcasts. English versions of these reports on the latest events in the area are available on those broadcasters' websites.

There's nothing like shortwave broadcasts for providing direct access to what's happening in the world, at the exact time and place that it's happening. Never has that been more apparent than in following the rapidly changing events in the world's latest hot spot.

About the Author

Dave White, K4CC (dave@k4cc.net) keeps one foot in the broadcast industry, one foot in the Internet business, four fingers on the keyboard, and at least one ear on his shortwave radio whenever possible.



A serene lake in the midst of political turmoil in the disputed Kashmir region of India. Courtesy India Tourist Office.

Clandestine Voices

by Hans Johnson

Kashmir's Clandestine Voice

The Voice of Jammu and Kashmir Freedom Movement (VOJKFM) is Pakistan's secret radio voice in its struggle with India over Kashmir. Although it never announces its location, the station broadcasts from a 100,000 watt shortwave transmitter located in Islamabad, Pakistan.

VOJKFM's parent organization is the Jammu and Kashmir Freedom Movement. There is also a political party with the same name, but it is unclear whether this party is VOJKFM's backer or if this is just a coincidence of names.

VOJKFM broadcasts three times a day: 0230-0400 universal time on 5988 kilohertz, 0745-0845 on 7230, and 1300-1430 on 5101. In addition to programs in Kashmiri and Urdu, there is an English program known as *Kashmir Panorama*. This program is best heard at 1400 and can be quite hostile to India.

As Pakistan takes steps to deal with terrorism, one wonders if they will shut down VOJKFM. Surely it is viewed as hate radio in New Delhi.

Reception reports may be sent to: P.O. Box 102 in Muzaffarabad, Pakistan, where Islam Ud Din Butt signs verification letters. Expect to receive materials on Kashmir as well as a verification letter. Return postage is not necessary.

WEB DIRECTORY

These Internet resources may be useful in augmenting your "listening in" to events unfolding between India and Pakistan:

All India Radio	http://air.kode.net/
Bangladesh Betar	http://banglaradio.com/
BBC Bengali Service (Bangladesh)	http://www.bbc.co.uk/bengali/
BBC Hindi Service (India)	http://www.bbc.co.uk/hindi/
BBC Nepali Service (Nepal)	http://www.bbc.co.uk/nepali/
BBC Tamil Service (India)	http://www.bbc.co.uk/tamil/index.shtml
BBC Urdu Service (Pakistan)	http://www.bbc.co.uk/urdu/
BCC Sinhala Service (Sri Lanka)	http://www.bbc.co.uk/sinhala/
Bhutan Broadcasting Service	http://www.bbs.com.bt/
Radio Nepal	http://www.catmando.com/radionepal/
Radio Pakistan	http://radio.gov.pk/
SAARC	http://www.saarc-sec.org/
Sri Lanka Broadcasting Service	http://www.infolanka.com/people/sisira/slbc.html
VOA Bengali Service (Bangladesh)	http://www.voa.gov/bangla/
VOA Hindi Service (India)	http://www.voa.gov/hindi/
VOA Urdu Service (Pakistan)	http://www.voa.gov/urdu/

Challenges for International Broadcasting: Shortwave Versus the Internet?

By John Figliozi

This is the last in a series of three articles reporting on the sixth *Challenges for International Broadcasting* conference held during May 2000 in Montreal, Canada. The theme for the 2000 conference was "Programming: The Heart of International Radio."

The first two articles in this series appeared in January and June 2001 and dealt with various aspects of international broadcasting – its role as a global public good and as a craft, its need to attract younger listeners, its relationship to national broadcasting, its role in conflict situations and promoting peace, and the prospects for cooperation among broadcasters. This time we discuss audience research and the impact of new technologies.

Knowing the audience

Graham Mytton, noted authority on audience research, chaired an enlightening session on this otherwise dark science. Much of the discussion centered on methods, which principally served to underline an oft-expressed admonishment during the session that available research is limited and, therefore, should be treated carefully.

Nonetheless, it is an indisputable fact that such research is important and that both methods and available information are improving. This is good news, according to Allen Cooper – formerly of the BBC but now

head of his own research organization – because broadcasters need to measure success, justify resources, quantify benefits to their funders, and identify and maintain their competitive advantage. Cooper acknowledged the value of direct listener feedback to stations, but pointed out that there is a huge difference between the small percentage of listeners who correspond with stations and the larger body of listeners who just listen. He asserted that there was no substitute for systematic research, a point made several times by several panelists.

The Center for International Broadcasters' Audience Research Services (CIBAR),

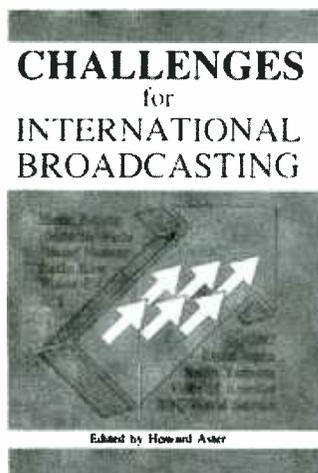
maintains professional standards and guidelines. In the main, international broadcasting audience research uses the same techniques as used for domestic audience research with some customization. For example, where domestic research uses daily ratings, international research uses weekly ratings. Special care is also needed in evaluating the impact of local rebroadcasting efforts of international stations.

Cooper sought to reassure smaller stations that the size of the audience was much less important than its qualities. He pointed

out that the worldwide radio audience cannot get significantly larger and that the growing number of radio stations means that each will likely end up with smaller audiences ("the same cake with smaller slices"). In this environment, the key questions for international broadcasters are: Are you reaching your target audience? And, if so, are you providing them with good programming? Successful niche programming, not audience size, is the true measure for success.

This message was reinforced by Colin Wilding of the BBC World Service. He posed the question, "Does an audience for international broadcasting exist?" He quickly answered in the affirmative; but pointed out that it was not one audience. The fact that BBC World Service research identifies 151 million listeners to the station is interesting, but is not the measure of success, said Wilding, echoing the sentiments of Cooper.

Wilding pointed out that the service's yardsticks for success involve a range of values that have little to do with audience size. These include being: the best known and best respected; the first choice for accurate, editorially objective, independent news; and the world's reference point and



guide to an ever more complex world.

Far from seeking to serve everyone, the World Service's audience targets were quite limited, said Wilding. It seeks to serve "cosmopolitans" (described as "opinion leaders"), those who aspire to be cosmopolitans, the information-deprived, and those needing a lifeline to vital information because of political or economic circumstances. Wilding explained that the characteristics of the audience change regionally. It would be a cardinal error, he said, to generalize about a global audience. In truth, he argued, there is no global audience; only several regional ones.

Where is the audience? Wilding offered a global tour: Nigeria is a large traditional, but changing, market; in Ghana, rebroadcasting on MW and FM is increasingly important; in the Ivory Coast, FM dominates the cities and shortwave the countryside; India has more televisions in use than radios and the recent introduction of FM is further reducing the use of shortwave; in Bangladesh the local media remains state-controlled; China, due to its sheet size, has a large audience in raw numbers, but quite small in percentage terms; and in the US and Mexico only about 1 percent listen to international stations.

Wilding has come to the conclusion that shortwave is not dead, but it is slowly dying. FM networks are growing in areas where shortwave has long held a strong position, and local commercial radio is beginning to develop in areas where the state once held a broadcasting monopoly. With an increase in options, the audience trend has been away from shortwave.

The role of the Internet

Daniel Nobi of Radio France Internationale (RFI) and Oliver Zoellner of Deutsche Welle (DW) explained that their research (conducted independently of one another) supports internal decisions to develop the Internet as the "wave" of the future.

Nobi cites the relative immediacy and ease with which audience research can be conducted on the Internet, while acknowledging that Internet listeners reflect only a very small proportion of RFI's total audience. He also admits that little can be done to extrapolate those findings to that wider audience. For example, most respondents are males in the 25-39 age group and are professionals, students or white collar workers – hardly representative of the audience as a whole.

Zoellner, who at the time of the conference was president of CIBAR, spoke of how audience research was instrumental in showing DW how to deal with major budget cuts it experienced during 1999. It identified where cuts could be made with least pain to the audience and, as a result, demand for such research was growing within DW. Audience research has been used to design DW's new Internet services and Zoellner sees such information as an important road map to the broadcaster's future.

David Gibson of the Washington based Intermedia Survey Institute, while warning that estimates of Internet use can vary wildly, claimed that it is clear that the Internet is making major inroads among the "elite." He pointed out that among these decision-makers, computer use is now almost universal. Overall use was highest by far in North America, with Europe a distant second but far ahead of the rest of the world. He cautioned that, while Internet use was making major inroads – especially in the former Soviet Union, the Ukraine and the Baltic states – almost all of that growth remains largely limited to the elite.

Graham Mytton argued that the key measurement of shortwave use remains the percentage of households owning a shortwave-capable radio. He pointed out that such numbers tend to be much higher in countries where shortwave has long been used for domestic broadcasts, where radio remained a state monopoly for a prolonged period, or where the region has or had important links to Great Britain.

Mytton cited Burkina Faso, Cameroon, Kenya, Nigeria, Sudan and Tanzania among the countries having the highest percentage of households owning a shortwave receiver, with Greece, Brazil, Jamaica, the US, China, Australia and Japan being among those with the lowest such percentage. Moderately high levels of ownership could be found in many African countries, the Middle East, Albania, Serbia-Montenegro, Guyana, Georgia, Bangladesh, Pakistan and Vietnam. India and Russia had much lower percentages than one would first expect – India because radio use in

general is comparatively quite low; and Russia because many households during the Soviet era had only government-favored "wired" receivers as opposed to a "wireless."

Mytton also stated that shortwave use tends to increase in crisis situations, both in the region where the crisis is unfolding and in other areas of the world where people have an interest in the crisis.

Blue skies or false hope?

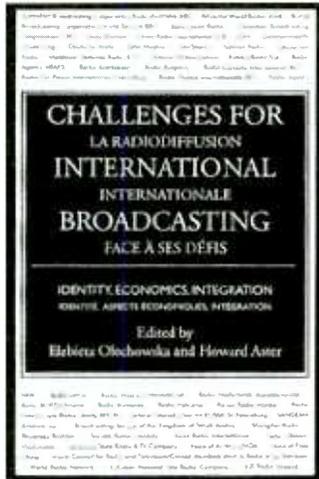
At the conference, enthusiasm for the actual and perceived potential benefits of the Internet alternated with several voices advising caution.

On the plus side, Tim Ayris of the World Radio Network pointed out that almost every international broadcaster now has its own web site. The challenge, he said, will be marketing those sites in competition with literally thousands of other radio stations, now suddenly also international broadcasters (in effect, if not in intent). The successful "broadcaster" will have to successfully identify and then serve the needs of the "listener."

Guangxing Zeng of Radio Guangdong (a semi-official, semi-commercial radio station serving Guangdong province, a special economic region of China) saw the Internet as especially useful in gauging and effectively responding to the interests of its listeners through the use of chat rooms. He said that the Internet also enabled the station to provide its audience with new sources of information by simply recycling radio resources.

Sylvain Lefrance of Radio-Canada cited the Internet as a means of breaking down a range of "borders" – both political and social – and reaching younger people, inasmuch as younger populations appeared to favor it as a mode of communication. Miriam Allan of Radio Free Europe-Radio Liberty echoed the Internet's appeal to younger listeners, saying it served to modernize the broadcaster's image. She also lauded the medium's ability to put the station in immediate inter-

active communication with its listeners. Some participants were even more wildly enthusiastic about the Internet and its prospects as an international broadcasting medium. Roger Tetrault of RCI cited the steady growth in the use of his station's Internet-based services and the imminent arrival of new technologies that, he said, would effectively merge radio with the Internet. He said that this growth had been



What is the purpose of the Challenges for International Broadcasting series of biennial conferences? The statement posted on the Challenges web page offers this description:

"Challenges for International Broadcasting is a series of biennial conferences held in Canada and organised by Radio Canada International. The objective of the Challenges series is to provide a forum for broadcasters and other communications experts from around the world to exchange ideas, to follow up on developments since the last meeting, to review and refine common strategies, and to discuss and define future directions for cooperation.

"What makes the Challenges series different from other conferences on broadcasting is that it is specifically designed to generate a much wider appeal and relevance for the general public. It ensures sustained interest and active participation of the academic community, the policy makers, the manufacturers of equipment and a broad range of supporters and fans of international broadcasting."

These are unique conferences that offer immeasurable potential for the successful promotion of international broadcasting and its distinctive values in an increasingly competitive multimedia world.

But will there be another Challenges conference? The date for this round of meetings has been pushed back from May to September with the label "tentative" attached to it. There are a number of possible reasons for this circumstance, not the least of which are the repercussions of September 11, 2001. A hopeful sign maybe that the conference organizers have issued a theme proposal and call for presentations. (See "A Response to Terror.") However, there are also indications that RCI's new management may be uncomfortable with the

accomplished with a budget that was only 2 percent of RCI's total and mused that as that percentage grew, the potential of the Internet would be realized. He was undeterred by the argument that the Internet was "a toy for the rich," arguing that the same was true of televisions and automobiles and eventually the rest of the population "catches up."

Lloyd Etheridge of the Connecticut-based Policy Sciences Center described what he saw as the impending benefits to mankind of advances in digital compression technology that would exponentially increase the capacities of the world's communications systems. Like Tetrault, Etheridge claimed that everything was moving toward greater access and availability.

broadcaster's role in hosting Challenges and might be considering jettisoning the whole idea.

Such an outcome would be most unfortunate. Of all the challenges that the international broadcasting community must successfully face down, the most threatening may be the perception that each station must go it alone. Many feel that this unique medium must first see itself as a community and present a more united front to its sponsors, providers, supporters, competitors and users. Given the attitudes entrenched over the decades of the Cold War period, this is not an easy sell. Thus far, the Challenges conferences have offered the best opportunities for this new and promising vision of international broadcasting to grow and de-



velop.

Ending its sponsorship would do irreparable damage to RCI's hard-won reputation within the international broadcasting community. It would also give credence to the views of critics - that the Canadian Broadcasting Corporation's (CBC) sudden, more active involvement in RCI affairs is driven primarily by a CBC self-interest, and that it neither knows nor cares about RCI's unique mission to bring Canada to the world and international attention to Canada.

It is to the credit of RCI's past management that it perceived a need and aggressively acted to address it. RCI's new management should be proud to embrace that legacy.

Nicolas Lombard of Swiss Radio International (SRI) also acknowledged that his station, in replacing shortwave with the Internet, was catering to the elite; but he seemed little concerned by that fact. He claimed that SRI was left little choice as its shortwave transmitters were being shut down due to environmental concerns. Besides, he said, SRI concluded that it couldn't compete with the BBC in any event. So, it was emphasizing its niche - Swiss content made available by an increasingly well-stocked and

intricately developed data bank accessible via the Internet.

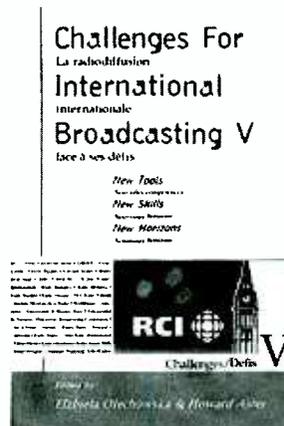
However, Mr. LaFrance noted that the Internet is largely an English language medium that threatens to overwhelm other languages and cultures. He pointed out that the medium is in its infancy and that it is impossible at this juncture to determine where it will succeed and where it may fail. LaFrance also suggested that public service broadcasters had a special responsibility to ensure that the Internet is accessible to all and "a force for good." He suggested that the Internet was more likely to treat the listener as a consumer rather than a citizen, though he acknowledged that it also had the capacity to give "marginal communities" a voice. Finn Norgren of Radio Sweden agreed that the principles of public service needed preservation and expressed concern that the Internet was not likely to do so.

Lodewijk Bouwens of Radio Netherlands noted the importance of radio's continued mobility and intimacy, in contrast to the current characteristics of Internet usage. He said that this would undoubtedly change as the latter develops, but that the key would likely be some merger of radio and Internet technologies. For now, he saw radio as maintaining its dominance.

In contrast to Mr. Tetrault's comments, Milagro Hernandez-Cuba of Radio Habana Cuba acknowledged that the station's modest web site did seem to attract only "prominent people" and seemed to find this disturbing. She described a conversation she had with one listener who told her that shortwave was the Internet of the poor. Also in this regard, Jesse Sikivou of the Pacific Islands Broadcasting Association said that while broadcasters in his part of the world appreciate the value of the Internet, most people in remote parts of the Pacific have yet to be exposed to 20th century technologies. Despite its expense for broadcasters, he too saw radio as the dominant technology for years to come.

Voice of America broadcaster Kim Elliott called the Internet "a wonderful thing," citing the ability to listen to programs on-demand as a key advantage. But, he pointed out that the Internet carries considerable expense to the "listener," that it is relatively easy to block web sites, and that the capacity of web sites to simultaneously serve large numbers of users is limited in most cases. Shortwave remains superior to the Internet in these important respects, Elliott argued.

Another key advantage brought to international broadcasting by the Internet, Elliott said, is that it provides the audience with the option



Challenges VII: A Response To Terror

Here are excerpts from the outline that is being circulated for this year's conference:

September 11: A Review and Assessment of Coverage

All stations are requested to send in brief reviews and assessments of their coverage over the first three days in the aftermath of the attacks. Suggested content:

Telling the Story As It Developed

- Facts, Analysis, Background and Opinion
- Portrayal of Facts: accuracy, sensationalism, good taste
- Drawing on experts: aviation, terrorist movements, construction, history, psychology
- Dealing with potentially sensitive information
- The On-Line Story

The Media and the War Against Terrorism

The Practical Aspects

Reaching the Audiences

- Addition of frequencies
- Extension of airtime
- Addition of languages
- New regular programming

Financing, Launch and Exit Strategies

- Short term financing
- Emergency/War Funds
- Cancellation or postponement of non-essential projects
- Long term financing
- Requests to the funding agencies/governments
- Re-assessment of priorities and re-direction of funds
- Cooperation with other broadcasters
- Launch and Exit
- Emergency plans: clear criteria for launching special programming
- Clear criteria for an eventual reduction and / or end of special programming

of accessing information via audio or text. Interestingly, most visitors to a web site choose text over audio. This has prompted several broadcasters to provide news and other information automatically via e-mail, a trend that Elliott says will grow.

Could DRM be the wild card?

Roy MacLachlan and Fiona Lowry of Merlin Communications pointed out that, despite all the excitement over alternative delivery platforms, over 80 percent of the BBC's audience still listens via short and medium wave. This is so, they argued, because AM remains the most cost effective technology in terms of economies of scale, has the greatest reach of all the platforms,

- Convincing the staff : how much to consult and when

The Content and the Treatment....

The Importance of Language:

- Points of view and definitions: Terrorists, Freedom Fighters and Insurgents
- Knowledge: the many faces of Islam (Islamism, Fundamentalism, Sunni, Shiites etc.), the Arab world in its complexity...

Ethics, Journalistic Principles, and Political Pressure

Is truth the first casualty of war?

To avoid panic, to protect strategic advantage and national security, to save or protect lives - is it the role of journalists?

"Objectivity in journalism does not mean an absence of values." (Paul Khlebnikov in *Forbes*)
"Resist censoring and self-censoring instinct" (VOA journalists in *The Washington Post*)

"It remains the job of a free press to report as fully and fairly as it knows how and to do that in ways that properly balance all other values that have to be considered - not at all the least of them national security." (Louis D. Boccardi, President and CEO, Associated Press, 15th Annual Harold W. Andersen Lecture, Oct. 30, 2001, Washington)...

Message to the stakeholders: Loss of credibility = loss of effectiveness

Co-operation between broadcasters in times of crisis

- Co-productions
- Sharing of information and contacts
- Sharing of production costs
- Sharing of equipment/ facilities
- Co-ordination of coverage plans

Audience Research

- Audiences and audience research in times of crisis and war....

For more information, visit the Challenges web site at <http://www.challenges.ca/index.htm>.

has the largest base of low cost and low energy consumption receivers, makes efficient use of the radio frequency spectrum, and provides the highest degree of reliability that a communication will be transmitted and received because it eschews the gatekeeper.

DRM is Digital Radio Mondial, a new technology that its backers say would transform traditional analog AM into a digital delivery vehicle whose audio quality would rival FM while retaining the best features of analog AM and shortwave. A single worldwide system has been developed and is currently being tested with early success. The single standard means that a digital receiver bought in one country would work

everywhere. Consumer electronics companies such as Sony are working on producing a digital receiver whose cost would be similar to that paid for an analog set today.

An added advantage of this wireless digital delivery system would be the ability to transmit audio and text simultaneously, just as is done via the Internet. In short, DRM could reinvigorate shortwave radio and make it a competitive medium in our multimedia world. On the other hand, the testing is not yet concluded, the receivers are not yet available, and the transmissions may interfere with analog shortwave transmissions using nearby frequencies.

If we've learned anything in the last decade or so, it is that predicting the future of communications is a risky endeavor. There are several delivery platforms - and there likely will be more - poised for the challenge. The days when wireless shortwave was the only technology capable of delivering mass media content across borders is over. Different technologies and platforms seem to have appeal for differing audiences and to yield varying results. The obvious challenge for broadcasters, at least in the near term, will be to balance content, cost, and delivery platforms in a way that effectively pursues a focused plan for communicating to (and perhaps with) a targeted audience.

We asked at the outset of this article, Is it really "shortwave versus the Internet?" By now you must know that the question is really much wider and more complex than that. It appears certain, to this observer, that the eventual answers and the paths to them will be equally so.

Longwave Resources

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✓ **The BeaconFinder** A 65-page guide listing Frequency, ID and Location for hundreds of LF beacons and utility stations. Covers 0-530 kHz.
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Electronic Kits and Gray-Line DXing

The best part about *MT* readers is that they are an inquisitive lot and are always thinking about new ways to improve their radio hobby. More great questions come in to the *Beginner's Corner* each month than there is room for in the column. Often single questions really deserve the "two page, full column" treatment, but there just isn't enough room. This month's questions are great and I hope you'll find some use for each.

❖ Electronic Kits

First, Gordon Davis asks, "...Do you know of any company which makes basic radio kits once turned out as Heathkits? I have a 14 year old grandson who would find this a great project..."

For decades from the '50s through the early '80s, radio kits were widely available to the radio hobbyist. These were complicated projects from building shortwave receivers and amateur transmitters all the way to kits for color TV sets and electronic organs. The best known name in kit building was Heathkit, with its headquarters in Benton Harbor, Michigan. Even today, thousands of Heathkit transceivers can be heard on the ham bands and there's a seemingly endless supply of user-built Heathkit gear at every hamfest throughout the year. Unused, unopened Heathkits fetch premium prices from collectors and vintage operators.

It's not really clear what killed the kit market. Some say the availability of cheaper, well designed and built Japanese imports negated the savings of building a kit over buying it ready made. Others believe it was the decline of the do-it-yourself ethic of the amateur radio hobby. Newer hams were coming into the hobby when schematic reading and soldering iron skills weren't required to enjoy the hobby. Even today, crusty old hams who practically came up with Marconi decry the newer generations of hams as "appliance operators" who lack the intelligence to sort through an electronic scrap heap and build their own transceivers.

The good news for all is that there is a sort of *renaissance* in the kit building side of the hobby. So, if you came to amateur radio after the demise of the kit companies or you're an older ham who would enjoy reliving the glory days amateur radio, then I urge you to check out today's kit market.

There are at least five companies that offer a variety of kits for the electronics beginner. In alphabetical order they are Elecraft, Hobbytron,

Rainbokits, Ramsey Electronics and Vectronics. For full details on all the kits offered by these companies check out their websites in the "sources" section below.

* **Elecraft** sells full-featured, expensive kits, including an all-band (160-10 meter) 10 watt SSB/CW transceiver with built-in audio filter and Heil hand mike for just under \$600. They also have a four band CW-only QRP transceiver (your choice of 40/30/20/ and 17 or 15 meter bands) with 5 watts output, keyer, variable-bandwidth crystal filter, digital display and measuring just 2.2 x 5.2 x 5.6". This kit starts at just under \$300.

* **Hobbytron** has a number of smaller kits and features a 20 meter QRP, CW-only, crystal controlled transmitter for just \$30 (\$15 for the case and \$10 for the AC wall adapter). The crystal-controlled part means that you can operate only on the frequency for which you have a transmitting crystal. It's not a tunable transmitter and you'll need a receiver of some kind in order to hear the station you're transmitting to.

* **Rainbokits** make a large variety of electronic kits from the very simplest devices to more complex 2, 10, and 20 meter receiver kits. They do not make transmitters to match their receivers.

* **Ramsey** and **Vectronics** offer similar kits for beginners including QRP transmitters and receivers for the 20, 30, 40 and 80 meter bands. They also sell 2 meter FM transmitter and receiver kits. In addition they offer a variety of radio re-

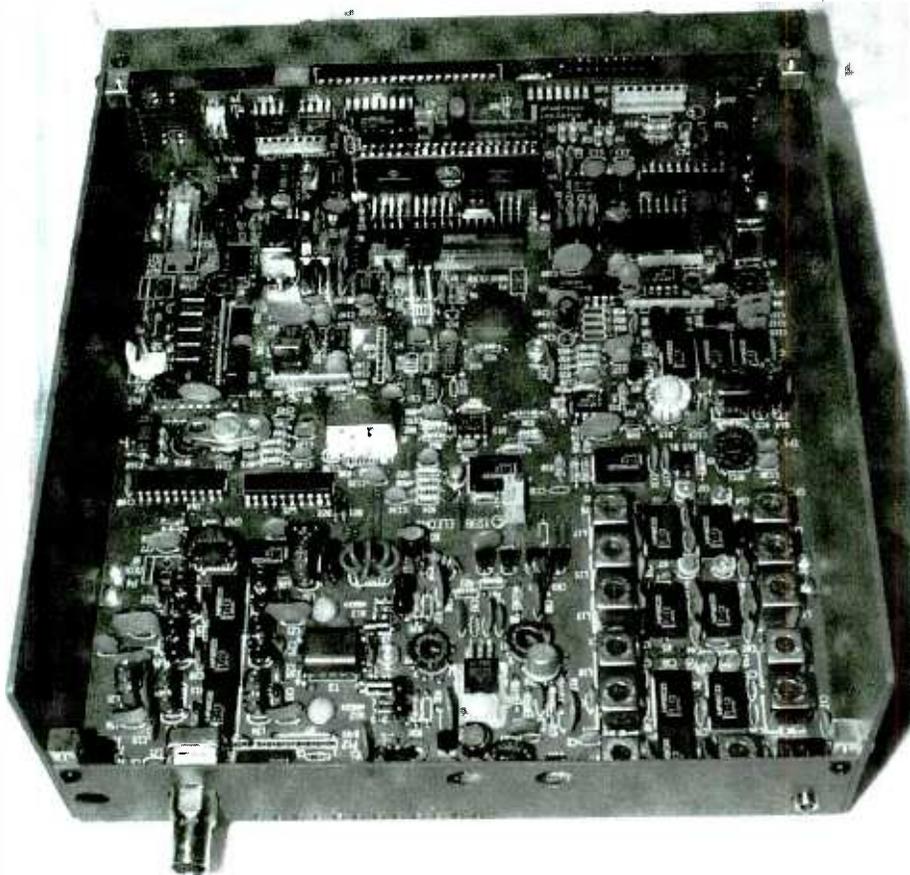
lated kits including an FM band transmitter, a shortwave converter for your car radio, crystal radio kits, aircraft receiver kits and many more. These kits are all rated as to the degree of difficulty (simple, moderate, intermediate and difficult). Vectronics also has a comprehensive soldering course designed for schools, which includes theory, quizzes, PC board and components for soldering practice.

Here are some kit building tips: If the kit company designates a kit for beginner level it doesn't mean that it will be easy or that it's not over your personal level. If they say it's "difficult" that means you'll need a full bench of test equipment and considerable background in kit building and electronics.

It's advisable for the total beginner to buy a very cheap and very easy kit to start with. Look for kits with very few parts and a very low price tag. Think of this as a learning experience and be prepared to throw the whole thing away, get another one and start over. There's no shame in learning the hard way; it's just best to learn cheaply! Some kit companies offer the same kits already made for an extra price. And, if you put your kit together and it won't work despite your best efforts to troubleshoot it, most kit companies will put the units together for you correctly for a fee. It's discouraging, sure, but it's better than having to throw the whole thing away just because you can't figure out what's wrong. But, before you ship it back, take a good look at your solder con-



Elecraft's K2 160-10 SSB/CW transceiver combines old-time kit building with latest electronic design. While this kit is not for beginners, there are plenty of other kits which are. (Courtesy: Elecraft)



Courtesy Elecraft

nections. Kit companies report that 90% of problems in getting kits to work involves the soldering work of the builder.

Some ham clubs sell kits and provide teachers for helping to put them together. If your local club does this, take advantage of it and you'll learn a lot more about radio and construction than you ever dreamed.

And, finally, if you find some of the old Heathkit products on sale at a local hamfest don't take anyone's word that it is in mint condition or "plays like new." Insist on looking at the underside of the chassis. Look for signs of sloppy workmanship such as random blobs of solder and poorly seated components. Look, too, for blackened components and evidence of critter infestations. The person who put this together back in '72 may not have been any better at it than you are now!

❖ Gray-Line DXing

Alan Bosch wants to know more about "gray-line" propagation saying that "...I for one don't understand that, nor how to best use it."

While one might think of gray-line propagation as mostly an amateur concern, shortwave listeners can benefit as well from an understanding of how it works. There is a great article by Tom Russel, N4KG, on the subject which appeared in the November 1992 issue of *QST* magazine. If you're an ARRL member you may download the piece in PDF format through their "Members Only" section of <http://www.arrl.org>. If you aren't a League member, check your local library or ham friends for back issues of *QST*.

Basically, the "gray-line" is what astronomers call the *terminator* and what many call the *twilight zone*, which is that band around the Earth separating daylight from darkness. The band, of course, moves constantly with the Earth's rotation, so radio conditions on the ground change as the terminator moves across it. We all know from listening that certain bands "open up" or "close" when it's day or night, and that those openings and closing themselves change with the seasons and with respect to the 11 year solar cycle. And we know, in general, that bands lower in frequency, *i.e.* medium wave through 30 meters (10 MHz), have a peak listening window from about sunset to sunrise. Higher frequency HF bands, 20 meters through 10 (14-30 MHz), work best from sunrise to sunset.

Propagation conditions along the gray-line, where it's not quite night and not quite day, change rapidly, allowing the Maximum Usable Frequency (MUF) to increase on the *sunrise* side of the gray-line while at the same time the MUF has not yet collapsed on the *sunset* side of the gray-line. This makes it possible, for relatively brief periods of time, to hear stations along the terminator anywhere on the planet on any band. As Tom Russell writes in his *QST* piece: "...For a period ranging from a few minutes at low and high frequencies (160-10 meters), to one or two hours at intermediate frequencies (20 meters), with suitable ionospheric conditions, stations in the twilight zone can communicate with stations at any other location within the twilight zone on any HF band..."

While exact conditions may not repeat each day, propagation along the gray-line is predict-

able. To make total use of this phenomenon you only need two things: a knowledge of your local sunrise and sunset and a list of beacons and their frequencies. Of course, you've got to be able to be at your listening post at those times and, assuming you can, you should be able to hear distant signals with predictable regularity.

In last month's issue I referred to a beacon list for 10 meters at <http://www.ten-ten.org> and you'll find a short but very useful list of beacons from 20 kHz to 25 MHz at <http://www.scn.org/IP/nwqrp/archives/misc/beacon.html>. The lists have the frequency, call sign and location of the station. These stations typically operate on very low power so it also provides a great test for your antenna and receiver.

Sources:

Check out the availability of electronic kits and add a new facet to your hobby.

<http://www.elecraft.com>
<http://www.hobbytron.net>
<http://www.rainbokits.com>
<http://www.romseyelectronics.com>
<http://www.vectronics.com>

Read more about gray-line propagation in "Low-Band DXing" by John Devoldere, ON4UN, from ARRL Publications and in the *ARRL Handbook for Radio Amateurs*, also a League publication. You can order these and other ARRL books and products by calling toll-free at 888-277-5289 or order on-line at <http://www.arrl.org/shop>.

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Q. Do you think that the more MT and others print, the less we are going to hear? Will more agencies rush to encrypt, using the vast funds that may become available to them? (Scott M. Doolittle, Scarsdale, NY)

A. So far as we can tell, the effect of MT and other publications on forcing privacy has been minimal, although some discrete signals disappeared after MT published reception reports. The major factor has been sensationalized cases of scanner listeners reporting cell phone conversations.

Even during the notorious Congressional hearings in 1997 when the cellular industry was looking for a scapegoat to avoid providing privacy measures to their customers, the focus was on scanners, not on magazines. MT has never condoned listening in on protected communications, and coverage in MT has been only when a court case ensued after the fact.

Q. Is there a reason to connect a ground wire to the chassis of a radio receiver? Doesn't the line cord already ground it? (Kenneth Cohen)

A. You are correct; connecting a ground wire to a modern radio receiver will not make signals stronger. It may, however, reduce electrical line noise interference (this is unpredictable), and it will reduce the risk of electrical shock.

Q. I have attempted to attach an external 8-ohm bookshelf speaker to the external speaker jack on my receiver, but the audio is very weak; what could be wrong? (Ed Barteski, Jr.)

A. There are several possible causes. My favorite for the moment is that the receiver jack could be for stereo; this is often done to accommodate commonly-available stereo headphones. This merely means you should change the ring/tip connections on the speaker cord plug.

There is always the possibility that the jack is defective; have you used the speaker on another radio to be sure it's OK?

If all else fails, read the instructions! Check the specifications and instructional text to see if it says the jack is for 4-8 ohms, monaural, and is not for a 500 ohm line output. If it is line output,

you would need a matching transformer like the Radio Shack 32-1031 (\$6.99).

Q. The other night our power went off and I could hear a strong "buzz" across the shortwave bands, strong on low frequencies and weaker higher. I hadn't heard this before; what caused it? (Jerry Brookman, AK)

A. Very likely arcing from the power line where it broke. Depending on the length of the wire section, its relative angle toward you, and its distance from you, different parts of the spectrum would exhibit different signal strengths from this spark-gap transmitter.

Q. I would like to build a simple wire antenna like a V or rhombic for listening to a distant FM broadcasting station. What is the feedpoint impedance and where do I put the terminating resistor? (Jerry Brookman, AK)

A. V antennas and rhombics are used on shortwave frequencies and lower to provide modest gain and directivity, but for VHF and UHF, simple arrays of aluminum tubing provide much better gain and directivity. It would be much easier just to go to Radio Shack and buy an FM beam. But if you wish to experiment, and I applaud that, the several-hundred-ohm feedpoint impedance can be reasonably matched with a conventional TV balun transformer (300:75 ohms) for your coax feedline. For the rhombic, I'd try a non-inductive (carbon) resistor of about 560 ohms. Better yet, get an old TV Yagi or log-periodic antenna and cut the elements to favor the 88-108 MHz FM band.

Q. Is there a chart available that shows a breakdown of frequency allocations and primary modes in the shortwave spectrum?

A. Sure. While a detailed listing is too large for this space, here are major users, including the expanded international broadcast bands. Utilities refer to fixed and mobile two-way communications and can include air to ground, ship to shore, military, government, and other licenses as well. Utility modes may include CW, LSB,

USB, RTTY, DATA, and other digital emissions, but a good mode to start with is shown.

Also, take careful note of our currently-running series on *Who's Who in the Spectrum*; over several months' time, it should answer most of your questions. This month addresses the shortwave broadcast bands.

1.7-1.8	CW	NAVIGATIONAL BEACONS
1.8-2.0	CW/LSB/DATA	AMATEUR 160 METER BAND
		UTILITIES
2.0-3.2	USB/DATA	BROADCASTING
3.2-3.4	AM	UTILITIES
3.4-3.5	USB/DATA	AMATEUR 80/75 METER BAND
3.5-4.0	CW/LSB?DATA	UTILITIES
		BROADCASTING
4.0-5.9	USB/DATA	UTILITIES
5.9-6.20	AM	BROADCASTING
6.20-7.0	USB/DATA	UTILITIES
7.0-7.3	AM/CW/LSB/DATA	BROADCASTING, AMATEUR 40 METER BAND
		BROADCASTING
7.3-7.5	AM	UTILITIES
7.5-9.4	USB/DATA	BROADCASTING
9.4-9.9	AM	UTILITIES
9.9-10.1	USB/DATA	BROADCASTING
10.1-10.15	CW/RTTY/DATA	UTILITIES
10.15-11.65	USB/DATA	AMATEUR 30 METER BAND
11.65-12.05	AM	UTILITIES
12.05-13.6	USB/DATA	BROADCASTING
13.6-13.8	AM	UTILITIES
13.8-14.0	USB/DATA	BROADCASTING
14.0-14.35	CW/USB/DATA	UTILITIES
14.35-15.1	USB/DATA	AMATEUR 20 METER BAND
15.1-15.6	AM	UTILITIES
15.6-17.55	USB/DATA	BROADCASTING
17.55-17.9	AM	UTILITIES
17.9-18.068	USB/DATA	BROADCASTING
18.068-18.168	CW/USB/DATA	UTILITIES
18.168-21.0	USB/DATA	AMATEUR 17 METER BAND
21.0-21.45	CW/USB/DATA	UTILITIES
21.45-21.85	AM	AMATEUR 15 METER BAND
21.85-24.89	USB/DATA	BROADCASTING
24.89-24.99	CW/USB/DATA	UTILITIES
24.99-25.07	USB/DATA	AMATEUR 12 METER BAND
25.07-26.965	AM/LSB/USB/FM	UTILITIES
		UTILITIES, FREEBANDERS (Out-of-band CB)
26.965-27.405	AM/SSB	CB - UNITED STATES
27.405-28.0	AM/LSB/USB/FM	UTILITIES, FREEBANDERS (Out-of-band CB)
28.0-29.7	CW/USB/AM/FM/DATA	AMATEUR 10 METER BAND
29.7-30.0	NFM	UTILITIES

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 bgrove@grove-ent.com. (Please include your name and address.) The current Ask Bob is now online at our website: www.monitoringtimes.com

Getting Started

Bright Ideas

Gary Webbenhurst

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This month we continue the three part series on the radio room for my new retirement home. Last month was the planning; this month we review ideas for AC, DC, and battery power systems.

21

I had separate 200-amp service to the garage/shop, and another 200-amp circuit to the house. I wanted AC power surge protectors for all incoming electrical power. The answer was surge protection breakers. These install directly into your circuit panel box just like any other breaker. Amazingly they were only about \$30: cheap insurance when you live in the boondocks where power outages and line surges are routine. Per my contractor's insistence, an electrician did all the actual installation, and wiring.



22

Even though I had those special surge protectors at the entry point, I also used six outlet surge protectors that fit over the existing two outlet covers. I used the six-outlet plug-ins from RS #61-2181 or similar. I used these for everything, especially for the computer, radio equipment, telephones, and TV/DVD setup. I love redundancy, so where necessary I also ran a computer-quality surge-protected power strip with a six-foot cord from every wall unit.

My chief AC power strip in the radio room was a Tripp-Lite® Isobar strip with eight outlets. Supposedly it isolates all the outlets so there is no interference or bleed-over. Try 'em at <http://www.tripplite.com>, or <http://www.graybar.com>. Well worth the \$75. Overall, the other power surge equipment, surge outlets, and strips ran another \$150. Still cheap, as a single new replacement radio would cost me that much.

23

For AC to DC power for the three mobile transceivers, I used two Astron Power Supplies, and the new DM-330MV from Alinco. I backed these up with an uninterruptible power supply (UPS). The price of these UPSs has really dropped. It

should provide extra 1-3 hours of power in the event of an AC outage. (I think I smell a future timed experiment coming up here.)

The powered DC distribution strips are from MFJ (<http://www.mfjenterprises.com/products.php>.) They were mounted on the main radio desk, but the power cords were run through the wall to the Astron located in the closet in the master bedroom. I had intentionally designed this so I could hide the clutter of wires and the DC supply.

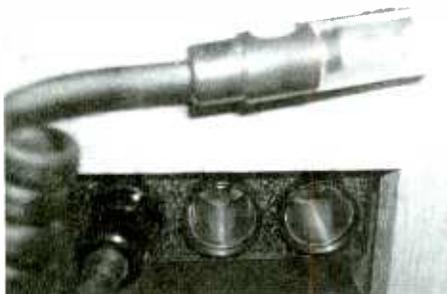
The Astrons are tried and proven, but I am very impressed with the new Alinco. I plan on purchasing another as a spare, or for my emergency grab-n-go bag.

24

Since the base/table top scanners use relatively little power, I ran 12-volt power to all scanners and related devices on my desktop using a deep cycle marine battery. Again, I used a MFJ DC power strip with the wire running into the closet to hide the battery and recharging process. To charge the battery, I had an inexpensive solar panel I placed on the windowsill in the master bedroom. Again, I conveniently located the window next to the closet that housed the battery. However, I now realize I should have run it to an outside post just below the window. It will take a year of use to see if the solar panel alone will do the trick. For backup, I have a trickle charger on a timer.

25

Not all radio devices will take 12 volts; most notably my hand held scanners, and the Opto Scout®, CD100, and DC440 Decoder. For those I had to use a single wall adapter for 9 volts RS # 273-1611 at 1300mah. I counted 27 different wall warts that I had collected over the years. I sorted them by manufacturer, and used three bins for Icom, Yaesu, and RS/misc. I stored all these away, hopefully never to see daylight again!



26

As part of my emergency operations plan, I mounted a 12-volt three-hole outlet night light on the bottom of the built-in overhead bookcase. I have a couple of

different 12-volt lights on gooseneck cords that I can use for auxiliary light. Again, power came from the deep cycle battery power strip. To hide some of the DC wiring under the bookshelf, I used black putty-like coax seal instead of nails. Down the wall I used the same white plastic cowl covering I used for my AC line for the overhead light.

27

I have about 20 handheld ham transceivers and scanners. I keep a couple of large packs of alkalines around, as well as many Ni-Cad, and Ni-MH cells. I try to keep a few always charged up and ready to go. In fact, there is finally room on my desktop for a voltmeter and battery recharger: no more fruitless searching in drawers. I have about a dozen desktop rapid chargers for my collection of HTs.

Special Tip: The December 2001 battery deal from Radio Shack was unbelievable. Ask your manager to let you know if they ever again have a "buy one get one free" deal. I bought six trays of twelve. Then I got six trays for free!

28

I use the square blue/green night-lights that have a flat panel and consume very little power for quiet time, low-light monitoring. I also have a 12-volt map light in the radio room as a backup light source. While ham gear usually has lighted displays and keypads, the scanners and lower end transceivers do not. A red light is the best bulb to maintain your night vision.

I also have a large rechargeable lantern from Galls (800-477-7766; <http://www.galls.com>) It costs about \$100 but is the ultimate emergency light source. If this option is beyond your reach, I recommend a cheap LED flashlight, available from many websites for around \$20. It provides very soft light and extended life to hundreds of hours on two AA batteries! Just do an Internet search for LED flashlights.

29

My defense against a loss of power is my generator. Unfortunately, I couldn't wire the house to switch from AC to a generator system. But as an afterthought, I did install one conduit from the generator outside to a single electrical outlet in the radio room. It is *no way* connected to the house wiring system. In the case of a lengthy loss of commercial power, I could set up a power strip and plug the main computer and radio surge protector circuit into the generator powered circuit.

Next month will be the conclusion of the three part series. We will focus on the all-important coax, and antennas.

Loading Bank Number One



Recent issues of *MT* have highlighted a variety of low-power business, government, public safety and military frequencies. This month, take a little time and load your Bank One memory positions with these channels. Once loaded, you'll be ready for all the special events, airshows and military exercises in your area during 2002. You'll also be able to finally hear that nearby fast-food restaurant or shopping mall security department, plus nearby survey and construction crews, emergency response teams, news media reporters and many others.

I like to segregate low power channels by their main (or expected) use:

Business channels such as the "color dot" radios and itinerant frequencies. This group will allow you to monitor nearby building security activities, surveyors and construction crews. Some fast-food restaurants may also be heard.

Industrial channels that are set aside for specific industries, such as for motion picture filming. This group will only be active when the industrial use is nearby, but the resulting communications are usually quite interesting. Examples include movie crews, oil exploration teams, government contractors and airline ramp agents at large airports. Due to recent FCC frequency allocation changes, some industrial groups have been merged and some channels have been made available to non-industrial users, so you may hear unexpected communications!

Local Government channels used for low power police, fire and government administration. This group includes local tactical and surveillance frequencies, fireground channels, emergency management and city/county administration. You may wish to include other frequencies related to emergency management, such as 2-meter amateur radio nets and Red Cross frequencies.

Federal Government channels used for a variety of law enforcement, utility and emergency response functions. *MT* has recently published new VHF and UHF federal channel plans for emergency incidents and "interoperability" programs. Other channels are allocated to FEMA, Urban Search and Rescue (USAR) teams, nuclear emergency teams and federal law enforcement agencies.

Military channels are a new addition to the mix. Historically, low power military channels were selected on a mission-specific, temporary-use basis. New channels have been set aside for full-time, low power military use.

Look over the back issues of *MT* and see the current *Police Call* books or CDs to obtain a com-

plete list of low power channels. It may take an hour to program everything, but you'll hear many new sites and agencies that are within a few miles of your monitoring location.

On-Scene Commander: AOPA Expo

"Cessna Zero Two Lima, you're cleared to Taxiway Charlie, then a right turn to the airport fence line, then proceed to Perimeter Road. Once at Perimeter Road, make a left toward Highway One and follow the Police Officer. Monitor Unicom."

The Aircraft Owners and Pilots Association convention, AOPA Expo 2001, came to Fort Lauderdale last fall and set the city buzzing with talk of "general aviation." The convention was especially important due to flight restrictions and security enhancements made as a result of the September 11th attacks.

I'm sure you can imagine the tense feelings for all involved: the hosting of a conference with several thousand attendees, plus the air traffic control and security concerns of accommodating several hundred small aircraft. No small feat was the convention's premier media event, a "plane parade" from the airport to the convention center a few miles away.

A large hole was cut in the perimeter fence of Fort Lauderdale-Hollywood International Airport...watched over by armed members of the Florida Army National Guard...and aircraft were taxied (driven?) along city streets between the airport and the Broward County Convention Center. The Broward County Aviation Department and the Broward Sheriff's Office provided outstanding logistics, traffic control and security.

Tension quickly turned to smiles as the event unfolded without difficulty. Airplanes exited the airport property through the hole in the fence, "drove" onto the asphalt pavement of Perimeter Road, then casually proceeded down Griffin Road, Federal Highway and SE 17th Street enroute to the convention center...actually, just like any other traffic!



Some roadway landscaping and traffic signs were temporarily removed from the parade route to make way for airplane wings, but no other significant modifications were needed. Upon arriving at the convention center, aircraft were parked in an adjacent lot and used for public tours and demonstrations. They did not have to pay for parking, but the rest of us sure did!

Walter E. Houghton, Assistant to the Director of Aviation for Broward County, Florida, was the commander of this show. Walter is well known in the local aviation community, as he provides the planning, logistics, personnel and on-site air traffic control for most of South Florida's airshows, stadium events and related aviation activities.

"It was a two year process," Walter explained. "We have almost 200 volunteers and representatives from the Convention and Visitors Bureau, AOPA, aero clubs, Civil Air Patrol, FAA (Federal Aviation Administration) and various Broward County and City of Fort Lauderdale





were developed to park up to 1,500 general aviation aircraft and handle the fueling, maintenance and transportation needs associated with such a large population of airplanes, pilots and guests.

Temporary air traffic control procedures and Flight Service Station frequencies were also implemented, and a "Volunteer Safety and Information Handbook" was published by Broward County to itemize all critical phone numbers, radio frequencies, locations, personnel and aircraft parking procedures.

The detailed planning was rewarded handsomely. AOPA Expo 2001 was a fun, safe and informative event for conference attendees as well as residents. Over 5,000 people enjoyed the formal conference sessions, exhibit halls, outdoor display areas and social activities. It took great courage to go through with this gathering and parade after September 11th, and my thanks go out to Walter E. Houghton, the Broward County Aviation Department, Broward Sheriff's Office, and

agencies. Assignments include hospitality, publicity, FBO (Fixed Base Operator) operations, safety and security." Special training classes were conducted for all personnel, and identification badges and uniforms were issued to maintain a high level of security.

While Fort Lauderdale-Hollywood International Airport served as the primary aviation event site, AOPA traffic was also accommodated at Fort Lauderdale Executive Airport, North Perry Airport, and Pompano Airpark. Airport "site plans"



AOPA for their assistance and hospitality.

A frequency list is included at the end of this column.

The Geographic Frequency List, Part 2

Microsoft *Streets and Trips* software includes a feature called a "Push Pin." Other software vendors have similar features. Push Pins are small icons or markers that can be placed on a map and saved as a file. The icon remains on the map unless moved or deleted, and groups of icons can be saved as files, e-mailed to other map users, backed up, searched as a database, or copied-and-pasted into other programs.

Push Pin files only contain information associated with the icon, not the underlying map, so file sizes are small and easy to transfer. Multiple Push Pin files can be used with individual maps; for example, one Push Pin file may contain police station locations, patrol boundary information and dispatch frequencies, while another Push Pin file has fire station locations and frequencies.

Each Push Pin icon or marker, when clicked, opens to a small text box window. The window can be displayed full-time or minimized again to only show the corresponding icon. Windows can also be arranged as desired around the icon...above, below, left or right...and may also contain hyperlinks to other files or websites.

Push Pins can be placed on the map one by one, or imported from a database or spreadsheet. In fact, if the imported database includes latitude and longitude fields or address fields (street, city, state, zipcode), the imported data will automatically appear on the map as Push Pins at the proper coordinates or street address.

If you already have a frequency list in a database or spreadsheet, you'll only need to add the street address of the agency or user, or the coordinates of the facility or radio tower, to import all information without having to retype anything.

The resulting map will have all of your frequencies placed in a text box at the exact site they are used. Police channels will be in a box at the police station's address, fire channels will appear next to the fire station's location, and aviation channels will appear right at the airport.

For small cities, one Push Pin file may be all that is needed. Larger cities, though, will generate so many Push Pins that it will be hard to see the information and the map. To alleviate crowding on the map, multiple Push Pin files are easily constructed. Files can be arranged by jurisdiction, agency, function or any other parameter.

Next month we'll get deeper into Push Pin importing, searching and saving, and try to print out some illustrations.

On the Keyboard

Another "Who's Listening" interview, Part 3 of the Geographic Frequency List series, and more mail, events, and your requests.

Links of interest from this column:

Aircraft Owners and Pilots Association:

<http://www.aopa.org>

Broward County, Florida:

<http://www.broward.org>

Table 1: AOPA Expo 2001

119.3	Tower, Fort Lauderdale-Hollywood International Airport
120.2	Tower, Fort Lauderdale-Hollywood International Airport
120.45	Ground Control, North Perry Airport
121.4	Ground Control, Fort Lauderdale-Hollywood International Airport
121.7	Ground Control, Fort Lauderdale-Hollywood International Airport
122.2	Miami Radio (FSS), Tamiami Outlet
122.35	Miami Radio (FSS), Pahoake Outlet
122.4	Miami Radio (FSS), Palm Beach Outlet
122.6	Flight Service Station, Fort Lauderdale-Hollywood International Airport
122.65	Flight Service Station, North Perry Airport
125.4	Tower, Pompano Beach Airpark
127.35	Approach Control, Palm Beach International Airport
128.4	Clearance Delivery, Fort Lauderdale-Hollywood International Airport
128.95	FBO Reliance Aviation
129.725	FBO Signature Flight Support
130.1	FBO Fort Lauderdale Jet Center
132.0	FBO National Jets
132.1	Tower, North Perry Airport
135.0	ATIS, Fort Lauderdale-Hollywood International Airport
135.475	ATIS, North Perry Airport
135.55	Tower, Pompano Beach Airpark
464.15	FBO use at Fort Lauderdale-Hollywood International Airport
464.8875	Broward Convention Center
467.75	Broward Convention Center
800 MHz	trunked system used by Broward County Aviation Department and Broward Sheriff's Office

Monitoring Winnipeg

On my first visit to Winnipeg I went in January, arriving at Winnipeg International airport from Toronto. The weather that I left behind in Toronto had been cold, but the weather that greeted me on my arrival in Winnipeg gave a whole new meaning to the word "cold." As I stepped out of the warm, comfortable Air Canada airbus into the jet bridge at the arrival gate, my pant legs developed a severe static charge. I felt as though all the air had been suddenly vacuumed out of my pants as the material stuck tightly to my legs. The air in Winnipeg in the winter is somewhat dry.

As I emerged from the terminal building into the parking lot, my lungs filled with frigid air and my nostrils froze instantly. In the rest of Canada, Winnipeg is affectionately, and appropriately, known as "Winterpeg." I salute any *MT* readers who live in that city and I wonder, in amazement, how they keep their scanners operating in such temperatures.

This month *Scanning Canada* is devoting the whole column to those hardy monitoring enthusiasts who live in the Winnipeg area. We are going to examine Winnipeg's main airport, its military base, and some other interesting local monitoring targets.

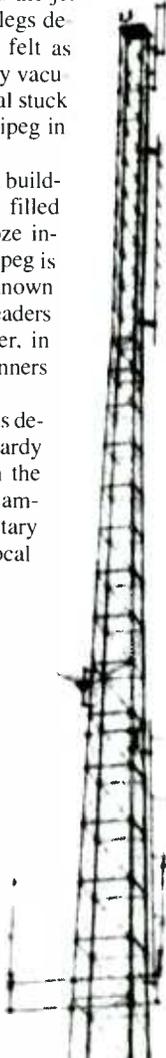
Winnipeg International Airport (Airport code CYWG)

Winnipeg International is a major airport located just about in the center of Canada. Winnipeg is the last stop on the prairies before our eastbound journey takes us into the Great Lakes region of Ontario. The following tables list the air traffic control and beacon frequencies that can be heard in Winnipeg.

Table 1. Air Traffic Control

Radio 122.5, 126.7
Automatic Terminal Information Service (ATIS):
114.8 120.2, 291.4
Clearance Delivery: 121.3, 283.5
Ground: 121.9, 275.8
Tower: 118.3, 125.4, 236.6, 325.9

Environment Canada operates Weather Radio repeaters across Canada, like this one in Mount Forest, Ontario



Arrivals: 119.5, 356.6
Departures: 119.9, 366.5
VFR (Visual Flight Rules) Advisory: 121.0, 341.3
Military Base Operations: 131.4, 308.8
International Air: 126.9 Selective Calling system
Pilot to Metro Service (PMSV): 344.6
Winnipeg Centre: 118.0, 119.7, 120.5, 134.4, 283.1, 294.5, 349.6

Table 2. Navigation Beacons

VOT (VHF Omnidirectional range Test facility): 114.8
VORTAC (VHF Omnidirectional range/Tactical Navigation):
115.5 (id code = "YWG") location = 45d55m40sN
97d14m21sW
ILS (Instrument Landing System):
109.5 id code = "INP"
109.9 id code = "IWG"
110.3 id code = "IHV"

Monitoring the Canadian Forces – Part 3, 17 Wing Winnipeg

The military controls one of the ramps and a couple of taxiways at Winnipeg International, making this part of the airport a restricted zone under the auspices of 17 Wing of the air force.

17 Wing is a composite of a number of training schools and operates a total of twelve aircraft. Eight of the aircraft are CC-130 Hercules, and the remaining four are military versions of the popular commuter civilian Dash 8 commuter aircraft which the military designate as the CT-142.

The CT-142s are used by CFANS (Canadian Forces Air Navigation School). Students operating from CT-142s learn GPS and INS (Inertial Navigation System) techniques while simultaneously operating the aircraft and communicating with the ground (refer to the frequency tables above for frequencies to monitor).

The CC-130s have multiple roles, as might be expected from one of the most versatile military aircraft ever produced. Five of 17 Wing's CC-130s are configured as air-to-air refueling aircraft and the remaining three aircraft serve as strategic airlift and search and rescue platforms. Winnipeg's CC-130s support search

and rescue operations throughout the Canadian prairies and the far north. When required, 17 Wing can call on helicopter support from Canadian Forces Base Trenton in Ontario (discussed in last month's column). Refueling operations keep Canada's CF-18 fighters in the air for sovereignty patrols.

Aircraft patrols from 17 Wing are likely to be long distance missions, so monitoring enthusiasts listening to departures will be able to follow aircraft throughout the departure sequence on VHF/UHF, but may have to switch to military HF frequencies to follow operations outside of Winnipeg controlled airspace.

Monitoring in the City of Winnipeg

While in the Winnipeg area scanner owners should also check out the following local VHF high band frequencies.

Table 3 – VHF utility frequencies in Winnipeg

Air Canada: 170.49 170.67
Canadian Broadcasting Corporation: 152.87 156.36 166.25
Canadian National Railway: 159.81 161.055
Canadian Pacific Railway: 159.885 159.93 160.05 160.755
City of Winnipeg: 152.9 153.29 153.35 153.47 158.19 158.25
159.45 167.7 168.96 169.62
City of Winnipeg, Finance Dept: 169.11
City of Winnipeg, Operations: 153.95 154.01 154.13 154.28
154.31 154.65 154.68 154.71 154.77 154.92 155.4
155.49 155.73 155.94 156.15 156.18 157.65
City of Winnipeg, Signals Dept: 151.505
City of Winnipeg, Transit System: 153.77 154.98
City of Winnipeg, Parks & Operation: 155.07 155.61 156.0

Manitoba Hydro: 169.32 169.38 169.41 169.44 169.47 169.5
169.53 169.95 169.98 170.04 170.1 170.22 170.25
170.28
Rogers Broadcasting Ltd: 152.99
Royal Manitoba Yacht Club: 156.7
University of Manitoba: 159.99
Environment Canada: 162.55

The Environment Canada frequency listed in Table 3 is the local Weather Radio frequency. Canada uses the same frequency assignments as NOAA in the USA and distributes the signal through a network of repeaters like the one shown in this month's *Scanning Canada* picture.

73 till next month and happy scanning.

HF Aero Frequencies

(continued from February)

10005-10100 kHz AERONAUTICAL MOBILE (R)

- 10018 MID MWARA: Ashkhabad; Bombay, India; Calcutta, India; Samarkand; Tashkent
- 10024 SAM MWARA: Cordoba, Argentina; Bogota, Colombia; Guayaquil, Ecuador; Iquitos, Peru; La Paz, Bolivia; Lima, Peru; Pascua, Easter Island; Quito, Ecuador; Resistencia, Argentina; Santa Cruz, Bolivia; Santiago, Chile
- 10025 LDOC: Prague (CSA Czech Airlines) Czech Republic; Nadine/Medien Operations (UAE Royal FH)
- 10027 LDOC: Amman (Royal Jordanian-ALIA), Jordan; Rome (Alitalia), Italy; Prague (CSA Czech Airlines), Czech Republic
- 10030 LDOC: Aeroparque Jorge Newbery-Buenos Aires (Aerolineas Argentinas), Argentina
- 10033 LDOC: Manama (Falcon-Gulf Air), Bahrain; Mexico City (Aeromexico), Mexico; Miami (Silver Radio), FL USA
- 10042 NAT RDARA (10F): Greenland Domestic Aerodios-Kangerlussuaq, Søndre Strømfjord
- 10046 LDOC: Berne, Switzerland
- 10048 NP MWARA: Honolulu, HI USA
- 10051 VNAT VOLMET: Gander, NF Canada and New York, NY USA
- 10057 CEP MWARA: San Francisco, CA USA VAFI VOLMET: Brazzaville, Congo
- 10066 SEA MWARA: Bombay, India; Calcutta, India; Dhaka, Bangladesh; Kathmandu, Nepal; Yangon, Myanmar
- 10069 LDOC: Berne, Switzerland; Rio de Janeiro (VARIG), Brazil
- 10072 LDOC: Auckland (Air New Zealand), New Zealand; Speedbird Radio (British Airways) London, England; Sydney Skycom, Australia
- 10075 LDOC: Beirut Middle East Airlines (Cedar Base), Lebanon; Cedar Rapids (Collins Radio), IA USA; Houston (Universal Radio), TX USA; Houston (Eastern Radio), TX USA
- 10078 LDOC: Brussels (Sabena), Belgium; Sydney/Perth (Qantas Control), Australia
- 10084 EUR MWARA: Malta, Malta
- 10090 VNCA VOLMET: Khabarovsk, Russia (H+05)
- 10093 LDOC Paris (Air France), France; Tokyo (Japan Airlines), Japan
- 10096 SAM MWARA: Bogota Radio, Colombia; Brasilia, Brazil; Ezeiza, Argentina; Leticia, Colombia; Maiquetia, Venezuela; Paramaribo, Surinam; Porto Velho, Brazil; Recife, Brazil
- 10206 LDOC: Stockholm, Sweden
- 10286 LDOC: Stockholm, Sweden
- 10575 LDOC: Stockholm, Sweden
- 10790 LDOC: Stockholm, Sweden
- 10795 LDOC: Stockholm, Sweden
- 10805 LDOC: Stockholm, Sweden
- 10856 LDOC: Stockholm, Sweden
- 10970 LDOC: Stockholm, Sweden
- 11117 LDOC: Corsair Ops; Tunis Air Ops
- 11165 RDARA: Ukraine Domestic/Regional Aerodios-Kiev, Ukraine
- 11273 LDOC Sofia, Bourgaz Radio (Balkan Bulgarian Airlines), Bulgaria

11275-11400 kHz AERONAUTICAL MOBILE (R)

- 11279 NAT MWARA: Bodo, Cambridge Bay (Baffin Radio), NWT Canada; Iqaluit, Reykjavik (Iceland Radio), Iceland; Shanwick VOLMET: St. Petersburg, Russia
- 11282 CEP MWARA: Honolulu, HI USA; San Francisco, CA USA
- 11285 Perth Radio, Australia; Madras Radio, India
- 11288 LDOC: Cairo (Egyptian Air), Egypt; Cedar Rapids (Rockwell Radio), IA USA; Jeddah (Saudi Airlines), Saudi Arabia
- 11297 VOLMET: Kiev, Ukraine (H+50); Rostov, Russia (H+25/55)
- 11300 AFI MWARA: Addis Ababa, Ethiopia; Asmara, Eritrea; Cairo, Egypt; Dar es Salaam, Tanzania; Djibouti, Djibouti; Entebbe, Uganda; Jeddah, Saudi Arabia; Khartoum, Sudan; Mogadishu, Somalia; Nairobi, Kenya; N'djamena, Chad; Port Sudan, Sudan; Scnao, Yemen; Seychelles; Seychelles; Tripoli, Libya

- 11306 LDOC: Cedar Rapids (Collins Radio), IA USA; Lima (Flight Support), Peru
- 11309 NAT MWARA: New York, NY USA; Santa Maria, Azores
- SEA RDARA (6D): Indonesia Domestic Aeradio Network-Jakarta
- 11318 LDOC: El Al Operations Tel Aviv, Israel.
- VOLMET: Syktyvkar, Samara, Jekaterinburg, Tyumen
- 11330 CAR MWARA: New York, NY USA
- 11333 NCA RDARA (2B/2C): Baku Aeradio, Azerbadzhon; Yerevan
- 11336 NAT MWARA: Gander Radio, NF Canada
- 11339 SP RDARA (9): Nadi, Fiji
- 11342 LDOC: Honolulu ARINC, HI USA; New York ARINC, NY US; San Francisco ARINC, CA USA; Tokyo (Japan Airlines), Japan
- 11345 LDOC: Paris (Air France), France; Piarco Operations (BWIA), Trinidad; Stockholm, Sweden
- 11351 LDOC: Paris (Air France), France
- 11354 LDOC: Manama (Gulf Air-Falcon Air), Bahrain; Moscow (Aeroflot), Russia; Springbok Radio (South African Airways) Johannesburg, South Africa
- 11355 LDOC: Manama (Falcon-Gulf Air), Bahrain
- 11366 LDOC: Belem (VARIG), Brazil; Rio de Janeiro (VARIG), Brazil
- 11370 VOLMET: Ezeiza, Argentina (H+00)
- 11384 CWP MWARA: Honolulu, HI USA
- 11387 VSEA VOLMET: Bangkok, Thailand; Bombay, India; Singapore, Singapore; Sydney, Australia
- 11390 NCA RDARA (2): Russian Domestic/Regional Aerodios-Moscow
- 11393 SP RDARA (9B): Port Moresby, Papua New Guinea
- 11396 CAR MWARA: Boyeros, Cuba; New York, NY USA; Panama Radio, Panama
- SEA MWARA: Bali, Indonesia; Brisbane, Australia; Darwin, Australia; Jakarta, Indonesia; Manila, Philippines; Medan, Indonesia; Perth, Australia; Ujung Padang, Indonesia
- 11401 SP RDARA: Panape Radio, Truk Island
- 11470 LDOC: Silver Radio-Miami, FL USA
- 13205 LDOC: Air Seychelles; Berne, Switzerland
- 13240 LDOC: Aeroparque Jorge Newbery-Buenos Aires (Aerolineas Argentinas), Argentina
- 13255 LDOC: Tors Cove (Rainbow Radio), NF Canada

13260-13360 kHz AERONAUTICAL MOBILE (R)

- 13261 SP MWARA: Auckland, New Zealand; Brisbane, Australia; Nadi, Fiji; Papeete (Tahiti Radio), French Polynesia
- 13264 VEUR VOLMET: Shannon, Ireland
- 13267 VOLMET: Irkutsk, Russia (H+00)
- 13270 VNAT VOLMET: Gander, NF Canada and New York, NY USA
- 13273 SP MWARA: Brisbane, Australia; Honolulu, HI USA; Nadi, Fiji
- 13282 VPAC VOLMET: Auckland, New Zealand; Hong Kong, Hong Kong; Honolulu, HI USA; Tokyo, Japan
- 13285 LDOC: Tors Cove (Rainbow Radio), NF Canada
- VSEA VOLMET: Beijing, China
- 13288 CEP MWARA: Honolulu, HI USA
- 13291 NAT MWARA: Gander (IFSS), NF Canada; New York (IFSS), NY USA; Reykjavik, Shanwick ATC, UK
- 13294 AFI MWARA: Kinshasha, Zaire
- 13300 CWP MWARA: Honolulu, HI USA
- LDOC: Beirut Middle East Airlines (Cedar Base), Lebanon
- 13304 LDOC: El Al Operations Tel Aviv, Israel
- 13306 NAT MWARA: Gander, NF Canada; New York, NY USA; Santa Maria, Azores; Shanwick, UK
- 13309 LDOC: New York ARINC, NY USASEA MWARA: Hong Kong, Hong Kong
- 13318 SEA MWARA: Jakarta, Indonesia; Perth, Australia
- 13324 LDOC: Berne, Switzerland; Tokyo (Japan Airlines), Japan
- 13327 LDOC: Madrid (Iberia), Spain
- 13330 LDOC: Beirut Middle East Airlines (Cedar Base), Lebanon; Manama (Falcon-Gulf Air), Bahrain; New York ARINC, NY USA; Houston (Universal Radio), TX USA; Houston (Eastern Radio), TX USA
- 13333 LDOC: Air New Zealand; Hong Kong (Cathay Pacific), Hong Kong; Hong Kong (Dragon), Hong Kong; Speedbird Radio (British Airways)

- London, England
- 13336 LDOC: Lisbon (Air Portugal TAP), Portugal; Rome (Alitalia), Italy
- 13339 LDOC: Jeddah (Saudi Airlines), Saudi Arabia; Cubana flight noted here (Bayeros LDOC?); Aero Mexico (Radio Mexico) unidentified location in Mexico
- 13342 LDOC: Sydney/Perth (Qantas Control), Australia; Stockholm, Sweden
- 13345 LDOC: Air New Zealand; Sydney/Perth (Qantas Control), Australia
- 13348 LDOC: Port Louis (Air Mauritius), Mauritius; Cedar Rapids (Rockwell Radio), IA USA
- 13351 LDOC: Brussels (Sabena), Belgium; Dublin (Aer Lingus), Ireland
- 13354 NAT MWARA: New York CEP MWARA: Honolulu Radio, HI USA; San Francisco Radio, CA USA
- 13356 LDOC: Kingston (Air Jamaica-Channel 1), Jamaica
- 13576 LDOC: Stockholm, Sweden
- 13593 LDOC: Berne, Switzerland
- 13942 LDOC: Stockholm, Sweden
- 14645 LDOC: Stockholm, Sweden
- 15046 LDOC: Berne, Switzerland
- 15050 LDOC: Berne, Switzerland
- 15835 LDOC: Berne, Switzerland

17900-17970 kHz AERONAUTICAL MOBILE (R)

- 17904 CWP MWARA: Honolulu, HI USA; Tokyo, Japan
- SEA MWARA: Jakarta, Indonesia
- SP MWARA: Brisbane, Australia; Honolulu, HI USA
- 17916 LDOC: Dublin (Aer Lingus), Ireland; Abidjan (Air Afrique), Cote d'Ivoire(tent); Stockholm, Sweden
- 17922 LDOC: Sydney/Perth (Qantas Control), Australia
- 17931 LDOC: Berne, Switzerland
- 17937 LDOC: Lima (Flight Support), Peru
- 17940 LDOC: Houston (Universal Radio), TX USA; Madrid (Iberia), Spain
- 17946 NP MWARA: Honolulu Radio, HI USA; Tokyo, Japan
- 18023 LDOC: Berne, Switzerland
- 18042 LDOC: Stockholm, Sweden
- 18480 LDOC: Berne, Switzerland
- 19554 LDOC: Berne, Switzerland
- 20035 LDOC: Berne, Switzerland
- 20870 LDOC: Berne, Switzerland

21924-22000 kHz AERONAUTICAL MOBILE (R)

- 21933 LDOC: Berne, Switzerland
- 21970 LDOC: Sydney/Perth (Qantas Control), Australia
- 21988 LDOC: Berne, Switzerland
- 21994 LDOC: Jeddah (Saudi Air), Saudi Arabia
- 23285 LDOC: Berne, Switzerland
- 25500 LDOC: Berne, Switzerland

Key to Abbreviations:

AFI	Africa
CAR	Caribbean
CEP	Eastern Pacific & Hawaii
CWP	Western Pacific
EA	Eastern Asia
EUR	Europe
INO	Indian Ocean
LDOC	Long Distance Operational Control
MID	Middle East
MWARA	Major World Air Route Areas
NAT	North Atlantic
NCA	Siberia & China
NP	North Pacific
(OR)	Off-Route
(R)	Regional
RDARA	Regional and Domestic Air Route Areas
SAM	South America
SEA	Australia & S. Pacific
SP	South Pacific
VOLMET	Aviation weather broadcasts

More Signals from MARS, FAA

No sooner did we finish last month talking about the US Navy-Marine Corps Military Affiliate Radio System (MARS), than the US Air Force MARS got red-hot. In a type of activity that everyone thought was gone forever, a few of their frequencies lit up with phone patches from planes over the US. They were calling anyone, from base operations offices to granny, who might want to see the aircraft land.

The MARS phone patch mission on short-wave (high frequency or HF) had been pretty much history until recent events put more aircraft into the skies over the US. Now, though, it appears to be back. While traffic has dropped considerably since the holiday period, one or two frequencies were still fairly lively at press time.

The first report I had was an e-mail in early December from Glen Rohde in Canada. He wondered why he'd seen nothing in this column about 13927 kilohertz (kHz), upper sideband (USB). I checked it out, and wondered the same thing myself. It was lit up almost continuously, with much the same traffic as 11175 kHz USB, the busiest frequency in the Air Force's Global High-Frequency System (GHFS).

As on 11175 and the other air-to-ground frequencies we hear, aircraft come on and make general calls to "any station" or to "Mainsail," a group callword which means basically the same thing. The difference, of course, becomes obvious when someone answers. 11175 is a US military communications net, and the stations are at such bases as Andrews, the control point in Maryland. On 13927, however, the stations are amateurs or military personnel answering on their own time, usually with the special MARS callsigns beginning in "AFA."

A trip through the reference lists shows 13927 as a very old Pacific phone patch frequency. Later on – presumably when the patch traffic dropped to nothing – it was pooled with the SHARES (Shared Resources) federal net. It still shows as an Air Force MARS contribution to this net. Of course, routine phone patching is not a SHARES usage of the frequency, and these are not SHARES messages. As with all "SHARES frequencies," the agencies pooling them retain them for their own uses as well.

Other frequencies worth checking are

14408.0 and 20992.5 USB, both of which apparently came from the Air Force MARS unassigned pool. Similar activity has been heard on both. All these are great to monitor, worldwide, whenever any activity puts a lot of military aircraft into the sky over the United States.

More FAA Alphabet Soup

Nobody generates acronyms faster than the government, and the Federal Aviation Administration (FAA) certainly contributes its share. NARACS is the agency's National Radio Communication System, which resides on very high frequencies (VHF) and on HF. The HF side is part of the RCOM (Recovery Communications) capability of the FAA. An upgrade has been in progress for some time, putting complex, computer-controlled radios into regional offices and emergency operation centers. More recently, installation has progressed on NARACS/ALE, an Automatic Link Establishment (ALE) radio system linking FAA Air Route Traffic Control Centers (ARTCCs).

The ALE callsigns are rather distinctive. "FAA" is the FAA headquarters station, KEM80, in Washington, DC. The rest are "FAA" plus a three-letter station code. If the station is an ARTCC, this will be the existing FAA identifier for the station. For example, the Los Angeles

ARTCC (which is actually way out in Palmdale, near Edwards Air Force Base) is already called "ZLA" in FAA-speak. Therefore, we hear it identifying on ALE as "FAAZLA."

FAA used to have a bewildering array of small regional HF nets, but they've been consolidated into a few large ones. Per relatively standard federal practice, these test every Wednesday morning. The east coast net is on 8125 kHz USB at 1545 Coordinated Universal Time (UTC). The southern region is on 6870 kHz lower sideband (LSB), reported variously at 1300, 1330, and 1400 UTC, so check around those times. The western region is on 13457 kHz, reported at 1600 and 1730 UTC.

FAA frequencies have been covered several times recently in other columns so I will just do a quick list of various fairly recent hits. The NARACS emergency system has been heard with voice, data, or self-scanning (SELSCAN) on 3428, 4675, 5512, 6870*,

7475*, 7611*, 8125*, 8912, 9914, 10493, 11288*, 11637*, 13312*, 13457*, 15851*, 16348, 17952, 19410*, and 20852. (A star * means the frequency is listed as being pooled with SHARES.) The NARACS/ALE system has been reported on 5236, 5860, 6870, 7475, 7611, 7903, 8125, 8912, 9114, 11637, 12267, 13312, 13457, 13630, 15851, 16348, and 24550*.

Good FAA hunting!

FAA ARTCC Identifiers

SJU	San Juan, PR
ZAB	Albuquerque
ZAN	Anchorage
ZAU	Aurora (Chicago)
ZBW	Boston
ZDC	Wash. DC
ZDV	Denver
ZFW	Fort Worth
ZHU	Houston
ZID	Indianapolis
ZJX	Jacksonville
ZKC	Kansas City
ZLA	Los Angeles
ZLC	Salt Lake City
ZMA	Miami
ZME	Memphis
ZMP	Minneapolis
ZNY	New York
ZOA	Oakland
ZOB	Cleveland
ZSE	Seattle
ZTL	Atlanta

Phone Company NS/EP

NS/EP, in the government's alphabet soup, stands for "National Security/Emergency Preparedness." It's an officially defined mission for a number of radio services. National long-distance carriers have always participated in NS/EP for reasons of infrastructure maintenance, especially on critical circuits needed in emergencies.

It appears that local phone companies are also dusting off their NS/EP capabilities. Here in Los Angeles, a key office has added a new station for weekly check-ins on frequencies near the 80 and 40 meter amateur bands. It's using ham radio gear, though not on ham frequencies.

Given that there's a net to check into – on Wednesday mornings, of course – they can't be the only station on. Frequencies were changing at press time, but just listen around.



- | | |
|--|---|
| <p>AFB Air Force Base
 ALE Automatic Link Establishment
 AM Amplitude Modulation
 ARQ Automatic Repeat Request teleprinting system
 AX.25 Amateur "packet radio" computer networking
 AWACS Airborne Warning and Control System
 CAMSLANT Communication Area Master Station, Atlantic
 CW Morse code telegraphy ("Continuous Wave")
 DX Distant Transmitter
 E3 British Lincolnshire Poacher tune and numbers
 E4 British Cherry Ripe, like Poacher, in Pacific
 E10 Israeli numbers, phonetic callup, with message
 E10a Israeli phonetic numbers, null message
 E17 Russian intelligence numbers, 2 messages
 EAM Emergency Action Message
 FAX Radiofacsimile
 FEC Forward Error Correction teleprinting system
 FM Frequency Modulation
 GHFS Global High-Frequency System
 HFDL High-Frequency Data Link, aereo data net
 MARS Military Affiliate Radio Service
 Meteo Meteorological
 M8a Cuban "Cut Number" CW (sounds like letters)
 M16 French intelligence, CW, identifies 8BY
 Meteo Meteorological
 MFA Ministry of Foreign Affairs
 NORAD North American Aerospace Defense Command
 PACTOR Packet Teleprinting Over Radio
 RSA Republic of South Africa
 RTTY Radio Teletype
 SITOR-A Simplex Teleprinting Over Radio, ARQ mode
 SITOR-B Simplex Teleprinting Over Radio, FEC mode
 UK United Kingdom
 Unid Unidentified
 US United States
 USC United States Customs
 V2a Cuban "Atencion!" numbers, 3-message format
 V21 Cuban Babbling, sing-song human "numbers"</p> | <p>2463.0 IDR-Italian Navy, Rome, with RTTY channel availability broadcast at 2311. (Day Watson-UK)
 3401.7 Rita51-Unknown station, exchanging control and data "packets" with Rita30, Rita49, and Rita74, in AX.25 at 2200. (Watson-UK)
 4027.0 Cuban "Atencion" numbers (V2a), AM female voice at 0205 and 0306. (Camillo Castillo-Panama)
 421B.5 LZW-Varna Radio, weather in SITOR-B, new frequency replacing 4212.5, at 1835. (Watson-UK)
 4231.0 FUF-French Navy, Martinique, testing in RTTY (75/425) at 1046. (B. Wade-KY)
 541B.0 Cuban "Atencion" numbers (V2a), AM female voice and 5-number groups, at 0208. (Castillo-Panama)
 5418.0 Cuban CW "Cut Numbers" (M8a), two Sundays at 0200, and Friday at 0303. (Castillo-Panama)
 5687.0 FAP Lisboa-Portuguese Air Force, Lisbon, taking position from aircraft "405" at 0803. (Ron Perron-MD)
 5696.0 Coast Guard 2104-US Coast Guard aircraft working CAMSLANT Chesapeake, VA, on rescue of persons in water at 1901. (Allan Stern-FL)
 5759.0 Cuban CW "Cut Numbers" (M8a), four times at 0200, once at 0303. (Castillo-Panama)
 5777.5 KYAASF-Unknown US government or National Guard, sounding in ALE on approximate quarter and three-quarter hour beginning at 0111. (Watson-UK)
 6529.0 "The Babbling"-Cuban sung "numbers" (V21), live male and female voices, at 2205. (Tom Severt-KS) Cuban Babbling (V21), male voice with various weird cadences, at 2345. (Barry Williams-AL) Cuban Babbling, incoherent "numbers" (V21) at 2359. (Stern-FL)
 6697.0 Spy Song-US military, with a 28-character EAM simulcast on 8992 and 11244, at 0506. (Haverlah-TX)
 6712.0 Andrews-US Air Force, Andrews AFB, MD, with a 105-character EAM at 0808. (Duke Rumley-NC)
 6712.0 Sigonella-US Air Force GHFS, Italy, with two EAM simulcast on 4724, 8992, and 11244, at 0729 and 0759. (Haverlah-TX)
 6797.0 Cuban CW "Cut Numbers" (M8a), once at 1203, twice at 1302. (Castillo-Panama)
 6826.0 Cuban CW "Cut Numbers" (M8a), two Fridays at 1303. (Castillo-Panama)
 6854.0 Cuban "Atencion" numbers (V2a), AM, two Mondays at 0300. (Castillo-Panama)
 6903.0 Lincolnshire Poacher-British "numbers" (E3), AM female voice, jammed, at 0125. (Williams-AL)
 6910.0 SYN2-Israeli intelligence "numbers" (E10), English phonetic callup only, at 0050. (Williams-AL)
 6911.0 SYN1-Israeli intelligence "numbers" (E10), English callup and message, in AM at 0527. (Williams-AL)
 6911.5 P18-Possible US Army or National Guard, sounding in ALE approximately at 18 and 48 after the hour, also heard on 7361.5, 9295, 11574, and 12168, starting at 0648. L18, sounding approximately every 15 minutes, also on 8171.5, 9295, and 12168, beginning at 0504. KYAASF, sounding at 16 and 46, starting at 0646. (Watson-UK)
 6912.0 SYN2-Israeli intelligence "numbers" (E10a), callup only, at 0534. (Severt-KS)
 6931.0 Cuban CW "Cut Numbers" (M8a), at 1202, on 6933 at 1304, and 6934 at 1303. (Castillo-Panama)
 6960.0 Lincolnshire Poacher (E3), loud at 2135 (Williams-AL)
 6987.0 Unid-English-speaking female "numbers" (E17), said "End of Message," "Repeat," and "Code 3666," at 0406. (Williams-AL)
 7668.0 8BY-French intelligence, with CW marker and 3-figure "numbers" (M16), at 0546. (Severt-KS)
 7889.0 Cuban "Atencion" numbers (V2a), AM, two Sundays at 0200. Cuban CW "Cut Numbers" (M8a), three times at 1300. (Castillo-Panama)
 8431.5 UAT-Moscow Radio, Russia, SITOR-A traffic with vessel KHOR, at 1653. (Patrice Privat-France)
 8504.0 US Coast Guard New Orleans, with FAX wind and high seas chart at 1252. (Wade-KY)
 8560.0 5555-Moroccan oil company, sounding in ALE at 0241. 2222, sounding at 0542. LARAND-Colombian Army, Laramia, calling Santana in ALE at 2249. TRESSEQINT-Colombian Army radar station Tres Esquinas, calling Florencia in ALE at 2321. (Mid-Atlantic DXer-MD)
 8906.0 Air France 3554-Scheduled commercial flight with position for New York, at 2231. (Stern-FL)
 8912.0 USC-US Customs, with ALE burst, then voice with WH9, at 1515. (Larry Van Horn-NC)
 8971.0 "T-7-R"-US military aircraft setting up satellite links with Fiddle (US Navy, FL) and Blue Star (USN, Roosevelt Roads, PR), at 1740. (Perron-MD)
 8983.0 CAMSLANT Chesapeake-US Coast Guard, VA, working aircraft CG 24C on a drug mission, at 1534. (Stern-FL) Coast Guard 2133, working CAMSLANT at 2122. (Perron-MD)
 8992.0 Snag 41-US Air Force, setting up radio guard with Andrews at 1514. (Rumley-NC) Riderless-US military, with two EAM simulcast on 11244, at 2125 and 2155. (Haverlah-TX)
 9016.0 Pep Talk-US military, with a 48-character EAM simulcast on 8992, at 0041. (Haverlah-TX)
 9023.0 Magic 75-US Air Force, working Northern Lights (NORAD NE US), at 1622. (Rumley-NC)
 9025.0 Darkstar Sierra-US Air Force, patching Homeward Ops at 1534. (Severt-KS) 891192-US Air Force C-17, calling JDG (Diego Garcia), in ALE, at 1533. (Privat-France)
 9057.0 Woodland-US military, with EAM simulcast on 8992 and 11244, at 1939. (Haverlah-TX)
 9121.0 Delta 11-Unknown military, radio check with Delta 5, at 1702. (Severt-KS)
 9252.0 Lincolnshire Poacher (E3), AM, jammed, at 2235. (Williams-AL)
 9337.7 Cuban "Atencion" numbers (V2a), AM, at 1206. (Ray Carmen-USA)
 10000.0 F26-Unknown, with many ALE calls to DCCOP, starting at 0835.</p> |
|--|---|

- ECC-Unknown, calling DCC in ALE at 0936. (Watson-UK)
- 10033.0 Panther 202-US aircraft en route to Santo Domingo, working Miami at 2231. Panther 901, working Miami at 2233. (Stern-FL)
- 10087.0 014-Aeronautical Radio, Inc., Krasnoyarsk, with HF DL identifier "squitters" at 1423. (Watson-UK)
- 10204.0 Andrews-US Air Force, Andrews AFB, MD, with a 54-character EAM simulcast on 11244 and others, at 2032. (Haverlah-TX)
- 10242.0 CS1-US Customs, calling WH9 in ALE, then clear and encrypted voice at 2017. (Van Horn-NC)
- 10448.5 Cuban "Atencion" numbers (V2a), AM, at 1206. (Carmen-USA)
- 10780.0 King 22-US Air Force C-130, patching Keesler AFB Metro, MS, via Cape Radio at 1922. (Stern-FL)
- 11018.0 Santana-Colombian Army, working Larandia in ALE and another data mode, at 2029. (MADX-MD)
- 11030.0 AXM34-Canberra Meteo, Australia, blurry weather FAX at 0943. (Watson-UK)
- 11080.0 YKP28-Syrian Arab News Agency, Damascus, with Arabic news in RTTY at 1603, then French and English until 1742. (Watson-UK)
- 11175.0 YD 215-US military P-3C, patching duty office via Andrews AFB, MD, at 0010. Reach 320Y-US Air Force C-141 transport, patching Hilda East and Metro via Andrews, at 0140. (Stern-FL) Jedi 40-US military, with a patch via Andrews AFB, MD to Mastiff, said he was "monitoring 12.700," at 0530. Aircraft 12-Unknown military, radio checks with Puerto Rico (Salinas GHFS), at 0730. (Brent Davenport-CO) Otis 76-US Air Force, radio check with Andrews at 1513. (Rumley-NC) Alpha 3-US military "over central Texas," calling "MARS Radio," no joy, at 1720. (Haverlah-TX) [Wonder if he meant to use 13927. -Hugh]
- 11181.0 Appointee-US military, calling Andrews, no joy at 1453. (Rumley-NC) Diego-US Air Force GHFS, Diego Garcia, working several aircraft at 2050. (Van Horn-NC)
- 11205.0 Smasher-US military, Key West, FL, calling Cobb 31 at 1729. (Perron-MD)
- 11226.0 Sentry 11-US Air Force AWACS, patch to Tinker Meteo, OK, at 2338. (Sevart-KS)
- 11232.0 Sentry 14-US Air Force, patching Raymond 24 (Tinker AFB, OK) via Trenton Military, at 1610. (Rumley-NC)
- 11244.0 Offutt-US Air Force, Offutt AFB, NE, with SKYKING at 1140. (Rumley-NC) Fairness-US military, then called "on 13155," not heard there, at 2007. (Haverlah-TX) [Forgot to change frequency? -Hugh]
- 11247.0 Haven-UK Royal Air Force Flight Watch, Ascension Island, working Ascot 3210, a weekly Falklands run, at 2145. (Perron-MD)
- 11279.0 Arctic Radio-Polar air route control, position checks with KLM 601, others, at 1456. (Steve Wallace-CA)
- 11309.0 New York Radio-Atlantic air traffic control, positions from EFF 005 and Martinair 064, at 2234. (Stern-FL)
- 11315.0 N664US-Commercial flight NW11, with an HF DL position message at 2021. (Watson-UK)
- 11523.0 HSP-UK Royal Signal Corps, Hanslope Park, sounding in ALE at 1016. HFB-RSC, Hereford, at 1131. (Privat-France)
- 11565.4 EZI-Israeli intelligence "numbers" (E10a), callup at 0231. (Carmen-USA)
- 12070.0 Stability-US military, with EAM simulcast on 8992 and 11244, at 1953. (Haverlah-TX)
- 12579.5 WLO-Mobile Radio, AL, with CW identifier in ARQ sync markers, at 1750. (Brian Limbach-USA)
- 13155.0 Acid Rock-US military [old Navy frequency -Hugh], with EAM, simulcast on 8992 and 11244, nothing on the usual Zulu channels, at 2206. (Haverlah-TX)
- 13200.0 Unid-Males using an African language mixed with some French, plus the occasional Arabic mention of Allah, all on a major US Air Force frequency, at 2354. (Perron-MD) [Now, who is THAT? -Hugh]
- 13254.0 Diego Tower-Unknown military, working aircraft Foxtrot, at 2046. (Perron-MD)
- 13257.0 Dark Star-US Air Force, patch to Current Ops via Trenton Military, at 2011. (Haverlah-TX)
- 13339.0 Aero Mexico Ops-Company station with weather in Spanish for Aero Mexico 004, at 1619. (Perron-MD)
- 13907.0 Little Beaver-US Navy, general call on Z-225 channel, then message to (sounded like) Charcoal, at 1653. (Van Horn-NC)
- 13927.0 AFA2OH-US Air Force MARS, with morale patch from aircraft Piston 51, at 1715. (Perron-MD) Vader 06-US military C-130 over Alabama, patching home base via AFA2SA, MARS, regarding status of Vader 04, at 1858. LC 002-US Navy P-3C, over Bahamas, patching Rosey Roads duty office via AFA2SJ, MARS, at 2048. Reach 62PI-US Air Force Air Mobility Command C-130, patching Hilda West via AFA1NA, MARS, at 2230. (Stern-FL) [This Air Force MARS frequency has recently become almost a second Global, with many routine patches from aircraft.]
- 14486.0 RFGW-French MFA, Paris, working D2Z, Budapest, Hungary, in FEC at 1549. (Watson-UK)
- 14775.0 BOGCON-Colombian Police, Bogota, sounding in ALE at 1948. (Watson-UK)
- 15016.0 Offutt-US Air Force GHFS, Offutt AFB, NE, with two EAM at 1905. (Haverlah-TX)
- 15025.0 Sweet 85-US military, position for Smasher (FL) at 1628. (Rumley-NC)
- 15615.0 AXI35-Darwin Meteo, Australia, with FAX weather schedule for Oceania South, at 0447. (Hall-RSA)
- 16800.0 Unid-Unknown ship station with SITOR-B relay of Philippines News Agency, then "happy new year," at 0930. (Privat-France)
- 16829.5 UCE-Arkhangelsk Radio, Russia, SITOR-A traffic with vessels UCNT, 9HIA5, UCED, UIUR, and UCBM, at 0915. (Privat-France)
- 16840.5 RRR34-Russian maritime coastal station, with SITOR-B frequency schedule and traffic list, at 1300. (Privat-France)
- 17045.7 9MG-Penang Radio, Malaysia, with ARQ markers at 1813. (Hall-RSA)
- 17955.0 Johannesburg Oceanic-Air route control, RSA, working Springbok 280, others, at 1545. (Wallace-CA)
- 18275.0 Unid-Voice Of America feeder, with Communications World in reduced-carrier USB, Sunday at 1410. (Mike Chace-PA)
- 18552.0 V5G-Romanian MFA, Bucharest, with long, online encrypted, FEC message at 1200. (Hall-RSA)
- 19031.7 Unid-Possibly Pakistan MFA, Islamabad, with an urgent message to "all missions," regarding border and airport restrictions, at 1559. (Hall-RSA)
- 19131.0 Atlas-US Drug Enforcement Agency, working Coast Guard 24C, at 1609. (Perron-MD)
- 19242.0 Unid-Unknown PACTOR 200/200 message in Czech from "Pastor Stefan ZALOZY Marek," at 1614. (Hall-RSA)
- 20167.0 Resemble-US military, with a 28-character EAM simulcast at 8992 and 11244, at 1833. (Haverlah-TX)
- 20201.6 DDK9-Hamburg Meteo, Germany, with widely-shifted RTTY second harmonic of 10100.8, at 1046. (Watson-UK)
- 21866.0 Cherry Ripe-British M16/SIS "numbers" (E4), with message at 2340. (Sevart-KS)
- 21925.0 San Francisco-Pacific air route control, working Northwest 17, All-Nippon 009, others, at 2330. (Wallace-CA)
- 22603.5 UIW-Kaliningrad Radio, Russia, with RTTY "Happy New Year" messages to several vessels, at 1500. (Privat-France)
- 23214.0 Service Center-US Customs, working unheard station at 1914. (Van Horn-NC)
- 23338.5 PLA-US Air Force, Lajes, Azores, sounding in ALE at 1155. ADW-USAF Andrews AFB, MD, sounding at 1155. (Watson-UK)
- 23386.3 LOR-Argentine Navy, Puerto Belgrano, with RTTY marine news and weather in Spanish, at 0530. (Hall-RSA)
- 24370.0 RFGW-French MFA, Paris, with very long coded FEC embassy circular, at 1513. (Hall-RSA)
- 25870.0 WFLA-Non-delayed program dump for cueing from Tampa, FL AM 970, heard briefly in FM at 1240. (Boender-Netherlands)
- 25970.0 Unlicensed net in Maine, using good procedures, trading reports and weather, at 1646. (Wallace-CA)
- 26089.0 Unid-Russian language taxicabs and phone systems, in FM, also on 26166, 26412, 26543, 26583, 26625, 26715, and 26729, at 1040. (Boender-Netherlands)

More Stuff for Digital Beginners

It's been a while since we covered some easy targets for listeners starting out with digital decoders, so without further ado let's look at a few choice catches for beginners. The majority of these stations have been chosen with the North American listener in mind, but should be audible by others around the world.

❖ A CW "Number" Station

A fascinating part of the listening hobby are the so-called numbers stations, relaying messages from the intelligence agencies of the world to their agents in the field. Although many of these stations keep schedules that appear to you and me as random (though probably not for the message recipient!) there are a few that have more predictable habits. One is the station operated by French Intelligence from a location just outside Paris and using the fictitious callsign "8BY". This station appears regularly at 40 minutes past the hour, nearly 24 hours per day, all year round on at least three of the following frequencies simultaneously:

7668, 10248, 12075, 12170, 12238, 14931, 18415 & 20946kHz

The "messages" are sets of three figure groups separated by "/" preceded by the usual CW call-up:

VVV VVV VVV 8BY 8BY 8BY 605/432/679/236

If there's no message, the station simply sends "QRU", the Morse short-hand for "there are no messages for you."

❖ A Mixed-Mode Propagation Beacon LN2A

Norwegian Telecom operates a 24 hour propagation beacon with callsign LN2A on behalf of the International Telecommunications Union (ITU) from a town called Sveio located at 59 deg 37 min N, 5 deg 19 min E. LN2A follows the frequencies and schedule below:

14395 kHz at hour +00, 20 & 40 minutes
20945 kHz at hour +04, 24 & 44 minutes
5470 kHz at hour +08, 28 & 48 minutes
7870 kHz at hour +12, 32 & 52 minutes
10407 kHz at hour +16, 36 & 56 minutes

The beacon sends its callsign in Morse together with a 100bd/850Hz data signal many times on each visit to one of its assigned frequencies. Only 1 kW of power is used to a modest antenna, so hearing it is always a good indication of the prevailing state of the ionosphere.

❖ SITOR-A from the Swiss Diplomatic Service

MFA Berne, callsign HBD20, can still be

heard daily on a number of frequencies sending long messages with five letter groups using standard 100bd/170 Hz SITOR-A equipment. The messages are accompanied by extensive headers which indicate the origin and destination(s). Currently the frequencies 20603 and 20610 kHz are very active between 1200 and 1700UTC and easily heard in the US. Here's what you're likely to see if you catch MFA Berne towards the end of a typical message exchange:

```
vlwlm yfagh nkiyv oyerj zjqsf rthba mpkss ofglo pftyz qeogh
alukx uoryt uznyk ihrqe inpbn tnnvn bhaoj laues stbla uxraq
cvcvc
))))
end of message + ?
/////9999 + ?
```

```
no message + ?
1440 ut tl
hbd 20/6
S
```

❖ RTTY CARB from the Royal Navy

MGJ, the Royal Navy's submarine base at Faslane, Scotland, sends a continuous channel availability broadcast (or CARB) using 75bd Baudot RTTY with a shift of 340 Hz. The CARB shows the occupancy of numbered channels through the use of certain characters which change as stations on those frequencies come and go:

```
02q 03p p04p 06p p08p 12q hq16pbk 16q 22p p 25p mgj
02q 03p 04p 06p 08p 12q 16poo 16q 22p 25p
02q 03p 04p 06p 08p 12q 16poo 16q 22p 25p mgj
02q 03p 04p 06p 08p 12q 16poo 16q 22p 25p
02q 03p 04p 06p 08p 12q 16poo 16q 22p 25p mgj
```

During daytime 19860 kHz is a good bet, with 9130 kHz usually audible during the evenings. This same style of transmission can still be heard on a number of other navy frequencies including other Royal Navy outlets and the Dutch Navy.

❖ RTTY Weather from Germany

A decade ago there were many, many meteorological stations using HF radio. Today there are but a few, with Hamburg Meteo, callsigns DDK and DDH, providing a reliable signal into the US on one of the following frequencies:

147.3, 4583, 7646, 10100.8, 11039 & 14467.3 kHz

Hamburg uses 50bd Baudot RTTY with a shift of 450 Hz. Owners of Hoka gear can test out the synoptic decoder which makes sense of the many coded weather messages automatically.

❖ ALE from the US Air Force

The US Air Force operates one of the world's most extensive ALE (Automatic Link Establishment) networks. No matter where you are, you should hear at least one of their frequencies alive with the characteristic burbling sound of ALE from aircraft and ground-stations. Here, in a typical display from the PC-ALE program, Offutt Air Force Base in Nebraska (OFF) and Lajes Field in the Azores (PLA) can be seen:

```
[TWS][OFF] [ALO] BER 18 SN 02
[TWS PLA][CMD 70 7E OF]][[CMD 04 74 1F]]][E]
```

The USAF ALE network can be found 24 hours per day on the following USB frequencies:

2805 3059 3068 3137 4490 4721 4724 5684 5708 6685 6715 6721 6761 7632 7840 8965 8992 9019 9025 9026 9027 9057 11175 11226 11250 13209 13215 15016 15043 18000 18003 20031 20631 23337 27870

❖ The Maritime Traffic in SITOR-B from Belgium

The coastal radio station OST in Oostende, Belgium, sends a regular traffic list of stations with pending mail on the following frequencies: 5376.5, 7776.5, 14719 & 19013.5 kHz

The list is sent in standard 100bd/170Hz shift SITOR-B (aka FEC) at hour+45 minutes and looks something like the following:

```
zczc
cq de ost qrc list 26/12/01 13:45
ost qrc list in fec mode:
v2k5 v2k5
ost mailbox: msg+
important: if no qso via dirtlx pse dial man+
or tlx followed by subscribnumber ond the '+' sign.
nnnn
```

The callsigns of the vessels are shown in the list.

Next month we'll look at some free and useful tools to assist in your digital decoding. Until then, 73 and happy hunting.

Resources

LN2A - <http://www.itu.int/ITU-R/study-groups/sg3/sg3/hf-campaign/>
MFA Berne Profile - <http://www.chace-ortiz.org/umc/mfatext/Switzerl.txt>
Hamburg Meteo - http://www.dwd.de/services/gfst/e_telepln.html
USAF ALE Network - <http://www.chace-ortiz.org/umc/mil/airforce/Usaf.txt>
PC-ALE Software - <http://www.chbrain.dicon.co.uk/pcale.html>

RCI Cuts Programming, Muzzles Staff

On October 31, 2001, in an unprecedented move, RCI's administration tried to shut down the RCI Action Committee. In a memo sent to all RCI staff, Jean Larin, Manager of the RCI "Redeployment" listed articles both from the employees' collective agreement and the Journalistic Standards and Practices of the CBC. As a result, all communications with non-CBC personnel concerning the RCI situation were stopped until legal advice could be given from the employees' union. Among the articles mentioned in Larin's memo:

"Employees may not engage in activities likely to bring the Corporation into disrepute; Employees may not take a stand on public controversies if, by doing so, the Corporation's integrity would be compromised..." This is the first time employees have been told to stop talking about what is going on at RCI, since they started their

battle 11 years ago to protect RCI's mandate. "Why is the administration so afraid of what we are saying?" asks Committee spokesman Wojtek Gwiadzda. "All we are asking is that CBC's own Program and Corporate policies, as they affect RCI, are respected and obeyed."

Staff and programming continue to be reduced, with only one production daily of *Canada Today*, the rest being repeats. By January there were only two RCI newscasts in English per day. "As journalists, producers, and production and technical staff, we are shocked at how far both RCI's and CBC's administrators are willing to go to dismantle the RCI team," said Gwiadzda. Following a Committee meeting on January 9, employees decided to continue the battle to restore programming and protect RCI's mandate to be the Voice of Canada to the world. More details: <http://www.geocities.com/rciaction>

AFGHANISTAN [non] Congress voted Dec. 20 to spend \$19.2 million to start Radio Free Afghanistan broadcasts by the end of January. The money was included in the annual military spending bill and the anti-terrorism package that won overwhelming approval in the House and Senate. The service is to be run by Radio Free Europe/Radio Liberty, which already employs eight Pashto and Dari speakers, said Thomas A. Dine, president of the private, government-funded organization. The broadcasts will originate from its Prague facility. Radio Free Afghanistan expects to broadcast a half-hour of programming eventually increasing to 12 hours a day. The money also will help pay for moving three transmitters from Spain to Kuwait to strengthen the signal to Afghanistan, Dine said (AP via Mike Cooper)

Dec 27 at 1330 on 9950, Denge Mesopotamia in Kurdish was heard instead of R. Voice of Afghanistan; switched to that after two minutes (K. Hashimoto, Japan Premium) A mixup indicating that these two stations have a common feed routing, or transmitter site, or both (gh)

ANTARCTICA After staff rotation in Jan which could put it off the air for a few days, LRA-36 was expected to resume its previous schedule, M-F 1800-2100 on 15476 (Gabriel Iván Barrera, Argentina, Conexión Digital)

ARGENTINA Although many different stations may be relayed by the SSB feeders, one frequently reported now is Cadena 3, e.g.: 0732 on 15819.97 USB, pop music and loteria. Full ID at 0800 & 0900, "Transmite AYP75, Cadena 3, Buenos Aires, 99.1 FM, Integrante de Cadena 3 Argentina." (Shoji Yamada, Tokyo, Japan, Radio Nuevo Mundo) AYP75, Cadena Tres, Buenos Aires, 15820.0-LSB at 0750-1100 with variety of LA pop music, ID, news (Takayuki Inoue Nozaki, Japan, Relámpago DX Logging via Conexión Digital)

14370-LSB, Radio Continental, 0255-0308 excellent with rapidfire M&W newscast over music bed (Terry Krueger, FL, Tocobaga DX)

On 2379.87 at 0130 tentatively R. Nacional, San Miguel de Tucumán. Some 'Nacional' IDs, definitely an Argie (© Mika Mäkeläinen, Lemmenjoki 158 DXpedition, Finland, Freeze! DXing Arctic Style) 2379.84, LRA15 Radio Nacional Tucumán? (harmonic 2 x 1190) 0030-0120 tentative, sounds very "Argentinian" to my ears (Mark Mohrmann, VT)

AUSTRIA Radio Africa International, not connected with the Radio Africa International operated from the US by the United Methodist Church, has existed in Austria for four years, on FM and MW 1476, and now on SW via Moosbrunn. Programs are in English, French and German, Woloff, Lingala, Kinyarwanda, Swahili and Kirundi. SW sked is: 1100-1200 on 17815 and 1500-1600 on 17895; English at 1103-1115, 1503-1515 on Monday, Tuesday, Wednesday and Friday, plus a sports programme at 1800-1815 on Sunday. The mailing address is Radio Afrika Center, Heigerleinstrasse 7, A-1160 Vienna, Austria. Tel/Fax +43 1 49 44 033. The E-mail address is radio.afrikas@sil.at (© Radio Netherlands Media Network)

BURKINA FASO Re last month's report of Ouagadougou on new 5030: It was heard just one evening, nothing since, until another brief reappearance in January. (Piet Pijpers, Netherlands, Cumbre DX, SWBC)

CANADA CFVP, Calgary, was audible in January until fade at 1559 on 6035.32 instead of usual 6030, not sure why. Lots of ads, IDs (Rich Skoba, NJ, DX Listening Digest)

CHINA The Chinese are making much more use of the nonstop music channel instead of CNR relays for jamming. The music isn't too bad, but with no daily variation it becomes a little boring (Olle Alm, Sweden,

BC-DX) Presumably one of those new transmitters testing, or serving as music jammer, though nothing else heard on frequency; around 1930 I was looking for background music, and found some on 13745, strong but fluttery signal with continuous Chinese music, percussion plus high-pitched whistling and strings, off abruptly at 2000*, never any announcements. Avoided tuning in again so as not to be bored (gh) 13745 is one of many used to disturb broadcasts to the PRC, others noted being 9350, 7540, 7560. Clearly they are active with music whenever some "unwanted" program is broadcast. Freedom of expression still seems a long time away in China (Silvain Domen, Belgium, DX Listening Digest)

According to info direct from station, Qinghai PBS, Xining, uses 9850, 9780, 6500, 6260, 6145, 5990, 4750 and 4224 kHz (Mauno Ritola, Finland, DX Listening Digest)

COLOMBIA 4470.06, heard by Hans Johnson in FL, is 3 x 1490 harmonic of HJAY, Onda Nueva, Barranquilla, until 0030*. Closes with the Colombian National Anthem and starts up with it around 1100. Colombians usually play the NA at 1100 and 2300 (Björn Malm, Ecuador, SW Bulletin)

CONGO DR [non] The new RTNC relay via Moyabi, Gabon, at 1600-1900 is quite easy to hear in Central Europe including French news at 1800 and later some segments in vernacular; high-life rather than traditional music (Thorsten Hallmann, Germany, DX Listening Digest)

COSTA RICA Faro del Caribe has new web site: <http://www.farodelcaribe.org/> E-Mail address: tffc@farodelcaribe.org (Pentti Lintujärvi, Helsinki, Finland) Among the few non-religious program titles: Peregrinar Folklorico Costarricense Sat 1305; Noticias Nacionales Mon, Tue, Thu, Fri 1345. Direct streaming webcast: <http://196.40.15.40:8080/ramgen/encoder/faro.rm> (gh)

On 5953.9v, Radio Casino heard in English Jan 1 at 1053-1200, when they went back to Spanish. Usually the station just has Spanish in the mornings. "You are tuned to the number #1 broadcasting station, the TIQ, Radio Casino." "That is from your friendly station, the queen of the Caribbean." I rang them later in the day to see if English in the morning was going to be a regular feature now. The announcer replied no. It was a special program on Christmas Day and New Year's Day mornings only. They do have English daily, at 2300-0000 and 0300-0600 UT; the first one we should have a shot at, not sure if they leave the shortwave transmitter on till 0600; I don't think so (Hans Johnson, FL, Cumbre DX)

CYPRUS NORTHERN BRT Int'l (presumed), 6150, 2200-2201*. I had a two minute window once CRI via France had signed off around 2158. I heard the end of a pop song, then the Turkish National anthem. SINPO during the anthem was 23432 (George Maroti, NY, Cumbre DX) I picked up Bayrak Radio around 0430, but audio was awful. YL in English, Mariyah Carey (Tarek Zeidan, Egypt, SU1TZ, BC-DX) Radio Bayrak, 6150.03 at 1730 with news in English, local music. Frequency is blocked from 1759, and the whole evening - but at :27 and :57 is free for three minutes. Can also be heard after Singapore s/off at 1600 (Stig-Hartvig Nielsen, Denmark, SW Bulletin)

CZECH REPUBLIC R. Prague has a new series of QSLs for 2002, featuring historic towns and UNESCO sites. In 2001 it was historic radio equipment (Jonathan Murphy, World DX Club Contact) Sneak peak at <http://www.radio.cz> - 8 cards, really neat (Gordy, GRDXC)

ECUADOR Regarding reports of Radio Maria heard on La Voz del Napo frequency 3279.56, DJ at R. Maria told me that Radio Maria was ne-

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-01 = winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

gotiating to buy the frequency 3280 kHz, i.e. not a direct purchase of La Voz del Napo, which will cease its broadcasts – but maybe they come back on a new frequency. La Voz del Napo actually exists and IDs as usual – Radio Maria at the moment buys programme time (Björn Malm in Quito, SW Bulletin)

New on 3380.07 is C.R.I. Internacional, Ibarra, heard at 1125 with SW-only ID; when simulcasting MW 1230, it is C.R.I. Centro Radiofónico de Imbabura. Asking for reports to: C.R.I. AM, Calle Rio Chinchipe 396, Los Ceibos, Ibarra, Ecuador. Very sporadic at the moment (Björn Malm, Ecuador, SW Bulletin)

ETHIOPIA Voice of Peace and Democracy / Voice of Tigray Revolution at 1415 on new 6350 ex- 6315 with Horn of Africa music and local announcements (Richard Lam, Singapore, EDXP)

[non] Web site for Sagalee Oromiyaa is at <http://www.voiceforomiyaa.com> (Ludo Maes, Belgium, Cumbre DX) Real audio files date back two months. Schedule is 12120 (via CIS?) Mondays and Thursdays 8:30-9 PM Oromiyaa time (1730-1800 UT per Ludo). Address is sagalromo@aol.com (Hans Johnson, Cumbre DX)

FINLAND YLE transmits on SW a lot of Radio Suomi (YLE network 3) regional programs, listed at http://194.242.88.3/rswebpri.nsf/sivut/maakuntaradiosi_maailmalla.html All in Finnish Time, UT + 2 (Makela, rec.radio.shortwave via Hans Johnson, Cumbre DX)

YLE Radio Finland has no immediate plans for cutting back English for North America, either on SW or satellite. However, should we have to reconsider SW, English to N. America would be considered. This may be triggered by increasing needs/poor service level in some other parts of the world, in our main languages. Foreign language programming from Finland is financed on the basis of regular YLE revenue, mainly TV usage fees. Special funding (from the Foreign Ministry or comparable sources) for foreign language broadcasts has not been available (nor requested, I believe) since the 1950s. Decisions on foreign language broadcasting have been taken within YLE. The idea of a special "mandate" or "a charter" to represent Finland on the airwaves (so often heard in connection with international broadcasting) has been alien to the Finnish situation. YLE broadcasts are not "public diplomacy." International broadcasting in foreign languages has been a spin-off of the respective Finnish and Swedish services – and a part of public broadcasting as such (Juhani Niinisto, YLE Radio Finland, DX Listening Digest)

FRANCE Confirmation that TDF Issoudun SW site is transmitting clandestine R. Seday-e Iran on 15690 is on the excellent website about SW in France, <http://myweb.worldnet.net/~tvignaud> which says that "since March 2001, an Iranian opposition radio is broadcast in Persian from Issoudun-E at 1530-1730 UT on 15690." Centre E is one of the Issoudun sub-sites and contains the eight 500 kW transmitters from 1973/1974 that was shut down Dec. 31 1998; but TDF revived it after the major failure at Montsinery to facilitate substitute services for NHK and SRI (Kai Ludwig, Germany, DX Listening Digest) V. of Iran 1630-1830 on new 12065, in addition to 15690 at 1630-1730 (Observer, Bulgaria) Synchronized, so both from France; maybe 9420 during second hour (Wolfgang Büschel, Germany, World of Radio)

FRENCH EQUATORIAL AFRICA The website above under FRANCE also has an illustrated article about R. Brazzaville, a station I can remember hearing in my very early years of DXing: <http://home.worldnet.fr/~tvignaud/am/rfi/brazzaville.htm> (gh)

GEORGIA R. Khara, Dusheti, 4540 observed, but not daily, around 1515-1545 in Abkhazian(?), 1600-1630 in Azeri; 4875 at 1700-1729 in Abkhazian (Rumen Pankov, Bulgaria, BC-DX)

GERMANY You'll find little or nothing about it in DW's own program info, but a monthly DX program in English still exists, the last Saturday of the month at :35 past the hour in transmissions to Asia, replacing the last 10 minutes of the weekly mailbag. We confirmed it via webcast UT Sun Dec 30 at 0235. Wolfram and Uwe were talking mostly about propagation, including double-echoes on VHF and higher HF bands, with lots of ham lingo. One of the hosts' dreams is for it to be on all DW English broadcasts, not just the Asia service (gh)

The Romany broadcast from Sender Freies Berlin is now carried by DW on SW Sundays 1830-1900 replacing Turkish, still heard other days, on 3995, 6130, and via Sines 11885 (Kai Ludwig, Germany, DX Listening Digest)

HONDURAS 1740.4 harmonic, HREO, 580v x 3 has the same sign-on sequence every day with music and canned IDs just after 1100. Mark Mohrmann transcribed ID: "En sus frecuencias autorizadas, 93.3 FM estéreo y 580 AM desde Santa Rosa de Copán transmite HREO, Radio Súper Estrella de Occidente, La Voz de Dios en su hogar." (Hans Johnson, FL, Cumbre DX)

R. Luz y Vida, HRPC, 3250, Santa Bárbara says English is UT Sun 0300-0400, Mon 0230-0400, and planned in Feb to expand SW to all-night (presumably in Spanish). Email: efmhonduras@globalnet.hn (Andy Sennitt, hard-core-dx)

ICELAND RUV webpage says SW relays are scheduled: To Europe (live) 1215-1300 on 13865, 1755-1825 on 11402; to USA (recorded) 1410-1440 & 1835-1905 on 13860, 2300-2335 on 11402 (Bernd Trutenau, Lithuania, BC-DX) Though Icelandic National Broadcasting Service resumed SW relays Dec. 22, future of these is uncertain. Dora Ingvadóttir, radio director of Ríkisútvarpið, expected a final decision in January. (Bernd Trutenau, Media Network via John Norfolk)

INDIA AIR has a special Urdu broadcast for Indians making the Hajj pilgrimage to Mecca, until March 22, 0530-0600 on Bangalore 13620, Aligarh 15770 (Jose Jacob, dx_india)

The Tenth Plan Working Group recommends that domestic shortwave radio be phased out, replaced by expanded FM service. SW stations would continue to operate as long as transmitters lost, but no new ones would be introduced (via Vincent D'Souza, community radio in india yahoo group via

Jose Jacob, *ibid.*)

Reception reports may be sent to AIR like to any other station, but I suggest:

1. Address to the Station Engineer at the respective station.
2. Write timings in Indian Standard Time (IST) also which is UT +5:30.
3. Instead of SINPO numbers write briefly in words reception quality.
4. Better report on local programs rather than on relays of Delhi.
5. No return postage is needed.
6. Reports are to be written in English.
7. Reply rates vary from station to station and even from listener to listener. Good Luck! (Jose Jacob, VU2JOS, dx_india)

IRAN Beware of giving your phone number to VOIRI. They surprised me with a call just before midnight asking all sorts of questions about Islam and my views on their programs. Later heard this broadcast on their mailbag show (Don Rhodes, Australia, EDXP)

IRAN [non] see FRANCE

IRAQ [non] Voice of Islamic Revolution of Iraq via Iran *0330-0400 on 11660, 1000 hertz tones prior to sign-on. \ 9790 \ 7100. News interspersed with a patriotic marching song, quite fluttery on 11660 and 9790, fur on 7100 (Ed Kusalik, Alberta, Cumbre DX)

IRELAND Several church services can be heard Sundays after local noon on the 27 MHz band, FM, with a strong Irish accent; such as a funeral on 27597-27605 at 1315-1327 (David Hodgson, TN, DX Listening Digest) I recall reports of CB being used by churches in Ireland to reach nearby listeners who could not attend (gh) The following Sunday surprised to hear several more: 27730, 1235 church organ and choir, followed by prayer by priest. 27780, 1240, priest praying, lots of QRM from other Irish CBers. 27790, 1255, choir, then priest. 27680, 1312, communion (David Hodgson, TN, DX Listening Digest)

ISRAEL In January, IBA's new Director General Ron Galinka was determined to review everything and make affordable improvements. But given the budget situation, little is affordable. Overseas radio cuts planned: ending of Yiddish, Spanish, Romanian, Hungarian, Ladino, Moghrabi, Georgian, Bukharian plus 2000-2025 English and 2030-2045 French. This was being fought by Director of Israel Radio International, and nothing had been decided (Doni Rosenzweig, Israel, DX Listening Digest)

ITALY AWR has sought rights to build a station in Argentina. This has been a long term project that we hoped by now would already be on air. Sadly, this project has been delayed yet again. The political climate in Italy has so far made construction impossible. Earlier in 2001, a local court decided that Argentina town leaders could require AWR to change the design of the station even though we had an approved license for the original design. These changes would severely limit the broadcast capability of the Argentina project and so are deemed unacceptable in the eyes of AWR leadership. The issue has been appealed but the process will likely take another two years or more (AWR Current via Adrian Peterson)

RAI is looking for SW monitors in its target areas; if interested, contact railway.hfmonitoring@rai.it (G. Blom, GRDXC, via Mike Terry, BDXC-UK) No compensation offered other than satisfaction

JAPAN For AFRTS alums and nostalgia, Sounds of the Far East Network <http://jg3.com/fen/fendra.html> with program descriptions and airchecks (Chet Copeland, NY, DXLD)

KASHMIR [non] Clandestine from Pakistan on 5101, Voice of Jammu and Kashmir Freedom: English commentary at 1400-1410 is called Kashmir Panorama, can be in a belligerent mood (Harjot Singh Brar, Punjab, Cumbre DX via DXLD)

KOREA SOUTH Bill Matthews retired at yearend from weekly DX reports on RKI *Multwave Feedback*, replaced by Paul Ormandy, New Zealand, and on the first week of each month, former Media Network contributor from Sri Lanka Victor Goonetilleke, who began by playing a tape of Bhutan (gh)

KURDISTAN [and non] Shortwave Target List compiled by Dan Henderson: <http://www.clandestineradio.com/martin/crw/crw-kurd.html> (Martin Schöch, Clandestine Radio Watch)

LIBYA Four SW transmitters had been operated only with open carrier or tones for years, but in January started testing with different network audio sources, generally between 1045 and 2300 on 9415 9445 9485 11635 11715 11865 15220 15615 15660 17525 17695 17750 21630 21670 21675. "Idha-atu Jamahiriya Al Ozma" (Wolfgang Büschel, Bulgarian Observers, Tarek Zeidan, Egypt)

LITHUANIA R. Vilnius' new QSLs show Lithuanian colors of yellow, green and red in swirls around a transmitter (Jonathan Murphy, World DX Club Contact)

MÉXICO Found XERMX English DX program at 0500 UT Sat in late Dec, not on 9705, but extremely distorted FM spur around 9376, and one to match around 10035, gone after a few days, so assumed it was fixed (gh, OK) Then heard around 9400 (George Thurman, IL) By Jan 11-12, XERMX spur was on 9270, strong, very distorted (Brian Alexander, PA, DX Listening Digest) by mid-Jan we had it peaking around 9302 (gh, OK)

XERMX still had not posted their winter program schedule at <http://www.imer.gob.mx/programacion/rmi.pdf> so by adding one hour we get what appear to be correct times for English half-hours, until DF DST resumes, if it does, at Aprilend(?): daily 1500, 1600, 2200; M-F 2300; Tu-Su 0400 and 0500. Including: DXperience: Th 16, Su 05 and 22, Tu 22; Mailbox: Th 05, Su 04 and 16, Tu 16; and the corresponding DX and mailbag shows in Spanish: Estación DX: F 02, Sa 23, Su 13, Tu 20; Radio Correo del Aire: Th 02, F 20, Sa 13, Su 23 (gh)

NIGER La Voix du Sahel is regular here on 9705. Best times 1730-1900 and 2145-2203/2300*. At first local language; later French until 2203, 2300 on Saturday. I believe all other frequencies are inactive (Thorsten Hallmann, Germany, DX Listening Digest) 9705, sign-on at 0424; news in French at

0530 (Rumen Pankov, Bulgaria, BC-DX) Starts at *0500 on 9705.0, but drifts by the evening, getting tired; Ethiopia is always rock-steady on 9704.2 (Vlad Titarev, Ukraine, SWBC) On 9705.35 at 2031 in French until covered by DW at 2057 (Iwao Nagatani, Kobe, Japan Premium)

NIGERIA Though scheduled all day on 15120, VON signs off 15120 at 1000, or even earlier, and sign on again at 1855 or even later. Never heard French or Arab service there at daytime (Thorsten Hallmann, Germany, DX Listening Digest)

NORWAY Just as I expected, Radio Norway announced that SW transmissions would continue after Jan 1, but no longer a foreign service; instead, home service programme 'Always News' during daytime UT, and the NRK 1st programme during nighttime. Denmark continues as before (Erik Køie, Radio Denmark, DX Listening Digest) It's really a silly thing NRK did, saving minimal expenses, something like 4 megakroner (0.5 megaEuro) - around 10 journalists worked in RNI. Longterm contracts with Norkring for transmission facilities could not be cancelled, so NRK still has to pay a lot to keep them on air, now with the rolling news service, NRK *Alltid Nyheter* (Always News) daytime M-F, and national P1 the remaining time. This is bound to sound silly when it's being switched on and off with a timer every hour for 30 mins! (Bernt Erfjord, Norway, DX-News, BC-DX)

PAPUA NEW GUINEA R. Gulf, Kerema was reported back on the air in Jan after a sesquieuhr absence (*The Independent*, via Don Nelson, DXLD) Presumably back on 3245

PERÚ On 2258 kHz, Radio La Mejor, Tumbes (2 x 1130 harmonic) 1005-1032 with Andean music, 1025 ID, "Radio La Mejor presentó...", Carrier drifting upwards from 2256.97 to 2258 by 1030. Mostly poor signal with occasional fair peaks. Another day had slight downward drift starting at 2259.37 at 1054 (Mark Mohrmann, VT, NRD 535D, V-Beam 140m @ 180 degrees)

On 6324.34, Radiodifusora Comercial "La Voz del Vecino," Nueva Cajamarca, la provincia de Rioja, el departamento de San Martín at 2355. Must be a new station at least on SW. Mixed music, from both Ecuador and Perú. Announces 6325 and FM 89.5. Close down at 0108. Rather stable in frequency (Björn Malm, Quito, Ecuador, via Thomas Nilsson, Sweden)

RUSSIA Krasnoyarsk transmitter of Radio Rossii and regional Radio Center of Russia on 5290 radiates 3rd harmonic on 15870. I receive it between 05 and 11. E-mails (I'm not sure they are working): root@telegid.krasnoyarsk.su and new@public.krasnet.ru (Vladimir Kovalenko, Tomsk, Russia, *World of Radio*)

SOMALIA Shortwave Target List, compiled by Dan Henderson: <http://www.clandestineradio.com/martin/crw/crw-som.html> (Martin Schöch, Clandestine Radio Watch)

SOUTH AFRICA Channel Africa announced on mailbag show in Portuguese that it would no longer QSL reception reports from listeners (Lenildo C. Silva, Lisboa, Portugal, SWL-DX via Conexión Digital)

SPAIN REE English to Europe at 2000 normally uses 9680 but occasionally 9630 instead, \ 9595 to Africa (Michael Stevenson, NSW, EDXP)

TAIWAN On Radio Taibei International's "Mailbag time," director and presenter Carlson Wong said they were dropping Chinese lessons heard every day. The correspondence school is dropping sponsorship, and they are going to have more music instead along with other changes in programme style in the new year (Dan Say, Vancouver, Canada, DX Listening Digest) RTI dropped 5950 via WYFR to NAM at 0700 from Jan 1 (Enrico Oliva, LINY, DX Listening Digest)

TAJIKISTAN Several listeners were surprised to find VOA in various languages on new 60mb frequencies. This was supposed to be R. Liberty via Dushanbe, evidently with wrong feeds at first (gh):

4760 0100-0200 Tatar-Bashkir

4760 1630-1700 Tatar-Bashkir

5005 1500-1700 Kazakh

5035 0200-0300 Kyrgyz (IBB via EDXP)

I heard 4760 at 0057 with VOA Special English and at 0140 with VOA in Thai or Vietnamese (Vladimir Kovalenko, Tomsk, Russia, DXLD) That's a problem in the MCB distribution circuits. Technicians at the various transmission facilities simply use the signal which comes in from Moscow control center. Similar faults happened, when R Free Asia opened/extended their outlets via the various RUS/CIS facilities a few years ago (Wolfgang Büschel, BC-DX)

TURKMENISTAN Heard a 10-minute English news bulletin from Radio Asgabad, at 1300 on 5015 and LW 279 (Harjot Singh Brar, Punjab, for GRDXC)

UKRAINE On 17299 at 1643, Radio Omega-Polis, Sevastopol', used as a filler between maritime 2-way traffic, duplexed with 16417 USB (Volodya Salmaniw, Victoria, BC, DX Listening Digest) Radio Omega Polis, Sevastopol' (tentative), 12508.53 USB at 0811, same as heard previously on 17004 USB; a nautical station just relaying a bit of local radio, for entertainment of the fishing fleet. Strong here (David Hodgson, TN, DX Listening Digest)

U K Many BBCWS programmes have audio on demand, for a week until next edition, or in the case of *Letter from America*, indefinitely. Check the list under Site Map at <http://www.bbc.co.uk/worldservice> such as: http://news.bbc.co.uk/hi/english/world/letter_from_america/default.stm This page does not seem to have any audio links, nor are the letters dated, but the latest one is at the top of the list, and if you click on it, not only do you get the full text but an audio link. Thanks to Kevin Kelly for this tip (gh)

U S A Before Xmas, WWRB, Manchester, TN, was testing on 12172 at 1528 (Mike Peraaho, DX Listening Digest) Dave Frantz's station replacing WWFV on its former frequencies with antennas 200 feet high (gh) Also heard testing on 5085. I heard the owner say they were closing down WWFV for good and moving to Tennessee; this was the very last transmission from that location and they were changing callsigns (Jim rec.radio.shortwave via Hans Johnson)

WWRB gave out its new phone number as 931-841-0492. Stated that the reason for moving to TN is that the new site has "no shading to the east," so in TN they have an antenna for the Middle East and Africa. Although WWFV talked about having all sorts of transmitters, no more than two were ever regularly heard on the air. I'm inclined to believe that the two transmitters in use at WWRB are the two WWFV units. They were simply moved from WWFV to WWRB, although they are now announced as 100 kW units instead of 50 so perhaps upgrade took place along the way (Hans Johnson, FL, Cumbre DX)

U S A Seldom Heard Radio's new weekly program "Drive-In Double Feature" started January 20 at 0330 UT Sun on WRMI 7385. Includes episodes of *The B-Movie Bob Show* (a celebration of B-Movies from the 50s, 60s & 70s) and science-fiction related and unusual music. This is a very homemade production and will hopefully add something different to the shortwave listening spectrum (Frederick Moe, DX Listening Digest)

World of Radio via WPCR as of late Jan: Thu 2130 15685, Fri 1030 9475, Sat 0600 5070, Sun 0330 5070, Sun 0730 3210, Mon 0600 3210. For latest revision see <http://www.worldofradio.com/radioskd.html> Also see <http://www.worldofradio.com/calender.html> on our new website for lots of listening tips in time order

VATICAN [and non] Vatican Radio uses these relays for B-01: 6020 Puge, Philippines, 1225-1315 Chinese; 6205 Irkutsk, Russia, 1315-1345 Vietnamese; 6205 Irkutsk, Russia, 2200-2245 Chinese; 6210 Samara, Russia, 1710-1740 Russian; 9865 Tashkent, Uzbekistan, 1450-1620 Hindi/Tamil/Malayalam/English. The reciprocal relays of Voice of Russia programs via Vatican Radio transmitters are: 9765 0200-0300 English to Eu; 7230 2100-2130 French to Eu (*Electronic DX Press*)

VENEZUELA 3060.00, YVNP, R. San Felipe (2 x 1530 harmonic) at 1020 Venezuelan national anthem, followed by another anthem then canned sign-on announcement. Fair to good signal (Mark Mohrmann, Coventry VT, DX Listening Digest)

YUGOSLAVIA Something's amiss with R. Yugoslavia; last heard English to NAM Dec 11. Silent at 0100 on 7115, 0200 on 7130 (Bob Thomas, CT) RY was to resume broadcasting by mid-December after the Yugoslav government offered to cover the radio's debt to the Bijeljina Electric Power Company. Yugoslav Information Secretary Slobodan Orlich said the government was unable as yet to pay the 9 megadinar debt, but the sum would be "calculated into next year's budget." ("ANEM Weekly Update," via RFE-RL *Media Matters*) But it did not. From <http://www.radioyu.org> Dec 27 alongside a Xmas card: "INFORMATION: Due to the current technical problems, we regret to have to inform you that we will not be able to broadcast our program on short waves during a period of approximately a month." But starting when was this month? No date on the notice. Still nothing by mid-Jan (gh)

RY is, in fact, in dispute with its own federal government as well as with the Bosnian Serbs. The station's budget is currently lumped together with several other media operations, and the current funding is not even sufficient to pay the salaries of the remaining employees. RY Director Milena Jokich says the well-pump at Bijeljina and the network of pipes have been cracked by melting ice (© Radio Netherlands Media Network) Presumably the cooling system

ZIMBABWE [non] SW Radio Africa, 6145 at 1600-1900 has an extensive website at <http://www.swradioafrica.com> including live streaming, broadcast archives... UK-based, but use of 6 MHz suggests a transmitter site quite close to Zimbabwe (Mike Barraclough, England, World DX Club Contact) Often used slogans: "SW Radio Africa - the voice you can trust" and "SW Radio Africa - Zimbabwe's independent voice." E-mail address announced: views@swradioafrica.com. Excellent and very strong signal which would be consistent with a South African transmitter. The quality of the signal is perfect and operation is professional, i.e. programmes must be made by skilled personnel and journalists in a top quality studio (Vashek Korinek, RSA, via DXplorer, via DSWCI DX Window via hcdx) British Channel 4 News identified South Africa as the transmitting country (Roger Tidy, DX Listening Digest) SW Radio Africa is the brainchild of Gerry Jackson, 49, a journalist with the state-controlled Zimbabwe Broadcasting Corporation for 13 years until she was sacked for "insubordination" for taking live calls on air from listeners during the 1997 food riots. She fought and won a legal battle in the Supreme Court in 2000 to set up an independent radio station, Capital FM, in Harare. Six days after it went on air it was closed down by some men with AK47s when Mugabe used his presidential powers to overturn the court's decision (Caroline Davies, © *Daily Telegraph* via Mike Terry, BDXC-UK) *Until the Next, Best of DX and 73 de Glenn!*

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0044 UTC on 6924.85

USA-PIRATES: WNOE. Wide variety of rock/rap tunes. Announcer's 9-11 commentary and IDs as "WNOE 6955". (This is not the WNOE mentioned from New Orleans in this month's QSL Report-ed.) **Betty Boop Radio** 6925.08 AM, *0126-0141+ with Boop-Oopa-Doop interval signal to I Want to Be Bad song. QSL to Providence mail drop. (Harold Frodge, Midland, MI)

0100 UTC on 7375

UKRAINE: Radio Ukraine Intl. Interval signal to sign-on identification into political news update. (William McGuire, Cheverly, MD)

0107 UTC on 9790

CANADA: China Radio Intl relay. News item that the textile industry will improve its quality control. **Radio Canada Intl** 13650 // 9805, 5995 at 2108. Maple Leaf Mailbag with Ian Jones. (Bob Fraser, Cohasset, MA) **CFRX** 6070, 2324-2330+. **CFRB Sports** show to "CFRB 10-10" identification. (Frodge, MI)

0114 UTC on 7354.37

USA: WRNO. Presumed station from New Orleans. No ID given up to 0302*. Gospel music throughout listening period. Signal unusually strong, 10+/S9, but with extreme warbling interference observed on the upper sideband. (Mark Fine, Remington, VA)

0250 UTC on 7160

ALBANIA: Radio Tirana. News on elections and meeting of political parties in Albania; good signal strength, fair modulation. (Howard Moser, Lincolnshire, IL)

0445 UTC on 7270

TUNISIA: RTV Tunisienne. (Presumed) Middle Eastern music to Arabic text. (Howard Moser, Lincolnshire, IL) Presumed this station at 2255 on 7110 with Arabic format // 7225. Thought this might also be RTV on 12005 around 1800. (Tom Banks, Dallas, TX)

0450 UTC on 6210.21

GERMANY: Radio Marabu. Rock/pop songs from Steely Dan, Creed, Weezer, Nickleback, and a few others I didn't recognize. Program interspersed with talk and German IDs. Relatively good signal from start, but slowly degraded by 0535. Some QRM (if you could call it that) from Radio Fana on lower-side band. (Fine, VA)

0520 UTC on 15120

NIGERIA: Voice of. National news on foreign investments in telecommunications, and Netherlands plans to send economic aid. Noted signal better this freq than 40 meters. (Moser, IL) 0745 on 15120. (Paul Ormandy, New Zealand/Hard Core DX)

0658 UTC on 4835

MALI: RDTV du Mali. Nice signal for French newscast to featured music. SIO=343. (Daniel Canonica, Muggio, Switzerland)

1050 UTC on 7170

SINGAPORE: Radio Corp of Singapore. (Presumed) Might have been this station with Asian pops and regional language, amid very poor signal. **Radio Singapore Intl** 6150 at 1450. American "oldies" tunes to ID and chat. SIO=454. This is a rebroadcast from their local AM station, heard here frequently in early mornings. (Jerry Brookman, Kenai, AK)

1100 UTC on 12005

ECUADOR: HCJB. *Insight for Living* on the meaning of Eulogy. (Fraser, MA; John Vercellino, Downers Grove, IL) 0200 on 15115 // 21455. (Ormandy, NZ/HCDX)

1315 UTC on 11650

AUSTRALIA: Radio Australia. Sport roundup to *The Planet* music show with poor signal quality, // 9580; 1220 on 9580 *Late Night Live* report on Israel & the PLO. (Fraser, MA) Indo service presumed via Darwin 0000 on 21615. (Ormandy, NZ/HCDX) 1740-1756+ on 9815, economic discussion to ID. (Frodge, MI)

1440 UTC on 21830

PORTUGAL: RDP Intl. Portuguese pops and station news to ID. (Brookman, AK) News headlines and sports scores 1555 on 17745 //15540. (Frank Hillton, Charleston, SC)

1601 UTC on 15725

USA: WRMI. Station ID and ad for potassium iodate pills, with something about them being better than potassium iodine because iodate has an extra oxygen atom. SIO=353+. **WMLK** 1635-1640+ on 9465. Preacher ragging on the Catholics. Noted transmitter hum and audio feedback. SIO=442+. (Frodge, MI)

1801 UTC on 9730

VIET NAM: Voice of. Announcer's news headlines to 1802, followed by national news. Station ID to world news at 1809. SIO=343. Prior log 1610-1616 with English news to national economic news. (Frodge, MI, Moser, IL)

1906 UTC on 5030

BURKINA FASO: Radio Burkina. Strong signal for French program and clear ID, SIO=444. (Canonica, SU) Noted 1923-1946 on 4815. Afro pops to 1930 French ID and time check. Mentions of Ouagadougou at 1941, followed by drum signal. (Mark Veldhuis, Netherlands/HCDX)

2132 UTC on 6265

ZAMBIA: ZNBC. Drum signal with chanting and Afro vocals from announcer's local language. Better to monitor in lower side band despite ongoing utility interferences. (Frodge, MI)

2145 UTC on 6035

SAO TOME: VOA relay. Kim Elliot's *Communications World*, with feature on new experimental stations in old marine 60 meter band. (Frodge, MI)

2147 UTC on 11620

INDIA: All India Radio. Station ID into regional language. English news at 2200, almost entirely covering Pakistan. SIO=443 //7410. (Frodge, MI) AIR-Russian service 1645 on 15140 with news and commentary. S9 signal quality. 1840 on 13605. (Dexter Anderson, Westerly, RI) 11715 at 2113 with subcontinent music. Station ID and address given. (Duane Hadley, Bristol, TN) 13795 at 2310 with world news and regional music. (Hillton, SC) 0130 on 9910 //11620 //11830. (Ormandy, NZ/HCDX)

2153 UTC on 6925.05

PIRATES: Voice of Captain Ron. Rock show including *When the Bullet Hits the Bone*. Email: captainronswr@yahoo.com (or) captainron6955@hotmail.com. Noted at 2215-2240. **Take It Easy Radio** 6955 USB, 0404-0409*. Belfast drop address given over Eagles' *Take It Easy* tune. Noted 0438-0446+ as Al Fansome out schemes bunny rabbits. **Rizzo Radio** 2008-2015+ on 2755.48, announcer noted from Arizona. QSLs to; rizzoradio@yahoo.com. (Frodge, MI)

2244 UTC on 6956.7

PERU: La Voz de Campesinos. Spanish text to Andean vocals. SIO=2+27. (Frodge, MI) Peru's **Ondas del Pacifico** 2333-2349 on 13565.9 (harmonic:6782x2) Local Spanish ads to time check and ID. Message of greetings and promotional segment. (Arnaldo Slaen, Buenos Aires, Argentina).

2249 UTC on 6000

BRAZIL: Radio Guaiba. Portuguese phone interviews to "Guaiba" ID at 2255. SIO=333, better than Radio Havana on frequency. (Frodge, MI)

2254 UTC on 6937

CHINA: Yuunan People's BS. (Presumed) Band music with Chinese flutes and sporadic pauses to 2258. Dead air observed from 2258-2300, followed by Chinese music. SIO=343. I've heard these folks several times but not this well; barely audible the next night. (Frodge, MI) **China Radio Intl** 1452 on 7405 Spotlight show, SIO 544. (Brookman, AK)

2330 UTC on 9885

SWITZERLAND: Swiss Radio Intl. Interval signal to station ID and report national news. (McGuire, MD)

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

Canadian QSLing

Have you verified the home of the Snowbirds? Canada remains an easy country to monitor, and justly so, with several stations to verify.

The largest and most powerful station remains Radio Canada International from Montreal. RCI's popular *Maple Leaf Mailbag* program is a hodgepodge of topics with special focus on you the listener. RCI frequencies may be found in our current *Shortwave Guide*, plus additional programming listed in the *Selected Programming Guide*. Reports may be sent to: Maple Leaf Mailbag, Radio Canada Int'l. P.O. Box 6000, Montreal H3C 3A8 Canada.



One IRC is appreciated but not required. This address may also be used for the CBC Northern Quebec shortwave service, but direct your correspondence to the attention of the particular service you seek to contact, or visit RCI's multilingual website at: <http://www.rcinet.ca/> for more information.

For additional Canadian listening, CBC Radio One has Real Audio links from various outlets at <http://www.cbc.ca/audio.html>.

The best time to hear the Canadian domestic stations are in the early mornings or in the evening. These smaller stations relay medium wave outlets, including their call signs, and most will verify. Please include return postage or \$1.00, except CKZN, which returns all enclosures.

CFRX: c/o Ontario DX Assoc. Atten: QSL Manager-Steve Canney VA3SC (scanney@home.com) P.O. Box 161, Station "A", Willowdale, Ont., M2N 5S8 Canada.

CFVP: Standard Broadcasting, Atten: Gary Russell (or) Beverly Van Tighem, P.O. Box 2750, Station "M", Calgary, Alberta, T2P 4P8 Canada.

CHNX: Garry Barker-General Manager, P.O. Box 400, Halifax, Nova Scotia B3J 2R2 Canada.

CKZN: P.O. Box 12010, Station "A", St. John's, Newfoundland A1B 3T8 Canada <http://www.cbc.ca>

CKZU: CBC, Atten: Engineering, P.O. Box 4600, Vancouver, BC Canada V6B 4AZ <http://www.vancouver.cbc.ca>

AMATEUR RADIO

4X6ZK, Israel 20 Meter USB. Full data ham logo card signed by Shlomi (Moni) Shafir. Received in 14 days for a nested airmail SASE and one U.S. dollar, plus a N5FPW QSL card. QSL address: 4, Frishman St., Holon, Israel 58-351. (Larry Van Horn, Brasstown, NC)

ES2X, Estonia 28 Meter USB. Full data colored ham logo card initialed by Andy ES2NA. Received in 12 days for a report sent to ARRL QSL Bureau, plus a N5FPW QSL card. (Van Horn, NC)

AUSTRALIA

Christian Voice, 21680 kHz. Full data verification letter signed by Mrs. Lorna Manning-Site Administrator, plus program schedule and DXer information. Received in 70 days for an English report and one IRC. Station address: PMB 5777, Darwin NT 0801, Australia. (Martin Schoech, Germany/Cumbre DX)

EGYPT

Rodio Cairo, 9900 kHz. Full data card and post card plus program schedule. Received in 78 days for an English report. Station address: English Service, P.O. Box 566, Cairo 11511 Egypt. (Joe Squashic, Wake Forest, NC)

MEDIUM WAVE

KSFT, 1550 kHz AM. Full data letter signed by Bob Heater-Operations Manager. Received in seven days for an AM report and one US dollar. Currency was returned with a note saying, "we're just glad to hear from you." Station address: P.O. Box 8550, St. Joseph, MO 4508-8550. (Patrick Griffith, Westminster, CO)

KTIS, 900 kHz AM. Partial data *Tune in For Life* card signed by Jori Susanka. Received for an AM report. Station address: 3003

Snelling Ave., North, St. Paul, MN 55113-1598. (Griffith, CO)

KZNS, 1280 kHz AM. Received QSL message on back of business card, signed by Kurt Thomas. Received in 16 days for an AM report. Station address: 515 South 700 East, Salt Lake City, UT 84102. (Patrick Martin, Seaside, OR)

WODI, 1230 kHz AM. Date only QSL/Coverage Map sheet for DX test. Received in 22 days for an AM report, cassette, and SASE (unused for reply). Station address: D&M Communications, 24 Belmont Avenue, Edison, NJ 08817-3528. (Herbert Newberry Jr., Newborn, GA)

WVGB, 1590 kHz AM. Full data letter with hand written note signed by Rod Zeigler-Chief Engineer. Note says station went to 24 hour format on 10/14/01. Station address: 1200 Baker St., P.O. Box 609, Great Bend, KS 67530. (Griffith, CO)

NEW ZEALAND

Radio Reading Service, 3935 kHz. Full data card, and personal letter signed by Brian Stokoe, plus calendar and schedule. Received in 54 days for a cassette report and one U.S. dollar. Station address: P.O. Box 360, Levin 5500, New Zealand. (Nicholas Eramo, Argentina/Cumbre DX)

RUSSIA

Voice of, 9480 kHz. St Petersburg Arabat Square card unsigned, plus personal letter from Elena Osipova, and frequency schedule. Received in 129 days for an English report, one IRC and a souvenir brochure. Station address: ul. Pyatnitskaya 25, Moscow 113326, Russia. (George Glotzbach, NM/Cumbre DX)

Voice of the Mediterranean relay, 12060 kHz. Partial data English/German cord unsigned.

Received in 48 days for a report and no return postage. Station address: German Service, P.O. Box 143, Valetta CMR 01, Malta (Martin Schoech, Germany, Cumbre DX)

USA

WEWN, 5825 kHz. Full data map/logo card signed by Shirley Cedaway. Received in 80 days for an English report and SASE (not used for reply). Station address: 1500 High Rd., P.O. Box 176, Vandiver, AL 35176. Email: wewn@ewtn.com Website: <http://www.ewtn.org>. (John Vercellino, Downers Grove, IL)

WYFR-Okeechobee, FL, Radio Taipei Intl relay, 9355 kHz. Full data color card with illegible initials, plus station stickers, pennant and schedule. Received in 45 days for an English report, one U.S. dollar and a souvenir postcard. Station address: P.O. Box 24-38, Taipei 106, Taiwan, Republic of China. (Duane Hadley, Bristol, TN)

UTILITY

AUSTRALIA, VIE, Darwin Radio 22682.5 kHz. Full data Globe Wireless card unsigned. Received in 178 days for a utility report. Station address: Globe Wireless Inc., 550 Pilgrim Dr., Foster, CA 94404. (Andreas Ibold, Alpen, Germany/WUN Club Newsgroup)

BOLIVIA, CPK, 22.847.7 kHz USB. Full data Globe Wireless logo card unsigned. Received in 41 days for a utility report. Station address: (see Globe Wireless, Inc.) (Ibold, Germany/WUN).

M/V Far Supporter MVEU7, 2182 + 2306 kHz USB. Full data prepared QSL card verified, plus photo. Received in 37 days for a utility report. Ship address: Farstad Shipping Ltd., Farstad House, Badentoy Avenue, Badentoy Park, Portlethen, Aberdeen AB1 4YB United Kingdom. (Ibold, Germany/WUN).

It Was 50 Years Ago Today...

Chris Boyd of Rancho Palos Verdes, California, (sounds like a nice place!) sent me an e-mail the other day asking, "What do you think the future holds for SW radio? I got my [2002] *Passport to World Band Radio* this week, and it's as full of frequencies as ever. I hope other stations get the clue about the power of SW radio and aren't as short-sighted as the BBC. But it seems that some broadcasters, like **Radio Netherlands**, are capitalizing on SW like never before. If the big broadcasters don't get it, perhaps pirates will have to take over the waves and give the people what they want?"

Yes indeed, *Passport's* "Blue Pages" (the section with the graphical representation of frequencies and the times that stations put them to use) is thicker than ever. The 2002 edition of *The World Radio-TV Handbook (WRTH)* weighs in at a bountiful 680 pages, about 551 of which are devoted to radio. In comparison, the 1952 edition of this tome – then called the *World Radio Handbook (WRH)* – totalled all of 120 pages. Yet, almost incredibly, we continue to hear questions about the future viability of shortwave radio.

❖ The Inevitability of Change

What's my point? Just this: the view expressed by some so-called "experts" that radio in general – and international radio in particular – is experiencing some sort of precipitous decline is nonsense. Also, the further impression that some have – that radio was somehow bigger and better in earlier times – is, in fact, a **misapprehension**.

To be sure, radio today is changing in several ways and on several levels; but, as paging through a fifty year old book proves, it has always been thus. Adapting has allowed radio to preserve its relevance for a long time. Arguably, that process continues into the present day. At one time it was television; then it was satellite; today, it's the internet. New world orders and new technologies continually challenge this venerable old medium and the medium emerges refreshed and renewed. History and experience tell us so. If this weren't true, why does the world own so many radios?

❖ Shortwave in 1952

It will come as no surprise to you, dear reader, that things were different in 1952 from what they are today. Fifty years ago, the Cold War was in its infancy. There was

not yet a **BBC World Service**, no **Deutsche Welle**, no **Radio Japan**, no 21 meter band (13 Megahertz). On the other hand, Great Britain, Switzerland and Australia were broadcasting to North America.

❖ Europe

Austria and Germany were occupied countries with no independent international radio voice. Belgium and France did not broadcast in English. Some may recall that for a time poor, backward Stalinist Albania had some of the most powerful radio transmitters in the world. That was still to come for **Radio Tirana**, whose most powerful shortwave sender in 1952 was a mere 3kW. Finland's broadcasts in English from Pori were very much like they are today – a news-cast and press review to North America during our weekday mornings. **Radio Norway** was already broadcasting *Norway This Week* in English on Sundays. **Radio Portugal**, as today, broadcast only in Portuguese; an English service *The Voice of the West* was to come much later. Spain, Poland, Bulgaria, Hungary and Czechoslovakia also had short broadcasts to North America in English.

The **BBC's General Overseas Service** broadcast 23 hours a day: 1515-1615, 2200-0300 and 0400-0615 UT to North America. Regional services also were offered with a North American service in English and French broadcast 1500-1715, 1800-2045 weekdays and 2045-2200. The relevant IDs were "This is the *General Overseas Service* of the **BBC**" and "This is London calling North America." Bow bells made up the interval signal for the *General Overseas Service*; the musical notes "BBC" played on a "novachord" (?) signaled the start of the North American service. (On second thought, maybe the **BBC** was better for North American listeners fifty years ago...)

Radio Nederland Wereldemroep broadcast in English to North America for fifty minutes a day starting at 0230. One of the frequencies used was 9590 kHz which is still in use today, and the most powerful transmitter in use was a 40 kW unit in Lopik. Some of the programs broadcast included *The Music Gazette*, *Window on Holland*, *By Request*, *Holland Makes It!*, *Letterbox*, *On the Dutch Farm*, *Holland's Art Galleries and Museums*, *As They Saw It* (described as "views on Holland by well-known foreign writers") and *Disc News*. On Sundays in North America (0230 UT Monday),

Eddie Startz presented *The Happy Station*, a 90 minute program described as "musical entertainment linked by polyglot announcements" and including segments called *Spotlight on Holland* and *Mailbag*.

Radio Sweden had programs like *Sweden Today*, *Over to Sweden*, *Youth Meeting on the Air* and, of course, *Sweden Calling DXers*. 6065 kHz – still in use today to Europe – was one of its prominent frequencies. *Radio Moscow's* schedule for North America looks much like the *Voice of Russia's* today – 2320-0600 and 1300-1330. Of course, they transmitted on a huge number of frequencies – something they don't do today. The Vatican was active on shortwave, but not to North America.

❖ Rest of the World

Paging through the '52 *WRTH*, I was mildly surprised to find that almost no country outside Europe targeted North America. Much of the remainder of the world was just beginning to emerge from a colonialist period, so any radio service was either sponsored by its European patron or was focused on its immediate neighbors. Even Canada was not yet broadcasting to its immediate south. Of course, the fact that the bands were much less crowded likely meant that many broadcasts could be monitored in North America that were not intentionally beamed in our direction. *Nonetheless, it should be noted that we were much less of a target then than we are now!*

One notable exception was **Radio Australia**, which in 1952 had one of the largest shortwave services (domestic and international) in the world. Broadcasts to North America aired 0430-0545 and 1200-1615, but the famous 9580 kHz, was not yet in use to the region. Program titles included *Overseas Mailbag*, *Listeners' Choice*, *Australia's Amateur Hour*, *Australian DXers Calling*, *Australian Radio Reel*, *Australia Today*, *Guest of Honour*, *Magazine of the Week*, *Meet the Australians*, *The Wilfred Thomas Show*.

❖ Believe Me, We're Safe

The 1952 *WRH's* "Shortwave Stations of the World" section had about 1920 listings of frequencies and stations. There are nearly 4500 in the 2002 edition. '52 was a fascinating year; but so is '02. And so will be '03, '04, '05....

So, my advice is, "Stop fretting and enjoy that radio!" And in that regard, until April – good listening!

HOW TO USE THE SHORTWAVE GUIDE

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

Convert your time to UTC.

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

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 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

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

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

The frequencies ⑦ 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 prob-

lems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

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

Target Areas

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

Choose a program or station you want to hear.

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

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

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

MT MONITORING TEAM

Gayle Van Horn John Figliozzi
 Frequency Manager Program Manager
 gayle@webworkz.com jfiglio1@nycap.rr.com

Mark Fine, VA
 mark.fine@fineware-swl.com

Program Highlights

John Figliozzi

In Memoriam

Peter Gzowski (1934-2002)

If you never were fortunate enough to have experienced the broadcast work of Peter Gzowski, take my word for this. You are the poorer for it.

Peter was not an international broadcaster – at least, not an intentional one. *Morningside*, the **CBC Radio** program Gzowski so elegantly shepherded for fifteen years, was relayed for some of those years by **Radio Canada International** and the **CBC North Quebec** shortwave service. This was almost accidental, brought about by **RCI** budget cuts. How fortunate. Put succinctly, Gzowski and *Morningside* were all about Canada. Notwithstanding **RCI's** fine efforts to bring Canada to the world, the essence of Canada was right here all along.

Peter remains the best interviewer I've ever heard. He had a knack for asking the question that you would've asked when you would've asked it. He had a respect for his guests that is sometimes seen as passe today. He didn't so much try to challenge their ideas as challenge them to reveal all they could about whatever it was they came to talk about. In so doing, he had a capacity to make things that you might've initially thought uninteresting, most interesting. He listened. That may seem too simple; but in truth, it is all too rare. He raised that talent to an art form. For me, he embodied all the qualities that makes radio the powerful and superior medium it is.

The desire – no, the need – to hear his program when it was no longer on **RCI** led me to do some pretty drastic things with receivers and antennae so I might be able to pull in, even faintly, the nearest **CBC** affiliate several hundred miles away. Radio in Canada has not been the same since he retired from *Morningside*. I dare say, Canada will not be the same now that he has retired from this life.

[The **CBC** web site has a tribute to Peter Gzowski that includes audio, video and text. It may be accessed at http://www.cbc.ca/news/obit/gzowski_peter/index.html.]

0000 UTC - 7PM E / 6PM C / 4PM P

0000	0015	Cambodia, National Radio Of	1940as				
0000	0015	Japan, Radio 13650as	17810as				
0000	0030	Australia, Radio 17775pa	17795va	2080pa	15240as	17580va	17750as
0000	0030	Egypt, Radio Cairo	9900na				
0000	0030	Sri Lanka, SIBC	4940do				
0000	0030	Thailand, Radio	9655af	9680af	11905af		
0000	0030	UK, BBC World Service	3915as	5965as	5975am	6195as	7105as
			9410as	9915sa	11945as	12095sa	15280as
			15360as	17615as	17790as	17615as	skd0801
				9950as		13605as	
0000	0045	India, All India Radio	9705as				
0000	0100	Anguilla, Caribbean Beacon	6090am				
0000	0100	Australia, ABC/Alice Springs	4835do				
0000	0100	Australia, ABC/Katherine	5025do				
0000	0100	Australia, ABC/Tennant Creek	4910do				
0000	0100	Bulgaria, Radio	7400na				
0000	0100	Canada, CBC Northern Service	9625do				
0000	0100	Canada, CFRX Toronto ON	6070do				
0000	0100	Canada, CFVP Calgary AB	6030do				
0000	0100	Canada, CHNX Halifax, NS	6130do				
0000	0100	Canada, CKZN St John's NF	6160do				
0000	0100	Canada, CKZU Vancouver BC	6160do				
0000	0100	Canada, Radio Canada Intl	5960na	6175na	9590na	9750as	
			9755na				
0000	0100	Costa Rica, R for Peace Intl	7455irr	15040va	21815usb		
0000	0100	Costa Rica, University Network	5030am	6150am	7375am	9724sa	
0000	0100	Ecuador, HCJB	11785as				
0000	0100	Finland, Scandv Weekend Radio	5980va	11720va			
0000	0100	Germany, Voice of Hope	6040as				
0000	0100	Guyana, Voice of	3290do				
0000	0100	Japan, Radio 6145na					
0000	0100	Malaysia, Radio	7295do				
0000	0100	Malaysia, RTM Kota Kinabalu	5980do				
0000	0100	Malaysia, RTM Sarawak	7160do				
0000	0100	Namibia, NBC	3270af	3290af	7215irr		
0000	0100	Netherlands, Radio	6165na	9845na			
0000	0100	New Zealand, Radio NZ Intl	301 to 3/18/02	17675pa			
0000	0100	Papua New Guinea, NBC	9675do	11880irr			
0000	0100	Russia, University Network	9940do				
0000	0100	Singapore, SBC Radio One	6150do				
0000	0100	Salomon Islands, SIBC	5020do				
0000	0100	Spain, R Exterior Espana	6055na				
0000	0100	USA, Armed Forces Radio	6458usb	12689usb			
0000	0100	USA, KAU Dallas TX	5755va				
0000	0100	USA, KTNB Salt Lk City UT	7510na				
0000	0100	USA, KWHR Naalehu HI	17510as				
0000	0100	USA, Voice of America	5995me	6130am	7405am	9455am	9775am
0000	0100	USA, WBCQ Monticello ME	7415na	9335na	17495na		
0000	0100	USA, WEWN Birmingham AL	5825na	9355na	15745na		
0000	0100	USA, WHRA Greenbush ME	7580af				
0000	0100	USA, WHRI Noblesville IN	5745va	7315am			
0000	0100	USA, WINB Red Lion PA	12160am				
0000	0100	USA, WJCR Upton KY	7490am	13595as			
0000	0100	USA, WRMI Miami FL	9955am				
0000	0100	USA, WRMI Miami FL	7385na				
0000	0100	USA, WRNO New Orleans LA	7355am				
0000	0100	USA, WSHB Cyp Creek SC	9430am	15285sa			
0000	0100	USA, WTJC Newport NC	9370na				
0000	0100	USA, WWBS Macon GA	11900na				
0000	0100	USA, WWCR Nashville TN	3215na	5070na	7520na	13845na	
0000	0100	USA, WWRB Manchester TN	5085va	6890va			
0000	0100	USA, WYFR Okeechobee FL	6085na	9505na			
0000	0100	Vanuatu, Radio	3945do	4960do	7260do		
0000	0100	Zambia, Christian Voice	4965do				
0005	0010	Croatia, Croatian Radio	9925sa				
0030	0100	Australia, Christian Voice Intl	21680as				
0030	0100	Australia, Christian Voice Intl	17775as	17850pa			
0030	0100	Australia, Radio	9660pa	12080pa	15240as	15415as	15415as
			17580va	17750as	21740va		
0030	0100	Iran, VO Islamic Rep. of Iran	6065am	6135na			
0030	0100	Lithuania, R Vilnius	7325am				
0030	0100	Sri Lanka, SIBC	4940do	6005as	9770as	15425as	
0030	0100	Thailand, Radio	9655as	11905as	13695as		
0030	0100	UAE, AWR Africa	6025as	6055as			
0030	0100	UK, BBC World Service	5965as	5975am	6195as	7105as	9410as
			11955as	12095sa	15360as	17790as	
0030	0100	USA, VOA Special English	15290as	17740as	17820as		
0030	0100	USA, Voice of America	5995me	6015me	6105me	7215as	7265me
			9890as	11760as	15290as	17740as	17820as
0030	0100	USA, Voice of America	5995me	6015me	6105me	7265me	
0055	0100	Italy, RAI Intl	9675na	11800na			

0100 UTC - 8PM E / 7PM C / 5PM P

0100	0115	Italy, RAI Intl	9675na	11800na			
0100	0125	Netherlands, Radio	6165na	9845na			
0100	0127	Czech Rep, Radio Prague Intl	6200na	7345na			
0100	0127	Vietnam, Voice of	6175na				
0100	0130	Australia, Christian Voice Intl	17775as	21550pa	21680pa		

0100	0130	Austria, AWR Europe	6160as				
0100	0130	Germany, Universal Life	9435as				
0100	0130	Germany, Voice of Hope	6040as				
0100	0130	Iran, VO Islamic Rep. of Iran	6065am	6135na			
0100	0130	Slovakia, R Slovakia Intl	5930na	7230ca	9440sa		
0100	0130	USA, Voice of America	5995am	6130am	7405am	9455am	9775am
0100	0130	Uzbekistan, Radio Tashkent	13790am	5955as	5975as	7215as	
0100	0130	Yugoslavia, Radio	7115am				
0100	0145	Germany, Deutsche Welle	9765na	11985na	6040na	6145am	9640na
							970Cam
0100	0156	China, China Radio Intl	9580na	9790na			
0100	0156	North Korea, Voice of	6195as	6520am	7140as	7580am	9345as
0100	0159	Spain, R Exterior Espana	6055na				
0100	0200	Anguilla, Caribbean Beacon	6090am	5025do			
0100	0200	Australia, ABC/Katherine	4910do				
0100	0200	Australia, ABC/Tennant Creek	9660pa	12080pa	15240as	15415as	17560va
0100	0200	Canada, CBC Northern Service	9625do				
0100	0200	Canada, CFRX Toronto ON	6070do				
0100	0200	Canada, CFVP Calgary AB	6030do				
0100	0200	Canada, CHNX Halifax, NS	6130do				
0100	0200	Canada, CKZN St John's NF	6160do				
0100	0200	Canada, CKZU Vancouver BC	6160do				
0100	0200	Costa Rica, R for Peace Intl	7455irr	15040va	21815usb		
0100	0200	Costa Rica, University Network	5030am	6150am	7375am	9724sa	
0100	0200	Cuba, Radio Havana	6000na	9820na	11705usb		
0100	0200	Ecuador, HCJB	9745na	11840na	21455usb		
0100	0200	Finland, Scandv Weekend Radio	5980va	11720va			
0100	0200	Guyana, Voice of	3290do	5950do			
0100	0200	Indonesia, Voice of	9525pa	skd0501	11785as	15150as	
0100	0200	Japan, Radio 11860pa	11870as	11880va	17810as	15325as	17685pa
0100	0200	Malaysia, Radio	7295do				
0100	0200	Malaysia, RTM Kota Kinabalu	5980do				
0100	0200	Namibia, NBC	3270af	3290af	7215irr		
0100	0200	New Zealand, Radio NZ Intl	301 to 3/18/02	17675pa			
0100	0200	Papua New Guinea, NBC	9675do	11880irr			
0100	0200	Russia, University Network	9940do				
0100	0200	Singapore, SBC Radio One	6150do				
0100	0200	Salomon Islands, SIBC	5020do				
0100	0200	Sri Lanka, SIBC	6005as	9770as	15425as		
0100	0200	UK, BBC World Service	5965as	5975am	6195as	9410as	9525ca
			9915sa	11955as	15280as	15310as	15360as
0100	0200	Ukraine, R Ukraine Intl	7375eu	7420as	9610as		
0100	0200	USA, Armed Forces Radio	6458usb	12689usb			
0100	0200	USA, KAU Dallas TX	5755va				
0100	0200	USA, KTNB Salt Lk City UT	7510na				
0100	0200	USA, KVOS Los Angeles CA	9975na				
0100	0200	USA, KWHR Naalehu HI	17510as				
0100	0200	USA, Voice of America	5995me	6015me	6105me	7115as	7200as
0100	0200	USA, WBCQ Monticello ME	7415na	9335na	17495na		
0100	0200	USA, WEWN Birmingham AL	5825na	9355na	15745na		
0100	0200	USA, WHRA Greenbush ME	7580af				
0100	0200	USA, WHRI Noblesville IN	5745va	7315am			
0100	0200	USA, WINB Red Lion PA	12160am				
0100	0200	USA, WJCR Upton KY	7490am	13595as			
0100	0200	USA, WRMI Miami FL	9955am				
0100	0200	USA, WRMI Miami FL	7385na				
0100	0200	USA, WRNO New Orleans LA	7355am				
0100	0200	USA, WSHB Cyp Creek SC	9430am	15285sa			
0100	0200	USA, WTJC Newport NC	9370na				
0100	0200	USA, WWCR Nashville TN	3215na	5070na	5935na	7520na	
0100	0200	USA, WWRB Manchester TN	5085va	6890va			
0100	0200	USA, WYFR Okeechobee FL	6065na	9505na	15060as		
0100	0200	Vanuatu, Radio	3945do	4960do	7260do		
0100	0200	Zambia, Christian Voice	4965do				
0130	0145	Libya, Voice of Africa	15435irr	17750irr			
0130	0200	Austria, Christian Voice	17645as	21680pa			

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0200	0300	vi	Australia, ABC/Tennant Creek	4910do				
0200	0300		Australia, Christian Voice Intl	21550as	21680pa			
0200	0300		Australia, Radio	9660pa	12080pa	15420as	15415as	15515vo
			17580va 17750as	21725as				
0200	0300		Austria, Christian Voice	17645as	21680pa			
0200	0300		Canada, CBC Northern Service	9625do				
0200	0300		Canada, CFRX Toronto ON	6070do				
0200	0300		Canada, CFVP Calgary AB	6030do				
0200	0300		Canada, CHNX Halifax, NS	6130do				
0200	0300		Canada, CKZN St John's NF	6160do				
0200	0300		Canada, CKZU Vancouver BC	6160do				
0200	0300		Costa Rica, R for Peace Intl	7455irr	15040va	21815usb		
0200	0300		Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am 13749na	13749na				
0200	0300		Cuba, Radio Havana	6000na	9820na	11705usb		
0200	0300		Ecuador, HCJB	9745na	11840na	21455usb		
0200	0300		Egypt, Radio Cairo	9475na				
0200	0300	a/monthly	Finland, Scandv Weekend Radio	5990va	11720va			
0200	0300	w	Germany, Remnants Hope Minsr	6125na				
0200	0300		Guyana, Voice of	3290do	5950do			
0200	0300		Kenya, Kenya BC Corp	4885irr	4915irr			
0200	0300		Malaysia, Radio	7295do				
0200	0300		Malaysia, RTM Kota Kinabalu	5980do				
0200	0300		Namibia, NBC	3270af	7215irr			
0200	0300		New Zealand, Radio NZ Intl	801 to 3/18/02	17675pa			
0200	0300	vi	Papua New Guinea, NBC	9675do	11880irr			
0200	0300		Romania, R Romania Intl	9550na	11740na	11830na	11940va	
			15290as	15370pa				
0200	0300		Russia, University Network	9940as				
0200	0300		Russia, Voice of Russia	7180na	9765na	12020na	17595na	
0200	0300		Singapore, SBC Radio One	6150do				
0200	0300	vi	Solomon Islands, SIBC	5020do	9545do			
0200	0300		South Korea, R Korea Intl	7275na	9560na	11725sa	11810sa	
			15575na					
0200	0300		Sri Lanka, SIBC	6005as	6130do	9770as	15425as	
0200	0300		Taiwan, R Taipei Intl	15320na	15465na			
0200	0300		Taiwan, R Taipei Intl	5950na	9680na	11740ca	15320as	15345as
0200	0300		UK, BBC World Service	5975am	9410me	9525ca	9770af	9915sa
			11955as	12095sa	15280as	15310as	15360as	17790as
0200	0300		USA, Armed Forces Radio	6458usb	12689usb			
0200	0300		USA, KAIJ Dallas TX	5755va				
0200	0300		USA, KJES Vado NM	7555na				
0200	0300		USA, KTVN Salt Lk City UT	7510na				
0200	0300		USA, KVOH Los Angeles CA	9975na				
0200	0300		USA, KWHR Naalehu HI	17510as				
0200	0300		USA, Voice of America	5995me	6015me	6105me	7115as	7200as
			7255me	9850as	11705as	11820as	15250as	15300as
			17820as					17740as
0200	0300		USA, WBCQ Monticello ME	7415na	9335na			
0200	0300		USA, WEWN Birmingham AL	5825na	9355na	15745na		
0200	0300		USA, WHRA Greenbush ME	7580af				
0200	0300		USA, WHRI Noblesville IN	5745va	7315am			
0200	0300		USA, WINB Red Lion PA	12160am				
0200	0300		USA, WJCR Upton KY	7490am	13595as			
0200	0300	s m	USA, WRMI Miami FL	9955am				
0200	0300	tw hfa	USA, WRMI Miami FL	7385na				
0200	0300		USA, WRNO New Orleans LA	7355am				
0200	0300		USA, WSHB Cyp Creek SC	7535am	9430na			
0200	0300		USA, WTJC Newport NC	9370na				
0200	0300		USA, WWRB Nashville TN	3215na	5070na	5935na	7520na	
0200	0300		USA, WWRB Manchester TN	5085vo	6890va			
0200	0300		USA, WYFR Okeechobee FL	6065na	9505na			
0200	0300	vi	Vanuatu, Radio	3945do	4960do	7260do		
0200	0300		Zambia, Christian Voice	4965do				
0205	1215		Cambodia, National Radio Of	11940as				
0205	0210		Croatia, Croatian Radio	9925na				
0215	0220		Nepal, Radio	3230as	5005as			
0230	0257		Vietnam, Voice of	6175na				
0230	0300		Austria, Radio Austria Intl	7325na				
0230	0300		Iraq, Radio Iraq Intl	9887irr	11787irr			
0230	0300as		Philippines, Radio Pilipinas	12015me	15120me	15270me		
0230	0300		Slovakia, AWR	7235as	skd1200			
0230	0300		Sweden, Radio	6020af	9495na			
0245	0300		Albania, Radio Tirana Intl	6110af	6115na	7160na		
0250	0300		Vatican City, Vatican Radio	7305am	9605am			

0300 UTC - 10PM E / 9PM C / 7PM P

0300	0310		Vatican City, Vatican Radio	7305am	9605am			
0300	0330	sm w fa	Belarus, Radio Belarus Intl	5970eu	7210eu			
0300	0330		Egypt, Radio Cairo	9475na				
0300	0330		S Africa, Channel Africa	9525af				
0300	0330		Thailand, Radio	9655am	11905am	15460na		
0300	0330	a	UK, Wales Radio Intl	9795na				
0300	0330		USA, KJES Vado NM	7555na				
0300	0330		USA, KVOH Los Angeles CA	9975na				
0300	0330	mtwhf	USA, Voice of America	4960af	6020na	6045na	9640am	9700na
			Germany, Deutsche Welle	9765na	11985na	14505na		
0300	0356		China, China Radio Intl	9690na				
0300	0356		North Korea, Voice of	6195as	7140as	9345as		
0300	0358		New Zealand, Radio NZ Intl	801 to 3/18/02	17675pa			
0300	0400		Anguilla, Caribbean Beacon	6090am				
0300	0400	vi	Australia, ABC/Alice Springs	4835do				
0300	0400	vi	Australia, ABC/Katherine	5025do				
0300	0400	vi	Australia, ABC/Tennant Creek	4910do				
0300	0400		Australia, Christian Voice Intl	21550as	21680pa			
0300	0400		Australia, Radio	9660pa	12080pa	15240as	15415as	15515va
			17580va 17750as	21725as				

0300	0400		Austria, Christian Voice	17645as	21680pa			
0300	0400	vi	Botswana, Radio	3356do	4820do	7255do		
0300	0400		Bulgaria, Radio	7400na	9400na			
0300	0400		Canada, CBC Northern Service	9625do				
0300	0400		Canada, CFRX Toronto ON	6070do				
0300	0400		Canada, CFVP Calgary AB	6030do				
0300	0400		Canada, CHNX Halifax, NS	6130do				
0300	0400		Canada, CKZN St John's NF	6160do				
0300	0400		Canada, CKZU Vancouver BC	6160do				
0300	0400		Costa Rica, R for Peace Intl	7455irr	15040va			
0300	0400		Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am 13749na	17645as				
0300	0400		Cuba, Radio Havana	6000na	9820na	11705usb		
0300	0400		Ecuador, HCJB	9745na	11840na	21455usb		
0300	0400	a/monthly	Finland, Scandv Weekend Radio	5990va	5990va	11720va		
0300	0400	vi	Guatemala, Radio Cultural	3290do	3300do	5955do		
0300	0400		Guyana, Voice of	3290do	5950do			
0300	0400		Japan, Radio	17825ca				
0300	0400		Kenya, Kenya BC Corp	4885irr	4915irr			
0300	0400	vi	Lesotho, Radio	4800do				
0300	0400		Malaysia, Radio	7295do				
0300	0400		Malaysia, Voice of	6175as	9750as	skd1101	15295pa	skd1101
0300	0400		Namibia, NBC	3270af	3290af	7215irr		
0300	0400		Oman, Radio	15355va				
0300	0400	vi	Papua New Guinea, NBC	9675do	11880irr			
0300	0400as		Philippines, Radio Pilipinas	12015me	15120me	15270me		
0300	0400		Russia, University Network	17765as				
0300	0400		Russia, Voice of Russia	7180na	7250na	12020na	17595na	
0300	0400		Singapore, SBC Radio One	6150do				
0300	0400	vi	Solomon Islands, SIBC	5020do	9545do			
0300	0400		Sri Lanka, SLBC	6005as	9770as	15425as		
0300	0400		Taiwan, R Taipei Intl	5950na	9680na	11875as	15320as	
0300	0400		Uganda, Radio	5026do	7196do			
0300	0400		UK, BBC World Service	3255af	5975am	6005af	6190af	6195eu
			7160af	9410eu	9525ca	11730af	11765af	12035af
			15280as	15310as	15360as	15575me	17760as	17790as
			21830as					21660as
0300	0400		USA, Armed Forces Radio	6458usb	12689usb			
0300	0400		USA, KAIJ Dallas TX	5755va				
0300	0400		USA, KTVN Salt Lk City UT	7510na				
0300	0400		USA, KWHR Naalehu HI	17510as				
0300	0400		USA, Voice of America	6035af	6080af	7105af	7290af	7340af
			7415af	9575af	9885af			
0300	0400		USA, WBCQ Monticello ME	7415na	9335na			
0300	0400		USA, WEWN Birmingham AL	5825na	7425na	15745na		
0300	0400		USA, WHRA Greenbush ME	7580af				
0300	0400		USA, WHRI Noblesville IN	5745va	7315am			
0300	0400		USA, WINB, Red Lion PA	12160am				
0300	0400		USA, WJCR Upton KY	7490am	13595as			
0300	0400	tw hfa	USA, WRMI Miami FL	7385na				
0300	0400		USA, WRNO New Orleans LA	7395am				
0300	0400		USA, WSHB Cyp Creek SC	7535am				
0300	0400		USA, WTJC Newport NC	9370na				
0300	0400		USA, WWRB Nashville TN	3215na	5070na	5935na	7520na	

Shortwave Guide



0600	0700	Kenya, Kenya BC Corp	4885irr	4915irr				
0600	0700	Kuwait, Radio	15110as					
0600	0700	Lesotho, Radio	4800do					
0600	0700	Liberia, ELWA	4760do					
0600	0700	Liberia, R Liberia Intl	6100do					
0600	0700	Malaysia, Radio	7295do					
0600	0700	Malaysia, RTM Sarawak	7160do					
0600	0700	Malaysia, Voice of	6175as	9750as	skd1101	15295pa	skd1101	
0600	0700	Myanmar, Radio	9730do					
0600	0700	Namibia, NBC	3270af	3290af	7215irr			
0600	0700	Nigeria, Radio/Enugu	801 to 3/18/02	6025do				
0600	0700	Nigeria, Radio/Ibadan	801 to 3/18/02	6050do				
0600	0700	Nigeria, Radio/Kaduna	801 to 3/18/02	4770do	6090do	7275do		
0600	0700	Nigeria, Radio/Lagos	801 to 3/18/02	3326do	4990do			
0600	0700	Nigeria, Voice of	801 to 3/18/02	7255af	11770af	15120va		
0600	0700	Papua New Guinea, NBC	9675do	11880irr				
0600	0700	Romania, R Romania Intl	9530na	11830na				
0600	0700	Russia, University Network	17765as					
0600	0700	Russia, Voice of Russia	15275au	15460au	17655au	21790au		
0600	0700	Sierra Leone, SLBS	3316do	skd0801				
0600	0700	Singapore, SBC Radio One	6150do					
0600	0700	Solomon Islands, SIBC	5020do	9545do				
0600	0700	Swaziland, TWR	6035af	7205af	9500af			
0600	0700	Uganda, Radio	7110	7196do				
0600	0700	UK, BBC World Service	6055af	6190af	6195eu	7160af	9410eu	
0600	0700	UK, BBC World Service	11760me	11765af	11940af	11955as	12095eu	15310as
0600	0700	UK, BBC World Service	15575as	17640af	17760as	17790as	21660as	15360as
0600	0700	UK, BBC World Service	17885af					
0600	0700	USA, Armed Forces Radio		6458usb	12689usb			
0600	0700	USA, KAJI Dallas TX	5755va					
0600	0700	USA, KTNB Salt Lk City UT		7510na				
0600	0700	USA, KWHR Naalehu HI	117780as					
0600	0700	USA, KWHR Naalehu HI	11565pa					
0600	0700	USA, WBCQ Monticello ME		7415na	9335na			
0600	0700	USA, WEWN Birmingham AL		5825na	7425na	15745na		
0600	0700	USA, WHRA Greenbush ME		7580af				
0600	0700	USA, WHRI Noblesville IN		5745va	7315am			
0600	0700	USA, WJCR Upton KY	7490am	13595as				
0600	0700	USA, WMLK Bethel PA	9465eu					
0600	0700	USA, WRMI Miami FL	7385na					
0600	0700	USA, WRNO New Orleans LA	7395am					
0600	0700	USA, WSHB Cyp Creek SC	7535af					
0600	0700	USA, WTJC Newport NC	9370na					
0600	0700	USA, WWCR Nashville TN	3215na	5070na	5935na	7560na		
0600	0700	USA, WWRB Manchester TN	5085va	6890va				
0600	0700	USA, WYFR Okeechobee FL	7355eu	11550eu				
0600	0700	Vanuatu, Radio	3945do	4960do	7260do			
0600	0700	Yemen, Rep of Yemen Radio		Tent 801	to 03/31/02	9780me		
0600	0700	Zambia, Christian Voice	9865do					
0600	0700	Zimbabwe, Zimbabwe BC Corp		5975do	6045do			
0605	0610	Croatia, Croatian Radio	9470pa					
0630	0700	Georgia, Georgian Radio		11805eu				
0630	0700	USA, Voice of America	5995af	7170af	11815eu	11915me	11930af	
0630	0700	USA, Voice of America	12025af	15205as	15335me			
0630	0700	USA, Voice of America	5970af	6035af	6080af	7295af	11835af	
0630	0700	USA, Voice of America	13710af					
0630	0700	Vatican City, Vatican Radio		11625af	13765af	15570af		
0632	0700	Austria, Radio Austria Intl		6155eu	13730eu	17870me		
0636	0653	Romania, R Romania Intl		7145eu	9510eu	9570eu	11790eu	

0700 UTC - 2AM E / 1AM C / 11PM P

0700	0705	USA, WWCR Nashville TN	5070na	5935na	7560na			
0700	0705	USA, WWCR Nashville TN	3210na					
0700	0705	USA, WWCR Nashville TN	3215na					
0700	0730	Papua New Guinea, NBC	9675do	11880irr				
0700	0730	Slovakia, R Slovakia Intl	15460au	17550au	21705au			
0700	0730	USA, Voice of America	11915me	12025af	15335me			
0700	0730	USA, Voice of America	6873af					
0700	0745	USA, WYFR Okeechobee FL	7355eu	9985af	11580af			
0700	0800	Anguilla, Caribbean Beacon	6090am					
0700	0800	Australia, ABC/Alice Springs	4835do					
0700	0800	Australia, ABC/Katherine	5025do					
0700	0800	Australia, ABC/Tennant Creek	4910do					
0700	0800	Australia, Christian Voice Intl	17820as	21680pa				
0700	0800	Australia, Radio	9660pa	12080pa	15240va	15415as	17580va	
0700	0800	Australia, Radio	17750as	21725as				
0700	0800	Botswana, Radio	7255do	9600do				
0700	0800	Cameroon, RTV	4850do	6005do				
0700	0800	Canada, CFRX Toronto ON	6070do					
0700	0800	Canada, CFVP Calgary AB	6030do					
0700	0800	Canada, CHNX Halifax, NS	6130do					
0700	0800	Canada, CKZN St John's NF	6160do					
0700	0800	Canada, CKZU Vancouver BC	6160do					
0700	0800	Costa Rica, R for Peace Intl	7455irr	15040va				
0700	0800	Costa Rica, University Network	5030am	6150am	7375am	9724sa		
0700	0800	Costa Rica, University Network	11870am	13749na	17645as			
0700	0800	Ecuador, HCJB	9780eu	11755pa	21455usb			
0700	0800	Eqt Guinea, Radio Africa		15185af				
0700	0800	Eqt Guinea, Radio East Africa		15185af				
0700	0800	Finland, Scandv Weekend Radio		5990va	11720va			
0700	0800	France Radio France Intl	15605af					
0700	0800	Germany, Voice of Hope		5975eu	21590me			
0700	0800	Germany, Deutsche Welle		6140eu				
0700	0800	Ghana, Ghana BC Corp		3366do	4915do			
0700	0800	Guyana, Voice of	3290do	5950do				
0700	0800	Italy, IRRS	7120va	7125af				

0700	0800	Kenya, Kenya BC Corp	4885irr	4915irr				
0700	0800	Kuwait, Radio	15110as					
0700	0800	Lesotho, Radio	4800do					
0700	0800	Liberia, ELWA	4760do					
0700	0800	Liberia, R Liberia Intl	6100do					
0700	0800	Malaysia, Radio	7295do					
0700	0800	Malaysia, RTM Sarawak	7160do					
0700	0800	Malaysia, Voice of	6175as	9750as	skd1101	15295pa	skd1101	
0700	0800	Myanmar, Radio	9730do					
0700	0800	Namibia, NBC	3270af	3290af	7215irr			
0700	0800	New Zealand, Radio NZ Intl	801 to 3/18/02			11675pa		
0700	0800	Nigeria, Radio/Enugu	801 to 3/18/02	6025do				
0700	0800	Nigeria, Radio/Ibadan	801 to 3/18/02	6050do				
0700	0800	Nigeria, Radio/Kaduna	801 to 3/18/02	4770do	6090do	7275do		
0700	0800	Nigeria, Radio/Lagos	801 to 3/18/02	3326do	4990do			
0700	0800	Nigeria, Voice of	801 to 3/18/02	7255af	11770af	15120va		
0700	0800	Romania, R Romania Intl	15335af	17720af				
0700	0800	Russia, University Network	17765as					
0700	0800	Russia, Voice of Russia	15275au	15460au	17655au	21790au		
0700	0800	Sierra Leone, SLBS	3316do	skd0801				
0700	0800	Singapore, SBC Radio One	6150do					
0700	0800	Solomon Islands, SIBC	5020do	9545do				
0700	0800	Swaziland, TWR	6035af	7205af	9500af			
0700	0800	Taiwan, R Taipei Intl	5950na					
0700	0800	Uganda, Radio	5026do	7110do	7196do			
0700	0800	UK, BBC World Service	6190af	9410eu	11760me	11765af	11940af	
0700	0800	UK, BBC World Service	11955as	12095eu	15360as	15400af	15485eu	15565eu
0700	0800	UK, BBC World Service	15575as	17640eu	17760as	17790as	21660as	
0700	0800	UK, BBC World Service	17885af					
0700	0800	USA, Armed Forces Radio		6458usb	12689usb			
0700	0800	USA, KAJI Dallas TX	5755va					
0700	0800	USA, KTNB Salt Lk City UT		7510na				
0700	0800	USA, KWHR Naalehu HI	117780as					
0700	0800	USA, KWHR Naalehu HI	11565pa					
0700	0800	USA, WBCQ Monticello ME		7415na	9335na			
0700	0800	USA, WEWN Birmingham AL		5825na	7425na	15745na		
0700	0800	USA, WHRA Greenbush ME		7580af				
0700	0800	USA, WHRI Noblesville IN		5745va	7315am			
0700	0800	USA, WJCR Upton KY	7490am	13595as				
0700	0800	USA, WMLK Bethel PA	9465eu					
0700	0800	USA, WRNO New Orleans LA	7395am					
0700	0800	USA, WSHB Cyp Creek SC	7535af					
0700	0800	USA, WTJC Newport NC	9370na					
0700	0800	USA, WWCR Nashville TN	3210na	5070na	5935na	7560na		
0700	0800	USA, WWRB Manchester TN	5085va	6890va				
0700	0800	USA, WYFR Okeechobee FL	7355eu	11550eu				
0700	0800	Vanuatu, Radio	3945do	4960do	7260do			
0700	0800	Zambia, Christian Voice	9865do					
0700	0800	Zimbabwe, Zimbabwe BC Corp		5975do	6045do			
0700	0800	USA, WWCR Nashville TN	3210na	5070na	5935na	7560na		
0710	0715	Vatican City, Vatican Radio		9645eu	11740eu	15595va		
0720	0735	Swaziland, TWR		6035af	7205af	9500af		
0730	0758	Finland, YLE/Radio Finland		9510va	21670va			
0730	0800	Georgia, Georgian Radio		6080me				
0730	0800	Guam, KTWR/TWR		15200as				
0730	0800	Papua New Guinea, NBC		4890do	9675irr			
0730	0800	Switzerland, Swiss R Intl		9885af	13635af	17665af		
0740	0745	Croatia, Croatian Radio		9470pa				
0745	0755	Armenia, TWR		12070eu				
0745	0755	Monaco, TWR		9870eu				
0745	0800	Albania, TWR		12070eu				
0755	0800	Albania, TWR		12070eu				
0755	0800	Armenia, TWR		12070eu				
0755	0800	Monaco, TWR		9870eu				

0800 UTC - 3AM E / 2AM C / 12AM P

0800	0804	Pakistan, Radio	17510eu	21465eu				
0800	0825	Belgium, RVi Flanders R Intl		5985eu				
0800	0825	Malaysia, Voice of	6175as	9750as	skd1101	15295pa	skd1101	
0800	0827	Czech Rep, Radio Prague Intl		11600eu	15255eu			
0800	0830	Australia, ABC/Alice Springs		4835do				
0800	0830	Australia, ABC/Katherine		5025do				
0800	0830	Australia, ABC/Tennant Creek		4910do				
0800	0830	Myanmar, Radio	9730do					
0800	0830	Sierra Leone, SLBS	3316do	skd0801				
0800	0830	USA, Voice of America	11995as	13615as	15150as</			

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0800	0900	Guam, KTWR/TWR	15200as	skd0201				
0800	0900	Guyana, Voice of	3290do	5950do				
0800	0900	Indonesia, Voice of	9525pa	11785as	15150as			
0800	0900as/vl	Italy, IRRS 7120va	7125af					
0800	0900	Kenya, Kenya BC Corp	4885irr	4915irr				
0800	0900 vl	Lesotho, Radio	4800do					
0800	0900	Liberia, ELWA	4760do					
0800	0900	Liberia, R Liberia Intl	6100do					
0800	0900	Malaysia, Radio	7295do					
0800	0900	Monaco, TWR	9870eu					
0800	0900	Namibia, NBC	7165af	7215af				
0800	0900	New Zealand, Radio NZ Intl	B01 to 3/18/02	11675pa				
0800	0900 vl	Nigeria, Radio/Enugu	B01 to 3/18/02	6025do				
0800	0900 vl	Nigeria, Radio/Ibadan	B01 to 3/18/02	6050do				
0800	0900 vl	Nigeria, Radio/Kaduna	B01 to 3/18/02	4770do	6090do	7275do		
		9570do						
0800	0900 vl	Nigeria, Radio/Lagos	B01 to 3/18/02	3326do	4990do			
0800	0900	Nigeria, Voice of	B01 to 3/18/02	7255af	11770af	15120va		
0800	0900 vl	Papua New Guinea, NBC	4890do	9675irr				
0800	0900	Russia, University Network	17765as					
0800	0900	Russia, Voice of Russia	15275au	15460au	17495au	17525au	17655au	
		17665au						
0800	0900	Singapore, SBC Radio One	6150do					
0800	0900 vl	Solomon Islands, SIBC	5020do					
0800	0900	South Korea, R Korea Intl	9570om	13670eu				
0800	0900	UK, BBC World Service	6190af	9410eu	11940af	11955as	12095eu	
		15310as	15360as	15400af	15485eu	15565eu	17640eu	17760as
		17830af	17885af	21470af	21660as	21830as		
		UK, BBC World Service	15575as					
0800	0900	USA, Armed Forces Radio	6458usb	12689usb				
0800	0900	USA, KAIJ Dallas TX	5755va					
0800	0900	USA, KNLS Anchor Point AK	B01 to 01/26/02	9615as				
0800	0900	USA, KTBN Salt Lk City UT	7510na					
0800	0900	USA, KWHR Naalehu HI9930as	11565pa					
0800	0900	USA, WWCR Monticello ME	7415na					
0800	0900	USA, WFNN Birmingham AL	5825na	7425na	15745na			
0800	0900	USA, WHRI Noblesville IN	5745va	7315am				
0800	0900	USA, WJCR Upton KY	7490am	13595as				
0800	0900	USA, WMLK Bethel PA	9465eu					
0800	0900	USA, WRMI Miami FL	7385na					
0800	0900	USA, WRNO New Orleans LA	7395am					
0800	0900	USA, WSHB Cyp Creek SC	7535eu	9845au				
0800	0900	USA, WTJC Newport NC	9370na					
0800	0900	USA, WWCR Nashville TN	3210na	5070na	5935na	7560na		
0800	0900 vl	Vanuatu, Radio	3945do	4960do	7260do			
0800	0900	Zambia, Christian Voice	9865do					
0800	0900 vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do				
0805	0810	Croatia, Croatian Radio	13820au					
0815	0900	Guam, KTWR/ TWR	15200as	15330as				
0830	0845 f	Seychelles, FEBA Radio	15460as					
0830	0900 vl	Australia, ABC/Alice Springs	2310do					
0830	0900 vl	Australia, ABC/Katherine	2485do					
0830	0900 vl	Australia, ABC/Tennant Creek	2325do					
0830	0900	Austria, AWR Europe	9660eu	17820af				
0830	0900	Austria, Radio Austria Intl	17820eu					
0830	0900	Georgia, Georgian Radio	11910eu					
0830	0900	Switzerland, Swiss R Intl	21770af					
0830	0900	USA, Voice of America	11995as	13615as	15150as	15165me	15235me	
		17875af						
0840	0900 s	Armenia, Voice of	4810eu	15270eu				

0900 UTC - 4AM E / 3AM C / 1AM P

0900	0915 vl	Ghana, Ghana BC Corp	3366do	4915do				
0900	0920 mtwhf	Albania, TWR	12070eu					
0900	0920	Armenia, TWR	12070eu					
0900	0920 mtwhf	Monaco, TWR	9870eu					
0900	0930	Australia, Radio	9580va	15420va	21820va			
0900	0930	Austria, AWR Europe	11670af					
0900	0930	Austria, Radio Austria Intl	11670eu					
0900	0930as	Guam, KTWR/ TWR	15330as					
0900	0945	Germany, Deutsche Welle	6160pa	7300as	9510af	11785af		
		15410af	17800pa	17820pa	17845af	17860af	21560af	
0900	0956	China, China Radio Intl	11730pa	15210pa				
0900	1000	Anguilla, Caribbean Beacon	6090am					
0900	1000 vl	Australia, ABC/Alice Springs	2310do					
0900	1000 vl	Australia, ABC/Katherine	2485do					
0900	1000 vl	Australia, ABC/Tennant Creek	2325do					
0900	1000	Australia, Christian Voice Intl	13775pa	17725pa				
0900	1000 vl	Botswana, Radio	7255do	9600do				
0900	1000 vl	Cameroon, RTV	4850do	6005do				
0900	1000	Canada, CFRX Toronto ON	6070do					
0900	1000	Canada, CFVP Calgary AB	6030do					
0900	1000	Canada, CHNX Halifax, NS	6130do					
0900	1000	Canada, CKZN St John's NF	6160do					
0900	1000	Canada, CKZU Vancouver BC	6160do					
0900	1000	Costa Rica, R for Peace Intl	7455irr	15040va				
0900	1000	Costa Rica, University Network	5030am	6150am	7375am	9724sa		
		11870am	13749na	17645as				
0900	1000	Ecuador, HCJB	11775pa	21455usb				
0900	1000	Eq Guinea, Radio Africa	15185af					
0900	1000as/vl	Eq Guinea, Radio East Africa	15185af					
0900	1000 a/monthly	Finland, Scandv Weekend Radio	6170va	11720va				
0900	1000	Germany, Deutsche Welle	6140eu					
0900	1000	Germany, Overcomer Ministries	5975eu					
0900	1000	Germany, Voice of Hope	21590me					
0900	1000	Guyana, Voice of	3290do	5950do				
0900	1000as/vl	Italy, IRRS 7120va	7125af					
0900	1000	Kenya, Kenya BC Corp	4885irr	4915irr				

0900	1000 vl	Lesotho, Radio	4800do					
0900	1000	Liberia, ELWA	4760do					
0900	1000	Liberia, R Liberia Intl	6100do					
0900	1000	Malaysia, Radio	7295do					
0900	1000 s	Malta, VO Mediterranean	B01 to 03/2002	9840eu				
0900	1000	Namibia, NBC	7165af	7215af				
0900	1000	New Zealand, Radio NZ Intl	B01 to 3/18/02	11675pa				
0900	1000 vl	Nigeria, Radio/Enugu	B01 to 3/18/02	6025do				
0900	1000 vl	Nigeria, Radio/Ibadan	B01 to 3/18/02	6050do				
0900	1000 vl	Nigeria, Radio/Kaduna	B01 to 3/18/02	4770do	6090do	7275do		
		9570do						
0900	1000 vl	Nigeria, Radio/Lagos	B01 to 3/18/02	3326do	4990do			
0900	1000	Nigeria, Voice of	B01 to 3/18/02	7255af	11770af	15120va		
0900	1000	Palau, KHBN/ VO Hope	15725as					
0900	1000 vl	Papua New Guinea, NBC	4890do	9675irr				
0900	1000	Russia, University Network	17765as					
0900	1000	Russia, Voice of Russia	15275au	15460au	17495au	17525au	17665au	
0900	1000	Singapore, SBC Radio One	6150do					
0900	1000 vl	Solomon Islands, SIBC	5020do					
0900	1000	UK, BBC World Service	6190af	6195as	9605as	9740as	11760me	
		11940af	11945as	12095eu	15190sa	15310as	15360as	15400af
		15485eu	15565eu	15575as	17640eu	17760as	17790as	
		17830af	17885af		21470af			21660as
0900	1000	USA, Armed Forces Radio	6458usb	12689usb				
0900	1000	USA, KAIJ Dallas TX	5755va					
0900	1000	USA, KTBN Salt Lk City UT	7510na					
0900	1000	USA, KWHR Naalehu HI9930as	11565pa					
0900	1000	USA, Voice of America	11995as	13615as	15150as	15165me	15235me	
		17875af						
0900	1000	USA, WBCQ Monticello ME	7415na					
0900	1000	USA, WEWN Birmingham AL	5825na	7425na	15745na			
0900	1000	USA, WHRA Greenbush ME	7580af					
0900	1000	USA, WHRI Noblesville IN	5745va	7315am				
0900	1000	USA, WJCR Upton KY	7490am	13595as				
0900	1000	USA, WRMI Miami FL	7385na					
0900	1000	USA, WSHB Cyp Creek SC	7535eu	9455sa				
0900	1000	USA, WTJC Newport NC	9370na					
0900	1000	USA, WWCR Nashville TN	3210na	5070na	5935na	7560na		
0900	1000 vl	Vanuatu, Radio	3945do	4960do	7260do			
0900	1000	Zambia, Christian Voice	9865do					
0900	1000 vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do				
0915	1000 vl	Ghana, Ghana BC Corp	6130do	4915do				
0915	1000 vl/as	Ghana, Ghana BC Corp	4915do					
0930	0950	Greece, Voice of	9420eu	15630eu				
0930	1000	Australia, Radio	9580va	15420va	17750va	21820va		
0930	1000	Georgia, Georgian Radio	11910me					
0930	1000	Lithuania, R Vilnius	9710eu					
0930	1000	Netherlands, Radio	7260va	9790va	12065va			
0940	0945	Croatia, Croatian Radio	13820au					

1000 UTC - 5AM E / 4AM C / 2AM P

1000	1005	New Zealand, Radio NZ Intl	B01 to 3/18/02	11675pa				
1000	1027	Czech Rep, Radio Prague Intl	21745va					
1000	1027	Vietnam, Voice of	9840au	12020au				
1000	1030	Guam, KSDA/ AWR	11705as	11900as				
1000	1030	Palau, KHBN/ VO Hope	15725as					
1000	1030	UK, RTE Radio	11685au	15540au				
1000	1045	USA, KWHR Naalehu HI9930as	11565pa					
1000	1056	China, China Radio Intl	11730pa	15210pa				
1000	1056	North Korea, Voice of	9335am	11710am	11735as			
1000	1100	Anguilla, Caribbean Beacon	6090am					
1000	1100 vl	Australia, ABC/Alice Springs	2310do					
1000	1100 vl	Australia, ABC/Katherine	2485do					
1000	1100 vl	Australia, ABC/Tennant Creek	2325do					
1000	1100	Australia, Christian Voice Intl	12775pa	17655pa	17725pa			
1000	1100	Australia, Radio	9580va	15420va	17750va	21820va		
1000	1100as	Bhutan, Bhutan BC Service	5030af	6035do				
1000	1100 vl	Botswana, Radio	7255do	9600do				
1000	1100	Canada, CFRX Toronto ON	6070do					
1000	1100	Canada, CFVP Calgary AB	6030do					
1000	1100	Canada, CHNX Halifax, NS	6130do					
1000	1100	Canada, CKZN St John's NF	6160do					
1000	1100	Canada, CKZU Vancouver BC	6160do					
1000	1100	Costa Rica, R for Peace Intl	7455irr	15040va				
1000	1100	Costa Rica, University Network	5030am	6150am	7375am	9724sa		
		11870am	13749na	17645as				
1000	1100	Ecuador, HCJB	11775pa	21455usb				
1000	1100	Eq Guinea, Radio Africa	15185af					
1000	1							

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1000	1100	vl	Nigeria, Radio/Ibadan	B01 to 3/18/02	6050do		
1000	1100	vl	Nigeria, Radio/Kaduna	B01 to 3/18/02	4770do	6090do	7275do
			9570do				
1000	1100	vl	Nigeria, Radio/Lagos	B01 to 3/18/02	4990do	7285do	
1000	1100	vl	Papua New Guinea, NBC		4890do	9675irr	
1000	1100		Russia, University Network		17765as		
1000	1100		Singapore, SBC Radio One		6150do		
1000	1100	vl	Salomon Islands, SIBC	5020do			
1000	1100		UK, BBC World Service	6190af	6195va	9605as	9740as 11760me
			11940af 11945as 12095eu	15310as	15360as	15485eu	15565eu
			15575as 17640eu 17760as	17790as	21470af	21660as	
1000	1100as		UK, BBC World Service	15190sa	15400af	17830af	
1000	1100		USA, Armed Forces Radio		6458usb	12689usb	
1000	1100		USA, KAIJ Dallas TX	5755va			
1000	1100		USA, KTNB Salt Lk City UT	7510na			
1000	1100		USA, Voice of America	5745am	5985pa	7370am	9590am 11720as
			15165me 15235me 15250as	15455as	17895me		
1000	1100		USA, WBCC Monticello ME	7415na			
1000	1100		USA, WEWN Birmingham AL	5825na	7425na	15395na	15745eu
1000	1100		USA, WHRI Noblesville IN	6040na	9495am		
1000	1100		USA, WJCR Upton KY	7490am	13595as		
1000	1100		USA, WRMI Miami FL	9955am			
1000	1100		USA, WRNO New Orleans LA	7395am			
1000	1100		USA, WSHB Cyp Creek SC	6095am	9455sa	11780as	
1000	1100		USA, WTJC Newport NC	9370na			
1000	1100		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na
1000	1100		USA, WYFR Okeechobee FL	5950na			
1000	1100	vl	Vanuatu, Radio	3945do	4960do	7260do	
1000	1100	mt hfa	Vatican City, Vatican Radio		5885eu		
1000	1100		Zambia, Christian Voice	9865do			
1000	1100	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do	
1006	1100		New Zealand, Radio NZ Intl	B01 to 3/18/02	7110do	9704do	15175pa
1030	1045	mtwhf	Ethiopia, Radio	5990do			
1030	1100		Guam, KSDA/ AWR	11900as			
1030	1100		Malaysia, RTM Sarawak	7160do			
1030	1100		Mongolia, Voice of	12085as			
1030	1100		Palau, KHBN/ VO Hope	9965as	15725as		
1030	1100		UAE, Emirates Radio	13675as	15370eu	15400eu	21597eu
1045	1100		USA, KWHR Naalehu HI	9930as			
1045	1100as		USA, KWHR Naalehu HI	11565pa			

1100 UTC - 6AM E / 5AM C / 3AM P

1100	1104		Pakistan, Radio	17520eu	21465eu		
1100	1127		Vietnam, Voice of	7285as			
1100	1130as		Bhutan, Bhutan BC Service	5030al	6035do		
1100	1130		Netherlands, Radio	7260va	9790va	12065va	
1100	1130	mtwhf	UK, BBC Caribbean Report		6195am	15190am	
1100	1130as		UK, BBC World Service	6195am	15190am		
1100	1145		Germany, Deutsche Welle		15410af	17800af	21780af
1100	1200		Anguilla, Caribbean Beacon		11775am		
1100	1200	vl	Australia, ABC/Alice Springs		2310do		
1100	1200	vl	Australia, ABC/Katherine		2485do		
1100	1200	vl	Australia, ABC/Tennant Creek		2325do		
1100	1200		Australia, Christian Voice Intl		13775pa	15530as	17655pa 17725pa
1100	1200		Australia, Radio	6020va	9475va	9580va	11650pa 11880as
			12080pa 15420va 21820va				
1100	1200	vl	Austria, Radio Africa Intl	17815eu			
1100	1200	vl	Botswana, Radio	7255do	9600do		
1100	1200		Canada, CBC Northern Service		9625do		
1100	1200		Canada, CFRX Toronto ON		6070do		
1100	1200		Canada, CFVP Calgary AB		6030do		
1100	1200		Canada, CHNX Halifax, NS		6130do		
1100	1200		Canada, CKZN St John's NF		6160do		
1100	1200		Canada, CKZU Vancouver BC		6160do		
1100	1200		Costa Rica, R for Peace Intl		7455irr	15040va	
1100	1200		Costa Rica, University Network		5030am	6150am	7375am 9724sa
			11870am 13749na 17645as				
1100	1200		Ecuador, HCJB	12005am	15115am	21455usb	
1100	1200	mtwhf	Eq. Guinea, Radio Africa		15185af		
1100	1200as/vl		Eq. Guinea, Radio East Africa		15185af		
1100	1200	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va	
1100	1200		Germany, Deutsche Welle		6140eu		
1100	1200		Germany, Overcomer Ministries		5975eu		
1100	1200		Germany, Voice of Hope		21590me		
1100	1200	vl	Ghana, Ghana BC Corp		6130do		
1100	1200	vl/as	Ghana, Ghana BC Corp		4915do		
1100	1200		Guyana, Voice of	5950do			
1100	1200		Iran, VO Islamic Rep. of Iran		15185as	15375as	15385as 15480as
			21470as 21730as				
1100	1200as/vl		Italy, IRRS	7120va	7125al		
1100	1200		Japan, Radio	6120na	9695as	15590as	21755as
1100	1200		Jordan, Radio		11690eu		
1100	1200		Kenya, Kenya BC Corp		4885irr	4915irr	
1100	1200	vl	Lesotho, Radio		4800do		
1100	1200		Liberia, ELWA		4760do		
1100	1200		Liberia, R Liberia Intl		6100do		
1100	1200		Malaysia, Radio		7295do		
1100	1200		Malaysia, TRM Sarawak		7160do		
1100	1200		Namibia, NBC		7215af		
1100	1200		New Zealand, Radio NZ Intl		B01 to 3/18/02	15175pa	
1100	1200	vl	Nigeria, Radio/Enugu	B01 to 3/18/02	6025do		
1100	1200	vl	Nigeria, Radio/Ibadan	B01 to 3/18/02	6050do		
1100	1200	vl	Nigeria, Radio/Kaduna	B01 to 3/18/02	4770do	6090do	7275do
			9570do				
1100	1200	vl	Nigeria, Radio/Lagos	B01 to 3/18/02	4990do	7285do	
1100	1200		Palau, KHBN/ VO Hope	9965as	4890do	9675irr	
1100	1200	vl	Papua New Guinea, NBC		17765as		
1100	1200	vl	Russia, University Network		17765as		

1100	1200		Singapore, R Singapore Intl		6150as	9600as	
1100	1200		Taiwan, R Taipei Intl		7445as	11985as	
1100	1200		Taiwan, Voice of Asia	A01 to 10/28/01		7445as	skd0501
1100	1200		UK, BBC World Service	6190af	6195as	9740as	11760me 11940af
			12095eu 15310as 15360as	15400af	15485eu	15565eu	15575as
			17640eu 17700as 17790as	17830af	17885af	21470af	
1100	1200		USA, Armed Forces Radio		6458usb	12689usb	
1100	1200		USA, KAIJ Dallas TX	5755va			
1100	1200		USA, KTNB Salt Lk City UT	7510na			
1100	1200		USA, KWHR Naalehu HI	9930as			
1100	1200as		USA, KWHR Naalehu HI	11565pa			
1100	1200		USA, Voice of America	5985pa	6110as	9645as	9760as 11705as
			11720as 15250as 15455as				
1100	1200		USA, WEWN Birmingham AL		5825na	7425na	15395na 15745eu
1100	1200		USA, WHRI Noblesville IN		6040na	9495am	
1100	1200		USA, WJCR Upton KY	7490am	13595as		
1100	1200		USA, WRMI Miami FL	9955am			
1100	1200		USA, WRNO New Orleans LA	7395am			
1100	1200		USA, WSHB Cyp Creek SC	6095am	9370na		
1100	1200		USA, WTJC Newport NC	9370na			
1100	1200		USA, WWCR Nashville TN	3210na	5070na	5935na	7560na 15685na
1100	1200		USA, WYFR Okeechobee FL	5950na			
1100	1200	vl/s	Vanuatu, Radio	3945do	4960do	7260do	
1100	1200		Zambia, Christian Voice	9865do			
1100	1200	vl	Zimbabwe, Zimbabwe BC Corp		5975do	6045do	
1115	1127		Zambia, National BC Corp		6265do		
1115	1145		Nepal, Radio	3230as	5005as		
1130	1135		Israel, Kol Israel		15640va	17545va	
1130	1145	vl	Libya, Voice of Africa		15435irr	17750irr	
1130	1155		Belgium, RVI Flanders R Intl		9865as		
1130	1157		Czech Rep. Radio Prague Intl		11640eu	21745va	
1130	1200		Netherlands, Radio		5965na	6045eu	9860eu
1130	1200		South Korea, R Korea Intl		9650na		
1130	1200	a	UK, Wales Radio Intl		17625eu		
1130	1200	f	Vatican City, Vatican Radio		15595va	17515va	

1200 UTC - 7AM E / 6AM C / 4AM P

1200	1210		New Zealand, Radio NZ Intl	B01 to 3/18/02	15175pa		
1200	1220	fa	Kazakhstan, R Almaty	9620eu	11840eu		
1200	1220	mtwhf	UK, BBC Caribbean Report		6195am	15190am	
1200	1220as		UK, BBC World Service	6195am	15190am		
1200	1227		Iran, VO Islamic Rep. of Iran		15185as	15375as	15385as 15480as
			21470as 21730as				
1200	1230		France Radio France Intl	15540af	25820af		
1200	1230		Mongolia, Voice of	12015as			
1200	1230		South Korea, R Korea Intl		9650na		
1200	1230		Uzbekistan, Radio Toshkent		5060as	5955as	5975as 6025as
			9715as				
1200	1245		USA, WYFR Okeechobee FL		5950na	11830na	11970na 13695na
1200	1256		China, China Radio Intl	9705as	9730as	9760pa	11760pa 11980as
			15415pa				
1200	1259		Canada, Radio Canada Intl		9660as	11730as	
1200	1300		Anguilla, Caribbean Beacon		11775am		
1200	1300	vl	Australia, ABC/Alice Springs		2310do		
1200	1300	vl	Australia, ABC/Katherine		2485do		
1200	1300	vl	Australia, ABC/Tennant Creek		2325do		
1200	1300		Australia, Christian Voice Intl		13775pa	15530as	17725pa
1200	1300		Australia, Radio	6020va	9475va	9580va	11650pa 11880as
			15400as 21820va				
1200	1300		Bangladesh, Bangla Betar		B01 to 03/24/02	7185as	9550as
1200	1300	vl	Botswana, Radio	7255do	9600do		
1200	1300		Bulgaria, Radio	15700eu	17500eu		
1200	1300		Canada, CBC Northern Service		9625do		
1200	1300		Canada, CFRX Toronto ON		6070do		
1200	1300		Canada, CFVP Calgary AB		6030do		
1200	1300		Canada, CHNX Halifax, NS		6130do		
1200	1300		Canada, CKZN St John's NF		6160do		
1200	1300		Canada, CKZU Vancouver BC		6160do		
1200	1300		China, Voice of Hope	7460as			
1200	1300		Costa Rica, R for Peace Intl		15040va	21815usb	
1200	1300		Costa Rica, University Network		5030am	6150am	7375am 9724sa
			11870am 13749na 17645as				
1200	1300		Ecuador, HCJB	12005am	15115am	21455usb	
1200	1300as/vl		Eq. Guinea, Radio East Africa		15185af		
1200	1300	a/monthly	Finland, Scandv Weekend Radio		6170va	11720va	
1200	1300		Germany, Deutsche Welle		6140eu		
1200	1300		Germany, Overcomer Ministries		5975eu		
1200	1300		Germany, Voice of Hope		15715me		
1200	1300	vl	Ghana, Ghana BC Corp		4915do	6130do	
1200	1300		Guyana, Voice of	5950do			
1200	1300as/vl		Italy, IRRS	7120va	7125al		
1200	1300		Kenya, Kenya BC Corp		4885irr	4915irr	
1200	1300	vl	Lesotho, Radio		4800do		
1200	1300		Liberia, R Liberia Intl		6100do		
1200	1300		Malaysia, Radio		7295do		
1200	1300		Namibia, NBC		7165af	7215af	
1200	1300						

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1200	1300	UK, BBC World Service 6190af 12095eu 15310as 15360as 17700as 17830af 17885af	6195as 15485eu 21470af	9740as 15565eu 11825na	11760me 15575me 15520na	11940af 17340eu 15520na
1200	1300	Ukraine, R Ukraine Intl 11720eu	6458usb	12689usb		
1200	1300	USA, Armed Forces Radio				
1200	1300	USA, KAIJ Dallas TX 5755va				
1200	1300	USA, KTBN Salt Lk City UT	7510na			
1200	1300	USA, KWHR Naalehu HI 9930as				
1200	1300as	USA, KWHR Naalehu HI 11565pa				
1200	1300	USA, Voice of America 6110as 15170me 15250as 15260me	9645as 15455as 5825na	9760as 17630af 7425na	11705as 11715as 15375na	11715as 15745eu
1200	1300	USA, WEWN Birmingham AL	6040na	9495am		
1200	1300	USA, WHRI Noblesville IN				
1200	1300	USA, WINB Red Lion PA 13570am				
1200	1300	USA, WJCR Upton KY 7490am	13595as			
1200	1300	USA, WRMI Miami FL 9955am				
1200	1300	USA, WRNO New Orleans LA	7395am			
1200	1300	USA, WSHB Cyp Creek SC	5915as	6095am	9980as	11660am
1200	1300	USA, WTJC Newport NC	9370na			
1200	1300	USA, WWCR Nashville TN	5070na	5935na	7560na	15685na
1200	1300	Vanuatu, Radio 3945do	4960do	7260do		
1200	1300	Zambia, Christian Voice 9865do				
1200	1300	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1211	1300	occnsal New Zealand, Radio NZ Intl	801 to 3/18/02	6095pa		
1215	1300	Egypt, Radio Cairo 17595as				
1215	1300	s Germany, Remnanis Hope Minstr	6110eu			
1220	1240	w Kazakhstan, R Almaty 9620eu	11840eu			
1225	1300	Sri Lanka, SLBC 6005as	9770as	15425as		
1230	1257	Vietnam, Voice of 9840as	12020as			
1230	1300	Austria, Radio Austria Intl	6155eu	13730eu		
1230	1300	Sweden, Radio 18960na				
1230	1300	Thailand, Radio 9655as	9810as	11905as		
1240	1300	† Kazakhstan, R Almaty 9620eu	11840eu			
1245	1300	a Seychelles, FEBA Radio 15535me				
1245	1300	USA, WYFR Okeechobee FL	11830na	11970na	13695na	

1300 UTC - 8AM E / 7AM C / 5AM P

1300	1310	Turkmenistan, Turkmen Radio	Tent 801 to 03/31/02	5015as		
1300	1315	a s Germany, Remnanis Hope Minstr	6110eu			
1300	1325	Netherlands, Radio 5965na	6045eu	9860eu		
1300	1330	Australia, Radio 6020va 15400as 21820va	9475va	9580va	11650pa	11880as
1300	1330	Egypt, Radio Cairo 17595as				
1300	1330	Germany, Voice of Hope	15715me			
1300	1330	Guam, KSDA/ AWR 15660as				
1300	1330	UAE, AWR Africa 17630as				
1300	1356	China, China Radio Intl 9750na 15180as	11760pa	11900pa	11980as	13650va
1300	1356	North Korea, Voice of 7505eu	9335na	11335eu	11710na	
1300	1359	Poland, Radio Polonia 6095eu	7270eu	9525eu	11820eu	
1300	1400	Anguilla, Caribbean Beacon	11775am			
1300	1400	Australia, ABC/Alice Springs	2310do			
1300	1400	Australia, ABC/Katherine	2485do			
1300	1400	Australia, ABC/Tennant Creek	2325do			
1300	1400	Australia, Christian Voice Intl	13660pa	13775pa	15155as	
1300	1400	Botswana, Radio 7255do	9600do			
1300	1400	Canada, CBC Northern Service	9625do			
1300	1400	Canada, CFRX Toronto ON	6070do			
1300	1400	Canada, CFVP Calgary AB	6030do			
1300	1400	Canada, CHNX Halifax, NS	6130do			
1300	1400	Canada, CKZN St John's NF	6160do			
1300	1400	Canada, CKZU Vancouver BC	6160do			
1300	1400	Canada, Radio Canada Intl	9515na	13655na	17710na	
1300	1400	China, Voice of Hope 7460as				
1300	1400	Costa Rica, R for Peace Intl	15040va	21815usb		
1300	1400	Costa Rica, University Network	5030am	6150am	7375am	9724sa
		11870am 13749na 17645as				
1300	1400	Ecuador, HCJB 12005am	15115am	21455usb		
1300	1400as/vl	Eq. Guinea, Radio East Africa	15185af			
1300	1400	a/monthly Finland, Scandy Weekend Radio	6170va	11720va		
1300	1400	Germany, Deutsche Welle	6140eu			
1300	1400	Germany, Overcomer Ministries	5975eu			
1300	1400	vl Ghana, Ghana BC Corp	4915do	6130do		
1300	1400	Guyana, Voice of 5950do				
1300	1400as/vl	Italy, IRRS 7120va	7125af			
1300	1400	Jordan, Radio 11690eu	17680af			
1300	1400	Kenya, Kenya BC Corp	4885irr	4915irr		
1300	1400	vl Lesotho, Radio 4800do				
1300	1400	Liberia, R Liberia Intl 6100do				
1300	1400	Malaysia, Radio 7295do				
1300	1400	Nambia, NBC 7165af	7215af			
1300	1400	occnsal New Zealand, Radio NZ Intl	801 to 3/18/02	6095pa		
1300	1400	vl Nigeria, Radio/Enugu 801 to 3/18/02	4770do	6090do	7275do	
1300	1400	Nigeria, Radio/Kaduna 801 to 3/18/02	4770do	6090do	7275do	
		9570do				
1300	1400	vl Nigeria, Radio/Lagos 801 to 3/18/02	4990do	7285do		
1300	1400	Palau, KHBN/ VO Hope 9965as				
1300	1400	vl Papua New Guinea, NBC	4890do	9675irr		
1300	1400	Russia, University Network	17765as			
1300	1400as	S Africa, Channel Africa 11720af	17780af	21725af		
1300	1400	Singapore, R Singapore Intl	6150as	9600as		
1300	1400	South Korea, R Korea Intl	9570as	13670am		
1300	1400	Sri Lanka, SLBC 6005as	9770as	15425as		
1300	1400	Uganda, Radio 7196do				
1300	1400	UK, BBC World Service 6190af 12095eu 15190am 15310as 15575me 17640eu 17700as	6195va 15360as 17830af	9740as 15420af 17885af	11760me 15485eu 15565eu	11940af 17340eu
1300	1400	USA, Armed Forces Radio	6458usb	12689usb		

1300	1400	USA, KAIJ Dallas TX 5755va				
1300	1400	USA, KNLS Anchor Point AK	801 to 01/26/02	9615as		
1300	1400	USA, KTBN Salt Lk City UT	7510na			
1300	1400	USA, KWHR Naalehu HI 9930as				
1300	1400as	USA, KWHR Naalehu HI 11565pa				
1300	1400	USA, Voice of America 6110as 15260me 15455as 17630af	9645as	9760as	11705as	15170me
1300	1400	USA, WBCQ Monticello ME	17495na			
1300	1400	USA, WEWN Birmingham AL	11875na	11530na	11550na	15375na
		15745eu				
1300	1400	USA, WHRI Noblesville IN	6040na	15105am		
1300	1400	USA, WINB Red Lion PA 13570am				
1300	1400	USA, WJCR Upton KY 7490am	13595as			
1300	1400	smtwhf USA, WRMI Miami FL 9955am				
1300	1400	USA, WRNO New Orleans LA	7395am			
1300	1400	USA, WSHB Cyp Creek SC	6095na	7485as	9455am	
1300	1400	USA, WTJC Newport NC	9370na			
1300	1400	USA, WWCR Nashville TN	9475na	13845na	12160na	15685na
1300	1400	USA, WYFR Okeechobee FL	11550as	11740na	11830na	11970na
		17510sa 17575sa				
1300	1400	Zambia, Christian Voice 9865do				
1300	1400	vl Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1330	1350	UAE, Emirates Radio 13630eu	13675eu	15400eu	21597eu	
1330	1357	Vietnam, Voice of 7145eu	9730eu			
1330	1359	Finland, YLE/Radio Finland	15400na	17660na		
1330	1400	Australia, Radio 6020va 11880as 21820va	9475as	9580va	11650pa	11660as
1330	1400	Austria, Radio Austria Intl	17855as			
1330	1400	Germany, Voice of Hope	15775as			
1330	1400	Guam, KSDA/ AWR 11755as	11980as			
1330	1400	India, All India Radio 11620as	13710as			
1330	1400	Laos, Lao National Radio	Tent. 801 to 03/28/02	7145as		
1330	1400	Sweden, Radio 9430va	17505va	18960na		
1330	1400	Turkey, Voice of 17690as	17815eu			
1330	1400	UAE, AWR Africa 15385as				
1330	1400	Uzbekistan, Radio Tashkent	5060as	5955as	5975as	6025as
		9715as				
1330	1400	Yugoslavia, Radio 11835au				
1345	1400	f Greece, Voice of 9420eu	9590na	15630eu	15650as	

1400 UTC - 9AM E / 8AM C / 6AM P

1400	1425	Turkey, Voice of 17690as	17815eu			
1400	1427	Czech Rep, Radio Prague Intl	21745eu			
1400	1430	Ecuador, HCJB 12005am	15115am	21455usb		
1400	1430	Thailand, Radio 9530as	9655as	11905as		
1400	1430	s USA, Voice of America 18275as				
1400	1455as	S Africa, Channel Africa 11720af	17780af	21725af	sksl201	
1400	1456	China, China Radio Intl 7405na 13685af 15125af 17720na	9700as	11675as	11765va	13650va
1400	1500	Anguilla, Caribbean Beacon	11775am			
1400	1500	vl Australia, ABC/Alice Springs	2310do			
1400	1500	vl Australia, ABC/Katherine	2485do			
1400	1500	vl Australia, ABC/Tennant Creek	2325do			
1400	1500	Australia, Christian Voice Intl	13660pa			
1400	1500	Australia, Radio 5995va	6080pa	13775pa	15155as	
1400	1500	Botswana, Radio 7255do	9600do			
1400	1500	Canada, CBC Northern Service	9625do			
1400	1500	Canada, CFRX Toronto ON	6070do			
1400	1500	Canada, CFVP Calgary AB	6030do			
1400	1500	Canada, CHNX Halifax, NS	6130do			
1400	1500	Canada, CKZN St John's NF	6160do			
1400	1500	Canada, CKZU Vancouver BC	6160do			
1400	1500	Canada, Radio Canada Intl	9515na	13655na	17710na	
1400	1500	China, Voice of Hope 7460as				
1400	1500	Costa Rica, R for Peace Intl	15040va	21815usb		
1400	1500	Costa Rica, University Network	5030am	6150am	7375am	9724sa
		11870am 13749na 17645as				
1400	1500as/vl	Eq. Guinea, Radio East Africa	15185af			
1400	1500	a/monthly Finland, Scandy Weekend Radio	6170va	11720va		
1400	1500	Germany, Deutsche Welle	6140eu			
1400	1500	Germany, Overcomer Ministries	5975eu			
1400	1500	Germany, Voice of Hope	15775as			
1400	1500	vl Ghana, Ghana BC Corp	4915do	6130do		
1400	1500	Guyana, Voice of 5950do				
1400	1500	India, All India Radio 11620as	13710as			
1400	1500	Italy, IRRS 7120va	7125af			
1400	1500	Japan, Radio 7200as	9505na	9845as	17755va	
1400	1500	Jordan, Radio 11690eu	17680af			
1400	1500	Kenya, Kenya BC Corp	4885irr	4915irr		
1400	1					

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1400	1500	Uganda, Radio	5026do	7196da				
1400	1500	UK, BBC World Service	6135as	6190af	6195as	9740as	11940af	
		12095eu	15190am	15485eu	15565eu	15575me	17640eu	
		17700as	17830af	21470af	21660af			
1400	1500	USA, Armed Forces Radio		6458usb	12689usb			
1400	1500	USA, KAU Dallas TX	13815va					
1400	1500	USA, KJES Vado NM	11715no					
1400	1500	USA, KTBN Salt Lk City UT		7510na				
1400	1500	USA, KWHR Naalehu HI	9930as					
1400	1500as	USA, KWHR Naalehu HI	11565pa					
1400	1500	USA, Voice of America	6110as	7125as	9645as	9760as	11705as	
		15205as	15395as	15455as				
1400	1500	USA, WBCQ Monticello ME		17495na				
1400	1500	USA, WEWN Birmingham AL		11875na	11530na	11550na	15375na	
		15745eu						
1400	1500	USA, WHRI Noblesville IN		6040na	15105am			
1400	1500	USA, WINB Red Lion PA	13750am					
1400	1500	USA, WJCR Upton KY	7490am					
1400	1500	USA, WRNO New Orleans LA		13595as				
1400	1500	USA, WRMI Miami FL	15725na					
1400	1500	USA, WRNO New Orleans LA		7395am				
1400	1500	USA, WTJC Newport NC		9370na				
1400	1500	USA, WWCR Nashville TN		9475na	12160na	13845na	15685na	
1400	1500	USA, WYFR Okeechobee FL		11550as	11740na	11830na	17510sa	
		17575sa	17760na					
1400	1500	Zambia, Christian Voice	9865do					
1400	1500	Zimbabwe, Zimbabwe BC Corp		5975do	6045do			
1415	1420	Nepal, Radio 3230as	5005as					
1430	1500	Austria, Radio Austria Intl		6155eu	13730eu			
1430	1500	Guam, KSDA/ AWR	15660as					
1430	1500	Guam, KTWR/ TWR	15330as					
1430	1500	Malaysia, RTM Kota Kinabalu		5980do				
1430	1500	Myanmar, Radio	5985do					
1430	1500	Netherlands, Radio	12070as	12080as	15220na	15595as		
1430	1500	Sweden, Radio	9430af	17505va	18960na			
1445	1500	f Seychelles, FEBA Radio	11600as					

1500 UTC - 10AM E / 9AM C / 7AM P

1500	1530	Australia, Radio	5995va	6080pa	9580va	11650pa		
1500	1530	Mexico, Radio Mexico Intl		801 to 03/2002	9705am	11770am		
1500	1530	S Africa, Channel Africa	17770af					
1500	1530	Seychelles, FEBA Radio	11600as					
1500	1530	USA, Voice of America	7125as	9645as	15205as	15395as		
1500	1530	USA, WRMI Miami FL	15725na					
1500	1535	Germany, Voice of Hope		15775as				
1500	1556	China, China Radio Intl	7160as	7405na	9785as	13685af	15125af	
		17720na						
1500	1556	North Korea, Voice of	7505eu	9335na	11335eu	11710na		
1500	1600	Anguilla, Caribbean Beacon		11775am				
1500	1600	Australia, ABC/Alice Springs		2310do				
1500	1600	Australia, ABC/Katherine		2485do				
1500	1600	Australia, ABC/Tennant Creek		2325do				
1500	1600	Australia, Christian Voice Intl		13660pa	13775pa	15155as		
1500	1600	Austria, Radio Africa Intl	17895eu					
1500	1600	Botswana, Radio	7255do	9600do				
1500	1600	Canada, CBC Northern Service		9625do				
1500	1600	Canada, CFRX Toronto ON		6070do				
1500	1600	Canada, CFVP Calgary AB		6030do				
1500	1600	Canada, CHNX Halifax, NS		6130do				
1500	1600	Canada, CKZN St John's NF		6160do				
1500	1600	Canada, CKZU Vancouver BC		6160do				
1500	1600	Canada, Radio Canada Intl		9515na	13655na	15360as	17710na	
		17820as						
1500	1600	China, Voice of Hope	7460as					
1500	1600	Costa Rica, R for Peace Intl		15040va	21815usb			
1500	1600	Costa Rica, University Network		5030am	6150am	7375am	9724sa	
		11870am	13749na	17645as				
1500	1600as/vl	Eqt. Guinea, Radio East Africa		15185af				
1500	1600	Finland, Scandv Weekend Radio		5990va	11720va			
1500	1600	Germany, Deutsche Welle		6140eu				
1500	1600	Germany, Overcomer Ministries		6110af				
1500	1600	Ghana, Ghana BC Corp		4915do	6130do			
1500	1600	Guam, KTWR/ TWR	15330as					
1500	1600	Guyana, Voice of	5950do					
1500	1600	Italy, IRRS	7120va	7125af				
1500	1600	Japan, Radio 7200as	9505na	9750as	9845as	17755va		
1500	1600	Jordan, Radio	11690eu	17680af				
1500	1600	Kenya, Kenya BC Corp	4885irr	4915irr				
1500	1600	Lesotho, Radio	4800do					
1500	1600	Liberia, R Liberia Intl	6100do					
1500	1600	Malaysia, Radio	7295do					
1500	1600	Malaysia, RTM Kota Kinabalu		5980do				
1500	1600	Malaysia, RTM Sarawak	7160do					
1500	1600	Myanmar, Radio	5985do					
1500	1600	Namibia, NBC	7165af					
1500	1600	Netherlands, Radio	12070as	12080as	15220na	15595as		
1500	1600	New Zealand, Radio NZ Intl		801 to 3/18/02	6095pa			
1500	1600	Nigeria, Radio/Enugu	801 to 3/18/02	6025do				
1500	1600	Nigeria, Radio/Abadan	801 to 3/18/02	6050do				
1500	1600	Nigeria, Radio/Kaduna	801 to 3/18/02	4770do	6090do	7275do		
		9570do						
1500	1600	Nigeria, Radio/Lagos	801 to 3/18/02	4990do	7285do			
1500	1600	Russia, University Network		17765as				
1500	1600	Russia, Voice of Russia	6205as	7260na	9875as			
1500	1600	Russia, World Beacon	15340eu					
1500	1600	Singapore, SBC Radio One		6150do				
1500	1600	Sri Lanka, SIBC	6005as	9770as	15425as			
1500	1600	Uganda, Radio	5026do	7196do				
1500	1600	UK, BBC World Service	5975as	6135as	6190af	6195as	9410eu	

					9740as	11860af	11940af	12095eu	15190am	15400af	15420af
					15485eu	15565eu	17700as	17830af	21470af	21490af	21660af
1500	1600	UK, World Beacon					15340eu				
1500	1600	USA, Armed Forces Radio					6458usb	12689usb			
1500	1600	USA, KAU Dallas TX									
1500	1600	USA, KJES Vado NM									
1500	1600	USA, KTBN Salt Lk City UT					7510na				
1500	1600	USA, KWHR Naalehu HI	9930as								
1500	1600as	USA, KWHR Naalehu HI	11565pa								
1500	1600	USA, VOA Special English					6110as	9760as	12040as	15460as	
1500	1600	USA, WBCQ Monticello ME					9335na	17495na			
1500	1600	USA, WEWN Birmingham AL					11875na	11530na	11550na	15375na	
		15745eu									
1500	1600	USA, WHRI Noblesville IN					6040na	15105am			
1500	1600	USA, WINB Red Lion PA	13570am								
1500	1600	USA, WJCR Upton KY	7490am				13595as				
1500	1600	USA, WRNO New Orleans LA					7395am				
1500	1600	USA, WTJC Newport NC					9370na				
1500	1600	USA, WWCR Nashville TN					9475na	12160na	13845na	15685na	
1500	1600	USA, WYFR Okeechobee FL					6280as	11830na	15255as	17760na	
1500	1600	Zambia, Christian Voice	4965do								
1500	1600	Zimbabwe, Zimbabwe BC Corp					5975do	6045do			
1515	1545	twf Seychelles, FEBA Radio	11600as								
1515	1600	m Australia, Radio	5995va				6080pa	9475as	9580va	11650pa	
1530	1600	Botswana, Radio	3356do				4820do	7255do			
1530	1600	Iran, VO Islamic Rep of Iran					9605as	11640eu	11870as		
1530	1600as	Seychelles, FEBA Radio	11600as								
1530	1600	USA, Voice of America	7125as				9575as	9645as	11955me	13735me	
		15120me	15205as	15265me	15395as						
1530	1600	mwhf USA, WRMI Miami FL	15725na								
1550	1600	Vatican City, Vatican Radio					9865au	13765au	15235au		

1600 UTC - 11AM E / 10AM C / 8AM P

1600	1610	Vatican City, Vatican Radio		9865au	13765au	15235au		
1600	1615	Pakistan, Radio	11570me	15100me	15725af	17750af		
1600	1625	Netherlands, Radio	12070as	12080as	15220na	15595as		
1600	1627	Iran, VO Islamic Rep of Iran		9605as	11640eu	11870as		
1600	1627	Vietnam, Voice of	7145eu	9730eu				
1600	1630	Mexico, Radio Mexico Intl		801 to 03/2002	9705om	11770am		
1600	1630	S Africa, Channel Africa	9525af					
1600	1630	Zimbabwe, Zimbabwe BC Corp		5975do	6045do			
1600	1640	UAE, Emirates Radio	13630eu	13675eu	15400eu	21597af		
1600	1645	a/monthly Finland, Scandv Weekend Radio		5990va	11720va			
1600	1645	Germany, Deutsche Welle		6170as	7225as	9735af	11695as	
		13605as	15455af	21840af				
1600	1649	occsnal New Zealand, Radio NZ Intl		801 to 3/18/02	6095pa			
1600	1656	China, China Radio Intl	7190af	13650af				

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1600	1700	UK, World Beacon	15340eu				
1600	1700	USA, Armed Forces Radio	6458usb	12689usb			
1600	1700	USA, KAJI Dallas TX	13815va				
1600	1700	USA, KJES Vado NM	11715na				
1600	1700	USA, KTBN Salt Lk City UT	15590na				
1600	1700	USA, KWHR Naalehu HI	9930as				
1600	1700	USA, VOA Special English	13600af	15445af	17640af		
1600	1700	USA, Voice of America	6035af	6110as	7125as	9575as	9645as
			9760as	11950me	13710af	13735me	15120me
			15395as	15485af	17715af	17895af	
1600	1700	USA, WBCQ Monticello ME	9335na	17495na			
1600	1700	USA, WEWN Birmingham AL	11530na	11550na	13615na	15375na	
			15745eu				
1600	1700	USA, WHRA Greenbush ME	17650af				
1600	1700	USA, WHRI Noblesville IN	13760va	15105am			
1600	1700	USA, WINB Red Lion PA	13570am				
1600	1700	USA, WJCR Upton KY	7490am	13595as			
1600	1700	USA, WRMI Miami FL	15725na				
1600	1700	USA, WRNO New Orleans LA	7395am	15420am			
1600	1700	USA, WSHB Cyp Creek SC	18910af				
1600	1700	USA, WTJC Newport NC	9370na				
1600	1700	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
1600	1700	USA, WYFR Okeechobee FL	11830na	13855af	15525as	17760na	
			18980eu	21455eu	21525af		
1600	1700	Zambia, Christian Voice	4965do				
1615	1700as	UK, BBC World Service	11860af	15420af	21490af		
1630	1700	Austria, Radio Austria Intl	17865na				
1630	1700	Egypt, Radio Cairo	15255af				
1630	1700	Georgia, Georgian Radio	6180me				
1630	1700	Guam, KSDA/ AWR	11980as				
1630	1700	UAE, AWR Africa	9890eu				
1630	1700as	UK, BBC World Service	11860af	21490af			
1630	1700	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
1645	1700	Finland, Scandv Weekend Radio	6170va	11720va			
1645	1700	Tajikistan, Radio	7245as				
1650	1700	New Zealand, Radio NZ Intl	801 to 3/18/02	11725pa			

1700 UTC - 12PM E / 11AM C / 9AM P

1700	1727	Czech Rep, Radio Prague Intl	5930eu	17485eu			
1700	1727	Vietnam, Voice of	12070eu				
1700	1730	Finland, Scandv Weekend Radio	6170va	11720va			
1700	1730	France, Radio France Intl	11615af	15605af	17605af		
1700	1730	Israel, Kol Israel	11605va	17545va			
1700	1730	Jordan, Radio	11690na	17680af			
1700	1730	Malta, VO Mediterranean	801 to 03/2002	6110eu	9840eu		
1700	1730	S Africa, Channel Africa	17870af				
1700	1756	China, China Radio Intl	7150af	9570af	9670va	9695af	11910af
1700	1800	Anguilla, Caribbean Beacon	11775am				
1700	1800	Australia, ABC/Alice Springs	2310do				
1700	1800	Australia, ABC/Katherine	2485do				
1700	1800	Australia, ABC/Tennant Creek	2325do				
1700	1800	Australia, Christian Voice Intl	7170pa	13660pa	15115as		
1700	1800	Australia, Radio	5995va	6080pa	9475as	9580va	11880va
1700	1800	Botswana, Radio	3356do	4820do	7255do		
1700	1800	Canada, CBC Northern Service	9625do				
1700	1800	Canada, CFRX Toronto ON	6070do				
1700	1800	Canada, CFVP Calgary AB	6030do				
1700	1800	Canada, CHNX Halifax, NS	6130do				
1700	1800	Canada, CKZN St John's NF	6160do				
1700	1800	Canada, CKZU Vancouver BC	6160do				
1700	1800	Costa Rica, R for Peace Intl	15040va	21815usb			
1700	1800	Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am	13749na	17645as		
1700	1800	Egypt, Radio Cairo	15255af				
1700	1800	Eat Guinea, Radio Africa	15185af				
1700	1800	Germany, Deutsche Welle	6140eu				
1700	1800	Germany, Overcomer Ministries	6110af				
1700	1800	Germany, Unt. Methodist Church	11735af	13820af			
1700	1800	Germany, Voice of Hope	9815eu				
1700	1800	Ghana, Ghana BC Corp	3366do	4915do			
1700	1800	Greece, Voice of	9420eu	15630eu	17705na		
1700	1800	Guyana, Voice of	5950do				
1700	1800	Japan, Radio 9505na	11970eu	15355af			
1700	1800	Kenya, Kenya BC Corp	4885irr	4915irr			
1700	1800	Lesotho, Radio	4800do				
1700	1800	Liberia, R Liberia Intl	6100do				
1700	1800	Namibia, NBC	3270af	3290af	7215irr		
1700	1800	New Zealand, Radio NZ Intl	801 to 3/18/02	11725pa			
1700	1800	Nigeria, Radio/Enugu	801 to 3/18/02	6025do			
1700	1800	Nigeria, Radio/Ibadan	801 to 3/18/02	6050do			
1700	1800	Nigeria, Radio/Kaduna	801 to 3/18/02	4770do	6090do	7275do	
			9570do				
1700	1800	Nigeria, Radio/Lagos	801 to 3/18/02	3326do	4990do		
1700	1800	Romania, R Romania Intl	9625af	11830eu	11940eu	15245eu	
1700	1800	Russia, University Network	17765as				
1700	1800	Russia, Voice of Russia	7260na	9470me	9830me		
1700	1800	Russia, World Beacon	9575eu				
1700	1800	Sierra Leone, SLBS	3316do	skd0801			
1700	1800	Taiwan, R Taipei Intl	11550as				
1700	1800	Uganda, Radio	5026do	7196do			
1700	1800	UK, BBC World Service	3255af	3915as	5975as	6005af	6190af
			6195eu	7160as	9410eu	9510as	9630af
			15420af	15565as	17830af	21470af	
1700	1800	UK, World Beacon	9575eu				
1700	1800	USA, Armed Forces Radio	6458usb	12689usb			
1700	1800	USA, KAJI Dallas TX	13815va				
1700	1800	USA, KTBN Salt Lk City UT	15590na				
1700	1800	USA, KWHR Naalehu HI	9930as				

1700	1800	USA, Voice of America	6040af	6110as	7125as	9645as	9760as
			13710af	15205as	15240af	15395as	15445af
1700	1800	USA, Voice of America	5990as	6045as	9525as	9670as	9795as
			11955as	12005as	15255as		
1700	1800	USA, WBCQ Monticello ME	9335na	17495na			
1700	1800	USA, WEWN Birmingham AL	11530na	11550na	13615na	15745na	
			17595eu				
1700	1800	USA, WHRA Greenbush ME	17650af				
1700	1800	USA, WHRI Noblesville IN	13760va	15105am			
1700	1800	USA, WINB Red Lion PA	13570am				
1700	1800	USA, WJCR Upton KY	7490am	13595as			
1700	1800	USA, WMLK Bethel PA	15265eu				
1700	1800	USA, WRMI Miami FL	15725na				
1700	1800	USA, WRNO New Orleans LA	7395am	15420am			
1700	1800	USA, WSHB Cyp Creek SC	18910af				
1700	1800	USA, WTJC Newport NC	9370na				
1700	1800	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
1700	1800	USA, WYFR Okeechobee FL	13855af	18980eu	21455eu		
1700	1800	Zambia, Christian Voice	4965do				
1700	1800	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
1710	1725	Armenia, TWR	5855eu				
1715	1730	Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu	
			15595eu				
1725	1745	UK, United Nations Radio	6125af	15495me	17580af		
1730	1745	Libya, Voice of Africa	15435irr	17750irr			
1730	1745	Swaziland, TWR	9500af				
1730	1745	Swaziland, TWR	3200af				
1730	1800	Finland, Scandv Weekend Radio	6170va	11690va			
1730	1800	Guam, KSDA/ AWR	7455as	9385me	11560me		
1730	1800	Liberia, ELWA	4760do				
1730	1800	Netherlands, Radio	6020af	11655as			
1730	1800	Philippines, Radio Pilipinas	11730me	11890me	15190me		
1730	1800	S Africa, AWR Africa	12130af				
1730	1800	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu		
1730	1800	Switzerland, Swiss R Intl	9605af	13790va	15555va		
1730	1800	Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu	
1735	1745	Paraguay, Radio Nacional	801 Tent to 03/31/02	9739sa			
1745	1800	Bangladesh, Bangla Betar	801 to 03/24/02	7185eu	9550eu		
			15520eu				
1745	1800	India, All India Radio	7410eu	11620eu	11935va	13605af	15155af
			17670af				
1745	1800	Swaziland, TWR	3200af				

1800 UTC - 1PM E / 12PM C / 10AM P

1800	1810	Zambia, National BC Corp	6265do				
1800	1815	Bangladesh, Bangla Betar	801 to 03/24/02	7185eu	9550eu		
			15520eu				
1800	1827	Vietnam, Voice of	5955eu	7145eu	9730eu		
1800	1830	Azerbaijan, Voice of	6110eu	9155eu			
1800	1830	Egypt, Radio Cairo	15255af				
1800	1830	Germany, Deutsche Welle	3995eu				
1800	1830	Germany, Universal Life	11840af				
1800	1830	S Africa, AWR Africa	5960af	6100af			
1800	1830	S Africa, Channel Africa	17870af				
1800	1830	UK, RTE Radio	9895me				
1800	1850	New Zealand, Radio NZ Intl	801 to 3/18/02	11725pa			
1800	1857	Czech Rep, Radio Prague Intl	5930eu	7315va			
1800	1858	Yemen, Rep of Yemen Radio	801 to 03/31/02	9780me			
1800	1859	Poland, Radio Polonia	5995eu	7285eu			
1800	1900	Anguilla, Caribbean Beacon	11775am				
1800	1900	Australia, ABC/Alice Springs	2310do				
1800	1900	Australia, ABC/Katherine	2485do				
1800	1900	Australia, ABC/Tennant Creek	2325do				
1800	1900	Australia, Christian Voice Intl	7170pa	9795pa			
1800	1900	Australia, Radio	6080as	7240pa	9430va	9475as	9580va
			11880va				
1800	1900	Botswana, Radio	3356do	4820do			
1800	1900	Cameroon, RTV	4850do	6005do			
1800	1900	Canada, CBC Northern Service	9625do				
1800	1900	Canada, CFRX Toronto ON	6070do				
1800	1900	Canada, CFVP Calgary AB	6030do				
1800	1900	Canada, CHNX Halifax, NS	6130do				
1800	1900	Canada, CKZN St John's NF	6160do				
1800	1900	Canada, CKZU Vancouver BC	6160do				
1800	1900	Costa Rica, R for Peace Intl	15040va	21815usb			
1800	1900	Costa Rica, University Network	5030am	6150am	7375am	9724sa	
			11870am	13749na	17645as		
1800	1900	Eat Guinea, Radio Africa	15185af				
1800	1900	Finland, Scandv Weekend Radio	6170va	11690va			
1800	1900	Germany, Deutsche Welle	6140eu				
1800	1900	Germany, Unt. Methodist Church	11735af	13820af			
1800	1900	Germany, Voice of Hope	9815eu				
1800	1900	Germany, Voice of Hope	9815eu				
1800	1900	Ghana, Ghana BC Corp	3366do	4915do			
1800	1900	Guyana, Voice of	5950do				
1800	1900	India, All India Radio	7410as	11620eu	11935va	13605af	15155af
			17670af				
1800	1900	Italy, IRRS	3980af	3985va			
1800	1900	Kenya, Kenya BC Corp	4885irr	4915irr			
1800	1900	Kuwait, Radio	11990va				

Shortwave Guide

1800	1900	vl	Nigeria, Radio/Kaduna	801 to 3/18/02	4770do	6090do	7275do		
1800	1900	vl	Nigeria, Radio/Lagos	801 to 3/18/02	3326do	4990do			
1800	1900		Philippines, Radio Pilipinas		11730me	11890me	15190me		
1800	1900		Russia, University Network		17765as				
1800	1900		Russia, Voice of Russia	7260na	7335af	7340eu	9775eu	9830af	
1800	1900as		Russia, Voice of Russia	5940eu	6175eu				
1800	1900		Russia, World Beacon	3230af	9575eu	17850af			
1800	1900		S Africa, African Beacon	3230af					
1800	1900		Sierra Leone, SLBS	3316do	skd0801				
1800	1900		Swaziland, TWR	3200af	9500af				
1800	1900		Taiwan, R Taipei Intl	3955eu					
1800	1900		Uganda, Radio	5026do	7196do				
1800	1900		UK, BBC World Service	3255af	5975as	6190af	6195eu	9410eu	
1800	1900		UK, World Beacon	3230af	9510as	9740me	15400af		
1800	1900		USA, Armed Forces Radio		6458usb	12689usb			
1800	1900		USA, KAIJ Dallas TX	13815va					
1800	1900		USA, KTBN Salt Lk City UT		15590na				
1800	1900		USA, KWHR Naalehu HI	9930as					
1800	1900		USA, Voice of America	6035af	6040af	9760as	9840as	11975af	
1800	1900		USA, WBCQ Monticello ME		9335na	17495na			
1800	1900		USA, WEWN Birmingham AL		11530na	11550na	13615na	15745na	
1800	1900		USA, WHRA Greenbush ME		17650af				
1800	1900		USA, WHRI Noblesville IN		9495am	13760va			
1800	1900		USA, WINB Red Lion PA	13570am					
1800	1900		USA, WJCR Upton KY	7490am	13595as				
1800	1900		USA, WMLK Bethel PA	15265eu					
1800	1900	mtwhf	USA, WRMI Miami FL	15725na					
1800	1900		USA, WRNO New Orleans LA		7395am	15420am			
1800	1900		USA, WSHB Cyp Creek SC		15665eu	18910af			
1800	1900		USA, WTJC Newport NC		9370na				
1800	1900		USA, WWCN Nashville TN		9475na	12160na	13845na	15685na	
1800	1900		USA, WWRB Manchester TN		9320va	12172va			
1800	1900		USA, WYFR Okeechobee FL		18980eu				
1800	1900		Zambia, Christian Voice	4965do					
1800	1900	vl	Zimbabwe, Zimbabwe BC Corp		4828do	6045do			
1815	1900		Bangladesh, Bangla Betar		801 to 03/24/02	7185eu	9550eu		
1830	1855	mtwhf	Belgium, RVI Flanders R Intl		9925eu	13685eu	13710va		
1830	1900	mtwhf	Georgia, Georgian Radio		6230eu				
1830	1900as		Georgia, Georgian Radio		6080as				
1830	1900		Netherlands, Radio	9895af	17605af				
1830	1900	s	Sweden, Radio	6065eu					
1830	1900		Sweden, Radio	5840eu					
1830	1900		UK, RTE Radio	13640na	21630af				
1830	1900as		USA, Voice of America	13675af	15160af	17640af			
1845	1900		Congo, RTV Congolaise	4765af	5985af				
1851	1900		New Zealand, Radio NZ Intl		801 to 03/18/02	15160pa			

1900 UTC - 2PM E / 1PM C / 11AM P

1900	1915		Congo, RTV Congolaise	4765do	5985af				
1900	1927		Vietnam, Voice of	7145eu	9730eu				
1900	1930		Germany, Deutsche Welle		3995eu				
1900	1930		Philippines, Radio Pilipinas		11730me	11890me	15190me		
1900	1930		USA, VOA Special English		9785me	12015me	13640me		
1900	1945		Germany, Deutsche Welle		11765af	11810af	13780af	15275af	
1900	1945		India, All India Radio	7410as	11620eu	11935vo	13605af	15155af	
1900	1956		China, China Radio Intl	9440af	9585af	13790af			
1900	1956		North Korea, Voice of	7505eu	11334eu				
1900	2000		Anguilla, Caribbean Beacon		11775am				
1900	2000	mtwhf	Argentina, RAE	9690va	15345va				
1900	2000	vl	Australia, ABC/Katherine		2485do				
1900	2000	vl	Australia, ABC/Tennant Creek		2325do				
1900	2000		Australia, Christian Voice Intl		7170pa	9795pa			
1900	2000		Australia, Radio	6080as	7240pa	9500as	9580va	11880va	
1900	2000	vl	Botswana, Radio	3356do	4820do				
1900	2000	vl	Cameroon, RTV	4850do	6005do				
1900	2000		Canada, CBC Northern Service		9625do				
1900	2000		Canada, CFRX Toronto ON		6070do				
1900	2000		Canada, CFVP Calgary AB		6030do				
1900	2000		Canada, CHNX Halifax, NS		6130do				
1900	2000		Canada, CKZN St John's NF		6160do				
1900	2000		Canada, CKZU Vancouver BC		6160do				
1900	2000		Costa Rica, R for Peace Intl		15040va	21815usb			
1900	2000		Costa Rica, University Network		5030am	6150am	7375am	9724sa	
1900	2000	mtwhf	Eq Guinea, Radio Africa		11870am	13749na	17645as		
1900	2000	a/monthly	Finland, Scandv Weekend Radio		6170va	11690va			
1900	2000	vl	Ghana, Ghana BC Corp		3366do	4915do			
1900	2000	s	Greece, Voice of	5865eu	7475eu	17705na			
1900	2000		Guyana, Voice of	5950do					
1900	2000	vl	Italy, IRRS	3980af	3985va				
1900	2000		Kenya, Kenya BC Corp		4885sirr	4915sirr			
1900	2000		Kuwait, Radio		11990va				
1900	2000	vl	Lesotho, Radio		4800do				
1900	2000		Liberia, ELWA		4760do				
1900	2000		Liberia, R Liberia Intl		5100do				
1900	2000		Namibia, NBC		3270af	7215sirr			
1900	2000		Netherlands, Radio	6020af	9895af	11655af	17605af		
1900	2000		New Zealand, Radio NZ Intl		801 to 3/18/02	15160pa			
1900	2000	vl	Nigeria, Radio/Enugu	801 to 3/18/02	6025do				

1900	2000	vl	Nigeria, Radio/Ibadan	801 to 3/18/02	6050do	6090do	7275do		
1900	2000	vl	Nigeria, Radio/Kaduna	801 to 3/18/02	4770do	6090do	7275do		
1900	2000	vl	Nigeria, Radio/Lagos	801 to 3/18/02	3326do	4990do			
1900	2000		Nigeria, Voice of	801 to 3/18/02	7255af	11770af	15120va		
1900	2000		Russia, University Network		17765as				
1900	2000		Russia, Voice of Russia	5940eu	6175eu	7335af	7340eu		
1900	2000		Russia, World Beacon	3230af	9550eu				
1900	2000		Russia, World Beacon	3230af	9775eu	9830af	11510af		
1900	2000		S Africa, African Beacon	3230af	17850af				
1900	2000		Sierra Leone, SLBS	3316do	skd0801				
1900	2000	vl	Solomon Islands, SIBC	5020do					
1900	2000		South Korea, R Korea Intl		5975om	7275eu			
1900	2000		Swaziland, TWR		3200af				
1900	2000		Thailand, Radio	9535eu	9655eu	11905eu			
1900	2000		Uganda, Radio	5026do	7196do				
1900	2000		UK, BBC World Service	3255af	6005af	6190af	6195eu	9410eu	
1900	2000		UK, World Beacon	3230af	9630af	12095af	15400af		
1900	2000		USA, Armed Forces Radio		17850af	6458usb	12689usb		
1900	2000		USA, KAIJ Dallas TX	13815va					
1900	2000		USA, KJES Vado NM	15385au					
1900	2000		USA, KTBN Salt Lk City UT		15590na				
1900	2000		USA, KWHR Naalehu HI	9930as					
1900	2000		USA, Voice of America	4950af	6035af	7415af	525pa	9690as	
1900	2000		USA, Voice of America	11870pa	13710af	15180pa	15240af	15580af	
1900	2000	mtwhf	USA, Voice of America	5965me	9840as	11720as	11970as	13725af	
1900	2000		USA, WBCQ Monticello ME		9335na	17495na			
1900	2000		USA, WEWN Birmingham AL		11550na	11530na	13615na	15745na	
1900	2000		USA, WHRA Greenbush ME		17650af				
1900	2000		USA, WHRI Noblesville IN		9495am	13760va			
1900	2000		USA, WINB Red Lion PA	13570am					
1900	2000		USA, WJCR Upton KY	7490am	13595as				
1900	2000		USA, WMLK Bethel PA	15265eu					
1900	2000	mtwhf	USA, WRMI Miami FL	15725na					
1900	2000		USA, WRNO New Orleans LA		7395am	15420am			
1900	2000		USA, WSHB Cyp Creek SC		15665eu	18910af			
1900	2000		USA, WTJC Newport NC		9370na				
1900	2000		USA, WWCN Nashville TN		9475na	12160na	13845na	15685na	
1900	2000		USA, WWRB Manchester TN		9320va	12172va			
1900	2000		USA, WYFR Okeechobee FL		18980eu				
1900	2000	vl	Zimbabwe, Zimbabwe BC Corp		4828do	6045do			
1930	1955		Greece, Voice of	11645eu					
1930	2000		Austria, Radio Austria Intl		5945eu	6155eu			
1930	2000		Georgia, Georgian Radio		11760eu				
1930	2000	s	Greece, Voice of	5865eu	7475eu	11645na	17705na		
1930	2000		Iran, VO Islamic Rep. of Iran		6110eu	9890eu	11695af	15140af	
1930	2000	vl	Papua New Guinea, NBC		4890do				
1930	2000		Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu			
1930	2000		Switzerland, Swiss R Intl	9605af	13660af	15485af	17660me		
1930	2000		Turkey, Voice of	7125eu					
1930	2000		Yugoslavia, Radio	6100eu					
1935	1955		Italy, RAI Intl	5970eu	94				

Shortwave Guide

2000	2'00	a/monthly	Finland, Scandv Weekend Radio	6170va	11690va			
2000	2'00	vl	Ghana, Ghana BC Corp	3366do	4915do			
2000	2'00		Guyana, Voice of	5950do				
2000	2'00		Indonesia, Voice of	9525pa	11785as	15150as		
2000	2'00	vl	Italy, IRRS 3980af	3985va				
2000	2'00		Kenya, Kenya BC Corp	4885sirr	4915sirr			
2000	2'00		Kuwait, Radio	11990va				
2000	2'00	vl	Lesotho, Radio	4800do				
2000	2'00		Liberia, ELWA	4760do				
2000	2'00		Liberia, R Liberia Intl	5100do				
2000	2'00	mtwha	Malta, VO Mediterranean	801 to 03/2002	7440eu			
2000	2'00		Namibia, NBC	3270af	3290af	7215sirr		
2000	2'00	vl	Nigeria, Radio/Enugu	801 to 3/18/02	6025do			
2000	2'00	vl	Nigeria, Radio/Ibadan	801 to 3/18/02	6050do			
2000	2'00	vl	Nigeria, Radio/Kaduna	801 to 3/18/02	4770do	6090do	7275do	
2000	2'00		Nigeria, Radio/Lagos	801 to 3/18/02	3326do	4990do		
2000	2'00		Nigeria, Voice of	801 to 3/18/02	7255af	11770af	15120va	
2000	2'00	vl	Papua New Guinea, NBC	4890do				
2000	2'00		Russia, University Network	17765as				
2000	2'00		Russia, Voice of Russia	5940eu	5950eu	6175eu	7340eu	9775eu
2000	2'00		Russia, World Beacon	3230af	17850af			
2000	2'00		S Africa, African Beacon	3230af				
2000	2'00		Solomon Islands, SIBC	5020do				
2000	2'00	vl	Spain, R Exterior Espana	9595af	9630alt	9680eu		
2000	2'00	mtwhf	Uganda, Radio	5026do	7196do			
2000	2'00		UK, BBC World Service	3255af	6005af	6190af	6195eu	9410eu
2000	2'00		UK, World Beacon	3230af	15400af	17830af		
2000	2'00		USA, Armed Forces Radio	6458usb	12689usb			
2000	2'00		USA, KAIJ Dallas TX	13815va				
2000	2'00		USA, KJES Vado NM	15385na				
2000	2'00		USA, KTBN Salt Lk City UT		15590na			
2000	2'00		USA, KWHR Naalehu HI	9930as				
2000	2'00		USA, WBCQ Monticello ME	9335na	17495na			
2000	2'00		USA, WEWN Birmingham AL	11530na	13615na	15745na	17959eu	
2000	2'00		USA, WHRA Greenbush ME	17650af				
2000	2'00		USA, WHRI Noblesville IN	5745va	9495am			
2000	2'00		USA, WINB Red Lion PA	13570am				
2000	2'00		USA, WJCR Upton KY	7490am				
2000	2'00		USA, WMK Bethel PA	15265eu				
2000	2'00	mtwhf	USA, WRMI Miami FL	15725na				
2000	2'00		USA, WRNO New Orleans LA	7395am	15420am			
2000	2'00		USA, WTJC Newport NC	9370na				
2000	2'00		USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	
2000	2'00		USA, WWRB Manchester TN	9320va	12172va			
2000	2'00		USA, WYFR Okeechobee FL	7580eu	13820af	13855af	15565af	
2000	2'00		Vanuatu, Radio	3945do	4960do	7260do		
2000	2'00		Zambia, Christian Voice	4965do				
2000	2'00	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			
2000	2'00		USA, WSHB Cyp Creek SC	11550eu	15665af			
2005	2'04	vl	Syria, Radio Damascus	12085eu	13610eu			
2025	2'04		Italy, RAI Intl	7220af	9710af	11880af		
2030	2'04	vl	Libya, Voice of Africa	15435sirr	17750sirr			
2030	2'04		Thailand, Radio	9535eu	9655eu	11905eu		
2030	2'05		Belgium, RVI Flanders R Intl	9925eu	9730eu			
2030	2'05		Vietnam, Voice of	7145eu	9730eu			
2030	2'00		Austria, AWR Europe	5955eu				
2030	2'00		Austria, Christian Voice	7170pa	11935pa			
2030	2'00	th	Belarus, Radio Belarus Intl	7105eu	7210eu			
2030	2'00		Cuba, Radio Havana	13660usb	13750eu			
2030	2'00		Egypt, Radio Cairo	15375af				
2030	2'00		Poland, Radio Polonia	5995eu	7165eu	7290eu	9540eu	
2030	2'00		S Africa, AWR Africa	15295af				
2030	2'00		Sweden, Radio	6065eu	9445au			
2030	2'00		USA, Voice of America	6035af	7415af	9690as	9760as	
2030	2'00		USA, Voice of America	11975af	13710af	15240af	15880af	17895af
2030	2'00		USA, Voice of America	4950af				
2030	2'10		Uzbekistan, Radio Tashkent	5025eu	7105eu	11905eu		
2030	2'10		Australia, Christian Voice Intl	11935pa				
2040	2'10	mtwhfa	Armenia, Voice of	4810eu	9960eu			
2045	2'00		India, All India Radio	7150va	7410eu	9650au	9910au	11620eu
2050	2'00		Vatican City, Vatican Radio	4005eu	5885eu	7250eu	9645eu	

2100 UTC - 4PM E / 3PM C / 1PM P

2100	2'10		Kenya, Kenya BC Corp	4885sirr	4915sirr			
2100	2'10		Vatican City, Vatican Radio	4005eu	5885eu	7250eu		
2100	2'29		Poland, Radio Polonia	5995eu	7165eu	7290eu	9540eu	
2100	2'30	vl	Australia, ABC/Alice Springs	2310do				
2100	2'30	vl	Australia, ABC/Katherine	2485do				
2100	2'30	vl	Australia, ABC/Tennant Creek	2325do				
2100	2'30		Australia, Christian Voice Intl	11935pa				
2100	2'30		Australia, Radio	7240pa	9500as	9580pa	9660pa	1'880va
2100	2'30		Austria, Christian Voice	7170pa	11935pa			
2100	2'30		China, China Radio Intl	5965eu	9845eu	13640af	15125af	
2100	2'30		Cuba, Radio Havana	13660usb	13750eu			
2100	2'45		Germany, Deutsche Welle	15410af	17560pa	17835af		
2100	2'45		Iraq, Radio Iraq Intl	7157sirr	9887sirr	11787sirr		
2100	2'45		USA, WYFR Okeechobee FL	7580eu	13820af	15565af	17575sa	
2100	2'56		North Korea, Voice of	7505eu	11335eu			
2100	2'57		Czech Rep, Radio Prague Intl	5930va	9430va			
2100	2'59		Canada, Radio Canada Intl	7235va	7425va	9770va	9805va	
			11600va	12015va	13650va			

2100	2'200		Anguilla, Caribbean Beacon	11775am				
2100	2'200		Australia, Christian Voice Intl	7170pa				
2100	2'200		Austria, AWR Europe	9660af				
2100	2'200	vl	Botswana, Radio	3356do	4820do			
2100	2'200	vl	Cameroon, RTV	4850do	6005do			
2100	2'200		Canada, CBC Northern Service	9625do				
2100	2'200		Canada, CFRX Toronto ON	6070do				
2100	2'200		Canada, CFVP Calgary AB	6030do				
2100	2'200		Canada, CHNX Halifax, NS	6130do				
2100	2'200		Canada, CKZN St John's NF	6160do				
2100	2'200		Canada, CKZU Vancouver BC	6160do				
2100	2'200		Costa Rica, R for Peace Intl	15040va	21815usb			
2100	2'200		Costa Rica, University Network	5030am	6150am	7375am	9724sa	
2100	2'200		11870am	13749na	17645as			
2100	2'200		Ecuador, HCJB	11890eu				
2100	2'200		Egypt, Radio Cairo	15375af				
2100	2'200	mtwhf	East Guinea, Radio Africa		15185af			
2100	2'200	f/monthly	Finland, Scandv Weekend Radio	6170va	11720va			
2100	2'200	vl	Ghana, Ghana BC Corp	3366do	4915do			
2100	2'200		Guyana, Voice of	5950do				
2100	2'200		India, All India Radio	7150va	7410eu	9650au	9910au	11620eu
2100	2'200		11715au					
2100	2'200	vl	Italy, IRRS 3980af	3985va				
2100	2'200		Japan, Radio6115eu	6180eu	11850as	11855af	11920as	17825pa
2100	2'200	vl	21670pa					
2100	2'200	vl	Lesotho, Radio	4800do				
2100	2'200		Liberia, ELWA	4760do				
2100	2'200		Liberia, R Liberia Intl	5100do				
2100	2'200		Namibia, NBC	3270af	3290af	7215sirr		
2100	2'200	vl	Nigeria, Radio/Enugu	801 to 3/18/02	6025do			
2100	2'200	vl	Nigeria, Radio/Ibadan	801 to 3/18/02	6050do			
2100	2'200	vl	Nigeria, Radio/Kaduna	801 to 3/18/02	4770do	6090do	7275do	
2100	2'200	vl	Nigeria, Radio/Lagos	801 to 3/18/02	3326do	4990do		
2100	2'200	vl	Nigeria, Voice of	801 to 3/18/02	7255af	11770af	15120va	
2100	2'200	vl	Papua New Guinea, NBC	4890do				
2100	2'200		Romania, R Romania Intl	5955eu	7105eu	7215eu	9690eu	
2100	2'200		Russia, University Network	17765as				
2100	2'200		Russia, Voice of Russia	5940eu	5950eu	6175eu	7300eu	7340eu
2100	2'200		Russia, World Beacon	3230af	17850af			
2100	2'200		S Africa, African Beacon	3230af				
2100	2'200	vl	Solomon Islands, SIBC	5020do	9545do	skd0501		
2100	2'200		South Korea, R Korea Intl	15575eu				
2100	2'200	vl	Syria, Radio Damascus	12085eu	13610eu			
2100	2'200		UK, BBC World Service	3255af	3915as	5965as	6005af	6110as
2100	2'200		6190af	6195va	9410eu	11835af	12095sa	15400af
2100	2'200		UK, World Beacon	3230af	17850af			
2100	2'200		USA, Armed Forces Radio	6458usb	12689usb			
2100	2'200		USA, KAIJ Dallas TX	13815va				
2100	2'200		USA, KTBN Salt Lk City UT		15590na			
2100	2'200		USA, KWHR Naalehu HI	9930as				
2100	2'200		USA, Voice of America	6035af	6040me	6095as	6160as	7140me
2100	2'200		7415af	9530me	9595as	9670as	9760me	11870pa
2100	2'200		13710af	15185pa	15240af	15580af	17735as	17820as
2100	2'200		USA, WBCQ Monticello ME	9335na	17495na			
2100	2'200		USA, WEWN Birmingham AL	11530na	13615na	15745na	17959eu	
2100	2'200	</						

Shortwave Guide

2200	2230	South Korea, R Korea Intl	3955eu				
2200	2230	Turkey, Voice of	9525as				
2200	2230	USA, KWHR Naalehu HI	9930as				
2200	2230	USA, Voice of America	6035af	7415af	11655af	11975af	13710af
2200	2230	Yugoslavia, Radio	6100eu				
2200	2245	Egypt, Radio Cairo	9990eu				
2200	2245	USA, WYFR Okeechobee FL	7580eu	11740na	15565af		
2200	2256	China, China Radio Intl	7170eu				
2200	2259as	Spain, R Exterior Espana	9595va	9680eu			
2200	2300	Anguilla, Caribbean Beacon	6090am				
2200	2300	Australia, ABC/Alice Springs	4835do				
2200	2300	Australia, ABC/Katherine	5025do				
2200	2300	Australia, ABC/Tennant Creek	4910do				
2200	2300	Australia, Christian Voice Intl	13620pa	17850pa			
2200	2300	Australia, Radio	13620va	15240as	17715va	17795va	21740va
2200	2300	Austria, Christian Voice	13620as	17850as			
2200	2300	Bulgaria, Radio	5800eu	7500eu			
2200	2300	Cameroon, RTV	4850do	6005do			
2200	2300	Canada, CBC Northern Service	9625do				
2200	2300	Canada, CFRX Toronto ON	6070do				
2200	2300	Canada, CFVP Calgary AB	6030do				
2200	2300	Canada, CHNX Halifax, NS	6130do				
2200	2300	Canada, CKZN St John's NF	6160do				
2200	2300	Canada, CKZU Vancouver BC	6160do				
2200	2300	Costa Rica, R for Peace Intl	15040va	21815usb			
2200	2300	Costa Rica, University Network	5030am	6150am	7375am	9724sa	
		11870am 13749na 17645as					
2200	2300	Eqi Guinea, Radio Africa	15185af				
2200	2300	Finland, Scandv Weekend Radio	6170va	11720va			
2200	2300	Ghana, Ghana BC Corp	3366do	4915do			
2200	2300	Guyana, Voice of	3290do	5950do			
2200	2300	Italy, IRRS 3980af	3985va				
2200	2300	Malaysia, Radio	7295do				
2200	2300	Namibia, NBC	3270af	3290af	7215irr		
2200	2300	New Zealand, Radio NZ Intl	801 to 3/18/02	6025do		17675pa	
2200	2300	Nigeria, Radio/Enugu	801 to 3/18/02	6050do			
2200	2300	Nigeria, Radio/Ibadan	801 to 3/18/02	6050do			
2200	2300	Nigeria, Radio/Kaduna	801 to 3/18/02	4770do	6090do	7275do	
		9570do					
2200	2300	Nigeria, Radio/Lagos	801 to 3/18/02	3326do	4990do		
2200	2300	Nigeria, Voice of	801 to 3/18/02	7255af	11770af	15120va	
2200	2300	Russia, University Network	17765as				
2200	2300	Saloman Islands, SIBC	5020do	9545do	skd0501		
2200	2300	Taiwan, R Taipei Intl	5810eu	9335eu			
2200	2300	UK, BBC World Service	5965as	5975am	6195va	7105as	9660as
		11685as 11835af 12080pa	15400of				
2200	2300	Ukraine, R Ukraine Intl	5905eu	7240eu	9560eu		
2200	2300	USA, Armed Forces Radio	6458usb	12689usb			
2200	2300	USA, KAJI Dallas TX	13815va				
2200	2300	USA, KTBN Salt Lk City UT	15590na				
2200	2300	USA, Voice of America	6160as	7215as	7290me	9530me	9770as
		9880as 9890as 11760as	15185as	15290as	15305as	17735as	
		17820as					
2200	2300	USA, WBCQ Monticello ME	7415na	9335na	17495na		
2200	2300	USA, WEWN Birmingham AL	9975eu	11530na	15745na	17595eu	
2200	2300	USA, WHRA Greenbush ME	17650af				
2200	2300	USA, WHRI Noblesville IN	5745va	9495am			
2200	2300	USA, WINB Red Lion PA	13570am				
2200	2300	USA, WJCR Upton KY	7490am	13595as			
2200	2300	USA, WRMI Miami FL	15725na				
2200	2300	USA, WRNO New Orleans LA	7395am				
2200	2300	USA, WSHB Cyp Creek SC	7510eu	15285sa			
2200	2300	USA, WTJC Newport NC	9370na				
2200	2300	USA, WWCR Nashville TN	3215na	7520na	12160na	13845na	
2200	2300	USA, WWRB Manchester TN	9320vo	12172va			
2200	2300	Vanuatu, Radio	3945do	4960do	7260do		
2200	2300	Zambia, Christian Voice	4965do				
2200	2359	Liberia, R Liberia Intl	5100do				
2205	2230	Italy, RAI Intl	9675as	11900as			
2230	2255	Belgium, RVI Flanders R Intl	13700na				
2230	2257	Czech Rep, Radio Prague Intl	7345na	9435af			
2230	2300	Austria, Radio Austria Intl	5945eu	6155eu			
2230	2300	Cuba, Radio Havana	9550am				
2230	2300	Hungary, Radio Budapest	3975eu	7135eu			
2230	2300	Papua New Guinea, NBC	4890do	11880irr	skd0501		
2230	2300	Sweden, Radio	6065eu	9435eu			
2245	2300	India, All India Radio	9705as	9950as	13605as		
2245	2300	USA, WYFR Okeechobee FL	11740na				

Hauser's Highlights

GREECE: Voice of Greece

English segments:

0930-0950	daily	9420 15630	News bulletin
1345-1400	Fri	9420 9590	Learn Greek (responses in Eng.)
		15630 15650	
1700-1800	Sat	9420 15630 17705	Hellenes Around the World
1900-2000	Sun	5865 7475 17705	It's All Greek to Me
1930-2000	daily	11645	Orientalions

A contact at ERT tells me that a number of 250-kW SW transmitters [provided by the USA some years ago] are still inside the containers (John Babbis, Silver Spring, MD, *DX Listening Digest*)

2300 UTC - 6PM E / 5PM C / 3PM P

2300	0000	Anguilla, Caribbean Beacon	6090am				
2300	0000	Australia, ABC/Alice Springs	4835do				
2300	0000	Australia, ABC/Katherine	5025do				
2300	0000	Australia, ABC/Tennant Creek	4910do				
2300	0000	Australia, Radio	9660pa	12080pa	13620va	15240as	17715va
		17795va 21740va					
2300	0000	Cameroon, RTV	4850do	6005do			
2300	0000	Canada, CBC Northern Service	9625do				
2300	0000	Canada, CFRX Toronto ON	6070do				
2300	0000	Canada, CFVP Calgary AB	6030do				
2300	0000	Canada, CHNX Halifax, NS	6130do				
2300	0000	Canada, CKZN St John's NF	6160do				
2300	0000	Canada, CKZU Vancouver BC	6160do				
2300	0000	Costa Rica, R for Peace Intl	15040va	21815usb			
2300	0000	Costa Rica, University Network	5030am	6150am	7375am	9925sa	
		11870am 13749na 17645as					
2300	0000	Ecuador, HCB	12035as				
2300	0000	Egypt, Radio Cairo	9900na				
2300	0000	Finland, Scandv Weekend Radio	6170va	skd0901	11690va		
2300	0000	Ghana, Ghana BC Corp	3366do	4915do			
2300	0000	Guyana, Voice of	3290do	5950do			
2300	0000	India, All India Radio	9705as	9950as	13605as		
2300	0000	Italy, IRRS 7120va	7125af				
2300	0000	Liberia, R Liberia Intl	5100do				
2300	0000	Malaysia, Radio	7295do				
2300	0000	Malaysia, RTM Kota Kinabalu	5980do				
2300	0000	Namibia, NBC	3270af	3290af	7215irr		
2300	0000	New Zealand, Radio NZ Intl	801 to 3/18/02	6025do		17675pa	
2300	0000	Papua New Guinea, NBC	4890do	skd0501	11880irr	skd0501	
2300	0000	Romania, R Romania Intl	7195eu	9510na	9570eu	11940na	
2300	0000	Russia, University Network	17765as				
2300	0000	Singapore, SBC Radio One	6150do				
2300	0000	Solomon Islands, SIBC	5020do				
2300	0000	UK, BBC World Service	3915as	5875eu	5965as	5975am	6035as
		7105as 11685as 11945as	12095sa	15280as			
2300	0000	USA, Armed Forces Radio	6458usb	12689usb			
2300	0000	USA, KAJI Dallas TX	13815va				
2300	0000	USA, KTBN Salt Lk City UT	15590na				
2300	0000	USA, Voice of America	6160as	7215as	7290me	9530me	9770me
		9880as 9890as 11760as	15185as	15290as	15305as	17735as	
		17820as					
2300	0000	USA, WBCQ Monticello ME	7415na	9335na	17495na		
2300	0000	USA, WEWN Birmingham AL	9355na	9975eu	11530na	17595eu	
2300	0000	USA, WHRA Greenbush ME	17650af				
2300	0000	USA, WHRI Noblesville IN	5745va	9495am			
2300	0000	USA, WINB Red Lion PA	12160am				
2300	0000	USA, WJCR Upton KY	7490am	13595as			
2300	0000	USA, WRMI Miami FL	15725na				
2300	0000	USA, WRNO New Orleans LA	7355am				
2300	0000	USA, WSHB Cyp Creek SC	7510va	15285sa			
2300	0000	USA, WTJC Newport NC	9370na				
2300	0000as	USA, WWBS Macon GA	11900na				
2300	0000	USA, WWCR Nashville TN	3215na	5070na	7520na	13845na	
2300	0000	USA, WWRB Manchester TN	5085va	6890va	7260do		
2300	0000	Vanuatu, Radio	3945do	4960do			
2300	0000	Zambia, Christian Voice	4965do				
2300	2305	Nigeria, Radio/Enugu	801 to 3/18/02	6025do			
2300	2305	Nigeria, Radio/Ibadan	801 to 3/18/02	6050do			
2300	2305	Nigeria, Radio/Kaduna	801 to 3/18/02	4770do	6090do	7275do	
		9570do					
2300	2305	Nigeria, Radio/Lagos	801 to 3/18/02	3326do	4990do		
2300	2330	Austria, Christian Voice	13620as	17850as			
		Canada, Radio Canada Intl	5960am	6040am	6175am	9590am	
		9755am 11865am 13730am					
2300	2330	Cuba, Radio Havana	9550am				
2300	2330	Mexico, Radio Mexico Intl	801 to 03/2002	9705am	11770am		
2300	2330	USA, VOA Special English	6045as	7140as	9545as	11925as	
		15395as					
2300	2345	Germany, Deutsche Welle	9470as	9815as	13690as	21790as	
2300	2345	USA, WYFR Okeechobee FL	11740na	15170sa	15400so		
2300	2350	Turkey, Voice of	9655na				
2300	2356	China, China Radio Intl	5990na	13680na			
2300	0000	Albania, Radio Tirana Intl	7130eu	9540eu			
2300	0000	Australia, Christian Voice Intl	11935pa	13620pa		17850pa	
2300	0000	Austria, Christian Voice	11935pa	13620as			
2300	0000	Canada, Radio Canada Intl	5960na	6175na	9590na	9755na	
2300	0000	Malaysia, RTM Sarawak	7160do				
2300	0000	Netherlands, Radio	6165na	9845na			
		USA, VOA Special English	6045as	6045as	7130as	7140as	9545as
		9620as 11805as 11925as	13745as	15205as	15395as		
2300	2345	Libya, Voice of Africa	15435irr	17750irr			
2300	2357	Czech Rep, Radio Prague Intl	7345na	9435na			
2300	2357	Vietnam, Voice of	9840as	12020as			
2300	2359	Lithuania, R Vilnius	9875na				
2300	2359	Switzerland, Swiss R Intl	9885sa	11660sa			

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Notes:

1. **The BBC World Service Americas stream [BBCWS(am)]** is on shortwave at these times and on these frequencies: 1000-1400 on 6195; 0900-1000, 1000-1100 (weekends only) and 1100-1700 on 15190; 1100-1130 on 17790; 2100-0200 on 12095; 2100-0500 on 5975; 0000-0300 on 9915; 0100-0400 on 9525; 0400-0600 on 6135.
2. **VOA News Now** broadcasts are best heard here during the service to Central and South America and the Caribbean at 1000-1100 and 0000-0200 (T-A only). Most **VOA** features are broadcast during these time periods. The most notable exception is *On the Line*, which discusses official US foreign policy, and is broadcast A at 0633, 1433, 2233 and S 0233, 1033 and 1833. See the MT frequency list for frequencies directed to other areas, some of which are heard well in North America.
3. **Some R. New Zealand Int. programs** will be heard one hour later starting March 17th, which is the day New Zealand returns to standard time.

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

SUNDAY	
0000 R. Netherlands	Music 52/15 (musical styles from around the globe)
WBCQ(7415kHz.)	The Real Amateur Radio Show
0001 BBCWS(am)	Play of the Week (classic and contemporary drama for radio)
0005 R. Australia	The Europeans (historical and cultural perspectives)
R. Canada Int.	Quirks and Quarks (what's new and next in science)
R. New Zealand Int.	The Film Show (a weekly report on cinema)
0010 R. Japan	Hello from Tokyo (listener letters, music and short features)
0030 R. Netherlands	Roughly Speaking (European youth lifestyles magazine)
R. New Zealand Int.	Bookmarks (NZ books, literature and writers)
WBCQ(7415 kHz.)	Fred Flintstone's Music Show
MONDAY-FRIDAY	
0005 R. New Zealand Int.	Codenco (light classical music selections)
MONDAY	
0000 BBCWS(am)	World Briefing
WBCQ(7415kHz.)	Le Show (Harry Shearer with a variety show)
R. Netherlands	Dutch Horizons (Bertine Kral chronicles life in Holland)
0005 R. Canada Int.	Global Village (reports and music from global venues)
0010 R. Australia	Away! (national indigenous arts and culture program)
R. Bulgaria	Folk Studio (Bulgarian folk music)
R. Japan	Weekend Square (aspects of Japan with interviews, music and discussions)
0020 BBCWS(am)	Sports Roundup
0030 BBCWS(am)	The World Today (the BBC's flagship global news program)
R. Bulgaria	Bulgarian Plaza (bimonthly cultural magazine)
	Walks and Talks (interesting places in Bulgaria, aired bimonthly)
R. Netherlands	The Sound Fountain (interesting topics approached in an unusual way)
0045 R. Exterior de Espana	Radio Club (a repeat of Saturday's 0035 program)
TUESDAY-SATURDAY	
0000 R. Exterior de Espana	REE's News Service
VOA News Now	News Now (rolling news service, around the clock, daily)
0005 BBCWS(am)	Outlook (topical magazine of people, places and events)
0005 R. Canada Int.	As It Happens (continues from Mon.-Fri. 2330)
0010 R. Bulgaria	Events and Developments (reports, analyses and commentary)
0015 R. Japan	44 Minutes (daily current affairs magazine)
0045 R. Exterior de Espana	Spanish Language Course
TUESDAY	
0000 R. Netherlands	The Research File (the relevance of science)
0010 R. Australia	The Science Show (one of the longest running programs)
0030 R. Netherlands	EuroQuest (a magazine placing Europe in context)
0033 VOA News Now	Encounter (current events debate and discussion)
0045 BBCWS(am)	Patterns of Faith (global religious values and wisdom)

WEDNESDAY	
0000 R. Netherlands	Music 52/15 (musical styles from around the globe)
0005 WWCW(9475kHz.)	Pat Boone (musical variety)
0010 R. Australia	The National Interest (round-up of the week's major issues)
0030 R. Netherlands	A Good Life (how development affects societies)
0033 VOA News Now	Our World (science, technology, agriculture and environment)
0045 BBCWS(am)	What is Civil Society? (concept, practice)
THURSDAY	
0000 R. Netherlands	Weekly Documentary (essays and in-depth investigations)
0005 WWCW(9475kHz.)	This Week in Americana (antique collecting)
0010 R. Australia	Background Briefing (current affairs radio documentary)
0030 R. Canada Int.	Dispatches (Canadian perspective on international news)
R. Netherlands	Dutch Horizons (Bertine Kral chronicles life in Holland)
WBCQ(7415kHz.)	World of Radio (Glenn Hauser on the week in broadcasting)
0033 VOA News Now	Kaleidoscope (the VOA's arts and culture magazine)
0045 BBCWS(am)	Heart and Soul (global religious and spiritual experiences)
FRIDAY	
0000 R. Netherlands	The Sound Fountain (interesting topics approached in an unusual way)
WBCQ(7415kHz.)	Goddess Irina 1 Music Show (your guess is as good as mine-ed.)
0010 R. Australia	Hindsight (Australian social history from those who were there)
0030 R. Netherlands	The Research File (the relevance of science to all our lives)
0033 VOA News Now	Best of 'Talk to America' (excerpts from listener phone-in)
0045 BBCWS(am)	What's the Problem (experts offer advice to listeners)
SATURDAY	
0000 R. Netherlands	A Good Life (how development affects societies)
0000 WBCQ(7415kHz.)	The Lost Discs Radio Show (spinning obscure oldies)
0005 R. Australia	Feedback (Roger Broadbent about RA)
0010 R. New Zealand Int.	Home Grown (Liz Barry plays contemporary Kiwi music)
0030 R. Australia	Country Breakfast (entertaining look of rural and regional issues)
R. Netherlands	The Weekly Documentary (essays and in-depth investigations)
R. New Zealand Int.	Music Chairs (background of a featured NZ musician)
0033 VOA News Now	Press Conference USA ('Meet the Press' for shortwave)
0035 R. Exterior de Espana	Radio Club (answering listeners' letters)
0045 BBCWS(am)	Health in Mind (a series about mental health problems)
R. Exterior de Espana	Radio Waves (weekly program for radio enthusiasts)

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

SUNDAY	
0100 BBCWS(am)	The World Today (the BBC's flagship global news program)
HCB Ecuador	DX Partyline (weekly program for DXers and SWLs)
WBCQ(7415kHz.)	A Different Kind of Oldies Show (unique mix of oldies music)
WHRI(5745kHz.)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
0105 Deutsche Welle	Talking Point (European journalists discuss the week's events)
R. Australia	Correspondents' Report (background international events)
0105 R. Netherlands	Wide Angle (a weekly in-depth look at a news topic)
R. New Zealand Int.	Eureka! (Allan Coukell reports on science in NZ)
R. Prague	Readings from Czech Literature
0110 R. Prague	SATURDAY Music (Czech classical, folk, jazz or rock music)
0115 Deutsche Welle	Inside Europe (topical issues shaping the continent)
0120 China R. Int.	In the Spotlight (Chinese arts and cultural magazine)
0130 BBCWS(am)	Reporting Religion (the week's religious news)
HCB Ecuador	Saludos Amigos (program of international friendship)
R. Australia	Oz Sounds (Australian new music releases)
R. New Zealand Int.	Health Matters or Environment Matters (series alternate)
RTE Ireland	Sportsnews (reports and accounts on the weekend's events)
0140 R. Habano Cuba	DXers Unlimited (Arnie Caro program for radio enthusiasts)
0145 BBCWS(am)	Letter from America (Alistair Cooke's commentary)
MONDAY-FRIDAY	
0105 R. New Zealand Int.	In Touch with New Zealand (domestic variety program)
0110 R. Australia	Asia-Pacific (current events and business report)
0115 China R. Int.	Current Affairs (reports and comment on events and issues)
MONDAY	
0100 BBCWS(am)	The World Today (the BBC's flagship global news program)
HCB Ecuador	Musical Mailbag (listener letters, food, question of the week)
R. Habano Cuba	Weekly Review (Cuba's perspective on current events)
WBCQ(7415kHz.)	Radio New York International (Johnny Lightning, classic rock)
WWCR(3215kHz.)	World of Radio (Glenn Hauser on the week in broadcasting)
0105 Deutsche Welle	Religion and Society (an insight into religious events around the world)
R. Netherlands	Wide Angle (a single issue examined in-depth)
WWCR(5070kHz.)	Into the Blue (bluegrass music)
0115 Deutsche Welle	Arts on the Air (Breandain O'Shea on German cultural scene)
0130 China R. Int.	People in the Know (interviews with prominent Chinese)
R. Australia	The Health Report (weekly report on health and medical issues)
RTE Ireland	Sportsnews (reports and accounts on the weekend's events)
0140 R. Habano Cuba	The Mailbag Show (listener letters)
0150 R. Habano Cuba	Breakthrough (Arnie Caro's weekly science report)
TUESDAY-SATURDAY	
0100 R. Exterior de Espana	REE's News Service (international, Ibero-American and national news in-depth)
R. Netherlands	Newsline (news, analysis and background reports)
VOA News Now	News Now (rolling news service, around the clock, daily)
0105 Deutsche Welle	Newslink (daily current affairs magazine focused on Europe)
0110 HCB Ecuador	Studio 9 (daily magazine with focused reports on Latin America)
0130 RTE Ireland	The News at Six (RTE's flagship evening news program)
0145 R. Exterior de Espana	Spanish Language Course
0155 VOA News Now	VOA Editorial (statement reflecting US government policy) [also broadcast M-F at 0555, 1355, 1755, 2355 and A/S at 0255, 0655, 1055, 1455, 1855, 2255; see MT frequency list for frequencies]
TUESDAY	
0100 WWCW(3215kHz.)	Keen on Jazz
0105 BBCWS(am)	Meridian-Masterpiece (critical examinations of creative endeavors)
0130 BBCWS(am)	Music Mix (insights into current popular music)
China R. Int.	Sports World (comprehensive coverage of sports in China and Asia)
Deutsche Welle	Insight (a look at major international trends and developments)
R. Australia	The Law Report (breaking legal stories in Australia and overseas)
WEDNESDAY	
0100 WBCQ(7415kHz.)	Off the Hook (a program about telecommunications)
0105 BBCWS(am)	Meridian-Screen (interviews, documentaries, features and discussions)
0130 BBCWS(am)	UK Top Twenty (music from the British rock and pop charts)
Deutsche Welle	Man and Environment (the human element in environmental issues.)
R. Australia	The Religion Report (the way religion and societies interact)
0140 R. Habano Cuba	DXers Unlimited (Arnie Caro program for radio enthusiasts)
THURSDAY	
0105 BBCWS(am)	Meridian-Music (an in-depth look at classical music of the world)
0120 HCB Ecuador	Hom Radio Today
0130 BBCWS(am)	Westway (a twice-weekly radio soap opera)
Deutsche Welle	Living in Germany (people, places and events in Germany)
R. Australia	The Media Report (latest developments in the communications industry)
0145 BBCWS(am)	UK Album Chart (music from Britain's most popular CDs)
FRIDAY	
0100 WBCQ(7415kHz.)	Everybody's Uncle
0105 BBCWS(am)	Meridian-Writing (books, theatre, poetry, journalism, biography, etc)
WWCR(9475kHz.)	This Week in Americana (magazine on antique collecting)
0115 Deutsche Welle	Hard to Beat—The World of Sport (German and European sport)

Shortwave Guide

0130 BBCWS(am) World of Music (folk, non-Western classical and non-Western popular)
R. Australia The Sports Factor (the cultural significance of sport)

SATURDAY

0100 WBCQ(7415kHz) Allan Weiner Worldwide (the station manager's show)
0105 BBCWS(am) Omnibus (documentary that tackles any topic across the globe)
R. Australia Asia-Pacific Weekend Edition (current events and business report)
R. New Zealand Int. Home Grown (continues from 01010)
0110 HCB Ecuador Music del Ecuador (Andean musical selections)
0120 China R. Int. Listeners' Garden (letters, touring, cooking and language lesson)
0130 BBCWS(am) Westway (a radio soap opera)
Deutsche Welle German by Radio (a language lesson)
R. Australia Arts Talk (Julie Capeland presents arts and cultural ideas)
0133 VOA News Now Communications World (Kim Elliott on the week in global communications)[also broadcast at 0533, 0933, 1333, 1733, 2133; see MT frequency list for frequencies]
0135 R. Exterior de Espana Radio Club (answering listeners' letters)
0145 BBCWS (am) Revolver (different weekly presenter reviews recent releases)
R. Exterior de Espana Radio Waves (a weekly program for radio enthusiasts)
VOA Special English American Stories (short stories by American authors)

0200 UTC/ 9pm E/6pm P - Page 43 Freqs

Daily
0230 R. Austria Int. Report from Austria (Austria and central and eastern Europe)

SUNDAY

0200 BBCWS(am) The World Today (the BBC's flagship global news program)
WBCQ(7415kHz) Marion's Attic (rare and vintage recordings)
0205 R. Australia Margaret Thasby (guest interview and favorite music pieces)
R. Prague Readings from Czech Literature
R. New Zealand Int. Program on Maori history, culture or issues
0210 R. Canada Int. Business Sense (an in-depth look at Canadian companies)
R. Prague Saturday Music (Czech classical, folk, jazz or rock music)
0211 Voice of Russia News and Views (Russian views on news developments)
0215 R. Taipei Int. Great Wall Forum (China-Taiwan issue from Taipei's perspective)
0230 BBCWS(am) From Our Own Correspondent (background to international events)
R. Sweden Weekend (a magazine about Europe, 1st of the month); Sweden Today (George Wood presents voices of Sweden, 2nd week); Spectrum (Bill Schiller covers the Swedish cultural scene, 3rd week); Studio 49 (ideas and long-term trends in the Nordic region, 4th week)
WWCR(5070kHz) New Horizons (discoveries in science, medicine and technology)
0232 Voice of Russia Moscow Yesterday and Today (events in the history of the city)
0235 R. Austria Int. Radio E (magazine jointly produced by European broadcasters)
R. Canada Int. Canada in the World (Canadian policies, priorities and international relations)
R. Habana Cuba The World of Stamps (philatelic matters)
R. New Zealand Int. The Band Programme (John Harrison on the world of brass)
0245 WWCR(5070kHz) Ask WWCR

MONDAY-FRIDAY

0205 R. New Zealand Int. In Touch with New Zealand (continues from 0105, includes interviews, reports and music)
0210 R. Australia The World Today (a comprehensive current affairs program)
0245 R. Taipei Int. Let's Learn Chinese

MONDAY

0230 WBCQ(7415kHz) Radio New York International (continues from 0100)
0235 BBCWS(am) Wright Around the World (Steve Wright reads messages and plays musical requests)
R. Budapest Spotlight (magazine)[1st M]; Europe Unlimited (relations with Europe)[2nd M]; Heading for Hungary (travelogue)[3rd M]; And the Gatepost (listener letters)[4th M]
0210 R. Canada Int. The Maple Leaf Mailbag (listener mail and fortnightly CIDX Report)

R. Habana Cuba From Havana (showcase of contemporary Cuban music)
0215 R. Taipei Int. Jade Bells and Bamboo Pipes (traditional Chinese music)

0230 R. Habana Cuba Top Tens (Cuba's most popular music) [1st/3rd wk.]; The Jazz Place (the very best of Cuban jazz)[2nd/4th wk.]
R. Sweden In Touch with Stockholm (listener contact program, 1st weekend); Sounds Nordic (youth music and trends magazine, every weekend of the month but the first)
WRMI(7385kHz) Wavescan (Adventist World Radio's SWL program)
0232 Voice of Russia Timelines (life in Moscow through foreign eyes)
0235 R. Canada Int. Spotlight (artistic and cultural life in Canada)

TUESDAY-SATURDAY

0210 R. Budapest Hungary Today (daily magazine covering current events in Hungary)
R. Canada Int. Canada Today (interviews, reports and Canadian views)
0211 Voice of Russia Commonwealth Update (domestic developments and issues)
0230 R. Sweden Sixty Degrees North (reports, interviews and analysis on the Nordic region)

TUESDAY

0205 BBCWS(am) Health Matters (latest research explaining where medicine is going)
0230 BBCWS(am) Everywoman (the BBC's international magazine for women)
0232 Voice of Russia Folk Box (music drawn from the traditions of hundreds of nationalities)
0235 R. Canada Int. Media Zone (Canadian journalists discussing topical issues)
0245 R. Sweden Sports Scan (a weekly report on sports in the Nordic region)

WEDNESDAY

0200 HCB Ecuador The Book and the Spade (developments in Biblical archaeology)
0205 BBCWS(am) Go Digital (technology journalist Tracey Logan explains the latest in IT)
0230 BBCWS(am) Focus on Faith (Trevor Barnes looks at religious stories behind the news)
0232 Voice of Russia The Jazz Show (recordings from the Russian world of jazz)
0235 R. Canada Int. Spotlight (artistic and cultural life in Canada)
0245 R. Sweden Close Up (profiles of people in Sweden from all walks of life)

THURSDAY

0205 BBCWS(am) Sports International (the issues and personalities behind the headlines)
0215 R. Taipei Int. Journey into Chinese Culture
0230 BBCWS(am) Pick of the World (World Service highlights, producers and presenters)
0232 Voice of Russia Folk Box (music from hundreds of nationalities that make up Russia)
0235 R. Canada Int. The Maple Leaf Mailbag (listener letters and answers)[The CIDX Report is included fortnightly]
0245 R. Sweden Money Matters (a weekly economic report on the Nordic region)

FRIDAY

0205 BBCWS(am) One Planet (environment, development, agriculture and human impact)
0230 BBCWS(am) People and Places (exchange of views and experiences)
0235 R. Canada Int. Business Sense (an in-depth look at Canadian companies)
0245 R. Sweden Nordic Report (a monthly magazine on Scandinavia, 1st week); Greenscan (Swedish environmental awareness, 2nd week); Heart Beat (health and medical magazine, 3rd week); The S-Files (Sweden behind the headlines, 4th week)

SATURDAY

0200 WBCQ(7415kHz) Tasha Takes Control (upbeat progressive music)
0205 BBCWS(am) Discovery (ideas and discoveries in science and technology)
R. New Zealand Int. Program or series on music.
0210 R. Australia Background Briefing (current affairs radio documentary program)
0230 BBCWS(am) Essential Guide (the biggest developments, issues and names in global affairs)
WWCR(3215kHz) Ken's Country Classics (classic country music)
0235 R. Canada Int. Canada in the World (Canadian policies, priorities and international relations)

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

Daily

0300 BBCWS(am) World Briefing
0320 BBCWS(am) Sports Roundup

SUNDAY

0300 HCB Ecuador Inspirational Classics (music inspired by spiritual themes)
WBCQ(7415kHz) Pocket Calculator
WWCR(5070kHz) Communications World (the week in global communications)
0305 R. Australia Feedback (Roger Broadbent provides updates about RA)
R. New Zealand Int. Playhouse (classic and contemporary radio drama)
0311 Voice of Russia Moscow Mailbag (Joe Adamov answers listener questions)
0315 Deutsche Welle Spectrum (developments in the fields of science and technology)
0320 China R. Int. In the Spotlight (Chinese arts and cultural magazine)
0330 BBCWS(am) Science in Action (news from the worlds of science and technology)
R. Australia Ockham's Razor (sharp commentaries on scientific issues)
R. Sweden Weekend (a magazine about Europe, 1st week); Sweden Today (voices of Sweden, 2nd week); Spectrum (Swedish cultural scene, 3rd week); Studio 49 (ideas and long-term trends in Nordic region, 4th week)
WRMI(7385kHz) Drive In Double Feature
WWCR(5070kHz) World of Radio (Glenn Houser on the week in broadcasting)
0332 Voice of Russia Songs from Russia (melodies and musical novelties)
0340 R. Habana Cuba DXers Unlimited (Arnie Caro program for radio enthusiasts)

MONDAY-FRIDAY

0300 R. New Zealand Int. Pacific Regional News
0315 China R. Int. Current Affairs (reports and comment on events and issues)

MONDAY

0300 R. Habana Cuba Weekly Review (Cuba's perspective on current events)
WBCQ(7415kHz) Radio New York International (continues from 0100)
WWCR(3215kHz) Keen on Jazz
0305 R. New Zealand Int. Tagata o te Moana (Regional Pacific news, issues, music)
0310 R. Bulgaria Folk Studio (Bulgarian folk music)
0311 Voice of Russia Moscow Mailbag (Joe Adamov answers and jokes)
0315 Deutsche Welle Arts on the Air (Breandain O'Shea covers the German cultural scene.)
0325 R. Bulgaria Bulgarian Plaza (bimonthly cultural magazine)
0330 BBCWS(am) Walks and Talks (interesting places in Bulgaria, aired bimonthly)
Assignment (how news events affect people's everyday lives)
China R. Int. People in the Know (interviews with prominent Chinese)
R. Sweden In Touch with Stockholm (listener contact program, 1st week); Sounds Nordic (youth music and trends, all other weekends)
0332 Voice of Russia This is Russia (cities, regions, arts, religion, people, etc)
0335 R. Budapest Spotlight (a monthly magazine)[1st M]
Europe Unlimited (Hungary's relations with the rest of Europe)[2nd M]
Heading for Hungary (a monthly travelogue)[3rd M]
And the Gatepost (listener letters)[4th M]
0340 R. Australia People and Places (exchange of views and experiences)
R. Habana Cuba Business Sense (an in-depth look at Canadian companies)
0350 R. Habana Cuba Nordic Report (a monthly magazine on Scandinavia, 1st week); Greenscan (Swedish environmental awareness, 2nd week); Heart Beat (health and medical magazine, 3rd week); The S-Files (Sweden behind the headlines, 4th week)

TUESDAY-SATURDAY

0305 Deutsche Welle Newslink (daily current affairs magazine focused on Europe)
0310 R. Bulgaria Events and Developments (reports, analyses and commentary)
0330 BBCWS(am) World Business Report (main business issues of the day)
R. Sweden Sixty Degrees North (reports, interviews and analysis on the Nordic region)
0335 R. Budapest Hungary Today (current events in Hungary)

TUESDAY

0305 R. New Zealand Int. Top Five and New Releases (music)
0311 Voice of Russia Science and Engineering (developments in science and technology)
0315 Radio Taipei Int. Taiwan Economic Journal
0330 China R. Int. Sports World (the sports scene in China and Asia)

Shortwave Guide



0332 Deutsche Welle
Voice of Russia
Insight (major international trends and developments)
Kaleidoscope (economic, social and cultural events in Russia)

0340 R. Australia
0345 BBCWS(am)
R. Sweden
Music Deli (folk, acoustic, traditional and world music)
Analysis (background to the stories in the news)
Sports Scan (a weekly report on sports in the Nordic region)

WEDNESDAY

0305 R. New Zealand Int.
Pacific Report (interviews and reports on regional matters)

0311 Voice of Russia
Newmarket (business in Russia and international business)

0330 Deutsche Welle
R. New Zealand Int.
Man and Environment (the human element in environmental issues.)
Tradewinds (Pacific regional business and economic news)

0340 R. Australia
R. Habana Cuba
Blacktracker (Mal Honess on contemporary Aboriginal music)
DXers Unlimited (Arnie Coro program for radio enthusiasts)

0345 BBCWS(am)
R. Sweden
Analysis (background to the stories in the news)
Close Up (profiles of people in Sweden from all walks of life)

THURSDAY

0305 R. New Zealand Int.
RNZI Talk (introduction to the RNZI and National Radio staff, fortnightly); Mailbox (program aimed at the serious shortwave listener, fortnightly)

0311 Voice of Russia
0330 Deutsche Welle
Moscow Mailbag (Joe Adamov answers and jokes)
Living in Germany (people, places and events in Germany)

R. New Zealand Int.
0332 Voice of Russia
The World in Sport (world's sporting week)
Moscow Yesterday and Today (events in the history of the city)

0340 R. Australia
0345 BBCWS(am)
Oz Country Style (country music from Australia)
From Our Own Correspondent (background to international events)

R. Sweden
Money Matters (a weekly economic report on the Nordic region)

FRIDAY

0305 R. New Zealand Int.
Dateline Pacific (stories of the week, background and reaction)

0311 Voice of Russia
Science and Engineering (developments in science and technology)

0330 China R. Int.
Deutsche Welle
Life in China (lives of ordinary people in China)
Hard to Beat: The World of Sport (German and European sport)

HCB Ecuador
R. New Zealand Int.
The Book and the Spade (developments in Biblical archaeology)
Pacific Correspondent (political and social issues in Pacific)

0332 Voice of Russia
0340 R. Australia
0345 BBCWS(am)
0345 R. Sweden
Russian by Radio (a language lesson)
Jazz Notes (Austrian jazz presented by Ivan Lloyd)
Analysis (background to the stories in the news)
Nordic Report (a monthly magazine on Scandinavia, 1st week); Greenscan (Swedish environmental awareness, 2nd week); Heart Beat (health and medical magazine, 3rd week); The S-Flies (Sweden behind the headlines, 4th week)

SATURDAY

0300 WWCRC(3215kHz.)
World of Radio (Glenn Hauser on the week in broadcasting)

0305 R. Australia
Rural Reporter (news and stories from rural and regional Australia)

R. New Zealand Int.
Togata o te Moana (Anita Purcell presents a weekly Pacific magazine with NZ and regional Pacific news, issues, information and music)

0311 Voice of Russia
Newmarket (news about business in Russia and international)

0320 China R. Int.
Listeners' Garden (letters, touring, cooking and a language lesson)

0330 Deutsche Welle
HCB Ecuador
German by Radio (a language lesson)
Walkin' in the Sunshine (Ben Cummings with country music)

R. Australia
Educational series on Asian or Pacific history, politics or communications

0332 Voice of Russia
0345 BBCWS(am)
Audio Book Club (best of Russian literature)
Analysis (background to the stories in the news)

0400 UTC/ 11pm E/8pm P - Page 44 Freqs

SUNDAY

0400 BBCWS(am) The World Today (the BBC's flagship global news program)

HCB Ecuador
R. Vlaanderen Int.
WBCQ
WWCR
R. Australia
R. New Zealand Int.
R. Prague
0410 R. New Zealand
R. Prague
0420 China R. Int.
0430 BBCWS(am)

HCB Ecuador
R. Australia
0432 Voice of Russia
0435 R. Habana Cuba
R. Netherlands
0445 WWCRC(3215kHz.)
0455 R. Netherlands
DX Partyline (weekly program for DXers and SWLs)
Music from Flanders (a half-hour of Flemish music)
Zombo's Mondo Record Party
Cyber Line (musings on the new technologies)
Pacific Focus-Arts (culture and the arts in the Pacific region)
Whenua! (Maori cultural magazine)
Readings from Czech Literature
Feature or series on NZ religious and spiritual matters
SATURDAY Music (Czech classical, folk, jazz or rock music)
In the Spotlight (Chinese arts and cultural magazine)
Global Business (Peter Day charts the world of commerce)
Saludos Amigos (popular international friendship program)
The Arts with Julie Copeland (an interview and a film review)
Kaleidoscope (economic, social and cultural events)
The World of Stamps (philatelic matters)
Europe Unzipped (the events of the past week in Europe, some unusual)
Money Matters (the latest business and financial innovations)
Insight (critical and humorous eye on the past week's headlines)

MONDAY-FRIDAY

0400 R. New Zealand Int.
0410 R. Australia
0415 China R. Int.
0400 BBCWS(am)
HCB Ecuador
R. Vlaanderen Int.
WBCQ(7415kHz.)
R. Habana Cuba
0430 BBCWS(am)
China R. Int.
R. Habana Cuba
0432 WWCRC(5070kHz.)
0432 Voice of Russia
0435 R. Netherlands
0455 R. Netherlands
Checkpoint (flagship evening news program)
Margaret Throsby (guest interview and favorite musical pieces)
Current Affairs (reports and comment on events and issues)

MONDAY

0400 BBCWS(am)
HCB Ecuador
R. Vlaanderen Int.
WBCQ(7415kHz.)
R. Habana Cuba
0405 BBCWS(am)
China R. Int.
R. Habana Cuba
0430 BBCWS(am)
Voice of Russia
0432 WWCRC(5070kHz.)
0432 Voice of Russia
0435 R. Netherlands
0455 R. Netherlands
The World Today (the BBC's flagship global news program)
Musical Mailbag (listener letters, food and the question of the week)
Radio World (Frans Vossen report about international radio)
Radio New York International (continues from 0100)
From Havana (a showcase of contemporary Cuban music and musicians)
Westway Omnibus (both episodes broadcast last week)
People in the Know (interviews with prominent Chinese)
Top Tens (Cuba's most popular music) [1st/3rd wk.]
The Jazz Place (the very best of Cuban jazz) [2nd/4th wk.]
The Old Record Shop (vintage recordings)
Audio Book Club (best of Russian classic and contemporary literature)
Sincerely Yours (listener response program.)
The Week Ahead (an RN the next seven days)

TUESDAY-SATURDAY

0410 HCB Ecuador
Studio 9 (daily magazine with focused reports on Latin America)
News and Views (Russian views on news developments)
Newswire (news, analysis and background reports)
Off the Shelf (serialized readings of literature)

0411 Voice of Russia
0430 R. Netherlands
0445 BBCWS(am)

0411 Voice of Russia
0430 R. Netherlands
0445 BBCWS(am)

0405 BBCWS(am)
0430 BBCWS(am)
China R. Int.
Panel game or quiz show
Health in Mind (a series about mental health problems)
Sports World (the sports scene in China and Asia)

WEDNESDAY

0405 BBCWS(am)
0430 BBCWS(am)
John Peel (an eclectic mix of music)
Patterns of Faith (a global exploration of religious values and human wisdom)

0405 BBCWS(am)
0420 HCB Ecuador
0430 BBCWS(am)
The Greenfield Collection (classical music requests)
Ham Radio Today
What is Civil Society? (the concept and practice)

FRIDAY

0405 BBCWS(am)
0430 BBCWS(am)
China R. Int.
Jazzmatazz (a weekly jazz magazine)
Heart and Soul (global religious and spiritual experiences)
Life in China (the lives of ordinary people in China)

SATURDAY

0405 BBCWS(am)
R. Australia
0410 HCB Ecuador
Composer of the Month (the life and music of a selected composer)
Pacific Focus-Environment (news from Pacific Beat)
Musica del Ecuador (Jorge Zambrano with Andean musical selections)

0412 R. New Zealand Int.
The Best of Kim Hill (highlights from past week interviews)

0420 China R. Int.
Listeners' Garden (letters, touring, cooking and a language lesson)

0430 BBCWS(am)
R. Australia
Write On (Penny Vine sifts through the listener mail)
From Where I Stand (audio diaries about modern British society) [2nd or 3rd week in place of Write On]
The Buzz (the week's big technology news and issues)

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

SUNDAY

0500 HCB Ecuador
R. Netherlands
WBCQ(7415kHz.)
0505 BBCWS(am)
Deutsche Welle
R. Australia
R. New Zealand Int.
0510 R. Japan
0515 Deutsche Welle
0530 R. Australia
0532 Voice of Russia
0540 R. Habana Cuba
Inspirational Classics (music inspired by spiritual themes)
Roughly Speaking (European youth lifestyles magazine)
Tom and Darryl (satellite, shortwave, LPFM and Internet communications) [1st/3rd S]
Wright Around the World (Steve Wright presents messages and music)
Talking Point (European journalists discuss the week's events.)
Pacific Focus-Sports (reports on sport in the Pacific region)
Whenua! (people, issues, music and comment in Aotearoa-the Maori name for NZ)
Pop! Goes Asia (pop cultures and lifestyles of Asian countries)
Marks and Markets (financial business in Europe)
Fine Music Australia (Australian classical music performances)
Timelines (life in Moscow through foreign eyes)
DXers Unlimited (Arnie Coro program for radio enthusiasts)

MONDAY-FRIDAY

0500 BBCWS(am)
WBCQ(7415kHz.)
0507 R. New Zealand Int.
0510 R. Australia
0515 R. Japan
0545 R. New Zealand Int.
The World Today (the BBC's flagship global news program)
Amos 'n Andy (the classic radio comedy from America's radio past)
What's Going On? (a daily update on entertainment and the arts in NZ)
Pacific Beat (daily current events and features magazine)
44 Minutes (current affairs magazine about Japan and Asia)
Storytime (a children's program)

MONDAY

0500 R. Habana Cuba
R. Netherlands
0505 Deutsche Welle
0515 Deutsche Welle
0530 R. New Zealand Int.
WWCR(5070kHz.)
0532 Voice of Russia
0540 R. Habana Cuba
0545 R. Exterior de Espana
WWCR(5070kHz.)
0550 R. Habana Cuba
Weekly Review (Cuba's perspective on current events)
Dutch Horizons (Bartine Krol chronicles life in Holland)
Religion and Society (an insight into religious events)
Cool (youth magazine with reports on the attitudes, music, style)
Letter from America (Alistair Cooke's weekly BBC commentary)
New Horizons (discoveries in science, medicine and technology)
The Jazz Show (recordings from the Russian world of jazz)
The Mailbag Show (listener letters)
Radio Club (a repeat of Saturday's program)
Ask WWCR
Breakthrough (Arnie Coro with a report on science)

TUESDAY-SATURDAY

0500 R. Exterior de Espana
REE's News Service (international, Ibero-American and national news)
0505 Deutsche Welle
Newslink (daily current affairs magazine focused on Europe)
0545 R. Exterior de Espana
Spanish Language Course

TUESDAY

0500 R. Netherlands
The Research File (the relevance of science to all our lives)
0511 Voice of Russia
Moscow Mailbag (Joe Adamov answers and jokes)
0530 Deutsche Welle
Insight (a look at major international trends and developments)
R. New Zealand Int.
Today in Parliament

WEDNESDAY

0500 R. Netherlands
0511 Voice of Russia
0530 Deutsche Welle
Music 52/15 (musical styles from around the globe)
Science and Engineering (developments in science and technology)
Man and Environment (the human element in environmental issues)

Shortwave Guide



R. New Zealand Int. Today in Parliament
 0532 Voice of Russia Moscow Yesterday and Today (events in the history of the city)
 0540 R. Habana Cuba DXers Unlimited (Arnie Coro program for radio enthusiasts)

THURSDAY

0500 R. Netherlands The Weekly Documentary (essays and in-depth investigations)
 0511 Voice of Russia Newmarket (news about business in Russia and international)
 0515 WBCQ(7415kHz.) World of Radio (Glenn Hauser on the week in broadcasting)
 0530 Deutsche Welle Living in Germany (people, places and events in Germany)
 R. New Zealand Int. Today in Parliament
 0532 Voice of Russia Folk Box (music from hundreds of nationalities)

FRIDAY

0500 R. Netherlands The Sound Fountain (interesting topics approached in an unusual way)
 0511 Voice of Russia Moscow Mailbag (Joe Adamov answers and jokes)
 0530 Deutsche Welle Hard to Beat: The World of Sport (German and European sport)
 HCJB Ecuador The Book and the Spade (developments in Biblical archaeology)
 R. New Zealand Int. Pacific Report (interviews and reports on regional matters)
 0532 Voice of Russia Audio Book Club (readings from the best of Russian literature)

SATURDAY

0500 BBCWS(am) The World Today (the BBC's flagship global news program)
 R. Netherlands WBCQ(7415kHz.) A Good Life (how development affects societies)
 Amos 'n Andy (the classic radio comedy from America's radio past)
 0505 R. Australia Pacific Focus-Sport (sports news from 'Pacific Beat')
 R. New Zealand Int. Focus on Politics (issues explored by the RNZ Parliamentary news team)
 0510 R. Japan Hello from Tokyo (listener letters, music and short features)
 0511 Voice of Russia Science and Engineering (developments in science and technology)
 In a Mellow Tone (easy listening jazz)
 0525 R. New Zealand Int. Arts in Action (ideas that shape our aesthetic, musical and literary worlds)
 0530 BBCWS(am) German by Radio (a language lesson)
 Deutsche Welle Walkin' in the Sunshine (Ben Cummings with country music)
 HCJB Ecuador Lingua Franca (a program about language and its ramifications)
 R. Australia Timelines (life in Moscow through foreign eyes)
 0532 Voice of Russia Radio Club (answering listeners' letters)
 0535 R. Exterior de Espana Radia Waves (a weekly program for radio enthusiasts)

0600 UTC/ 1am E/10pm P - Page 45 Freqs

SUNDAY

0600 WWCR(5070kHz) Keen on Jazz
 0605 R. Australia The Europeans (historical and cultural perspectives)
 R. New Zealand Int. Future Indicative (a program of interest to people with disabilities)
 0610 R. Japan Weekend Square (aspects of Japan with interviews, music and discussions)
 0635 R. Habana Cuba The World of Stamps (philatelic matters)
 R. New Zealand Int. This Week in Parliament

MONDAY-FRIDAY

0600 R. New Zealand Int. Checkpoint (a repeat from 0400)
 0615 R. Japan Asian Top News (the day's major stories)
 0620 R. Australia Pacific Focus (different theme daily—business, health, environment, sport and culture)

MONDAY

0600 WWCR(3210kHz.) World of Radio (Glenn Hauser on the week in broadcasting)
 0605 R. Habana Cuba From Havana (a showcase of contemporary Cuban music and musicians)
 0625 R. Japan Unforgettable Musical Masterpieces (Japanese pop songs as a means of explaining history and attitudes)
 0630 R. Habana Cuba Top Tens (Cuba's most popular music) [1st/3rd wk.]
 The Jazz Place (the very best of Cuban jazz) [2nd/4th wk.]

WWCR(3210kHz.) Communications World (the week in global communications)
 0640 R. Australia The Australian Music Show (the latest rock music)

TUESDAY-SATURDAY

0600 WWCR(3210kHz.) World Wide Country Radio (country music)

TUESDAY

0600 WWCR(5070kHz.) Ask WWCR
 0605 WWCR(3215kHz.) The Golden Age of Radio Theatre (classic American radio programs)
 0625 R. Japan Let's Learn Japanese (a Japanese language lesson for beginners)
 0640 R. Australia Music Deli (folk, acoustic, traditional and world music)

WEDNESDAY

0605 R. New Zealand Int. Musical Chairs (featured NZ musician)
 WWCR(3215kHz.) The Golden Age of Radio Theatre (classic American radio programs)
 0625 R. Japan Japan Music Log
 0640 R. Australia Blacktrucker (Mal Honess presents contemporary Aboriginal music.)

THURSDAY

0600 WBCQ(7415kHz.) World of Radio (Glenn Hauser on the week in broadcasting)
 0605 WWCR(3215kHz.) The Golden Age of Radio Theatre (classic American radio programs)
 0625 R. Japan Brush Up Your Japanese (an intermediate course in Japanese)
 0640 R. Australia Oz Country Style (country music from Australia)

FRIDAY

0605 WWCR(3215kHz.) The Golden Age of Radio Theatre (classic American radio programs)
 0625 R. Japan Music Beat (contemporary Japanese popular music)
 0640 R. Australia Jazz Notes (Australian jazz presented by Ivan Lloyd)

SATURDAY

0600 WBCQ(7415kHz.) The Clone Zone (ed. note: your guess is as good as mine!)
 WHRI(7315kHz.) O'Xing with Cumbre (Marie Lamb with the hottest OX catches)
 0605 R. New Zealand Int. SATURDAY Night (music, reminiscences and entertainment) [continues to 1000]
 WWCR(3210kHz.) Rock the Universe (Christian rock music)
 0610 R. Japan Pop! Goes Asia (pop cultures and lifestyles of Asian countries)
 0630 R. Australia Oz Sounds (Australian new music releases)

1000 UTC/ 5am E/2am P - Page 47 Freqs

Daily

1100 BBCWS(am) World Briefing
 WRMI(9955kHz.) Viva Miami (south Florida, listener letters and OX news)

SUNDAY

1105 R. Australia Correspondents Report (interpretation and analysis)
 1110 R. Japan Hello from Tokyo (listener letters, music and short features)
 R. New Zealand Int. Mediawatch (performance and trends in NZ's news media)
 1115 WWCR(9475kHz.) Ask WWCR
 1130 R. Australia The Business Report (business news and information)
 BBCWS(am) Arts in Action (trends and developments in the fine arts)
 1135 R. Netherlands Wide Angle (a weekly in-depth look at a news topic)
 R. New Zealand Int. Sunday Supplement (the views of ordinary New Zealanders)
 1155 R. Netherlands The Week Ahead (on RN the next seven days)

MONDAY-FRIDAY

1100 R. New Zealand Int. Late Edition (RNZ National Radio's late evening news magazine)
 1105 BBCWS(am) Caribbean Report (the latest news in the Caribbean)
 R. Australia Asia-Pacific (current events and business report)
 1110 BBCWS(am) Caribbean Sport
 1115 BBCWS(am) Caribbean Magazine (a current affairs and feature program)
 R. Japan Asian Top News (stories reported by regional radio stations)
 1130 BBCWS(am) World Business Report (a guide through the main business issues of the day)
 HCJB Ecuador Morning in the Mountains (news, sports, prayer, conversation and inspirational music)
 R. Australia RA Sport (a daily report on sports events in Australia, Asia and the world)

R. Netherlands Newline (news, analysis and background reports)
 WRMI(9955kHz.) Wovescan (Adventist World Radio's swl program)

MONDAY

1125 R. Japan Unforgettable Musical Masterpieces (a focus on Japanese pop songs written in the post war years as a means of explaining Japanese history and attitudes)
 1130 BBCWS(am) Letter from America (commentary on America by Alistair Cooke)
 1145 BBCWS(am) Sports Round-up (all the daily sporting news worldwide)

TUESDAY

1125 R. Japan Let's Learn Japanese (a Japanese language lesson for beginners)
 1130 BBCWS(am) Analysis (background to stories in the news)
 1145 BBCWS(am) Sports Round-up (all the daily sporting news worldwide)

WEDNESDAY

1125 R. Japan Japan Music Log (songs rooted in the lifestyles of each region of Japan, introducing the local traditions, history and culture)
 1130 BBCWS(am) Analysis (background to stories in the news)
 1145 BBCWS(am) Sports Round-up (all the daily sporting news worldwide)

THURSDAY

1125 R. Japan Brush Up Your Japanese (an intermediate course in Japanese)
 1130 BBCWS(am) From Our Own Correspondent (background to international events)
 1145 BBCWS(am) Sports Round-up (all the daily sporting news worldwide)

FRIDAY

1125 R. Japan Music Beat (contemporary Japanese popular music)
 1130 BBCWS(am) Analysis (background to stories in the news)
 1145 BBCWS(am) Football Extra (global soccer news, reviews and interviews)

SATURDAY

1100 WWCR(5070kHz.) The Old Record Shop (vintage recordings)
 1105 R. Australia Correspondents Report
 1110 R. Japan Pop! Goes Asia (pop cultures and lifestyles of Asian countries)
 R. New Zealand Int. Deep Purple (relaxing music)
 1130 BBCWS(am) World Business Review (Martin Webber explains the consequences of recent business developments for companies, investors and consumers)
 R. Australia Fine Music Australia (Australian classical artists with Charles Southwood)
 1135 R. Netherlands Europe Unzipped (the events of the past week in Europe, some unusual)
 1145 BBCWS(am) Sports Round-up (all the daily sporting news worldwide)
 1155 R. Netherlands Insight (Rob Green casts a critical and humorous eye on the past week's headlines)

1200 UTC/ 7am E/4am P - Page 48 Freqs

Daily

1200 BBCWS(am) Newshour (an hour of news and analysis from around the globe)

SUNDAY

1200 R. Korea Int. Multiwave Feedback (RKI's interactive program for OXers and SWLs)
 R. Netherlands The Sound Fountain (interesting topics approached in an unusual way)
 1205 R. Australia Country Club (Richard Porteous with an off-the-road ramble through the various tracks that make up that very wide field of country music)
 1230 R. Netherlands Dutch Horizons (Berline Krol chronicles life in Holland)
 R. Sweden In Touch with Stockholm (listener contact program, 1st week); Sounds Nordic (youth music and trends, all other weekends)
 WRMI(15725kHz.) Wovescan (Adventist World Radio's SWL program)

MONDAY-FRIDAY

1200 HCJB Ecuador Latin American and International News
 1205 BBCWS(am) Caribbean Business (a report on regional commerce and economics)
 HCJB Ecuador Sports Report
 1210 BBCWS(am) Caribbean Report (the latest news in the Caribbean)
 HCJB Ecuador Morning in the Mountains (continues from 1130)
 1230 HCJB Ecuador Latin American and International News
 R. Sweden Sixty Degrees North (reports, interviews and analysis on the Nordic region)

Shortwave Guide

1235 HCB Ecuador Morning in the Mountains (continues from 1130)

MONDAY

1200 R. Netherlands EuroQuest (a magazine placing Europe in context)
1205 R. Australia Late Night Live (Philip Adams interviews the major newsmakers, philosophers, artists and trendsetters in Australia and around the world)

1230 R. Netherlands The Research File (the relevance of science to all our lives)
1245 R. Sweden Sports Scan (a weekly report on sports in the Nordic region)

TUESDAY

1200 R. Netherlands A Good Life (how development affects societies)
WWCR(15685kHz) World of Radio (Glenn Houser on the week in broadcasting)

1205 R. Australia Late Night Live (Philip Adams interviews the major newsmakers, philosophers, artists and trendsetters in Australia and around the world)

1230 R. Netherlands Music 52-15 (musical styles from around the globe)
1245 R. Sweden Close Up (profiles of people in Sweden from all walks of life)

WEDNESDAY

1200 R. Netherlands Dutch Horizons (Bertine Krol chronicles life in Holland)
WWCR(15685kHz) Communications World (Kim Elliott reviews the week in global communications)

1205 R. Australia Late Night Live (Philip Adams interviews the major newsmakers, philosophers, artists and trendsetters in Australia and around the world)

1230 R. Netherlands The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)
1245 R. Sweden Money Matters (a weekly economic report on the Nordic region)

THURSDAY

1200 R. Netherlands The Research File (a magazine emphasizing the relevance of science to all our lives)

1205 R. Australia Late Night Live (Philip Adams interviews the major newsmakers, philosophers, artists and trendsetters in Australia and around the world)

1230 R. Netherlands The Sound Fountain (interesting topics approached in an unusual way)
1245 R. Sweden Nordic Report (a monthly magazine on Scandinavia, 1st week); Greenscan (Swedish environmental awareness, 2nd week); Heart Beat (health and medical magazine, 3rd week); The S-Files (Sweden behind the headlines, 4th week)

FRIDAY

1200 R. Netherlands The Weekly Documentary (RN's award-winning sound essays and in-depth investigations)

1205 R. Australia Sound Quality (Tim Ritchie seeks out the interesting, the evolutionary, the inaccessible and the wonderful in music)

1230 R. Netherlands A Good Life (how development affects societies)
1245 R. Sweden A Report on the Nordic Newsweek (the week's main news stories)

SATURDAY

1200 R. Netherlands Roughly Speaking (European youth lifestyles magazine)
1205 R. Australia The Spirit of Things (Dr. Rachel Kohn explores contemporary values and beliefs as expressed through ritual, art, music, and sacred texts)

WWCR(5070kHz) This Week in Americana (magazine about antique collecting)
1215 WWCR(15685kHz) Eco Watch (global ecological developments)

1230 R. Netherlands Music 52-15 (musical styles from around the globe)
R. Sweden Weekend (a magazine about Europe, 1st week); Sweden Today (voices of Sweden, 2nd week); Spectrum (Swedish cultural scene, 3rd week); Studio 49 (ideas and long-term trends in Nordic region, 4th week)

1300 UTC/ 8am E/5am P - Page 49 Freqs

SUNDAY

1300 Channel Africa Channel Africa Extra (news, sports, music, reports and features)

1305 BBCWS(am) R. Australia Jazzmatazz (weekly jazz magazine)
R. Netherlands Country Club (continues from 1205)
R. Netherlands Sincerely Yours (RN's listener response program)

1320 China R. Int. In the Spotlight (Chinese arts and cultural magazine)
1330 BBCWS(am) R. Sweden In Praise of God (diverse services of worship)
In Touch with Stockholm (listener contact program, 1st

WRMI(15725kHz)
YLE R. Finland

week); Sounds Nordic (youth music and trends, all other weekends)
Wavescan (Adventist World Radio's swl program)
Capital Cafe (conversations with Finns from all walks of life)

MONDAY-FRIDAY

1300 KWHR(11565kHz) DXing with Cumbre (Marie Lamb with the hottest DX catches)

R. Australia RA News (a fifteen minute report on events, sports)
R. Netherlands Newline (news, analysis and background reports)

1305 BBCWS(am) Outlook (topical magazine of people, places and events)
1310 R. Canada Int. This Morning (interviews, documentaries, music, and personal essays on issues important to Canadians and showcasing Canadian arts)

1315 R. Australia The Planet (good, heartfelt, inspiring music from around the world in a show artfully arranged for radio)

China R. Int. Current Affairs (reports and comment on events and issues)

1330 R. Sweden Sixty Degrees North (reports, interviews and analysis on the Nordic region)

1345 BBCWS(am) Off the Shelf (serialized readings of novels and other literature)

MONDAY

1330 China R. Int. People in the Know (interviews with prominent Chinese)
YLE R. Finland Finland This Morning (news, business, sports, weather and interviews)

1345 R. Sweden Sports Scan (a weekly report on sports in the Nordic region)
WWCR(15685kHz) Eco Watch (global ecological developments)

TUESDAY

1330 China R. Int. Sports World (the sports scene in China and Asia)
YLE R. Finland Finland This Morning (news, business, sports, weather and interviews)

1345 R. Sweden Close Up (profiles of people in Sweden from all walks of life)

WEDNESDAY

1330 YLE R. Finland Finland This Morning (news, business, sports, weather and interviews)

1345 R. Sweden Money Matters (a weekly economic report on the Nordic region)

THURSDAY

1330 WWCR(15685kHz) Communications World (the week in global communications)

YLE R. Finland Finland This Morning (news, business, sports, weather and interviews)

1345 R. Sweden Nordic Report (a monthly magazine on Scandinavia, 1st week); Greenscan (Swedish environmental awareness, 2nd week); Heart Beat (health and medical magazine, 3rd week); The S-Files (Sweden behind the headlines, 4th week)

FRIDAY

1330 China R. Int. Life in China (the lives of ordinary people in China)
YLE R. Finland Capital Cafe (conversations with Finns from all walks of life)

1345 R. Sweden A Report on the Nordic Newsweek

SATURDAY

1300 Channel Africa Channel Africa Extra (news, sports, music, reports, features)

WHRI(6040kHz) DXing with Cumbre (Marie Lamb with the hottest DX catches)

1305 BBCWS(am) World Football (interviews, features, reports for soccer fans around the globe)

R. Australia The Science Show (one of the longest running programs on ABC Radio)

WWCR(5070kHz) Rock the Universe (Christian rock music)
1320 China R. Int. Listeners' Garden (letters, touring, cooking and a language lesson)

1330 R. Sweden Weekend (a magazine about Europe, 1st week); Sweden Today (voices of Sweden, 2nd week); Spectrum (Swedish cultural scene, 3rd week); Studio 49 (ideas and long-term trends in Nordic region, 4th week)

WHRI(9495kHz)

YLE R. Finland DXing with Cumbre (Marie Lamb with the hottest DX catches)

1345 YLE R. Finland Finland This Week (the best from weekday Finland This Morning)

Starting Finnish (a language lesson)

1400 UTC/ 9am E/6am P - Page 49 Freqs

Daily

1400 R. Japan News (a round-up of Asian and world news)

SUNDAY

1400 Channel Africa Channel Africa Extra (continued from 1300)
WRMI(15725kHz) World Radio Network (a relay of WRN's satellite service)

1405 BBCWS(am) R. Australia Talking Point (global phone-in on the issues of the day)

1410 R. Canada Int. Books and Writing (discussions on books, ideas and writing)

R. Japan The Sunday Edition (relaxed and reflective edition of This Morning)

1420 China R. Int. Roundup Asia (various aspects of the rapidly changing Asian region)

1430 R. Sweden In the Spotlight (Chinese arts and cultural magazine)

In Touch with Stockholm (listener contact program, 1st week); Sounds Nordic (youth music and trends, all other weekends)

1435 R. Netherlands Sincerely Yours (RN's listener response program)
1455 R. Netherlands The Week Ahead (an RN the next seven days)

MONDAY-FRIDAY

1405 R. Australia The Planet (continues from 1315)
R. Canada Int. This Morning (continues from 1310)

1415 China R. Int. Current Affairs (reports and comment on events and issues)

R. Japan 44 Minutes (current affairs magazine about Japan and Asia)

1430 R. Netherlands Newsline (news, analysis and background reports)
R. Sweden Sixty Degrees North (reports, interviews and analysis on the Nordic region)

MONDAY

1405 BBCWS(am) Meridian-Masterpiece (critical examinations of creative endeavors)

1430 BBCWS(am) The Music Mix (insights into current popular music)

China R. Int. People in the Know (interviews with prominent Chinese)
1445 R. Sweden Sports Scan (a weekly report on sports in the Nordic region)

TUESDAY

1405 BBCWS(am) Meridian-Screen (interviews, documentaries, features and discussions)

1430 BBCWS(am) The UK Top Twenty (music from the British rock and pop charts)

China R. Int. Sports World (the sports scene in China and Asia)
1445 R. Sweden Close Up (profiles of people in Sweden from all walks of life)

WEDNESDAY

1405 BBCWS(am) Meridian-Music (an in-depth look at classical music of the world)

1430 BBCWS(am) Westway (a radio soap opera)

1445 BBCWS(am) The UK Album Chart (music from Britain's most popular CDs)
R. Sweden Money Matters (a weekly economic report on the Nordic region)

THURSDAY

1405 BBCWS(am) Meridian-Writing (books, theatre, poetry, journalism, biography, etc)

1430 BBCWS(am) World of Music (the best of folk, non-Western classical and non-Western popular music)

1445 R. Sweden Nordic Report (a monthly magazine on Scandinavia, 1st week); Greenscan (Swedish environmental awareness, 2nd week); Heart Beat (health and medical magazine, 3rd week); The S-Files (Sweden behind the headlines, 4th week)

FRIDAY

1405 BBCWS(am) Omnibus (a weekly feature documentary program that tackles any topic)

1430 BBCWS(am) Westway (a radio soap opera)

China R. Int. Life in China (the lives of ordinary people in China)

1445 BBCWS(am) Revolver (different weekly presenter reviews recent releases)
A Report on the Nordic Newsweek (the week's main news stories)

SATURDAY

1400 Channel Africa Channel Africa Extra (continued from 1300)
1405 BBCWS(am) Sportsworld (live commentary, news of all the day's

Shortwave Guide



	R. Australia	sporting action)
	R. Prague	New Dimensions (conversations with leading thinkers)
1410	R. Canada Int.	Readings from Czech Literature
	R. Japan	The House (a review of the week in Canadian national politics)
	R. Prague	Weekend Square (aspects of Japan with interviews, music and discussions)
1415	WWCR(15685kHz.)	SATURDAY Music (Czech classical, folk, jazz or rock music)
1420	China R. Int.	Ask WWCR
	R. Sweden	Listeners' Garden (letters, touring, cooking and a language lesson)
1430	R. Sweden	Weekend (a magazine about Europe, 1st week); Sweden Today (voices of Sweden, 2nd week); Spectrum (Swedish cultural scene, 3rd week); Studio 49 (ideas and long-term trends in Nordic region, 4th week)
1435	R. Netherlands	Europe Unzipped (events of past week in Europe, some unusual)
1455	R. Netherlands	Insight (critical and humorous eye on the past week's headlines)

1500 UTC/ 10am E/7am P - Page 50 Freqs

SUNDAY		
1500	R. Netherlands	Dutch Horizons (Berline Krol chronicles life in Holland)
	WRMI(15725kHz.)	Wavescan (Adventist World Radio's SWL program)
1505	BBCWS(am)	Assignment (delving behind the headlines)
	R. Australia	Encounter (religion and life and multicultural Australia)
1505	R. Canada Int.	The Sunday Edition (continues from 1410, feature documentary)
1530	BBCWS(am)	People and Politics (inside British politics)
	R. Netherlands	The Sound Fountain (interesting topics approached in an unusual way)
MONDAY-FRIDAY		
1505	R. Australia	Asia-Pacific (current events and business report)
1505	R. Canada Int.	This Morning (continues from 1310)
MONDAY		
1500	R. Netherlands	The Research File (the relevance of science to all our lives)
1505	BBCWS(am)	One Planet (environment, development, agriculture and human impact)
1530	BBCWS(am)	People and Places (exchange of views and experiences)
	R. Australia	The Health Report (report on health and medical issues)
	R. Netherlands	EuroQuest (a magazine placing Europe in context)
1545	R. Canada Int.	Out Front (new ideas, new ways of making radio, new voices)
TUESDAY		
1500	R. Netherlands	Music 52-15 (musical styles from around the globe)
1505	BBCWS(am)	Discovery (ideas and discoveries in science and technology)
1530	BBCWS(am)	Essential Guide (developments, issues and names in global affairs)
	R. Australia	The Law Report (Damien Carrick presents breaking legal stories)
	R. Netherlands	A Good Life (how development affects societies)
1545	R. Canada Int.	Out Front (new ideas, new ways of making radio, new voices)
WEDNESDAY		
1500	R. Netherlands	The Weekly Documentary (sound essays and in-depth investigations)
1505	BBCWS(am)	Health Matters (reports on research explaining where medicine is going)
1530	R. Australia	The Religion Report (the way religion and societies interact)
1530	BBCWS(am)	Everywoman (the BBC's international magazine for women)
	R. Netherlands	Dutch Horizons (Berline Krol chronicles life in Holland)
1545	R. Canada Int.	Out Front (new ideas, new ways of making radio, new voices)
THURSDAY		
1500	R. Netherlands	The Sound Fountain (interesting topics approached in an unusual way)
1505	BBCWS(am)	Go Digital (technology journalist Tracey Logan explains the latest in IT)
1530	BBCWS(am)	Focus on Faith (religious stories behind the news)
	R. Australia	The Media Report (latest developments in the communications industry)
	R. Netherlands	The Research File (the relevance of science to all our lives)
1545	R. Canada Int.	Out Front (new ideas, new ways of making radio, new voices)

FRIDAY		
1500	R. Netherlands	A Good Life (how development affects societies)
1505	BBCWS(am)	Sports International (the issues and personalities behind the headlines)
1530	BBCWS(am)	Pick of the World (World Service highlights, producers and presenters)
	R. Australia	The Sports Factor (reports on the cultural significance of sport)
	R. Canada Int.	C'est La Vie (life in Quebec and French-speaking Canada)
	R. Netherlands	The Weekly Documentary (sound essays and in-depth investigations)
SATURDAY		
1500	R. Netherlands	Music 52-15 (musical styles from around the globe)
1505	BBCWS(am)	Sportsworld (continues from 1405)
	R. Australia	Nocturne (artfully arranged selection of music)
	R. Canada Int.	The Vinyl Cafe (Canadian humorist and storyteller Stuart McLean)
1530	R. Netherlands	Roughly Speaking (European youth lifestyles magazine)

1600 UTC/ 11am E/8am P - Page 50 Freqs

Daily		
1630	R. Austria Int.	Report from Austria
SUNDAY		
1600	WHRI(15105 kHz.)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
1601	BBCWS(am)	Concert Hall (classical music recitals and performances)
1605	R. Australia	The National Interest (Terry Lane's round-up of the week's major issues)
	R. Canada Int.	The SUNDAY Edition (continues from 1410)
	R. Netherlands	Wide Angle (a weekly in-depth look at a news topic)
1635	R. Austria Int.	Radio E (jointly produced by BBC and European broadcasters)
MONDAY-FRIDAY		
1600	BBCWS(am)	World Briefing
	R. Netherlands	Newsline (news, analysis and background reports)
1645	BBCWS(am)	Sports Roundup (all the daily sporting news worldwide)
MONDAY		
1630	BBCWS(am)	Analysis (background to stories in the news)
TUESDAY		
1605	R. Australia	The Comfort Zone (debates cultural significance of design, landscape, food, etc.)
1630	BBCWS(am)	Analysis (background to stories in the news)
WEDNESDAY		
1605	R. Australia	Verbatim (the story of the 20th century through ordinary Australians)
1630	R. Australia	Eorshot (a half-hour feature from the diverse Australian continent)
1630	BBCWS(am)	From Our Own Correspondent (background to international events)
THURSDAY		
1605	R. Australia	Hindsight (Australian social history from those who were there)
1630	BBCWS(am)	Analysis (background to stories in the news)
FRIDAY		
1605	R. Australia	Away! (Produced and presented by Aboriginal broadcasters)
1630	BBCWS(am)	Analysis (background to stories in the news)
SATURDAY		
1600	BBCWS(am)	News
	WHRI(13760 kHz.)	DXing with Cumbre (Marie Lamb with the hottest DX catches)
1605	BBCWS(am)	Sportsworld (continues from 1405)
	R. Australia	Melisma (continues from 1505)
	R. Canada Int.	Quirks and Quarks (what's new and next in science)
	R. Netherlands	Europe Unzipped (events of the past week, some unusual)

1700 UTC/ 12pm E/9am P - Page 51 Freqs

Daily		
1700	R. Japan	News (a round-up of Asian and world news)
SUNDAY		
1705	R. Australia	The Spirit of Things (contemporary values and beliefs)

1710	R. Japan	as expressed through ritual, art, music, and sacred texts)
		Hello from Tokyo (listener letters, music and short features)
1730	VOA Africa	Music Time in Africa (the best of traditional and modern African music) [broadcast in two editions with part two airing at 1930]
MONDAY-FRIDAY		
1700	WWCR(15685kHz)	World Wide Country Radio (country music)
1705	R. Australia	Bush Telegraph (entertaining look at issues around Australia)
	VOA News Now	Talk to America (worldwide call-in show)

MONDAY		
1710	R. Japan	Pop! Goes Asia (pop cultures and lifestyles of Asian countries)
TUESDAY-SATURDAY		
1715	R. Japan	44 Minutes (current affairs magazine about Japan and Asia)
SATURDAY		
1705	R. Australia	New Dimensions (interviews with leading thinkers)
	VOA Africa	Hip Hop Connections (Rod Murray with the latest US hip hop music)
1745	WWCR(15685kHz.)	New Horizons (discoveries in science, medicine and technology)

2100 UTC/ 4pm E/1pm P - Page 53 Freqs

Daily		
2100	R. Japan	News (a round-up of Asian and world news)
SUNDAY		
2100	BBCWS(am)	NewsHour (an hour of news and analysis from around the globe)
	WBCQ(7415kHz.)	Radio Caroline ("Europe's first and only album station")
	WRMI(15725kHz.)	Viva Miami (R. Miami International's listener magazine program)
2110	R. Australia	AM (ABC Radio's flagship morning news magazine)
	R. Canada Int.	The Maple Leaf Mailbag (listener letters and answers) [The CIDX Report fortnightly]
	R. Japan	Weekend Square (aspects of Japan with interviews, music and discussions)
2130	R. Australia	Educational series on Asian or Pacific history, politics or communications
2135	R. Canada Int.	Spotlight (all facets of artistic and cultural life in Canada)
2245	BBCWS(am)	Reporting Religion (the week's religion news)
MONDAY-FRIDAY		
2100	R. Canada Int.	Canada Today (interviews, reports and Canadian views)
MONDAY		
2105	BBCWS(am)	Discovery (ideas and discoveries in science and technology)
2110	R. Japan	Pop! Goes Asia (pop cultures and lifestyles of Asian countries)
2110	R. Australia	AM (ABC Radio's flagship morning news magazine)
2130	R. Australia	The Health Report (report on health and medical issues)
2135	R. Canada Int.	Media Zone (Canadian journalists discussing topical issues)
TUESDAY-SATURDAY		
2115	R. Japan	Asian Top News (stories reported by regional radio stations)
TUESDAY		
2105	BBCWS(am)	Health Matters (reports on research explaining where medicine is going)
2110	R. Australia	AM (ABC Radio's flagship morning news magazine)
2125	R. Japan	Unforgettable Musical Masterpieces (pop songs as a means of explaining Japanese history and attitudes)
2130	R. Australia	Innovations (Australian invention, enterprise and ingenuity)
2135	R. Canada Int.	Spotlight (all facets of artistic and cultural life in Canada)
WEDNESDAY		
2105	BBCWS(am)	Go Digital (the latest in IT)
2110	R. Australia	AM (ABC Radio's flagship morning news magazine)
2125	R. Japan	Lef's Learn Japanese (a Japanese language lesson for beginners)
2130	BBCWS(am)	Focus on Faith (religious stories behind the news)
	R. Australia	The Religion Report (the way religion and societies interact)

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2135 R. Canada Int. The Maple Leaf Mailbag (listener letters and answers)(The CIDX Report is included fortnightly)

THURSDAY

2100 WBCQ(7415kHz.) Radio Caroline ("Europe's first and only album station")
WWCR(12160kHz.) Keen on Jazz
2105 BBCWS(am) Sports International (the issues and personalities behind the headlines)
2110 R. Australia AM (ABC Radio's flagship morning news magazine)
2115 WWCR(15685kHz.) Eco Watch (global ecological developments)
2125 R. Japan Japan Music Log (songs rooted in the lifestyles of each region)
2130 BBCWS(am) Pick of the World (World Service highlights, producers and presenters)
R. Australia Rural Reporter (news and stories from rural and regional Australia)
WWCR(15685kHz.) World of Radio (Glenn Hauser on the week in broadcasting)
2135 R. Canada Int. Business Sense (an in-depth look at Canadian companies)

FRIDAY

2100 WBCQ(7415kHz.) Radio Caroline ("Europe's first and only album station")
WWCR(15685kHz.) Ask WWCR
2105 BBCWS(am) One Planet (environment, development, agriculture and human impact)
R. Australia Feedback (Roger Broadbent provides updates about RA)
2115 WWCR(15685kHz.) New Horizons (discoveries in science, medicine and technology)
2125 R. Japan Brush Up Your Japanese (intermediate course in Japanese)
2130 BBCWS(am) People and Places (a forum for the exchange of views and experiences)
R. Australia Oz Sounds (Australian new music releases)
2135 R. Canada Int. Canada in the World (Canadian policies, priorities and international relations)

SATURDAY

2100 BBCWS(am) Newshour (an hour of news and analysis from around the globe)
WBCQ(7415kHz.) Radio Caroline ("Europe's first and only album station")
WWRM(15725kHz.) Viva Miami (R. Miami International's listener magazine show)
2105 R. Australia Australia All Over (Ion McNamara—aka "Marco"—hosts this celebration of Australian and traditional Australian customs and values)(begins at 1900)
Readings from Czech Literature
2105 R. Prague Business Sense (an in-depth look at Canadian companies)
2110 R. Canada Int. SATURDAY Music (Czech classical, folk, jazz or rock music)
R. Prague Music Beat (contemporary Japanese popular music)
2125 R. Japan Presidential Radio Address and the Democratic Party Response
2130 WWCR(15685kHz.) Canada in the World (Canadian policies, priorities and international relations)
2135 R. Canada Int. Asia SUNDAY (a weekly report on regional events and issues)
2145 R. Australia Ask WWCR
WWCR(12160kHz.)

2200 UTC/ 5pm E/2pm P - Page 53 Freqs

SUNDAY

2200 BBCWS(am) The World Today (the BBC's flagship global news program)
WBCQ(7415kHz.) Communications World (Kim Elliott -the week in global communications)
2210 R. Australia AM (ABC Radio's flagship morning news magazine)
2230 BBCWS (am) Agenda (ideas and trends shaping our world)
2230 R. Vlaanderen Int. Radio World (Frans Vossen report about international radio)
2240 R. Australia The Australian Music Show (the latest rock music)

MONDAY-FRIDAY

2200 WWCR(12160kHz.) World Wide Country Radio (country music)
2205 BBCWS(am) World Business Report
2230 BBCWS(am) Sports Roundup (all the daily sporting news world-wide)

MONDAY

2200 WBCQ(7415kHz.) Jean Shepherd (his classic programs from the 60s and 70s)
2210 R. Australia AM (ABC Radio's flagship morning news magazine)
2240 R. Australia Music Deli (folk, acoustic, traditional and world music)

2245 BBCWS(am) Analysis (background to stories in the news)

TUESDAY

2210 R. Australia AM (ABC Radio's flagship morning news magazine)
2240 R. Australia Blacktracker (Mal Holness presents contemporary Aboriginal music)
2245 BBCWS(am) Analysis (background to stories in the news)

WEDNESDAY

2200 WBCQ(7415kHz.) The Clone Zone (ed. note: your guess is as good as mine!)
2210 R. Australia AM (ABC Radio's flagship morning news magazine)
2240 R. Australia Oz Country Style (country music from Australia)
2245 BBCWS(am) From Our Own Correspondent (background to international events)

THURSDAY

2210 R. Australia AM (ABC Radio's flagship morning news magazine)
2240 R. Australia Jazz Notes (Australian jazz presented by Ivan Lloyd)
2245 BBCWS(am) Analysis (background to stories in the news)

FRIDAY

2200 WBCQ(7415kHz.) Juliet's Wild Kingdom
WHRA(17650kHz.) DXing with Cumbre (Marie Lamb with the hottest DX catches)
2205 R. Australia Asia-Pacific Weekend Edition (regional news and business report)
2230 WBCQ(7415kHz.) Pub Sungenis Project (stand-up comedy and sketches)
2245 BBCWS(am) Analysis (background to stories in the news)

SATURDAY

2200 BBCWS(am) The World Today (the BBC's flagship global news program)
WBCQ(7415kHz.) Harzower (a personal selection of contemporary music)
2205 R. Australia Correspondents Report (interpretation and analysis of the week)
2230 BBCWS(am) From Our Own Correspondent (background from BBC correspondents)
R. Australia The Business Report (business news and information)
R. Vlaanderen Int. Music from Flanders (a half-hour of Flemish music)
WHRA(17650kHz.) DXing with Cumbre (Marie Lamb with the hottest DX catches)
2235 R. Prague Readings from Czech Literature
2240 R. Prague SATURDAY Music (Czech classical, folk, jazz or rock music)

2300 UTC/ 6pm E/3pm P - Page 54 Freqs

Daily

2300 BBCWS(am) The World Today (the BBC's flagship global news program)

SUNDAY-THURSDAY

2300 R. New Zealand Int. Midday Report (news updates and in-depth reports)

SUNDAY

2300 R. Canada Int. The World This Weekend (CBC weekend news magazine)
WBCQ(9335kHz.) Uncle Ed's Musical Memories
2310 R. Australia Asia-Pacific (current events and business report)
2320 China R. Int. In the Spotlight (Chinese arts and cultural magazine)
2330 BBCWS(am) The Greenfield Collection (classical music requests)
R. Australia Earthbeat (Alexandra DeBlos on environmental science)
R. Canada Int. The Inside Track (documentaries about sports and those who compete)
2335 R. Netherlands Sincerely Yours (RN's listener response program)
2355 R. Netherlands The Week Ahead (on RN the next seven days)

MONDAY-FRIDAY

2300 R. Canada Int. The World at Six (the CBC's flagship evening newscast)
2330 R. Netherlands Newslines (news, analysis and background reports)
R. Canada Int. As It Happens (interviews of newsmakers from the famous to ordinary people)

MONDAY

2300 WBCQ(7415kHz.) Wonton Display of Control and Disruption (satire)[1st Mon.]
2310 R. Australia Asia-Pacific (current events and business report)
2330 China R. Int. People in the Know (interviews with prominent Chinese)
R. Australia The Buzz (the week's big technology news and issues)

TUESDAY

2310 R. Australia Asia-Pacific (current events and business report)
2330 China R. Int. Sports World (the sports scene in China and Asia)

R. Australia The Arts with Julie Capeland (an interview and a film review)

WEDNESDAY

2310 R. Australia Asia-Pacific (current events and business report)
2330 R. Australia Rural Reporter (news and stories from rural and regional Australia)

THURSDAY

2310 R. Australia Asia-Pacific (current events and business report)
2330 R. Australia The Media Report (latest developments in the communications industry)

FRIDAY

2305 R. Australia Lingua Franca (language and its ramifications)
2310 R. New Zealand Int. Focus on Politics (a report on government and politics in NZ)
2315 WWCR(15685kHz.) World of Radio (Glenn Hauser on the week in broadcasting)
2330 BBCWS(am) Global Business (Peter Day charts the world of commerce)
China R. Int. Life in China (the lives of ordinary people in China)
R. Australia The Sports Factor (reports on the cultural significance of sport)
R. New Zealand Int. The Sampler (the latest CD offerings)
WBCQ(7415kHz.) International World Beat Music

SATURDAY

2300 R. Canada Int. The World This Weekend (CBC weekend news magazine)
WBCQ(7415kHz.) Radio Timtron Worldwide
WWCR(12160kHz.) Keen on Jazz
2305 R. Australia Ockham's Razor (sharp commentaries on scientific issues)
2310 R. New Zealand Int. The Week in Parliament (a weekly roundup of NZ political news)
2320 China R. Int. Listeners' Garden (letters, touring, cooking and a language lesson)
2330 BBCWSom Arts in Action (ideas that shape our aesthetic, musical and literary worlds)
R. Australia Innovations (Australian invention, enterprise and ingenuity)
R. Canada Int. Madly Off in All Directions (the country's unique sense of humor)
R. New Zealand Int. Spectrum (a weekly look at the people, places and events around NZ)
WHRI(9495kHz.) DXing with Cumbre (Marie Lamb with the hottest DX catches)
2335 R. Netherlands Europe Unzipped (the events of the past week in Europe, some unusual)
2335 R. Netherlands Insight (Rob Green casts a critical and humorous eye on the past week's headlines)
R. Prague Readings from Czech Literature
2340 R. Prague Saturday Music (Czech classical, folk, jazz or rock music)

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

John Babbis, Silver Spring, MD;
Harold Frodge, Midland, MI; Hans Johnson, WY/Ulis Fleming, MD / Cumbre DX/ Michael Murray, UK; Daniel Sampson, Arcadia, WI; Harold Sellers, Robert E. Thomas III, Bridgeport, CT; Larry Van Horn, Brasstown, NC; DX Listening Digest; DX Ontario; Hard Core DX; World of Radio; Worldwide DX Club.



Sound cards for monitoring APT

My own weather satellite (WXSAT) station is again under radical change. In recent years I have monitored APT (mostly NOAA and Meteor) WXSATs using hardware recording methods – that is, with a PC card that provides power to the receiver, and takes the received signal for real-time processing. Software allows control of the PC card and permits channel changing – which is useful while I am absent.

A couple of hardware problems, together with a so-far unsolved system clock drift, has caused difficulties with the automatic recording of scheduled satellite passes, so I have been experimenting with sound card recording and decoding. This involves feeding the received APT signal into a sound card and using a suitable recording program to save the resulting sound file. Computer motherboards invariably have an integral sound chip that should suffice, but a fully featured sound card now costs but a few dollars, and is often fitted to new machines. The built-in Windows sound recorder will work well for test purposes, but for ongoing routine monitoring of WXSAT transmissions, a more sophisticated program is really required.

If you monitor the WXSAT forums on the Internet, you may be aware that a number of programs are available for recording sound files originating from WXSATs. The program *WXTOIMG* was written by Abstract Technologies New Zealand Limited, and is freely available for private use. This software can record and decode APT and WEFAX WXSAT signals, though for the best results it is important to set a number of parameters.

<http://www.weather.net.nz/wxtoimg/>

The program *WXSAT* dates back a few years, and is possibly the software that originally started the trend to sound card operation. However it is done, a sound file (*wav* format) results and can be processed further to recreate the image.

http://www.hffax.de/WX_Satellite/WXsat/wxsat.html

❖ Sampling APT

In the APT (automatic picture transmission) format, image data is contained within the 2400 Hz sub-carrier. This sub-carrier information is extracted from the 137 MHz signal by the receiver. This frequency range (2400 Hz) lies within the audio spectrum and is the sound that we hear when an APT signal is received by the receiver. It can be fed to a sound card via the line input – rather than using the microphone input, which is usually too sensitive. The signal

is then sampled at a rate consistent with the frequency of modulation. We usually set the sampling rate at 11,025 kHz, to allow for the amount of data carried within the signal.

The first setting is that of the computer's sound card. Activating the volume control icon in the taskbar tray gives access to the currently available signal inputs. If the line-in option is not shown, it can be activated by selecting *options* and *properties* within the menu. Select *recording* and you can then activate additional inputs – including line-in. The next setting is the actual signal level, and for this you need an APT signal. When a WXSAT is being received and fed to the sound card, the level will be shown in a graphical manner. I find that setting the control to the half-way position provides a good level. If you later find that this is too low or high, it can be adjusted.

Having set the sound card's parameters, the next adjustments are to those of *WXSAT*. The software includes a multi-page description file explaining setting up procedures in detail. Les Hamilton, a committee member in the UK's Remote Imaging Group, has published a summary of the procedure:

<http://www.riglib.demon.co.uk/guide.htm>

Perhaps the most important matter concerning sound card recording of APT is to ensure that other processor-intensive programs are not running. Many people still use so-called screen-saver programs. These were designed to prevent burn-in on older type monitors by displaying a continuously changing image. They seem totally unnecessary with today's high quality phosphors. You should disable screen savers if you use *WXSAT*, or comparable recording programs, otherwise you may find discontinuities in your recordings.

When my computer is on but inactive, I run the *seti@home* program screen-saver that uses a recording from the Arecibo radio telescope to search for evidence of periodic radio transmissions that might be from an extra-terrestrial civilization – but that is another story!

Frequencies

NOAA-14 transmits (faulty) APT on 137.62 MHz

NOAA-12 and -15 transmit APT on 137.50 MHz

Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight

Okean-0, Okean-4 and Sich-1 sometimes transmit APT briefly on

137.40 MHz over Europe

GOES-9 and GOES-10 use 1691 MHz for WEFAX



Fig 1: DMSP Defense Meteorological Satellite Program image from F-15 showing an aurora over North America. The visible-light sensor also shows the extent of light pollution from US cities. DMSP satellites carry NOAA-like hardware for obtaining weather imagery.

Satellite Service Guide

Robert Smathers

roberts@umia.com

www.grove-ent.com/mtsyg.html

All Frequencies MHz

SES Americom Americom-1

C-Band - 103 degrees West longitude

1(H)	3720	Occasional video / National Jewish Television (occasional)
2(V)	3740	(none)
3(H)	3760	PBS (digital)
4(V)	3780	Fox Sports (digital)
5(H)	3800	Mun2 East and West / Adhoc feeds / LBC (audio) / Radio Paz-WACC-AM / Miami (audio) / WLVE-FM Miami (audio) / WZMQ-FM Miami (audio) (all services digital)
6(V)	3820	(none)
7(H)	3840	Pax TV East, Mountain, Pacific / Worship TV / Praise TV (digital)
8(V)	3860	InDemand PPV (digital)
9(H)	3880	Occasional video
10(V)	3900	Occasional video
11(H)	3920	Univision feeds (digital)
12(V)	3940	Wisdom Television (analog) / Wisdom Television (digital)
13(H)	3960	InDemand PPV (digital)
14(V)	3980	InDemand PPV (digital)
15(H)	4000	Total Living Network (digital)
16(V)	4020	Occasional video
17(H)	4040	Telemundo / Telenoticias (digital)
18(V)	4060	Fox Sports (digital)
19(H)	4080	AFN Direct-to-Sailor Network (digital)
20(V)	4100	M2: Music Television
21(H)	4120	Telefutura (digital)
22(V)	4140	Deutsche Welle TV (German)
		7.38, 7.56 DW Radio 1 (German)
		7.74 Deutsche Welle Radio 2 (English)
		7.92 Deutsche Welle Radio 7 (Various languages)
23(H)	4160	TV Games Network (VC2+)
24(V)	4180	Data Transmissions

SES Americom Americom-1

Ku-Band - 103 degrees West longitude

1(H)	11720	Data Transmissions
2(V)	11740	Data Transmissions
3(H)	11760	NBC SkyPath / NBC Primetime Prefeet / NBC Daytime Prefeet (digital)
4(V)	11780	Data Transmissions
5(H)	11800	Data Transmissions
6(V)	11820	Kentucky Educational TV (digital) / Data Transmissions
7(H)	11840	NBC Mountain time zone programming / NBC Pacific time zone programming / NBC SkyPath (digital)
8(V)	11860	Data Transmissions
9(H)	11880	NBC East and Central time zone programming / NBC SkyPath (digital)
10(V)	11900	Data Transmissions
11(H)	11920	(none)
12(V)	11940	Microspace Velocity (digital)
13(H)	11960	Data Transmissions
14(V)	11980	Data Transmissions
15(H)	12000	NBC feeds (occasional analog) / NBC HDTV feed (occasional)
16(V)	12020	DirectPC (digital)
17(H)	12040	NBC Newschannel DSNG feeds (digital)
18(V)	12060	Starnet (digital) / Data Transmissions
19(H)	12080	NBC Newschannel (digital)
20(V)	12100	Occasional video
21(H)	12120	NBC Newschannel DSNG feeds (digital)
22(V)	12140	Occasional video
23(H)	12160	NBC Newschannel DSNG feeds (digital)
24(V)	12180	FedEx TV (digital)

SES Americom GSTAR-4

Ku-Band - 105 degrees West longitude

T01(H)	11730	Data Transmissions
T02(H)	11791	Data Transmissions
T03(H)	11852	Occasional video
T04(H)	11913	Data Transmissions
T05(H)	11974	Occasional video / CourtTV feeds (occasional analog)
T06(H)	12035	Occasional video
T07(H)	12096	Occasional video
T08(H)	12157	Data Transmissions
T09(V)	11744	Data Transmissions
T10(V)	11805	Data Transmissions
T11(V)	11866	Data Transmissions
T12(V)	11927	Data Transmissions
T13(V)	11988	Occasional video
T14(V)	12049	Data Transmissions
T15(V)	12110	Data Transmissions
T16(V)	12171	Data Transmissions

Telesat Canada Anik F1

C-Band - 107.3 degrees West longitude

1A(H)	3720	Occasional video
1B(V)	3740	Data Transmissions
2A(H)	3760	CBC Television (digital)
2A(H)	3760	South American Beamed
2B(V)	3780	Musimax / Musique Plus / Radio Mutual / Mognatheque / RDS / Canal Nouvelle / The Green Channel (digital)
3A(H)	3800	Data Transmissions
3A(H)	3800	South American Beamed
3B(V)	3820	Occasional video
4A(H)	3840	(none)
5A(H)	3880	Occasional video
5A(H)	3880	South American Beamed
5B(V)	3900	Concom (digital)
6A(H)	3920	Radio Canada (digital)
6A(H)	3920	South American Beamed
6B(V)	3940	Concom (digital)
7A(H)	3960	CBC analog feeds (occasional)
7A(H)	3960	South American Beamed
7B(V)	3980	Concom (digital)
8A(H)	4000	Occasional video
8A(H)	4000	South American Beamed
8B(V)	4020	Occasional video
9A(H)	4040	CBC analog feeds (occasional)
9A(H)	4040	South American Beamed
9B(V)	4060	Meteo Media / TV 5 USA / TV 5 France / Blue Banner / RDI / Radio Quebec / Canal Vie / various French-language radio stations (digital)
10A(H)	4080	Occasional video
10A(H)	4080	South American Beamed
10B(V)	4100	CTV Red / CTV Green / CTV Blue / Newsworld International / The Weather Network (digital)
11A(H)	4120	Occasional video
11A(H)	4120	South American Beamed
11B(V)	4140	Occasional video
12A(H)	4160	CBC analog feeds (occasional)
12A(H)	4160	South American Beamed
12B(V)	4180	McKibben Communications adhoc services (analog/digital)

Telesat Canada Anik F1

Ku-Band - 107.3 degrees West longitude

11(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
T18(H)	11756	Star Choice DBS (digital)
T18S(H)	11756	South American Beamed
T19(H)	11786	Star Choice DBS (digital)
T19S(H)	11786	South American Beamed
T20(H)	11817	Star Choice DBS (digital)
T20S(H)	11817	South American Beamed
T21(H)	11850	Star Choice DBS (digital)
T21S(H)	11850	South American Beamed
T22(H)	11880	Star Choice DBS (digital)
T22S(H)	11880	South American Beamed
T23(H)	11910	CBC / SRC feeds (digital)
T23S(H)	11910	South American Beamed
T24(H)	11940	CBC / SRC feeds (digital)
T24S(H)	11940	South American Beamed
T25(H)	11971	Star Choice DBS (digital)
T25S(H)	11971	South American Beamed
T26(H)	12002	Star Choice DBS (digital)
T26S(H)	12002	South American Beamed
T27(H)	12033	Star Choice DBS (digital)
T27S(H)	12033	South American Beamed
T28(H)	12063	Star Choice DBS (digital)
T28S(H)	12063	South American Beamed
T29(H)	12094	Star Choice DBS (digital)
T29S(H)	12094	South American Beamed
T30(H)	12124	Star Choice DBS (digital)
T30S(H)	12124	South American Beamed
T31(H)	12155	Star Choice DBS (digital)
T31S(H)	12155	South American Beamed
T32(H)	12180	Star Choice DBS (digital)
T32S(H)	12180	South American Beamed

TeleSat Canada Anik E2

C-Band - 111.1 degrees West longitude

1A(H)	3720	(Inactive)
1B(V)	3740	Occasional video / Global TV feeds (occasional) / Horse Racing (occasional analog)
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	Horse Racing (occasional digital)
5A(H)	3880	Data Transmissions
5B(V)	3900	Data Transmissions
6A(H)	3920	Occasional video
6B(V)	3940	Occasional video / Horse Racing (occasional analog)
7A(H)	3960	(Inactive)
7B(V)	3980	Occasional video
8A(H)	4000	Occasional video
8B(V)	4020	Occasional video / Horse Racing (occasional analog)
9A(H)	4040	(Inactive)
9B(V)	4060	(Inactive)
10A(H)	4080	Data Transmissions

108(V)	4100	Data Transmissions
11A(H)	4120	SCPC Services / Data Transmissions
		4113.30 1036.70 63.30 In-store Music
		4113.00 1037.00 63.00 In-store Music
		4112.50 1037.50 62.50 In-store Music
118(V)	4140	Data Transmissions
12A(H)	4160	(Inactive)
12B(V)	4180	(Inactive)

Telesat Canada Anik E2

Ku-Band - 111.1 degrees West longitude

T01(V)	11717	Data Transmissions
T02(V)	11743	Data Transmissions
T03(V)	11778	Data Transmissions
T04(V)	11804	Data Transmissions
T05(V)	11839	Data Transmissions
T06(V)	11865	Occasional video
T07(V)	11900	Occasional video
T08(V)	11926	Novanet (digital)
T09(V)	11961	Saskatchewan Communications Network (SCN) (digital)
T10(V)	11987	Star Choice DBS (digital)
T11(V)	12022	Star Choice DBS (digital)
T12(V)	12048	Star Choice DBS (digital)
T13(V)	12083	Star Choice DBS (digital)
T14(V)	12109	Star Choice DBS (digital)
T15(V)	12144	Ground Loop Attitude Control System (digital)
T16(V)	12170	Star Choice DBS (digital)
T17(H)	11730	Data Transmissions
T18(H)	11756	Data Transmissions
T19(H)	11791	Data Transmissions
T20(H)	11817	Data Transmissions
T21(H)	11852	Star Choice DBS (digital)
T22(H)	11878	Star Choice DBS (digital)
T23(H)	11913	Data Transmissions
T24(H)	11939	Data Transmissions
T25(H)	11974	Star Choice DBS (digital)
T26(H)	12000	Star Choice DBS (digital)
T27(H)	12035	Star Choice DBS (digital)
T28(H)	12061	Star Choice DBS (digital)
T29(H)	12096	Star Choice DBS (digital)
T30(H)	12122	Ground Loop Attitude Control System (digital)
T31(H)	12157	Star Choice DBS (digital)
T32(H)	12183	Star Choice DBS (digital)

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Skyvision

Animal and Plant Health Inspection Service

Agriculture, America's biggest industry and its largest employer, is under constant threat of attack. The enemies are countless and often microscopic, and they gain access to our country in surprising ways.

Mad cow disease and the Mediterranean Fruit Fly are just two threats to the United States agricultural industry that have made the headlines in recent months. And while most people know that the U.S. Department of Agriculture (USDA) is responsible for combating these threats, little is known about the service that is directly responsible for waging war on agricultural threats.

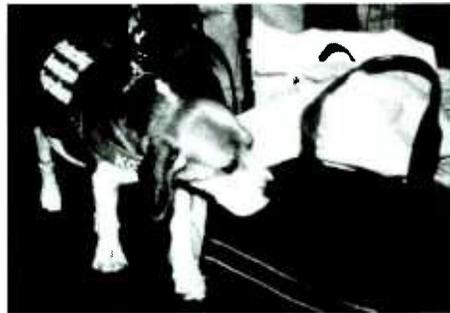
That job falls to the Animal and Plant Health Inspection Service (APHIS) which is part of the Agriculture Department, and it is the focus of this month's government communications system profile.



APHIS agricultural quarantine inspectors at border ports and international airports check millions of passengers and their baggage for plant or animal pests and diseases that might harm U.S. agriculture. (Photo courtesy of APHIS)

Agricultural quarantine inspection is the first line of defense against foreign pests and diseases. Seven days a week, around 1,300 inspectors with USDA's Animal and Plant Health Inspection Service are on duty at international airports, seaports, and border stations to inspect passengers and baggage for plant and animal products that could be harboring pests or disease organisms. These APHIS Plant Protection and Quarantine (PPQ) inspectors check millions of passengers and their baggage each year for plant or animal pests and diseases that might harm U.S. agriculture. They also inspect ship cargoes, rail and truck freight, and mail from foreign countries.

From high-tech to a keen nose, APHIS uses a variety of means to exclude foreign pests and



Specially trained detector dogs sniff for prohibited agricultural items that travelers may try to bring into the country. USDA's "Beagle Brigade" identifies smugglers, who can be fined \$1,000. (Photo courtesy of APHIS)

protect American agriculture. PPQ inspectors augment visual inspection with some 75 x-ray units that help check passenger baggage and mail for prohibited agricultural materials. They also have enlisted trained detector dogs and their keen sense of smell to help sniff out prohibited fruit and meat. On leashes and under the constant supervision of their handlers, the friendly beagles in USDA's "Beagle Brigade" have checked the baggage of passengers arriving from overseas for the past 10 years.

The high tech portion of the APHIS includes an extensive HF/VHF/UHF communications network. Table One profiles some of this radio network and Table Two has an extensive list of APHIS government issued callsigns.

Tennessee Valley Authority Low Band

A monitor who wish to remain anonymous recently passed along the frequency programming in a TVA VX-510 handheld. These are all low band assignments and I have confirmed that quite a few of the assignments are in fact quite active. Given the current sunspot count, low band DX enthusiasts should have no problem catching some activity on these frequencies.

TVA Low Band Radio System –

Transmission and Customer Service (TCS) Operations/Maintenance
 40.310 Simplex (250.3 Hz) HUNT – TCS Huntsville <Ch 5>
 40.370 Simplex (250.3 Hz) JCY – TCS Johnson City <Ch 7>
 40.370 Simplex (203.5 Hz) MFLD – TCS <Ch 9>
 40.430 Simplex (250.3 Hz) CLEV – TCS Cleveland (Wide) <Ch 2>
 40.430 Simplex (203.5 Hz) MEMP – TCS Memphis (Wide) <Ch 10>
 40.490 Simplex (250.3 Hz) CON1 – Construction/TCS [replaced 40.500 MHz] <Ch 16>
 40.530 Simplex (250.3 Hz) CHAT – TCS Chickamauga <Ch 3>
 40.570 Simplex (250.3 Hz) CLMB – TCS <Ch 4>

40.610 Simplex (250.3 Hz) BGRE – TCS Bowling Green [replaced 40.620 MHz] <Ch 1>
 40.610 Simplex (203.5 Hz) TPLO – TCS Tupelo [replaced 40.620 MHz] <Ch 14>
 40.650 Simplex (250.3 Hz) JCKS – TCS Jackson <Ch 6>
 40.690 Simplex (250.3 Hz) MSHL – TCS Muscle Shoals <Ch 12>
 40.730 Simplex (250.3 Hz) MBRO – TCS Murfreesboro [replaced 40.740 MHz] <Ch 11>
 40.730 Simplex (203.5 Hz) WPNT – TCS West Point [replaced 40.740 MHz] <Ch 15>
 40.770 Simplex (250.3 Hz) KNOX – TCS Knoxville <Ch 8>
 40.830 Simplex (250.3 Hz) NASH – TCS Nashville <Ch 13>
 40.870 Simplex (250.3 Hz) CON2 – Construction/TCS <Ch 7>
 40.870 Simplex (COR) CH18 – Construction/TCS <Ch 18>

The only two channel location designators I am not sure about are MFLD and CLMB. Anyone have any ideas on these? Many thanks to our anonymous contributor.

Cape Hatteras National Seashore

Virginian John Wilson recently passed along some information on the internet *Fedcom* newsgroup regarding a Department of the Interior unit – the Cape Hatteras National Seashore.

This National Seashore is headquartered in Manteo, North Carolina. John reports that this system is not linked to any Virginia system.

164.725	Park Rangers Direct Channel 1
164.7250/164.200	Park Rangers Repeater
169.6500/169150	Cape Lookout Liaison

Thanks, John, for the update and I appreciate all the information from all our contributors in this month's column. Till next month, 73 and good hunting.

Table 1: APHIS Communication Networks

HF Frequencies: 5870.0 7430.0 7730.0 9145.0 10129.0
 12145.0 13515.0 kHz

VHF/UHF Frequencies (MHz):
 34.630 Wildlife Services paired with 34.670 (some locations pair with 38.550) – Nationwide
 34.670 Wildlife Services paired with 34.630 – Nationwide
 46.750 Wildlife Services frequency – Eastern United States
 122.800 APHIS Air Operations – Texas statewide
 122.900 APHIS Air Operations – Nationwide
 122.925 APHIS Plant Protection and Quarantine Air Operations – Nationwide
 162.225 Plant Protection and Quarantine Station simplex – Oakland International Airport, CA
 163.100 Wildlife Services simplex (also paired with 168.350) – Nationwide

Digital Monitoring in Sight

Our hobby received some good news this past January at the Consumer Electronics Show in Las Vegas. At the show Uniden unveiled a pair of long-awaited scanners that promise to be capable of monitoring digital transmissions from APCO Project 25 radio systems.

For those of you new to this sort of monitoring, Project 25 (P-25) is a set of standards put forward by the Association of Public-Safety Communications Officials International, Inc. (APCO) that define how radios and base stations should transmit and receive voice and data messages. These standards include the requirement that voice traffic be sent in digital form rather than the older, more common analog methods. Many municipalities across the country have been replacing their old analog radio equipment with new digital P-25 systems, and in the process have locked out the monitoring public due to a lack of digital-capable consumer scanners.

Uniden hopes to be first to market with two scanners that can monitor these digital P-25 radio systems. The Bearcat BC250D is a handheld unit with all of the features and capabilities of the current production BC780XLT. The Bearcat BC785D is the base and/or mobile version with a similar feature set. Each scanner is slated to have 1,100 channels in 10 banks and provide a frequency range of 25 MHz to 1300 MHz (with the usual cellular telephone frequency gaps). Both scanners are expected to have a retail price of about \$350 and are scheduled to be on dealer shelves in "late 2002." Given the delays in the introduction of the 780XLT, it will be interesting to see how close Uniden comes to achieving this deadline.

By themselves, the scanners will monitor conventional and trunked analog systems. The new feature on each of these scanners is a slot that will accept an external electronic "card." In order to process the P-25 transmissions, a BCi25D card must be inserted into the scanner. This add-on card will work in either scanner and is expected to retail at around \$330. This method of flexible radio capability is reminiscent of the OptoElectronics OptoCom receiver, which was designed to accept additional hardware modules, and is similar in concept to the add-on modules available for some personal digital assistants such as the Handspring Visor.

For Uniden, this card will allow them to manufacture and sell the P-25 capability separate from the 250D and 785D scanners

themselves. Since the method used in P-25 for digitally compressing and encoding voice traffic is patented by Digital Voice Systems, Inc., royalty payments from Uniden are tied only to the BCi25D card, not to each scanner. Looking ahead, this "slot" feature may also open the door for other digital add-ons, such as a card capable of processing other digital systems. In an ideal world, Uniden would release the specification for the slot, allowing third parties to develop their own add-on cards. No word from Uniden yet on these future possibilities.

Once again it worthwhile to emphasize that these scanners will not be able to decode any encrypted voice traffic, just the standard P-25 signals. Departments and agencies that are already encrypting their traffic will remain out of reach for hobby scanner listeners. Some municipalities are currently under the illusion that their signals are immune from monitoring simply because they are in digital form, and it will be interesting to see which ones begin to purchase encryption equipment as these scanners reach the consumer market.

❖ ScannerMaster

In your September 2001 column you wrote that at the APCO convention in Boston last year ScannerMaster had demonstrated a circuit board that would allow a BC780XLT to receive digital transmissions. I found their website and e-mailed them for more information. I got no response. I e-mailed them again about 6-8 weeks later and got no response and also noticed that their web site had not been updated at all. To your knowledge, is ScannerMaster still in business?

— Randy

ScannerMaster is still in business, their primary focus being the publication of the *Police Call* series of frequency guides found in almost every Radio Shack store. Rich Barnett edits the guides and has been involved in the hobby monitoring business for many years, so I would be surprised if he closed up shop. In addition to the guides, ScannerMaster is currently marketing a number of accessories for various Uniden scanners.

I have not received any further reliable information regarding their P-25 digital decoder board, but they have posted the follow-

ing message on their Internet website at <http://www.scannermaster.com>:

Press Release

Digital Decoder Board

We are not releasing at this time what scanners will be capable of accepting a digital board, nor can we say with any certainty whether existing scanners could be modified to take a board or whether a new model will have to be purchased. Prices and release dates have also not been set. We understand the need to offer digital decoding in both a base/mobile and handheld configuration, but it is likely any first version will be for base/mobiles. Note that this is an extremely complex project and we prefer not to make any promises in regard to this product at this time.

We can say that any digital decoding board will work with APCO-25 systems, both conventional and 3600 baud control channel trunked systems. We cannot make any statements as to 9600 baud systems at this time, although any board that decodes 3600 will allow you to at least listen to 9600, if not track. Of course encrypted systems will never be trackable. Whether an APCO-25 board will work on other systems, such as ProVoice® is unknown.

We understand the high-level of interest in this product and wish we could provide more details, but because of continuing development, contractual obligations, as well as other factors (including the fact that we don't want to make promises or timetables we may not be able to keep), this is all the information we can offer at this time. If you have further questions or comments, feel free to e-mail us, but be advised we may not respond as there is nothing more to say at this time. You may also feel free to contact the scanner manufacturers directly to inquire whether they have any news on digital scanner development.

❖ 400 MHz Trunking

While we wait for Uniden and ScannerMaster to finish their product development cycle, keep in mind that there are a

lot of trunked radio systems that are analog and can be monitored today, sometimes in unusual places. For instance, even though most public safety trunking systems operate in the 800 MHz band, there is a significant amount of activity in the 400 MHz band.

Historically, the majority of trunked 400 MHz users have been military installations using either Motorola or EDACS systems. In general, the nationwide military frequency assignments can be split up into four groups of five frequencies, each frequency in a group separated by 800 kHz as follows:

Group 4	Group 1	Group 2	Group 3
406.950	406.350	406.750	406.550
407.750	407.150	407.550	407.350
408.550	407.950	408.350	408.150
409.350	408.750	409.150	408.950
410.150	409.550	409.950	409.750

The Bearcat BC-245XLT and BC-780XLT as well as the PRO-92 and PRO-94 scanners are all able to trunk track without difficulty in the 400 MHz band.

◆ Ft. Irwin, California

The U.S. Army's Fort Irwin, located in the Mojave desert near Barstow, California, is probably best known as the home of the National Training Center (NTC), a simulated battleground where Army units come to train in as realistic a setting as possible. The deployment and operation of these units at the NTC is called a "rotation" and lasts 28 days. During this period the unit "fights" a full-time professional opposing force, testing new tactics and equipment.

The NTC covers approximately 1,000 square miles and is well away from any major centers of population, allowing for live fire exercises, close air support, and a variety of electronic warfare operations.

NTC operates a 25-channel EDACS system in the 400 MHz band, although I've received reports that some radios are using AEGIS digital voice rather than analog. Some of these radios are apparently in use on board UH-1 Huey and UH-60 Blackhawk helicopters and with specially equipped soldiers.

Interestingly, NTC rules prohibit the use of Family Radio Service (FRS) radios and scanners for training or for use during the rotation, although soldiers have been allowed to use them on post if they're not engaged in operations. Commanders also discourage the use of cellular telephones during operations due to the ability of the opposition force to



intercept and make use of information discussed during such calls.

Monitoring Fort Irwin will present new challenges in the near future since a contract was recently awarded to upgrade the NTC radio infrastructure. Over the next year the existing cellular telephone network for the exercise areas, first installed by Motorola, will be replaced by a trunked radio system. Later a new system based on Tetrapol, a digital trunked radio system popular in Europe, will provide observers and analysts with voice and data communications across the facility. Emergency and maintenance personnel will also be part of the system, which is expected to eventually support upwards of 10,000 users.

Of interest to radio aficionados is the nearby Goldstone Tracking Station, part of

the National Aeronautics and Space Administration (NASA) Deep Space Network (DSN). Although not as large as the Arecibo dish in Puerto Rico, the Goldstone main antenna has a diameter of 70 meters (about 230 feet) and is fully steerable. It can be linked to sensitive receiver equipment or used to send messages to deep space via a 500-kilowatt transmitter. Besides communicating with space probes, the dish is also used for

radio astronomy. Monitor 314.600 MHz for possible NASA traffic related to Goldstone.

◆ Wright-Patterson Air Force Base, Ohio

The Wright-Patterson Air Force Base near Dayton, Ohio, operates a Motorola Type II system for base operations. Known by locals as "Wright-Pat," the on-base museum rivals the Air and Space Museum and has been a common sightseeing stop for attendees of the annual Dayton HamVention held every May.

This system is reported to use the following frequencies: 406.350, 406.550,

407.150, 407.350, 407.500, 407.950, 408.750, 408.950, 409.550, 409.750, 409.900 and 409.950 MHz.

The base frequency is 406.350 and the offset is 50 kHz. Talkgroups of interest include:

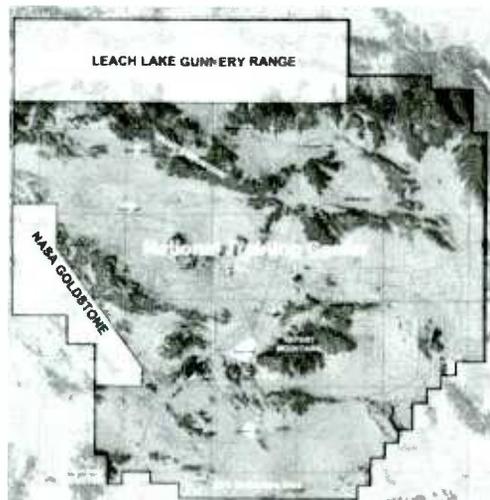
176	Crash
272	Crash
592	Medical
976	Aircraft Fueling
1008	Flight Operations
1040	Security (Car-to-Car)
8016	Security 1
8048	Security 2
8080	Security 3
11312	Flight Operations

While you're in the area, be sure to monitor the control tower on 126.9 MHz and ground control on 121.8 MHz. Remember that aviation radio transmissions are almost always in AM (amplitude modulation) mode.

◆ Kings Bay, Georgia

The Naval Submarine Base at Kings Bay, Georgia, is home port to nearly a dozen Trident II ("boomer") ballistic missile submarines as well as a number of shore commands. On base is a Motorola Type II system with control channels apparently switching between 407.950, 408.750 and 409.550 MHz. Voice traffic primarily on 406.750, 407.550, 408.350, 409.150 and 409.950 MHz. Telephone interconnect is reported on two frequencies, 406.350 and 407.150 MHz.

I'd be very interested to hear what trunked radio systems you're monitoring, especially if they're in the 400 MHz band, so send me e-mail at dan@signalharbor.com. More information about these and other radio topics is available on my website at <http://www.signalharbor.com>. Until next month, happy monitoring!



- * 5.3ft solid 6-panel C/Ku dish, polar mount, add Hq18 and scan 120 azimuth. S150 + S80SH (Ku holder \$25 extra)
- * 4.5ft solid 6-panel C/Ku dish, patio mount, fixed satellite. S80 + S50SH (ku LNB 23mm holder \$25 extra)
- * Digital C-LNB 20 deg NF + scalar ring, \$49 + S10SH
- * Superjack 18" actuator for 5.3ft, HD18, S59 + S20SH
- * Integro I1910s hdvr stb \$899 + S255H

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Monitoring Military Demonstration Groups

There is nothing quite as thrilling as going to one of the many public air shows across the country and watching the Blue Angels or Thunderbirds flight demonstration team strut their stuff in front of thousands of fans. But if you add to the visual drama in front of you the element of radio, you will have a whole new perspective that few enjoy.

Since the 2002 air show season starts this month, we present our annual frequencies to monitor, review of equipment, and the military demonstration team schedules (Table One) for the upcoming 2002 air show season nationwide.

So where is the action?

You will need to concentrate on four different bands for air show activity. Search in the 118-136 MHz band (AM mode at 25 kHz steps), 138-150.8 MHz band (minus 144-148, in both the AM and Narrow FM modes in 12.5 kHz steps), 118-136 MHz (AM mode in 25 kHz steps), and finally 225-420 MHz (AM in 225-400 in 25 kHz steps/Narrow FM in 406-420 MHz in 12.5 kHz steps).

The following discrete frequencies have been reported in use by the **U.S. Navy Blue Angels** during the past four seasons.

Frequency Usage

142.000	Ground support (Comm Cart)
143.000	Tower Observer
143.600	Ground support, occasional Air-to-Air reported here
164.900	Engine Start/Taxi Out Ground support (Comm Cart)
168.900	Engine Start/Taxi Out Ground support (Comm Cart)
169.400	Engine Start/Taxi Out Ground support (Comm Cart)
170.900	Engine Start/Taxi Out/Maintenance Ground support (Comm Cart)
236.450	Miscellaneous Air-to-Air (Eastern U.S.)
238.150	Show center/Delta formation (Eastern U.S.)
251.600	Solo formation (Aircraft 5/6) Air-to-Air
256.250	Usage unknown
263.350	Fat Albert (Blues C-130 Transport Aircraft), plus FA JATO flight demonstrations
263.500	Blue Angels/Fat Albert
264.550	Diamond/Solo formations
275.350	Diamond formation (Aircraft 1-4) Air-to-Air
286.000	Usage unknown
302.150	Miscellaneous Air-to-Air (Western U.S.)
307.700	Show center/Delta formation (Western U.S.)
321.100	Blue Angel Operations
345.900	Solo formation (Aircraft 5-6) Air-to-Air

The **U.S. Air Force Thunderbirds** are always a crowd favorite. The following frequencies have been reportedly used by the Thunderbirds during the last four seasons.

Frequency Usage

140.400	Support Aircraft: Cross Country Air-to-Air
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141.850	Four ship formation (Victor 1) Show Air-to-Air which is linked to public address system (AM mode)
143.850	Four ship formation (Victor 2) air-to-air which is linked to public address system (AM mode)
235.250	Thunderbird Control
269.900	Thunderbird Control to Air Boss
322.950	Solo aircraft (5-6) Show Air-to-Air
413.025	Maintenance/ground teams <channel 1> (NFM 146.2 PL tone)
413.100	Maintenance/ground teams <channel 2>
413.275	Maintenance/ground teams
413.375	Maintenance/ground teams

Both the Navy and the Air Force have aircraft special demonstration units in addition to the flight demonstration units mentioned above. Here is a list of known units and their frequencies.

US Air Force A-10 Flight Demo Teams (Nationwide):	32.350 34.125 34.175 34.350 34.375 34.575 36.150 36.350 36.850 38.670 40.200 46.650 49.750 139.675 140.000 (all tentative identifications, confirmation requested)
US Air Force F-15 Flight Demo Team (Misc):	275.675
US Air Force F-15 Flight Demo Team (East):	228.450 233.525 238.825 252.775 257.075 264.975 276.675 282.675 282.800(S) 298.350 359.225
US Air Force F-15 Flight Demo Team (West):	384.550
US Air Force F-16 Flight Demo Teams (Shaw units):	260.400 282.800
US Air Force F-117 Flight Demo Discrete:	304.900
US Air Force Combat Search and Rescue Demonstrations:	251.900
US Navy F-14 Flight Demo Teams:	299.500 311.500 341.200 342.900 342.950 345.000
US Navy F/A-18 Flight Demo Teams:	333.300 (very tentative)
US Coast Guard Rescue Demo Teams:	381.800

Military Parachute Teams

The colorful **U.S. Navy Seal Parachute Team**, known as the **Leap Frogs**, are frequent visitors around the country at various sporting events and air shows. Look for their communications on 407.500 MHz.

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

During 2001 I received several reports that the Golden Knights were using three civilian UHF frequencies (462.625 a business itinerant frequency known as Black Dot, 467.5625, and 467.6125 MHz). Some reports indicated that the Golden Knights might be using Family Radio Service radios. It might be a good idea to keep FRS frequencies in your airshow scanner loadout as you might hear some interesting activity on these frequencies during airshows. The standard FRS

frequencies are:

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

Other/Foreign Air Demonstration Teams

The Canadian Forces aircraft demonstration team (431 Air Demonstration Squadron) is also known as the **Snowbirds**. The following have been recently reported for this popular aerial team: 246.500, 272.100 (air-to-air primary), 284.900 (solo aircraft), 299.500 (air-to-air enroute), and 333.300 MHz.

Some other foreign and US flight demonstration teams that have been reported to us during the last couple of years include:

120.300	Extra 13 Flight Demonstration Team
122.750	Patty Wagstaff
122.825	Ian Groom's FedEx aerobatic Demonstration Team
130.500	Spanish Military LA Patrulla Aguila Flight Demonstration Team
136.175	Chilean Military Falcones Flight Demonstration Team
136.975	UK Army Air Corps Blue Eagles Helicopter Flight Demonstration Team
	Northern Lights Flight Demonstration Team
138.450	France Air Force La Patrouille Adecco Flight Demonstration Team
141.825	France Air Force La Patrouille Adecco Flight Demonstration Team
143.100	France Air Force La Patrouille Adecco Flight Demonstration Team
243.450	UK Air Force Red Arrows Flight Demonstration Team
252.500	Spanish Military Aguila Flight Demonstration Team
255.100	UK Air Force Falcons Flight Demonstration Team
264.400	Turkish Military Stars Flight Demonstration Team
279.600	Turkish Military Stars Flight Demonstration Team
288.850	Swiss Military Patrouille Suisse Flight Demonstration Team
307.800	Italian Military Freccia Tricolori Flight Demonstration Team
465.100	UK Air Force Falcons Flight Demonstration Team
469.500	US Confederate Air Force Tora Team
469.550	US Confederate Air Force Tora Team

Not Just Any Old Scanner

Most of the handheld scanners currently being marketed are *not* suited for air show monitoring. None of the Uniden brand scanners currently being sold (except for the BC-780) can be used for air show monitoring due to their lack of independent mode selection. If you are going to an Air Force Thunderbird show you will need a scanner that can monitor the 138-150 MHz military land mobile band in the AM mode. Almost all the Uniden scanners currently available (including all their handheld models) will be unable to receive any of the VHF T-bird transmissions because these scanners lock you into the FM mode in that frequency range.

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

I am frequently asked on the Grove Tech line what scanners are the best for air show monitoring. Below is a list of those units that we feel should be considered for this type of monitoring. This list continues to grow (especially in the area of wideband handhelds), and I am happy to report that scanner enthusiasts now have a wider range of products and prices to choose from. We have also included in this year's list base/mobile models and antennas suitable for milair monitoring. Please note that all of these antennas are omnidirectional, which I recommend for monitoring military aircraft communications. You will not be as successful in milair monitoring if you use directional type antennas.

Information below includes current Grove stock codes/prices for the items indicated, but the price does not include shipping or taxes (if applicable). Prices are subject to change without notice so be sure to call the Grove order department at 800-438-8155 or visit our website at <http://www.grove-ent.com> for current pricing.

Handheld Unit	Grove Stock No	Price
Alinca DJ-X2T	SCN03	\$199.95 (On Sale)
Alinca DJ-X3T	SCN11	\$249.95
Alinca DJ-X10T	SCN01	\$349.95
Alinca DJ-X2000T	SCN10	\$499.95
AOR AR-8200 Mk IIB	SCN50	\$559.95
Icom R-2	SCN05	\$169.95 (On Sale)
Icom R-3	SCN07	\$349.95 (On Sale)
Icom R-10	SCN04	\$289.95 (On Sale)
Yaesu VR-500	SCN06	\$324.95

Base/Mobile Unit	Grove Stock No.	Price
AOR-3000AB	SCN26	\$1062.95
AOR-5000 + 3	RCV42P	\$2119.95
AOR-8600	SCN08	\$899.95
Icom R-8500	RCV14	\$1449.95
JRC NRD-545 w/converter	RCV21DS/ACC11DS	\$1799.95 + \$349.95
Uniden BC-780 Base/Mobile	SCN49	\$349.95
Yaesu VR-5000	RCV51	\$899.95

Computer Receivers	Grove Stock No.	Price
*Icom PCR-100	RCV44	\$249.95
*Icom PCR-1000	RCV45	\$349.95 (On Sale)
WinRadio WR-1550e	RCV47-E	\$549.95
WinRadio WR-1550i	RCV47-I	\$499.95
WinRadio WR-3150e	RCV48-E	\$1849.95
WinRadio WR-3150i-DSP	RCV48-I	\$1549.95 (On Sale)
WinRadio WR-3500e	RCV49-E	\$2395.95
WinRadio WR-3500i-DSP	RCV49-I	\$2395.95
WinRadio WR-3700e	RCV50-E	\$2895.95
WinRadio WR-3700i-DSP	RCV50-I	\$2895.95

Antenna Recommendations	Grove Stock No.	Price
AOR DA-3000 (Base)	ANT11	\$129.00
AOR MA-500 (Mobile)	ANT12	\$99.00
Austin Condor Flex (Handheld)	ANT14	\$29.95
Diamond Discane (Base)	ANT09	\$99.95
Grove Omni-II (Base)	ANT05	\$29.95
Nil-Jan Super-M (Mobile)	ANT10	\$79.95
Scantenna (Base)	ANT07	\$54.95
Stealth Mobile Ant. (Mobile)	ANT30	\$34.95
WinRadio AX-12B (Base)	ANT35	\$4,799.95
WinRadio AX-31B (Base)	ANT04	\$119.95

Another purchase you should consider is an extra set of charged batteries for your handheld. Murphy's law applies, and nothing is worse than having your NiCads die halfway through the show with your replacements at home in the shack.

During the 2002 season we want to hear from our readers about active demonstration/air show frequencies. If you attend an air show,

please pass along what you hear! You can reach me via e-mail at larry@grove-ent.com with a subject line of **Airshow Intercepts**, or you can write us at: Milcom, 7540 Highway 64 West, Brasstown, NC 28902.

Thanks to our many contributors who took the time to share their air show reports with us last year. In the meantime, we will see you again in two months and good hunting to all.

Table One: Military Demonstration Teams 2002 Performance Schedule

Note: Demonstration schedules dates listed are subject to change.

Group Abbreviations		
BA=USN Blue Angels	Jun 27	SB: Cobourg, ON
TB=USAF Thunderbirds	Jun 28-30	SB: London, ON
SB=Canadian Snowbirds	Jun 29-30	BA: London, ON; TB: N. Kingstown, RI; GK: Anchorage, AK/Joplin, MO
GK=Golden Knights (Schedule for Black, Gold & Headquarters Teams combined)	Jul 1	SB: Canada Day, Ottawa, ON
	Jul 3	GK: Dubuque, IA
	Jul 4	TB: Battle Creek, MI; SB: Battle Creek, MI
	Jul 6-7	BA: Traverse City, MI; TB/GK: Syracuse, NY; SB: 15 Wing Moose Jaw, SK
	Jul 12-13	BA: Pensacola Beach, FL
	Jul 13	TB/GK: Terre Haute, IN
	Jul 14	TB: Ft Wayne, IN; GK: Terre Haute, IN
	Jul 13-14	SB: Edmonton, AB
	Jul 20-21	BA: Helena, MT; TB/GK: Dayton, OH; GK: Gary, IN
	Jul 24	TB: Cheyenne, WY
	Jul 27	TB: Malstrom AFB, MT; SB: Yellowknife, NT; GK: Minot, ND
	Jul 27-28	BA: Point Mugu, CA
	Jul 28	TB: Fairchild AFB, WA; SB: Peace River, AB; GK: Spokane, WA
	Jul 31	SB: Terrace, BC
	Aug 3-4	BA: Seattle, WA; SB: Lethbridge, AB; GK: Ellsworth AFB, SD
	Aug 3-6	GK: North Bay, ON, Canada
	Aug 7	SB: Esquimalt, BC
	Aug 9-11	SB: Abbotsford, BC
	Aug 10-11	TB: Westover ARB, MA
	Aug 17	TB: Portland, OR
	Aug 17-18	BA/GK: Chicago, IL; SB: Saskatoon, SK; GK: Hillsboro, OR
	Aug 18	TB: NAS Whidbey Island, WA
	Aug 24-25	BA/GK: Offutt AFB, NE; SB: Thunder Bay, ON; GK: Eau Claire, WI
	Aug 28	SB: Brantford, ON
	Aug 31-Sep 2	BA: St. Louis, MO; TB/GK: Cleveland, OH; SB: Toronto, ON; GK: Chesterfield, MO
	Sep 7-8	BA: Toledo, OH; TB/GK: Lubbock, TX; SB: 12 Wing Shearwater, NS; GK: Greenfield, IN
	Sep 11	SB: Bathurst, NB
	Sep 14-15	BA/GK: McConnell AFB, KS; TB/GK: NAS Willow Grove, PA; SB: Ottawa (Samia), ON
	Sep 20	GK: NAS Oceana, VA
	Sep 21	TB/GK: Grand Junction, CO
	Sep 21-22	BA/SB/GK: NAS Oceana, VA
	Sep 22	TB: Holloman AFB, NM
	Sep 25	SB: Sportanburg, SC
	Sep 28-29	BA: Augusta, GA; TB/SB: NAS Patuxent River, MD; GK: Tupelo, MS
	Oct 2	SB: Whiteman AFB, MO; GK: Tucuman, NM
	Oct 5-6	BA/GK: Salinas, CA; TB: Nellis AFB, NV; SB: Page, AZ
	Oct 12-13	BA: San Francisco, CA; TB/GK: Ft Worth, TX; SB: Springfield, IL; GK: Monassas, VA
	Oct 19	TB: Shaw AFB, SC
	Oct 19-20	BA/GK: MCAS Miramar, CA
	Oct 20	TB: Seymour Johnson AFB, NC
	Oct 25	GK: NAS/JRB New Orleans, LA
	Oct 26	GK: Edwards AFB, CA
	Oct 26-27	BA/GK: NAS/JRB New Orleans, LA; TB: Houston, TX
	Oct 28-Nov 3	GK: San Antonio, TX
	Nov 2	TB: Lackland AFB, TX
	Nov 2-3	BA: NAS Jacksonville, FL
	Nov 3	TB: Cannon AFB, NM
	Nov 8-9	BA: NAS Pensacola, FL
	Nov 9-10	TB: Lake City, FL
	Nov 16	GK: Richmond, VA
	Dec 5	GK: Army vs Navy, Philadelphia, PA
		*Pending approval.

Nothing is forever...

FM stations and smaller AM operations come and go all the time. We tend to think of larger AM stations as something permanent. No WGN? WABC broadcasting in Spanish? KNX going religious? Any of it would be hard to imagine. But things do change on the AM dial – even at the largest stations – and we have several such items this month.

The first disappearing station is **KAIM-870**. KAIM was the most powerful AM station in Hawaii, the only one authorized for 50kW of power. They left the air at the end of 2001, moving some programming to co-owned KGU-760. Management cited several reasons for the shutdown – a marginal signal in Honolulu (KAIM's transmitter is on another island); zoning hassles at the transmitter site; and a desire to increase power at co-owned KRLA-870 near Los Angeles.

The disappearance of KAIM will make it harder to log Hawaii, but not much. Other stations (notably KGU) are far more frequently reported heard on the mainland, despite lower power.

WSM-650 doesn't intend to disappear, but the country music might. According to an article in the December 21st edition of the *Tennessean*, the station's owners are re-evaluating its format. Gaylord Entertainment also owns two FM stations in Nashville – WSM-650 is the least profitable of the bunch. The "Grand Ol' Opry" is not in danger; the article says a deal is near to air WSM's most famous program on a syndicated network of stations. There is, however, a good chance WSM's classic country format could be swapped to one of the FM stations, making WSM a news/talk outlet. There aren't many music stations left on AM!

AM stations keep disappearing in Canada, too. Three stations in British Columbia – **CKMA-850**, **CFSR-1270**, and **CKGO-1240** – have left the air, having moved to FM. And in Winnipeg, **CKY-580** is one of several applicants for 99.1 FM. If granted, it would mean the demise of the last three-letter callsign on a private AM station in Canada.

(Three-letter calls would live on on **CKY-TV**, and on **CKX-FM** and **TV** in Brandon.) Finally, in a three-way deal, Regina is losing a historic station. **CKRM-980** is to take over **CKCK-620**'s frequency; **CJME-1300** will get 980; and **CKCK** (and the 1300 kHz frequency) will disappear altogether.

◆ Bits and Pieces

- Patrick Griffith near Denver caught travelers-information station **WPD1548-540** at the Denver International Airport carrying an "impromptu DX test." They were running "legibility test" messages, interspersed with IDs and brief selections of classical music. It's not very often you hear music on these stations!

Another "TIS" station, **WPRI268-1620** in Leominster, Massachusetts, ran a real DX test in early December. Morse Code IDs and test tones were used, and the station was heard as far away as Ontario.

- If you stumble across Morse Code while scanning the AM dial, stop and pay careful attention. Someone is running a test, probably on increased daytime facilities, so it's likely to be a station you don't normally hear. This winter, these tests have been arranged without enough notice to meet *MT*'s deadline. The best way to

make sure you know about these in time is to join one of the AM DX clubs, the NRC and/or IRCA.

- All New York VHF TV stations are now operating from the Empire State Building. The temporary facilities on Armstrong's Alpine, NJ, tower proved inadequate to provide decent coverage of the city, and opposition from neighbors stalled plans to expand the tower or increase power.

With the exception of **WCBS-TV** (which had an existing site there) these stations are still operating on reduced power. The electrical cables atop the Empire State aren't big enough to support all seven stations at full power. In December, Congress allotted \$8.2 million to the stations to begin work on a replacement tower, one designed to hold only TV stations. The new tower could be as tall as 2,000 ft. Finding a site will be a problem, though; locations that don't raise aesthetic objections may be too close to stations on the same channels in Boston, Baltimore, or Albany; or too close to New York's airports and flight paths.

- Canadians will be getting a bunch of new FM stations. In their last license renewal, the CBC was told to extend the coverage of *La Chaine Culturelle* to at least half of the French-speaking population of each province (75% in New Brunswick and Ontario), and to all ten provincial capitals. 18 new transmitters were requested to fill this mandate. Two of them – 89.9 in Paris, Ontario, and 107.9 in Windsor – will affect the normal reception of DXers in the U.S. All eighteen will be potential E-skip DX targets. *La Chaine Culturelle* is a cultural network, with mostly classical music programming.

Disappearing stations open up new "holes" in the band – opportunities to hear new and interesting stations. Are you hearing anything interesting on frequencies vacated by nearby stations? Write me at Box 98, Brasstown NC 28902-0098, or by email to w9wi@w9wi.com. Good DX!



KOLR-TV, 328 miles from my home in Tennessee, made an appearance on Dec. 5.

Pirate Shortwave Broadcasting Activity Explodes

Hardly a month goes by in *Monitoring Times* without news of contraction or extinction at some veteran international shortwave broadcasting station. Time after time the uncertain international political situation has exposed these moves as bad governmental decisions.

At the same time, we continually hear theories that a similar demise looms for unlicensed broadcasting. Nothing could be farther from the truth. Clandestine shortwave broadcasting is rising to what may be an all-time high, as Martin Schoech shows us at his amazing <http://www.clandestineradio.com> web site. Pirate shortwave broadcasters are also booming, as *MT's* readers found this month with three dozen stations logged.

◆ What We Are Hearing

North American pirate stations all operate near 6955 kHz, but frequencies can vary about 5 or 10 kHz depending on interference and propagation conditions. 6900 kHz is also worth a check.

Black Rock Radio- Ballad instrumental music is the format on this new one, which atypically gives its identifications in CW Morse code. (None)

Blind Faith Radio- Dr. Napalm occasionally mixes seasonal music with his classic rock. (Merlin)

Buckwheat Radio- South American music and rock music is an odd combination, but they have featured it lately. (Uses buckwheatradio@hotmail.com e-mail)

Captain Morgan- This new one appeared with tunes from Steppenwolf and Garth Brooks, an odd combination. (None)

Crunch Radio- Their eclectic format even included some classical music lately. (Still none)

East Coast Beer Drinker- He offered free beer to DXers sending loggings to *The ACE*. (Blue Ridge Summit)

Fake Radio Three- Sal Amoniac again joins the ranks of pirates who have been parodied. (None)

Happy Hanukkah- They always appear around the holidays, but last year they were active at other times as well. (Merlin)

He Man Radio- He Man, the world's manliest broadcaster, still says that he uses upper sideband because it is manly. (Blue Ridge Summit)

KIPM- Alan Maxwell seems to have an unlimited supply of complex drama programs. When he's on the air, marathon shows often ensue. (Elkhorn)

KRMI- Radio Michigan International had Santa Claus swearing at children; times are tough. (Uses KRMI6955@hotmail.com e-mail)

Melvin Malfunction Radio- Melvin's parody broadcasts produced the QSL that we see this month. (Uses melvinmalfunction@yahoo.com e-mail)

Oxycontin Radio- Sixty year old popular music has a place on shortwave; at least that's what this station believes. (None)

Paragon Radio- We still don't know much about this new one, but they have been repeatedly active. (None)

Psyco Radio- Rock music dominates on this one, but a "We Want Psyco" chant is new. QSLs are still extremely rare. (Uses psycoradiohd@yahoo.com e-mail)

PUNK Radio- He's a newcomer who so far has just QSOed on the pirate bands, but he promises 2002 programming. (None yet)

Radio Bingo- Here's a tip. This bingo game appears to be fixed. The same guy wins every time. (Merlin)

Radio Cochiguaz- This South American pirate has been widely heard in North America about once a month on 11440 kHz. (Santiago)

Radio Free Euphoria- The Maharishi does not seem to have cut back on the ganja this year. (Belfast)

Radio Free Speech- Bill O. Rights is back, with a powerful pirate advocacy program in AM on 6900 kHz. (Belfast)

Radio Piraña International- Another widely heard South American pirate has been using 11420 kHz on an occasional basis to North America. (Blue Ridge Summit)

Radio Three- Sal Amoniac is still with us. (None; QSLs logs in *The ACE*)

Radio Tornado Worldwide- Radio Metallica has been inactive for a long time, but Dr. Tornado's influence on pirate radio was so great that he still gets parodied. (None)

Radio Toronto- They announce that their studios are on the 14th floor of a Toronto office building. (Merlin)

Rizzo Radio- It's been years since Frank Rizzo was the mayor of Philadelphia, but this pirate station remembers him. (Uses rizzoradio@yahoo.com e-mail)

Slim Shady Radio- Here's another new one with an urban ghetto humor format. (Uses slimshadyradio@yahoo.com e-mail)

The Purple Nucleus of Creation- A newcomer in 2002, they play new age music. (Try Elkhorn)

United Patriot Militia Bingo- Former clandestine broadcaster Steve Anderson remains at large from the Kentucky State Police, but his pirate parody lives on. (Merlin)

Voice of Captain Ron Shortwave- Ron's format remains rock music. (Uses captainronswr@yahoo.com e-mail)

WHYP- James Brownyard has been the most active pirate station of the century so far. (Uses whyp1530@yahoo.com e-mail)

WKUE- Another ancient veteran pirate has reactivated. This one has an oldies format. (Blue Ridge Summit)

WLIQ- This old-timer has long been inactive, but their return featured rockabilly music. (None)

WMFQ- They certainly hold the record for the most consistent promotion of pirate QSLs in



history. (Providence)

WMOE- The station is a memorial to the Three Stooges. (Belfast)

WPAT- Using a slogan of the "Voice of Lake Superior," country music and truck driving songs are a staple here. (Uses wpat6955@hotmail.com e-mail)

Z-100- Their operator reveals that he's worked in commercial radio for 30 years, accounting for his highly professional sound. (Uses bigz100fm@yahoo.com e-mail)

◆ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. They don't make money; the funds cover postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses: PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 109; Blue Ridge Summit, PA 17214; PO Box 69, Elkhorn, NE 68022; PO Box 293, Merlin, Ontario N0P 1W0, Canada; and PO Box 159, Santiago 14, Chile. A few pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. Reports to the *Free Radio Network* (FRN) go to <http://www.frn.net/> on the web. *Free Radio Weekly* loggings go via niel@ican.net e-mail. Sample copies of *The ACE* bulletin are \$2 via the Belfast maildrop.

◆ Thanks

Your loggings and news are always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's contributors: Cachito, Santiago, Chile; Michael Clark, Cary, NC; Ross Comeau, Andover, MA; Gerry Dexter, Lake Geneva, WI; Garth Doetzel, Kamloops, British Columbia; Joe Filipkowski, Providence, RI; Mark J. Fine, Remington, VA; Ulis Fleming, Glen Burnie, MD; Harold Frogge, Midland, MI; William Hassig, Mount Prospect, IL; Rolf Haenggi, Gfell, Switzerland; Jim Keeling, Kansas City, MO; Ed Kusalik, Coaldale, Alberta; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Bill McClintock, Minneapolis, MN; Mike Prindle, New Suffolk, NY; Lee Reynolds, Lempster, NH; Martin Schoech, Merseburg, Germany; Lee Silvi, Mentor, OH; Niel Wolfish, Toronto, Ontario; and Bob Zeher, Raleigh, NC.

March Madness

March offers a final chance to bag some of the best loggings winter has to offer. If you've missed out on surfing the band until now, there is still time to try for some good DX before the "static" season returns. Elusive beacons in Northern Canada, Central and South America, Cuba, the Caribbean, and Pacific regions are all good bets at this time of the year.

By all accounts, conditions on longwave this winter have been fantastic. Why not document what you've been hearing and send a copy of your log to *Below 500 kHz*? QSL cards are also welcome (JPEGs and photocopies only, please) and may be used in a future issue of *MT*. As always, submittals, comments or questions can be sent to me at wb2qmy@arrl.net, or via postal mail at P.O. Box 98, Brasstown, NC 28902.

◆ Reader Loggings

First-time contributor Eddi Gorham (TN) wrote to say that he's begun exploring the longwaves with a Realistic DX-394 receiver and a homebrew 36-inch loop antenna. He uses a 365 pf variable condenser (capacitor) from an old broadcast set, and various fixed capacitors to tune the loop to the low frequencies. Eddi has logged over 30 beacons from his location in Southeastern Tennessee, but laments not having a directory to look them up. I've identified a sample of his logs in Table 1, using the *BeaconFinder Guide* (P.O. Box 56, West Bloomfield, NY 14585).

We are also pleased to have logs from Tim O'Hare (WA), representing the North-western U.S. Tim correctly points out that we don't seem to get many logs from his part of the country. His loggings are a most welcome change. Tim uses a professional-grade Racal RA-17 receiver, an RA-237-B LF converter and a Wellbrook loop antenna.

Table 1. Selected Beacon Loggings

FREQ.	ID	LOCATION	BY
200	UAB	Anaheim Lake, BC	T.O. (WA)
216	CLB	Wilmington, NC	E.G. (TN)
217	DPY	Deer Park, WA	T.O. (WA)
223	YKA	Camloops, BC	T.O. (WA)
230	PD	Pendleton, OR	T.O. (WA)
236	YZA	Ashcroft, BC	T.O. (WA)

236	GNI	Grand Isle, LA	E.G. (TN)
242	MMI	Athens, TN	E.G. (TN)
245	HE	Hope, BC	T.O. (WA)
264	SZT	Sandpoint, ID	T.O. (WA)
280	GVV	Grangeville, ID	T.O. (WA)
308	EVZ	Cartersville, GA	E.G. (TN)
323	OUK	Calhoun, GA	E.G. (TN)
326	BHF	Freeport/Gr. Bahamas Is.	E.G. (TN)
326	DC	Princeton, BC	T.O. (WA)
326	PKZ	Pensacola, FL	E.G. (TN)
329	CH	Charleston, SC	E.G. (TN)
338	PBT	Red Bluff, CA	T.O. (WA)
349	AAF	Apalachicola, FL	E.G. (TN)
350	NY	Enderly, BC	T.O. (WA)
353	LWT	Lewiston, MT	T.O. (WA)
354	LI	Little Rock, AR	E.G. (TN)
361	MNV	Madisonville, TN	E.G. (TN)
362	AWM	West Memphis, AR	E.G. (TN)
365	FT	Fort Worth, TX	E.G. (TN)
365	SFF	Spokane, WA	T.O. (WA)
379	BRA	Asheville, NC	E.G. (TN)
379	TL	Tallahassee, FL	E.G. (TN)
382	APT	Jasper, TN	E.G. (TN)
388	AM	Tampa, FL	E.G. (TN)
388	GE	Spokane, WA	T.O. (WA)
391	DDP	San Juan, PR	E.G. (TN)
394	DTE	Dayton, TN	E.G. (TN)
400	UWI	Dalton, GA	E.G. (TN)
403	BPO	Oneida, TN	E.G. (TN)
404	MOG	Montague, CA	T.O. (WA)
408	MW	Moses Lake, WA	T.O. (WA)
414	LYI	Libby, MT	T.O. (WA)
414	JUE	Lebanon, TN	E.G. (TN)
426	FTP	Fort Payne, GA	E.G. (TN)
426	IZS	Montezuma, GA	E.G. (TN)
521	INE	Missoula, MT	T.O. (WA)

◆ Right on Time

WWVB (60 kHz) has gotten a lot of press in the past few years because of their massive power increase (now 40 kW) and upgraded antenna system. These improvements have boosted WWVB's signal considerably, making it possible to incorporate miniature time-keeping receivers into consumer devices such as VCRs, wall clocks, and even some wrist watches.

A small radio-controlled desk clock by La Crosse Technologies recently caught my eye. For around \$20, I bought one for use in the radio room and have been very impressed with its quality and performance. Once per day, the clock taps into WWVB's 60 kHz signal and calibrates itself to the exact time of the National Institute of Standards and Technology atomic clock. The

radio clock runs on just one AA battery and includes an alarm, date and temperature display, 12/24 hour display format, and backlighting. I believe this is an ideal clock for the ham or SWL shack. While there may be other sources for this item, I found mine on the Heartland America website (<http://www.heartlandamerica.com>).



Radio-controlled clocks, such as this unit by La Crosse Technologies, take the guesswork out of timekeeping. Unit includes a built-in antenna for receiving WWVB's 60 kHz signal.

◆ End Notes

I've been known to stray above 500 kHz from time to time, especially when the topic involves beacons. As we ride out the peak of Solar Cycle 23, I've been devoting some of my time to the 6-meter amateur band (50 MHz). Although this band is far removed from longwave, I am attracted to it for many of the same reasons that brought me to the basement band (underdog status, exotic propagation modes, rich history, etc.) As a bonus, six meters is loaded with propagation beacons operated by hams in many countries of the world.

Most of these beacons operate in the 50.0 to 50.090 frequency range and use low power and modest antennas. If you have equipment for six, I encourage you to try hearing some of these interesting stations. To ID them, simply look up their amateur call signs at <http://www.QRZ.com> or other online directory. More information on six can be found in the book, *Six Meters – a Guide to the Magic Band*, by Ken Neubeck, WB2AMU. It is available from WorldRadio Books, 2120 28th St., Sacramento, CA 95818 (<http://www.wr6wr.com>).

Next month we will explore the longwave beacons of the New England states. Until then, 73 and best LW DX!

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Of Fine Old Bugs and Other Stuff

Recently, I was given a gift of a fine old Vibroplex Champion Semi-Automatic Key, also known as a "Bug." Utilizing Web resources available at Vibroplex's Web site (<http://www.vibroplex.com>), I was able to trace its pedigree back to 1948. A little cleaning and a few minor parts (most still available from the company) and I'll have a wonderful piece of radio art and tradition – one that I can actually learn to put on the air with a bit of practice.

When I joined the ranks of ham radio, electronic keying circuits were already inexpensive adjuncts to the hobby. This was not always the case. The only way to get *real* speed back in the good old days of radio was to use a semi-automatic key. The design was first patented in 1904 by New York inventor Horace G. Martin and with minor refinements it remains in use today.

These devices were made up of a series of levers and springs that would allow the user to send dashes manually by tapping a paddle in one direction. The trick came when you hit the paddle in the opposite direction and the key's mechanism would send a string of dots. Releasing the paddle would stop the process. Because only the dots were machine sent and the dashes were completed in a normal fashion the device was known as a semi-automatic key.

This system would allow a user to send code at the break-neck speeds of commercial operators. Keying speed was set by adjustment to springs, dampers and weights. It took a lot of tweaking to get a semi-automatic key to work at speeds much below 20 wpm. (How many Novices can recall putting a clothespin on the speed weight to slow down Daddy's bug?) The military would not even allow an operator to use a bug until he (back then I guess they all were he's) qualified at 20 wpm with a hand key.

You'll still hear a lot of folks using bugs on the air today. The senders usually have a noticeable weighting difference between their dits and dahs. But with a really good

operator you need to listen closely to catch their "swing." If they aren't running too much speed I'll try for a QSO, because these folks, more often than not, are old professional CW operators. They have some great stories to tell.

As I mentioned earlier, learning to send to a bug is a challenge but it is within the skill level of anyone interested in CW operating. As with most things, a lot of practice makes perfect.

You don't need to track down an old collectable like my Champion if you want to get involved with sending like the Old Masters did. Vibroplex is still in business (website listed above) and they still make bugs as well as a complete line of paddles for modern electronic keyers.

So how did the semi-automatic key come to be known as a bug? In the golden days of telegraph, a poor operator was called a "bug," and some operators bought a key from Vibroplex or a competitor and started using it without much practice. The result was poor sending, and the keys themselves became known as "bugs." But now, instead of being a term of derision toward an operator (we have "Lid" for that), the term bug is a term of endearment for one of the great inventions in radio history.

◆ Getting Ready for Hamfest Season

The snow should be beginning to melt, even in the more northern parts of the country. This means that this year's annual cycle of hamfests will be beginning soon. If you are like most hams there is probably a piece of equipment or two (or more) that you have

decided to be "excess." Now is the time to get things sorted out for your local sale. I've written in the past about helpful hints for buyers. Now it is the seller's turn. Here are a few hints to help you look forward to making those sales.

First and foremost, unless it is your intention to sell an item "as is" or in some other way incomplete, make sure that the item has all its parts and pieces. Anything missing can lead to a rig or accessory being given a jaundiced eye. I myself have passed up what might have otherwise been a good radio because a knob or other part was obviously missing. It always made me think that the rig was less than properly cared for. A few minutes looking through your drawers for that missing part or original equipment microphone will help to close the sale.

And while you're at it... Do all your potential buyers a great big favor and find the manuals that go with the items you are selling. Including the manual will always make a difference to a potential buyer.

There remains one more small task that may just make or break your sale. Clean your sales items up to as close to as new condition as possible. Even if what you are selling has been moldering on the floor of your basement for a couple of years, take some time to chip off the patina and get the item looking like something someone would be proud to have in their shack.

There is a notable exception to this rule of thumb, however. Truly collectable items are often better left with just a good dusting with a soft cloth. Leave it up to the buying collector to decide how much restoration they desire.

◆ Setting the Price

Something else you can do is hit the Web and try to get a sense of a reasonable and accurate price for the items you plan on selling. You want to get a fair price, of course, and taking a few minutes to see what the market will bear will prevent many a lost sale. Remember that you really need to be honest with yourself, too. A transmitter, receiver or accessory that is

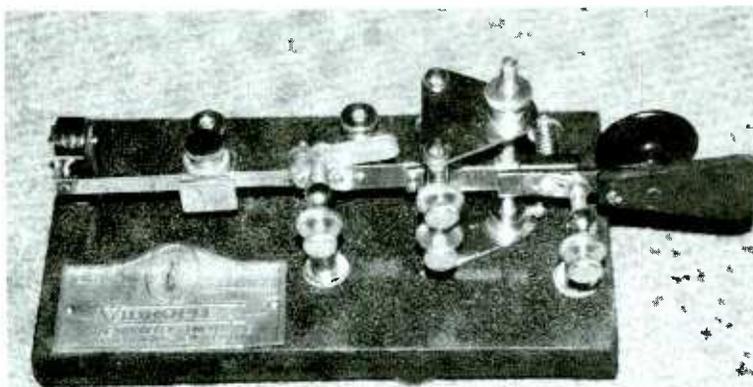




Photo courtesy of Bob Grove

less than a "10 out of 10" can still be sold if you are willing to price the equipment accordingly.

When I sell stuff at hamfests I always know my best price and what I determine to be the lowest I will go. I'm not one of these folks who consider it a sin to bring things home if they can't get a reasonable price. I'm willing to dicker, but if I want to give the equipment away I'll donate it to a school ham club. In other words, while being reasonable with your pricing for your buyers, it is perfectly okay to be reasonable with yourself as well.

Something else I started to do recently was frequent my local liquor store. No... the ham radio hobby hasn't driven me to drink. Discarded wine boxes are sturdy and serve as a great way for you (and your buyer) to carry around your sales items. Being able to offer a box with each major item sold enables you to include the proper manual and accessories in a convenient way for both you and your buyer. It keeps things together so you don't need to go rooting around at the last minute. I also bring along some shopping bags for my smaller items. If you have ever seen somebody trying to juggle half a dozen hamfest purchases, you will see that offering a box or bag can be a real sales closer.

The day before you go to set up at the hamfest, take a trip to your local bank for change. Some one and five dollar bills and a pocket full of quarters will make the dealing easier. You won't need to round something down to make a sale just because you didn't have change.

My last rule for selling at hamfests comes as a request. I love the dickering and horsetrading. I'll go nose to nose with anyone with one notable exception. Anyone who appears to me to be an obvious beginner, someone just getting started in ham radio, gets my rock bottom, if-I-go-any-lower-my-kids-will-starve price. I do this because I know some folks did it for me when I was starting out. It made a difference. You can, too.

❖ QSLing Post-9/11

The world has become a very strange place. We are encountering changes we never

expected since last fall's disasters at the World Trade Center and Pentagon. The first thing that gave many of us pause and brought home the point that our world had changed for us in a personal way was the anthrax scare in late September. The Mercer County New Jersey postal facility that was so prominent in that event was the local service for the place where I work. Needless to say, strange things occurred with the mail system for a while.

However, as far as I can tell, things are back to normal with one notable exception. It seems my domestic QSL return rate has dropped dramatically. I've told you in this column that I QSL every station I work. I send along return postage to those stations I really desire a card from (for award credit, etc.) But even those folks from whom I do not expect a reply because of return postage very often QSL. Or at least they have up until now.

I checked my logs and I had a domestic QSL return rate of over 60% prior to the anthrax problem. Since then it has dropped to under 30%. This is... as they say... statistically significant. I am not complaining. As I've stated before, I don't expect a return card if I haven't sent postage. I just find it a curious turn of events.

I plan to spend a little time reaching out to folks to try to find out if there is something to all this - out of curiosity, not out of fear that our postal system has collapsed or that the fellowship that Amateur Radio is known for has fallen by the wayside. Whatever the reason for the drop in domestic

QSLing (or at least New Jersey QSLing), I think it is time for the powers that be in the various clubs and award sanctioning bodies to seriously consider electronic QSLing and verification. Why should the enjoyment of our hobby be affected in any way by the postal system, now that there are so many ways to make secure online transactions?

You may have noticed that I haven't expressed any concerns about DX QSLing. The reason for this is that I use the ARRL Outgoing Bureau (<http://www.arrl.org/qs/qsout.html>) for almost all my overseas QSLs. This system stands the test of time and saves a lot of money, too.

Have fun. I'll see you on the lower end of 40 meters.

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March 10

Wisconsin QSO Party
1800 UTC, Mar 10 - 0100 UTC, Mar 11

March 16

Alaska QSO Party
0000 UTC, Mar 16 - 2400 UTC, Mar 17

Virginia QSO Party
1800 UTC, Mar 16 - 0200 UTC, Mar 18

March 25

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BC453/R23A Pinouts and Alignment

In last month's column, I got as far as giving you the pinouts for the local control plug in the recessed enclosure behind the BC-453's front panel. I also discussed how to wire a phone jack, BFO switch and gain control to this plug. The proper size for the gain control, by the way, is 50k. The pinouts for the R23A, which is a Navy (ARC-5 series) version of the same receiver, are the same except there is no headset output available at the plug. Pin 4 (see plug layout in last issue), which is headphone output on the BC-453, provides audio for use with instrument landing equipment (not usable for headphones) on the R23A.

If you want a phone jack at this location in the R-23A, it will be necessary for you to jumper a special connection from the socket at the rear of the set (to be discussed). The equivalent Navy set in the ARA series (#46129) seems to be identical to the BC-453 in all ways, and thus should have headset audio at pin 4. I have not seen a schematic of this set, however.

◆ Making Power Connections

To get power into this radio, you can use the 7-pin socket on the chassis rear apron or the 3-pin plug on the dynamotor deck. If there is a dynamotor installed (doubtful, these are rare), unsnap the fasteners and remove it before applying power – even if you are using only the rear plug. I'm including views of both plugs, as seen from the front. Plug connections are identical in the BC-453 and R-23A.

Connect 24 volts a.c. from a transformer supplying at least 0.5 amperes between pins 1 (ground) and 2 of the dynamotor plug or between pins 1 (ground) and 6 of the rear apron socket. A word of caution: make sure your set is still wired for 24-volt operation of the filaments before hooking up power (see discussion in December issue). Otherwise, use a transformer of the correct voltage. Plate voltage (320 to 350 volts @ at least 50 mA) is applied between pins 1 and 3 (plus to 3) of the dynamotor plug or between pins 1 and 7 (plus to 7) of the rear apron socket.

Note that the rear apron socket has pin connections for the gain and CW oscillator controls, as well as headset audio (marked "TEL" in the diagram). You won't need these extra gain and CW control connections. But in the R-23A, this headset output connection

is the only one available. As mentioned, you might like to run a wire under the chassis from this location to the front of the set. You can connect it to pin 4 of the local control plug (just snip and tape up the wire now connected there) – thus providing a headset connection analogous to that on the BC-455.

If you connect the transformer, plate voltage supply, and controls as discussed, the little command set will likely work as soon as you turn the power on. Do you lack a local tuning knob? One classical method is to use the knurled screw-in top from a fuse holder assembly. Cut a slot in the hollow end of the top to allow it to expand over the tuning spline as you push it on; also, fill the cavity with Duco cement. Force the hollow end over the spline and allow this assembly to dry overnight before using.

◆ Realignment

My set seemed to perform in lively fashion when powered up, even in a basement and with just a few feet of wire as an antenna. And if you obtain the same results, that may be as far as you want to go. However, I decided to put my set through a complete realignment just to make sure it was performing as closely as possible to its original specs.

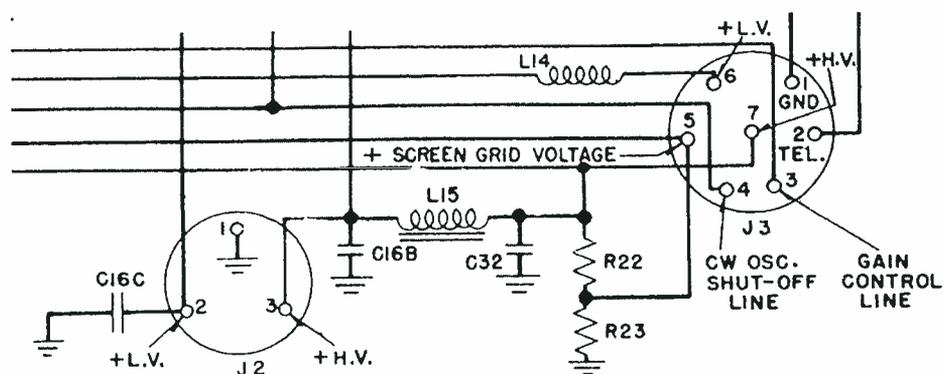
I'll give you an overview of the process here. But if you would like carry out this realignment, you should have a copy of the detailed, government-prescribed procedure. Fair Radio Sales offers a photocopy of the military maintenance booklet for ARC-5 (R-XX) receivers and transmitters (*AN/ARC5 Bench Test And Alignment*). The alignment proce-

dures given there also works for the "BC-xxx" sets. This is the same reference I used, and cost is a very reasonable \$8.50. Contact Fair Radio Sales at 419-227-6573; 1016 E. Eureka, Lima OH 45802; <http://www.fairradio.com>

Speaking broadly, the alignment process is similar to the ones we carried out on the Philco *Transitone* and the National SW-54 in earlier restorations. It's perhaps more like the *Transitone* because the BC-453 has just one band, not four like the SW-54. However, there are a few extra adjustments to make because the BC-453 is a more sophisticated radio than either of those sets.

For a signal generator, I used the Triplet 2432 we restored in an earlier column. My audio output indicator was a Radio Shack "FET VOM" (essentially a "vacuum tube voltmeter" that uses semiconductors instead of tubes), set to a low a.c. volts range. This sensitive unit allowed me to measure low levels of audio directly at the 453's audio output pin. I could have used an ordinary VOM for this purpose, as I have in the previous alignments we've gone through. In that case, the instrument would have been connected to the plate of the 12A6 audio output tube via a blocking capacitor.

There are three i.f. transformers to adjust, not two as in the earlier sets. And, since calibration must be maintained more accurately in the military set, there is an oscillator padder adjustment in addition to the oscillator trimmer. The trimmer is used to set dial calibration at the high end of the dial; the padder at the low end. It's also important to note that the BC-453 has a stage of r.f. ampli-



Detail from BC-453 schematic showing front views of 3-pin dynamotor plug and 7-pin rear apron socket.

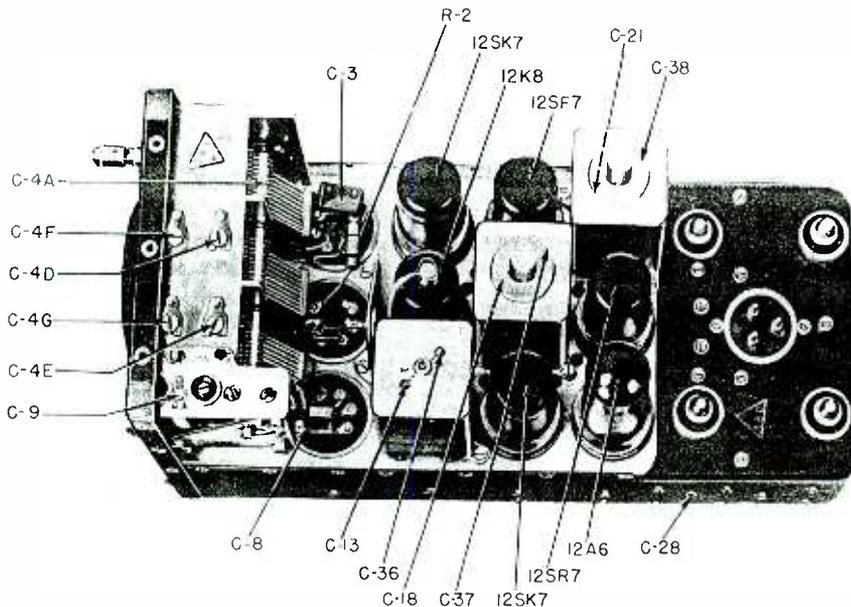


Illustration from government maintenance booklet shows all alignment adjustment points. Dynamotor deck at right. Cover removed from i.f. transformer in foreground to show top of Bakelite "coupling rod" and adjustment trimmers (C-13 and C-36). BFO trimmer (C28) is accessed through side of chassis. Normally, main tuning capacitor assembly at front of set would be covered with an aluminum housing. The oscillator trimmer (C-4E), oscillator padder (C-9), and r.f. trimmer (C-4D) are accessed through holes in the housing. The other trimmers (C4-F and C4-G) are not used in a normal alignment and do not have access holes.

fication ahead of the mixer (in the other sets, the signal from the antenna went directly to the mixer). However, this does not add another adjustment; there is still just a single r.f. trimmer.

The i.f. transformer adjustment is a little unusual. The transformers are deliberately "overcoupled" to make the radio tune a bit broadly (in order, I suppose, to make it easier to capture signals under the stress of battle conditions). However, this condition makes it difficult to peak the transformer adjustments. And so the coupling is made adjustable. To loosen the coupling to make the tuning sharper for alignment purposes, one removes a screw-on cover from the top of the transformer and pulls up a Bakelite rod set into the center. Removing the cover also exposes the i.f. trimmer adjustment screws. With the alignment completed, the rods are pushed back in and the covers replaced.

With the i.f. transformer rods pulled out, alignment begins, as usual, with the i.f. transformer trimmers – starting with the last transformer and proceeding back to the first. For this procedure, the signal generator is set to produce a modulated signal at 85 kHz (the i.f. frequency) and fed to the mixer grid (top cap of the 12K8) via a small capacitor. Then (for this adjustment only) the BFO is turned on, the signal generator modulation turned off, and the BFO trimmer set for zero beat. With signal generator and receiver set at 520 MHz, modulation on again and BFO off, the oscillator trimmer is peaked.

By the way, in the government mainte-

nance booklet, shutting off the BFO is referred to as "switching to MCW." Then and now, beacon transmitters send their dots and dashes in modulated CW – which means that the tone is already present in the signal and a BFO is not necessary to receive it.

Now the connection from the signal generator and capacitor is switched to the antenna post of the receiver with the frequency settings left as is. The r.f. trimmer and the little "Align Input" (antenna coupling) control on the receiver's front panel are peaked. Then the oscillator trimmer is touched up again.

Leaving the signal generator connection unchanged, the frequency settings of the signal generator and receiver are moved to 210 MHz and the oscillator padder is peaked for maximum output. Then it's back to 520 MHz settings and a repeaking of the oscillator trimmer. The padder and trimmer adjustments are repeated several times (changing frequencies appropriately each time) until no further improvement is noted when repeaking the oscillator trimmer. Finally, still at 520 MHz, with modulation off and BFO on, the BFO trimmer is readjusted for zero beat. Now the i.f. transformer rods are pushed down, the covers are replaced, and the radio is good to go.

❖ Listening Test

After buttoning up the little BC-453, I couldn't wait to connect it to an antenna and try it out. I've never done much listening at these frequencies so it would be a new experience. Unfortunately, right now all I have is a temporary antenna running about 25 feet

straight up into a tree. And, as all new LF listeners quickly find, the man-made noise level at these frequencies is appalling.

I made my first test at about 10 o'clock one evening and could hear little other than one strong beacon and those infernal buzzes. Assuming the problem was probably the alley street lamps and the neighbors' patio lights (all mercury vapor and close to my shack), I got up at dawn to try again. I switched on the radio just *before* all those lights went off and found the listening much quieter! A little later, after all lights were extinguished, the noise suddenly reached the same annoying level as the night before. Perhaps the problem is really TV set radiation, which I understand is a major offender; that would have been about the right time for people to be switching on the morning news.

At any rate, after a little experience tuning the beacon signals and listening "around the buzz," I was able to make several loggings – mostly around the Chicago area, where I live. The Chicago beacons were: HK (332 kHz), UG (379 kHz), MX (248 kHz), OR (394 kHz), OH (368 kHz) and ME (352 kHz). I can also boast a tiny bit of "DX": LaPorte IN (IUL on 358 kHz) and Dekalb, IL (DKB on 209 kHz). I also logged a signal I was unable to identify either in Kevin Carey's *Beacon Finder* (my main reference source) or on an internet reference for pilots (<http://www.airnav.com>). This was IK at 273 kHz.

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An Antenna Primer Part II: Antenna Terms and Build Your Own Dipole

This month we continue with our Antenna Primer series by defining and discussing some terms which are useful in dealing with antennas. We also build another antenna.

❖ Antenna Gain and Response Patterns

Antennas differ in their sensitivity or response to signals which they receive. A more sensitive antenna is said to have more "gain" because it responds to signals which it intercepts by producing a greater signal output for the receiver than will an antenna with lower gain.

Nondirectional antennas have equal gain to signals coming to them from all directions. Directional antennas are more responsive to signals coming from certain directions than from other directions: thus their gain is different in different directions.

A figure showing an antenna's gain or responsiveness to signals from different directions or vertical angles can be called its "reception pattern" (Figs. 1A and 1B). The performance of an antenna in transmitting the power which it receives from a transmitter and sending it in different directions gives a "radiation pattern" identical in shape to its reception pattern. Because reception and radiation patterns are identical, either one may be referred to as the "radiation pattern." However, to avoid confusion they can be referred to individually by separate terms, or collectively as the "radiation and reception" (R&R) pattern.

The portion of the pattern showing directions of maximum response (or gain) are called "lobes," (1A & 1B), and those showing minimum response are called "nulls" (fig. 1A & 1B). An antenna's gain is usually specified as the gain of its most responsive lobe.

Although a minimum amount of gain is necessary for satisfactory reception or transmission, it is not necessarily true that more gain is always better. For example, a directive pattern may allow us to reduce received noise from certain directions and hear weak signals from other directions better than with an antenna of higher gain and a different pattern. Appropriate patterns can also help avoid radiating interference to locations not involved in our communications link.

❖ Horizontal vs. Vertical R&R Patterns

An antenna's R&R pattern in horizontal directions (fig. 1A) shows the antenna's relative gain in the various compass directions. The vertical R&R pattern shows gain at different elevation angles.

Antennas with considerable functioning at low-vertical angles (fig. 1B) send and receive well toward the horizon. This gives maximum coverage out toward the horizon. On the HF and MF bands this low-angle radiation sends signals to refract from the ionosphere such that they produce very long distance (DX) communication.

Antennas with patterns giving very high

angles of vertical radiation are useful on HF for relatively short-distance HF paths, from valley to valley in mountainous areas, and for communication with aircraft, spacecraft, and satellites in the HF, VHF and higher bands.

❖ Matching

Impedance is one measure of opposition to RF current flow. In connecting a transmitter (source) to an antenna's feedline (load), the impedance of transmitter's output circuit and of the feedline must match, or power from the transmitter will not be transferred to the feedline efficiently. Similarly, when any connection must be made between antenna, feedline, transmitter or receiver, the impedance of the source of the signal and the impedance of the load receiving the signal must match reasonably well for efficient signal transfer.

Where mismatches occur, there are circuits which we can use to make the match better. In some applications matching is more important than in others. We will discuss this in a future column.

❖ Standing Wave Ratio

As mentioned, there is efficient transfer of power between a source and load when the two are impedance matched. If they are not matched then there is some reflection of power from the load back toward the source. On a feedline this returning power interacts with the power coming forward, and causes stationary points of high and low current and voltage along the line.

The distribution of these currents and voltages are known as "standing waves." A high standing wave ratio (SWR) is indicative of a poor impedance match between source and load. Although fairly high SWR can be tolerated fairly well in some situations, in others it leads to unacceptable power loss, or destruction of components. We'll discuss this in a future column.

❖ Physical Length vs. Electrical Length

We generally define wavelength, or electrical length, as the distance that a radio wave travels in space in one cycle of its operation. The wave's length would be about the same in air as in space. As an example, in

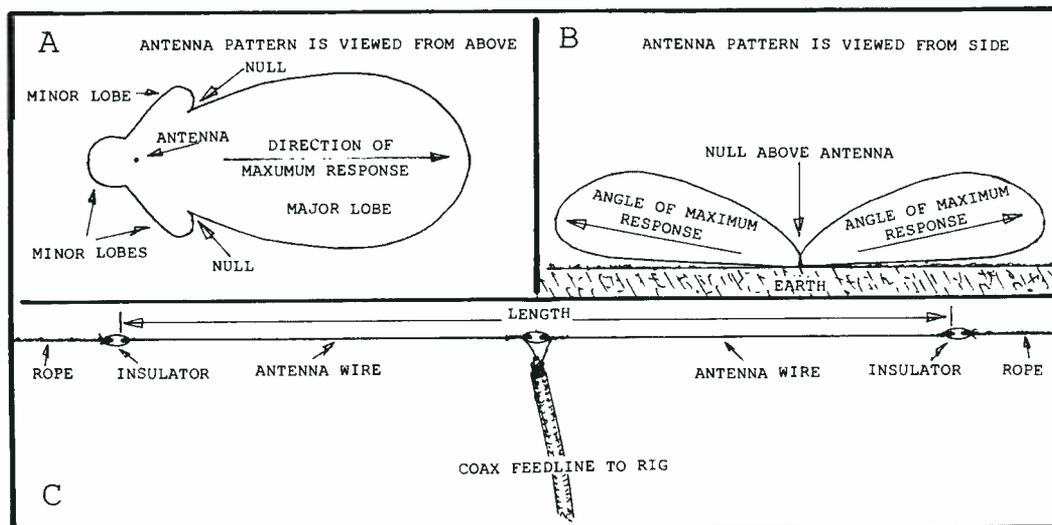


Fig. 1. Horizontal radiation and reception pattern for a directional antenna (A), Vertical radiation and reception pattern for an omnidirectional (nondirectional in horizontal plane) groundplane antenna (B), A halfwave dipole antenna (C).

This Month's Interesting Antenna-Related Web site:

For more on dipoles check out:
http://members.tripod.com/%7Ecb_antennas/antenna_basics.html
And here is a short tutorial of antenna technology:
<http://www.gigaant.com/antennabasics/basicknowhow/>

space or air a 30 MHz signal will travel very close to 10 meters during one cycle of operation. So for 30 MHz one wavelength is said to be 10 meters long.

Radio waves traveling in, or on, a medium other than space or air have a lower speed than that they have in space. And so waves traveling on a wire antenna are somewhat shorter than their commonly designated wavelength. For instance, a halfwave wire antenna at 30 MHz (10 meters) is not 5 meters long, but somewhat less. We have a formula which takes this shortening, as well as something called "end effect," into account. The formula is: $468/\text{frequency (MHz)} = \text{length (feet)}$, or $143/\text{frequency (MHz)} = \text{length (meters)}$. Thus, a halfwave antenna on 30 MHz is: $143/30 = 4.77$ meters, not the 5 meters one might otherwise expect.

❖ **Let's Make an Antenna:**

The halfwave dipole antenna (fig. 1C) is found useful from the upper portion of the MF band on into the microwave region. It is most common on HF where it is more responsive to distant stations when strung a half wavelength above the ground, and to closer-in stations when strung a

quarter wavelength high. Never mount it near power lines.

Cut your elements by the formula given above, and solder them in place on the three insulators as shown in Fig. 1C. An acceptable antenna-to-feedline match for HF or lower frequency reception will usually be obtained using any good coaxial cable for the feedline. We'll discuss why this is so in more detail another time.

Solder the feedline to the antenna as shown, and insulate the exposed end of the coax with coax sealant. Then run the feedline to your receiver. We won't worry about using a balun for now, we'll talk about their function another time. But don't forget lightning-induced damage protection: the minimum is to disconnect and ground the antenna when it is not in use, and never use it when weather is likely to produce lightning.

Happy monitoring!

RADIO RIDDLES

Last Month:

I said: "Antennas certainly are useful devices, but what would you say if I told you that antennas in space could also be used to measure the temperature of the Amazon Rain Forest on earth? Is this a joke? Am I kidding or not?"

Well, it's true. Electrical noise is generated by the thermal action of molecules in matter, and this noise is radiated into space. Sometimes portions of the microwave spectrum are sufficiently low in other kinds of received electrical noise so that the electrical noise from thermal radiation can be detected. Using highly directive antennas it is possible to estimate the temperature of objects by measuring this noise.

From satellites or space vehicles we can measure temperatures of large areas on earth, and from earth we can measure temperatures of the sky or of heavenly bodies.

This Month:

Above we discussed the desirability of matching any source and load. What about matching between a transmitting antenna (source) and the space into which it radiates (load)?

You'll find an answer for this month's riddle, another interesting, antenna-related web site, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.



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Alinco DJ-X3T Portable Wide Band Receiver

Alinco's new DJ-X3T wide coverage scanner (fig. 1) is taller and thicker than the wafer thin DJ-X2T we reviewed in December 2000 *MT*. The T suffix indicates the version marketed in the US.

Both models tune AM, FM, and WFM signals, though the newer DJ-X3T coverage is extended to 0.1 to 1300 MHz.

The DJ-X3T comes with a battery tray with room for three AA size alkaline cells (fig. 2) and the instruction manual warns not to use NiCd batteries. A 3.6 VDC 500-mAH NiMH battery pack (EPB-52NS), charger (EDC-105), and AC power supply (EDC-92) are extra cost options. The older DJ-X2T is supplied with more goodies, namely, an internal lithium-ion battery, charger, and a tray for three AA alkaline batteries.

When powered by the three AA batteries, our DJ-X3T consumes about 85 mA while scanning. That's less than the IC-R2 (109 mA) and more than the VR-500 (73 mA), which are powered by two AA batteries.

❖ Construction

The DJ-X3T is slim and prone to fall over if stood upright. The classy silver coloring distinguishes it from ICOM and Yaesu competitors. The supplied belt clip is made of plastic and attaches to the radio using a single screw. The battery is a tight fit initially, though it became easier to install with use.

The DJ-X3T has a single multipurpose rotary switch. The knob can be both twisted and pushed and serves to tune the radio, switch channels, and navigate the menus. Setting the volume and squelch on the Alinco portables we've tested has been a chore and it's the same story with the DJ-X3T. The knob must be pressed once, then rotated for volume adjustment. To set the squelch, you must push down on the knob twice, then twist.

Operations are performed using a four-key, nonnumeric pad and two side-mounted pushbuttons. The individual front key pushbuttons

have a positive feel and we prefer them to the DJ-X2T's plastic membrane "bubbles." The key press confirmation beep tone may be disabled via a menu.

The supplied flexible antenna screws onto a brass SMA connector. If you want to listen above 12 MHz without attracting unwanted attention, you can disconnect the flexible antenna and employ the earphone cord as an antenna. The DJ-X3T contains two internal "bar" antennas, one for AM broadcast band and the other for 1.625 - 12 MHz reception. You can choose to use the external antenna instead via menu settings. The internal AM BCB antenna affords better reception than using our IC-R2 with a short rubber antenna. For strong signal situations, you can navigate the menu system and enable an attenuator that is global to all channels.

❖ VFO, Memory, and Preset Modes

The DJ-X3T supports Memory, VFO, and Preset methods of operation. Like its predecessor, the DJ-X3T has a single VFO and 700

memory channels, divided into 10 banks of 70 channels.

The DJ-X3T can scan memory, search using the VFO or perform a limit search using one of 20 programmable ranges. A maximum of five memory banks may be linked together for scanning. The IC-R2 scans only one bank at a time and the VR-500 scans any combination of its 10 banks. All three models let you choose to resume scanning after a fixed interval or sometime after the signal ends. The DJ-X3T, DJ-X2T, and VR-500 rescan delay time is 2 seconds. The IC-R2 provides a choice of rescan delay times.

All three models permit memory channels to be locked out from the scan and frequencies to be skipped during a limit or VFO search.

The DJ-X3T's priority feature simply alternates between the VFO and one priority channel. You cannot scan memory with

priority as you can with the Uniden and GRE scanners.

Pressing the Bank button while in Preset mode cycles among AM, FM, and TV broadcast bands. The tuning knob selects either the frequency or TV channel and the frequencies are set up for American frequency allocations. The DJ-X3T contains a stereo decoder for WFM signals, though you'll need stereo earphones to benefit. You can force monaural reception using a menu option.

❖ Other Features

The signal strength meter consists of six dots. Thinking about using the descrambler? Forget about it! The descrambler is disabled in the "T" suffix model due to privacy laws.

The DJ-X3T has a simple "bugging detector" feature. When placed in the bugging detector mode, the DJ-X3T looks for a signal with "howling" feedback while scanning the memory channels you've programmed in advance. The howling is presumed to be feedback from an eavesdropping transmitter nearby. Will anyone use this feature?

The display is illuminated for 5 seconds after any keypress. A menu option disables the backlight.

❖ Radio and Computer Cloning

One DJ-X3T may be cloned to another if you buy or build a 3-conductor cable and connect the two radios via the earphone jack.



Figure 1 - Alinco DJ-X3T

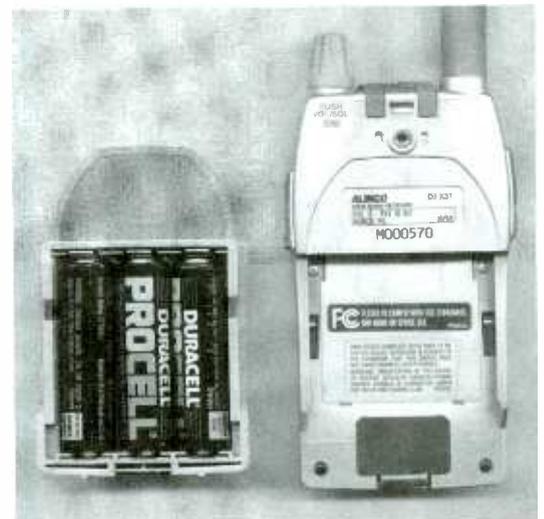


Figure 2 - Alkaline battery case (left), DJ-X3T rear view (right)

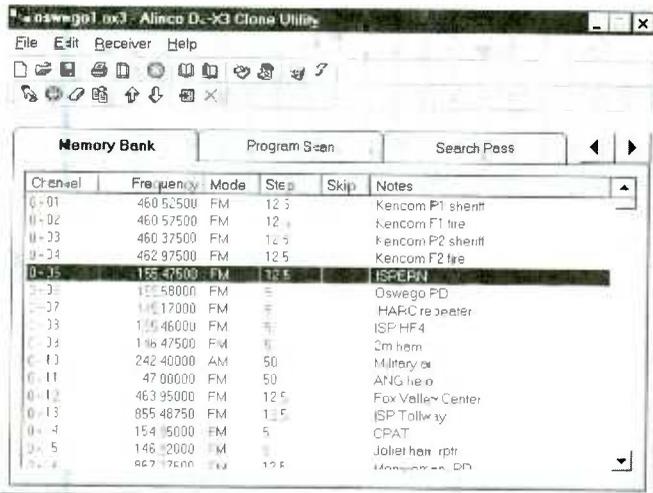


Figure 3 - DJ-X3T clone utility, showing memory contents

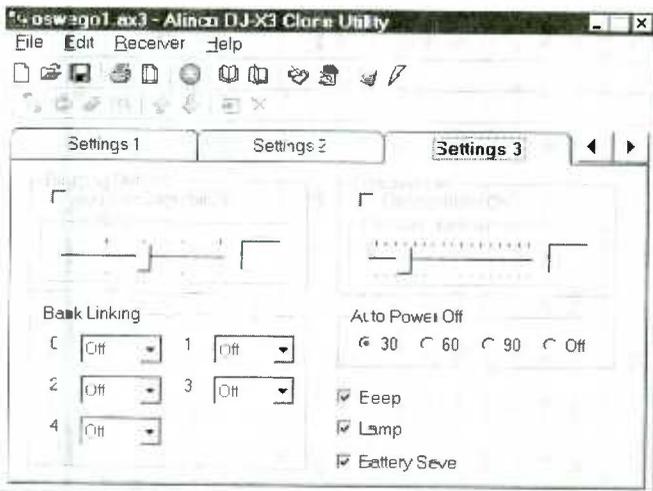


Figure 4 - DJ-X3T clone utility, showing one of the settings applets

Measurements

Alinco DJ-X3T Wideband Receiver S/N M000570

Alinco, Inc.

438 Amapola Ave., Unit 130
Torrance, CA 90501

Frequency coverage (MHz):

0.1 - 1299.995 (USA version, cell bands blocked)

Step sizes (kHz):

5, 6.25, 8.33, 10, 12.5, 15, 20, 25, 30, 50, 100

Modes: AM, NFM, WFM

FM modulation acceptance: 8.4 kHz

Intermediate Frequencies:

248.45, 38.85 (AM, NFM), and 0.45 MHz

Image rejection due to 1st IF:

32 dB at 40 MHz

53 dB at 155 MHz

56 dB at 460 MHz

61 dB at 860 MHz

Squelch tail: loud pop when squelch closes

Practical memory scan speed: 10 channels/sec.

Current consumption @ 4.5 VDC

off: 0.05 mA

scanning: 85 mA

manual: 100

full volume: 260 mA

Battery saver: after 5 sec. in manual mode

Low battery alarm threshold: 3.5 VDC

Shutdown threshold: 2.8 VDC

The newer model has more audio, though it's still weaker than our IC-R2. Both our Alinco handhelds emit a loud noise burst ("kerchunk" sound) at the end of a transmission as the squelch closes.

The internal AM BCB bar antenna makes the DJ-X3T significantly more sensitive than our IC-R2 and VR-500 when listening to mediumwave broadcasters. The internal shortwave bar antenna is less decisive. Our DJ-X3T outperforms our IC-R2 and VR-500 in some 5 - 12 MHz tests, but other tests in the same range favor the competitors.

Our DJ-X2T exhibits better image rejection than the DJ-X3T, but the figures are good for both models.

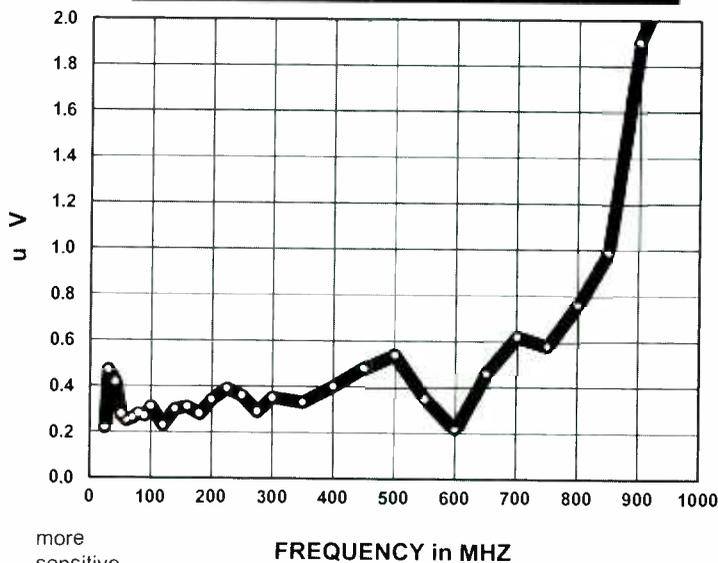
Bottom Line

The DJ-X3T is an improvement over the thinner DJ-X2T, both in audio level and keypad construction. Its styling is attractive and the numeric display is easy to view. We find the squelch tail distracting, but welcome the improvement in AM BCB reception afforded by the bar antenna.

A CTCSS decoding squelch would be much more useful than the DJ-X3T's bug detector. Despite providing excellent, no cost cloning software, Alinco should document the computer interface commands in the instruction manual to encourage the development of alternative software for Linux and Mac owners.

less sensitive

DJ-X3T NFM SENSITIVITY
12 dB SINAD, 3 KHZ DEVIATION, Serial #M000570



more sensitive

FREQUENCY in MHZ

Users are able to program the DJ-X3T using a personal computer, the proper cable (not supplied), and software available free from the Alinco web site, <http://www.alinco.com>. The free software is quite good and made programming our DX-X3T so much easier.

Performance

Our DJ-X3T works better than the DJ-X2T we used.

The Alinco DJ-X3T is available for \$249.95 from Grove Enterprises (1-800-438-8155; <http://www.grove-ent.com>)

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

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- Optional CTCSS & Extra memory boards

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- Weighs 7 oz., 15mm thin. SMA connector

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Antenna Design Software

You know, as radio listeners, we spend the bulk of our time and money on choosing a receiver. We check and compare receiver performance specifications such as the almighty sensitivity. Intercept points and signal-to-noise ratios are ever on the minds of every technically knowledgeable radio monitoring enthusiast. And why not!

If we are going to use our valuable time, we want to ensure that we have the best equipment that we can afford. Right? Then why is it that we – novices and old experienced radio veterans alike – think so little about our antenna specifications? That could account for the popularity of the venerable longwire antenna. In fact, how many of us just connect a length of hook-up wire and call it an antenna?!

❖ The Sky Hook

Strictly speaking, the purpose of an antenna is to “capture” the radio signal and send it to the receiver. Simple, right? Well ... actually, if the signal induces a dipole moment in the conductor (antenna), then we say it is “receiving” the signal. Very, very simply put, free electrons in the antenna’s conductor are put into motion by, and “in step” with the received electromagnetic radio wave. These electrons then are sent to our receivers.

But what makes one “wire” a better antenna than another? Again, very simply de-

scribed, in a highly idealized physical world, it comes down to a physical phenomenon called resonance. Resonance can be considered as a matching between the signal and the antenna conductor which “encourages” the induced electron movement with the least amount of energy loss.

In a way, we can view a trouser belt as having “resonance” by virtue of its length and position of the belt holes. If the belt is a 36-inch, then it will be “resonant” with people with a waist of 36 inches. However, the belt holes allow for a little “bandwidth” so that it will work with waist from 35 to 37 inches. But a rope of almost any length will keep up the trousers!

In a similar manner antennas are “cut” to be resonant at a center frequency’s associated wavelength, or some multiple of the wavelength. The fundamental relationship between the wavelength (W), frequency (F) and speed of propagation (S) of a wave is $W=S/F$. However, real world considerations such as conductor bulk material properties affect propagation speed and add some small modifications to the calculations.

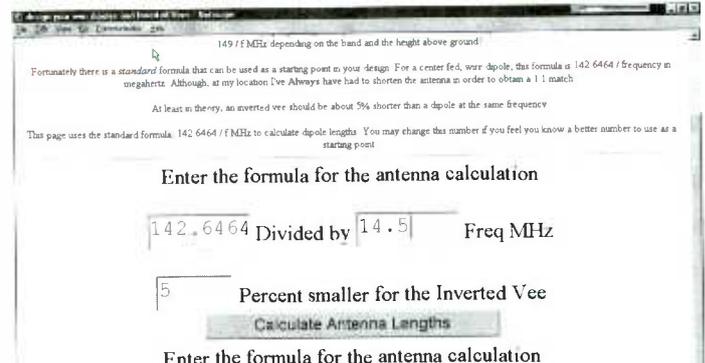


Figure 2: Antenna Elmer Dipole Calculations Screen

common antenna configurations. Each has its advantages, disadvantages and frequency dependent formula for construction. Once the province of slide rules, then electronic calculators, antenna calculations were natural candidates for the first BASIC computer programs.

❖ Antenna Software 2002

Today, antenna design software is available for just about any imaginable antenna, and for both DOS and Windows operating systems. We will look at a few free antenna programs available from the Internet and one commercially produced.

First the Freebies

Before I purchase an application program, I usually do a rough search using Hotbot and Google and check out what is available on freeware sites such as <http://www.qth.com> and <http://www.qrz.com>. The Elmer page of qth.com has an on-line antenna program that is quite useful. (Elmer is the name used by ham radio operators to describe a teacher.) The Antenna Elmer page allows the user to design a number of the most common antenna types. See Figure 1.

Figure 2 displays the “Design Your Own Dipole and Inverted Vees” calculation screen. The top of the page (not shown) gives a brief discussion of the dipole antenna and the inverted vee. The only data which needs to be entered is the frequency: We have entered 14.5 next to the MHz label. A click of the “Calculate ...” box makes the necessary calculations and then gives us all the measurements we require in order to determine the length of each dipole element. We can

❖ Not Just a Wire

Humans rarely, if ever, develop an invention in isolation. In fact, it is an old axiom that the value of any invention can be gauged by the number of new inventions it spawns. Antenna development is no exception with a number of unique conductor arrangements with their own characteristics. These include dipoles, verticals, ground planes and Yagis, to name a few

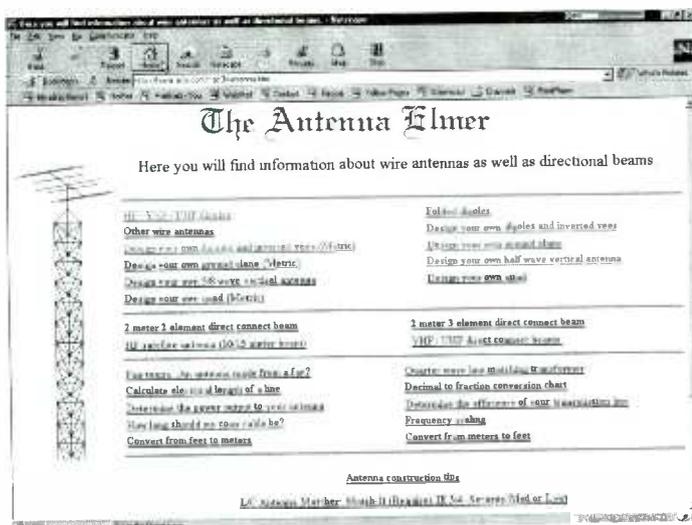


Figure 1: QTH.com’s Antenna Elmer Screen



Figure 3: Antenna Designer Main Screen

see from figure 2 that this number is 4.92 meters. Using the "Convert from Meters to Feet" option in Figure 1 we can convert this into 16.14 feet or 193.68 inches.

Tutorials on the various antenna types are accessible from the Main Screen, Figure 1. For anyone interested in building any antenna, this site should not be missed. After all, the price is right!

Next Up - QRZ

Going to <http://www.qrz.com/download/antennas/index.html> brings up over 30 antenna-related programs. Some are long in the tooth and very, very simple. Other are geared toward the ham community and also calculate the antenna's transmitting characteristics.

Not just content with automatically running simple formulas, one program, NEC ([necfp.com](http://www.necfp.com)) actually models many of the antenna characteristics including its modeled radiation pattern.

A simpler program, [antenna.zip](http://www.antenna.zip) has no graphics and just asks for your frequency and conductor diameter details. It's basic, but works fine on just about any PC.

There are many more antenna design programs specific to one type of antenna, for example the J-pole. Check them all out via

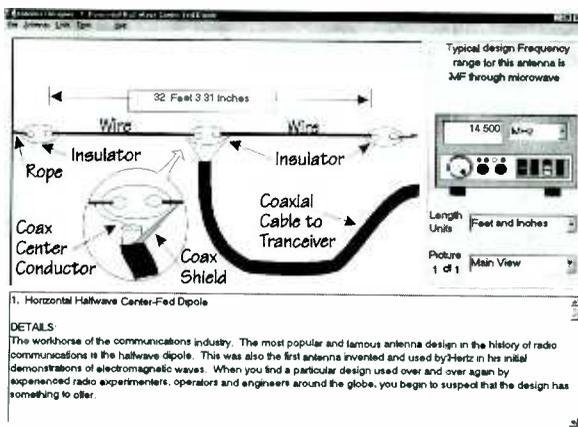


Figure 4: Antenna Designer Center fed Dipole Calculation Screen

a search engine or from links from qrz or qth web sites. Really, you have nothing to lose.

Pay For View?

Although a number of antenna design programs are commercially available we took a look at one that will not break the bank. **Antenna Designer**, <http://www.smallplanet.com> version 2.1 costs around \$40 and runs on most Pentium PCs. It easily installs from a CD, but seemed to freeze up the computer during its automatic reboot. Hitting reset and rebooting a second time seemed to cure the situation.

Figure 3 shows Antenna Designer's main screen with the pull-down menu showing all the antenna types and sub-types that are included for design.

If we select "center fed dipole" from the list and we enter a frequency of 14.500 MHz in the receiver window on the top right, Figure 4 results. The bottom section of the screen is full of useful and interesting details about the antenna type. Only a small part of the text is visible in Figure 4.

Antenna Designer is very convenient, since it displays the physical layout of each type along with its dimensions. It is very comprehensive, including all types of antenna in one program. For European users, units can be changed to metrics via the window on the lower right. Check out their website and ad in *Monitoring Times* for more details.

Designing a Conclusion

The Internet is filled with antenna design programs; some very good and some not so good. If you have the time, check them out via search engines. If, on the other hand, you just want to pay for the convenience of having it all in one place, with some graphics to show what the antenna should look like, Antenna Designer may be for you.

In all cases, remember the analogy between an antenna and a trouser belt. Just about any conductor will pick up strong signals. But those matched to your signal's frequency (i.e., waist

size) will help pull in the weak ones. Finally, don't get pedantic about the exactness of your dimensions. Keep in mind that even these formula are highly idealized mathematical models that only approximate reality. We'll leave you with that bit of sobering philosophy. Till next time ...

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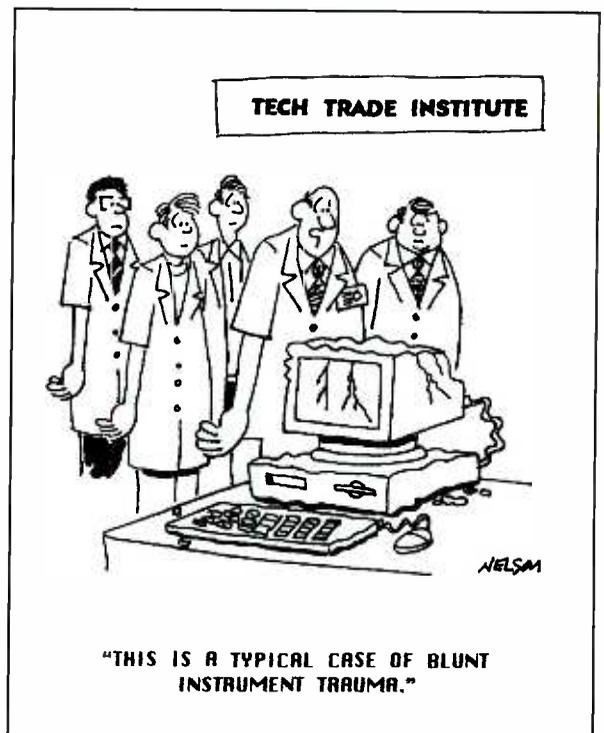
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Getting Started in SW Listening - Part 1

By Ken Reitz

What if I told you there was an inexpensive wireless plastic box which could give you the latest news 24/7, in dozens of languages, in real time, and do it for free? Would you be interested? Forget about your cable news networks, fancy satellite TV systems, on-line news sources and the hundreds of dollars and monthly fees they represent, because I'm talking about shortwave radio.

Using 70 year old technology, international shortwave broadcasters beam a steady stream of news, information and music to hundreds of millions of listeners the world over every day. Because of the nature of the shortwave bands anyone can listen to nearly every nation's voice using the simplest of receivers no matter where they live. But, before you can join in you'll need to know what kind of shortwave radio is best for you to buy. So, let's go shopping!



AOR 5000 \$2140

◆ How to Buy a Shortwave Radio

Recent world events have made shortwave radios more popular than ever and units have been flying off retailers' shelves. Consumers are confronted with a wide array of shortwave radios from \$39 to over \$6,000 and, unless you're shopping for price alone, it may not be clear which one to buy. In general, shortwave radios can be classified into price groupings: under \$100, \$100-400, \$400-900, and \$900 and up. Let's take a look at the under \$100 group first.

This group represents the bulk of shortwave radio sales. They are turned out by their Chinese manufacturers and sold worldwide by the millions each year. Still, thanks to advances in electronic circuitry, amazing reception can be had for very little cost. As I'm



Sangean ATS505 \$130

writing this, I'm listening a Radio Shack bottom of the line Realistic DX-350 which measures just 7" x 4.5", less than an inch and a half thick, and with a telescoping whip antenna less than 2 feet long. The radio sits next to the computer, which generates a great deal of radio frequency interference (RFI), and yet this diminutive radio brings in all the major international broadcasters with excellent signals and good audio without any strain on the ears. And, in a portable mode with moderate use, this radio will run for months on four "AA" batteries. What more could I want?

Well, for starters the 2" x 2" analog tuning dial is hard to read and trying to locate a specific frequency on the dial is mostly a matter of guessing.

There are also gaps in the tuning ranges which don't allow listening in between the bands listed on the dial. Further, there's no single sideband (SSB) button in order to tune in amateur radio operators or digital modes such as weather facsimile (WEFAX) or radioteletype (RTTY).

That brings us to the \$100-400 range. The most obvious difference is the addition of digital tuning. On these radios, tuning is done by pressing buttons on a numeric keypad. The tuned frequency is displayed on an easy-to-read liquid crystal display (LCD) panel. But, the real power of the microchip is the ability to store items in memory. These sets typically feature 40-50 memory presets, with some radios having room for as many as 300. Casual shortwave listeners will prob-

ably be hard-pressed to store more than 40 frequencies in memory.

Among the other amenities in this group are the addition of SSB reception, continuous tuning without gaps in frequency, cassette recorder output jack, and built-in clock with timer and on/off functions. Some units in this price group actually have built-in cassette recorders which, when used in conjunction with the timers, can record broadcasts while you're sleeping. A bargain among this group is the Sangean ATS505P which includes keypad tuning, digital display, continuous tuning (540 kHz to 30 MHz as well as the commercial FM band), SSB reception, and an external power supply for \$130.

There are some drawbacks to this group as well. The extra options, microprocessor, and bigger audio section requires more power, and these units will typically use eight "AA" or four "C" batteries and may not run nearly so long as the cheaper analog radios. These units are considerably larger and weigh from 2 to 4 pounds, a consideration when hiking or camping.



Sangean ATS909 \$239.95

The \$400-900 group is where the serious shortwave listening equipment comes in. While there are some portables in this group, most are desk top radios known as *communications receivers*. This is also where you'll find the new computer-based receivers.

Among the amenities are external antenna connectors, extended RF spectrum coverage (often into the Ultra UHF range), advanced tuning modes (including narrow and wide bandwidth selections), as many as 1,000 memory presets, computer connections for



Drake R8 \$1350

importing data, and actual signal strength meters. These receivers typically feature frequency tuning by both keypad and manual tuning knob.

There are few drawbacks to this group as well. You should know that most do not feature a built-in antenna and will require an external (outdoor) antenna for optimal reception. They also have a large desk-top footprint – typically 9" x 9" – and weigh 6 to 10 pounds.

The last group, \$900 and up, is for government agencies and SWL enthusiasts who simply must have the best equipment available. With frequency ranges to 3 gigahertz (GHz) these are all-band all-mode receivers which feature multiple antenna connections, RS-232 ports for computer interfacing, built-in noise filtering, extraordinary bandwidth filters and more. These super-sensitive receivers will tune in just about anything transmitted on the HF spectrum. Their all-mode capability at higher frequencies make them good candidates for monitoring polar orbiting satellites. Again, in this group you'll need external antennas, and, for satellite reception, special tracking antennas will also be required.

❖ Buying New – Buying Used

The biggest advantage of buying a new radio is the warranty. If something goes wrong with your unit it can be repaired or replaced free of charge. Used radios, particularly when buying through private parties, carry no such warranty. However, most commercial companies dealing in used shortwave equipment such as Grove, Universal Radio, Amateur Electronic Supply and others include at least a 30 day warranty with their used gear.

There's a considerable market in used shortwave radios and some are worth looking at more closely. Anything in the under



JRC NRD515 - \$1000 when new; around \$650 used

\$100 category is probably not worth buying. These units are built very cheaply and the first thing to go is usually the antenna. Finding a replacement antenna which works for such a radio may not be worth the effort. Plastic knobs

are sometimes missing or broken, analog tuning dials may be stuck or non-functioning. Unless someone is giving away the radio, you're better off buying new in this category.

Bargains in the next category can easily be had. The reasons for this are that radios in this category are usually made better, consumers tend to take better care of more expensive items, and these radios are often sold by SWL enthusiasts who are trading up for better radios and are anxious to preserve their resale value. Look for widely sold brands with longevity, such as Sony, Sangean, and Grundig. In the event your radio needs repair it's easy to send it away for factory authorized service. These particular brands tend to hold their value and you'll have little trouble selling your unit when you decide to trade up.

Great values in the \$400-\$900 group can also be had with a little looking. The production quality of these radios is very high and they're not generally susceptible to obvious wear and tear. Most catalog retailers take this group in on trade-in all the time, typically cleaning them up and making certain that they are performing properly. Lists of used equipment can usually be found at the retail websites and occasionally in their catalogs. But, used radios are in short supply and move quickly off the shelves. If you see one that you've been looking for, it may not be there long.

❖ Other Shortwave Radios of Note

If you've spent any time at all looking for shortwave radios you'll have noticed quite a few in discount catalogs and various retail stores. Sometimes real bargains can be had. I've seen one big name portable shortwave radio which regularly sells for \$200 in the shortwave catalogs selling for \$100 in one such discount catalog. Keep your eyes open and know what you're seeing!

Also, make sure from the catalog retailer that the item pictured in the catalog is actually what you're buying.

Another type of receiver is the "Vintage Recreation." These are usually multi-band



Grundig Yacht Boy 400 \$150

radios recently manufactured to look like vintage radio sets. The cases are usually plastic and the receivers are simple solid state boards used in many other models. The idea is to evoke the era of the tube radio with classic design of the '30s and '40s when radio was king. The resemblance, however, ends at the visual appeal. These radios should be purchased as decorative items *only* whose value is not likely to increase. One case in point is the Grundig Classic 960 anniversary edition, which was to celebrate the old '50s Grundig standard of table top shortwave radios with the fabled Grundig sound. Unfortunately, the resemblance ended as soon as the set was turned on. The original sets which sold in the late '90s for \$400 can be found in discount catalogs for \$100.

If you're really interested in vintage shortwave radio listening, there are tens of thousands of genuine period shortwave radios from the '30s and '40s in excellent operating condition which can be had for a reasonable price. Browse the usual web auction sites and look for these old sets at ham fests. Real working vintage shortwave receivers can be found from \$100 to \$200. They're a real joy to listen to and make great additions to your listening post.

❖ Next Time:

In the next installment I'll cover where to tune, when to tune, how to tell time, and what those strong signals with strange sounds are which are found all over the shortwave bands.

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Cobra's Outstanding PR 900-DX GMRS Handi-Talkie

During my tenure as the Easy Access Radio columnist, it's been my privilege to handle and operate many different radios. With only one or two exceptions, all have worked pretty well.

It's also been my privilege to watch the rise of a new radio service – Family Radio Service (FRS) – and to see renewed interest in General Mobile Radio Service (GMRS). I mention the two radio services as a pair because they actually share seven frequencies. Because of that, an interesting story has been unfolding.

FRS is an unlicensed radio service that is limited by FCC regulation to one-half watt transmitter power. As a rule, FRS handi-talkies tend to be small, light, cute, and somewhat wimpy on range. While FRS marketing literature invariably claims “range up to two miles,” the reality is that a more typical range might be a half-mile to a mile. As a rule, FRS radios do a great job of keeping people in touch over these short ranges.

To meet the need of folks who would like additional range from their FRS radios, some manufacturers of FRS radios have been bringing out two-watt GMRS handitalkies. GMRS, however, is a licensed radio service. FCC rules require paying a fee to get a license to use GMRS frequencies. There are GMRS repeaters across the country, but most manufacturers' new GMRS offerings are simplex-only – not capable of accessing the GMRS repeaters. In general these new GMRS rigs have been bigger and heavier while delivering considerably more range.

The upshot is that consumers have been faced with choosing between a small, light, limited range radio and a bigger, heavier, long-range radio. The Cobra PR-900 DX changes all that.

While I'm generally suspicious of marketing language, Cobra press release about these new radios is right on the money: “Cobra Electronics today unveiled a new product that brings to market a five-mile range two-way radio combining the best features of the FRS and GMRS categories into a new GMRS radio.”

The PR-900 puts out 2 watts on 15 channels:

- 1 462.5625
- 2 462.5875
- 3 462.6125
- 4 462.6375
- 5 462.6625
- 6 462.6875

- 7 462.7125
- 8 462.5750
- 9 462.6250
- 10 462.6750
- 11 462.5500
- 12 462.6000
- 13 462.6500
- 14 462.7000
- 15 462.7250

The first seven channels are shared with the Family Radio Service, but the last eight channels are General Mobile Radio Service only. As a result, on the very first page of the manual, Cobra clearly states that a license is required and then gives the number to call to get the licensing forms.

◆ Features

The PR-900 measures just 4.5 inches x 2.25 inches x 1.375 inches, excluding belt clip and antenna, and is noticeably lighter than other radios in the category. (When my wife picked up the PR-900, she said, “What's in this, air?”) Further, it really does seem to combine the best of both FRS and GMRS.

On the front of the PR-900 is a liquid crystal display that delivers, at a glance, what's going on with the unit. To the left of the LCD are UP/DOWN channel buttons. Below the LCD are three buttons: MODE, LOCK, and CALL. The MODE button allows access to various advanced features. LOCK locks all critical operating parameters, and CALL enables a ringing tone to be sent to other units on the same frequency. At the bottom of the PR-900 is the speaker/microphone grill.

On top of the handi-talkie is a 2.5 inch flex-

ible antenna, a jack for a speaker microphone (covered by a removable rubber plug), and the ON/OFF/VOLUME knob. On the back of the unit is a removable plastic belt clip and a hatch for inserting four AAA alkaline batteries or an optional rechargeable battery pack. On the left side of the case are a push-to-talk button and the “M” button. Press the M button once briefly and the liquid crystal display is illuminated for 10 seconds. Press it and hold it, the auto-squelch is turned off for monitoring faint transmissions.

The PR-900 also incorporates a number of really nice goodies: voice-operated transmission, continuous-tone-coded squelch system for blocking unwanted transmissions, scan function, priority channel, busy channel lockout and even two levels of auto-squelch sensitivity.

◆ A Lot to Like

Two things are really striking about the PR-900 (in addition to its light weight and handy size). First, the operating scheme is really well thought out. The power and volume are controlled by the knob on top where it can be easily accessed even when clipped to a belt. This makes a lot of sense. Changing channels is easy, too, thanks to the UP/DOWN buttons. All advanced functions are accessed by pressing the MODE button and then using the UP/DOWN buttons. It makes operating a feature-laden radio very easy indeed. Well done, Cobra!

Second, the performance is simply exceptional: crisp, clear audio and transmit and receive, combined with exceptional range. As a result, the PR-900 is, hands down, the best simplex-only GMRS handi-talkie I have tested to date. Even better, the suggested retail price of a PAIR of these radios (in a blister pack) is only \$149.95. The PR-900 gets my highest personal recommendation.



The PR-900 is, hands down, the best simplex-only GMRS handi-talkie I have tested to date.

What's NEW

Tell them you saw it in *Monitoring Times*



Uniden Announces APCO 25 Digital Scanners

Uniden America Corporation unveiled its new digital scanner line at the winter Consumer Electronics Show in Las Vegas. Of most interest to scanner buffs was the announcement of the anticipated APCO 25 digital scanning models, the BC250D handheld and BC785D base/mobile scanner. Product manager Scott Carpenter said, "With the ability to monitor conventional, trunked and APCO 25 conventional and trunked systems these models are state-of-the-art radio scanners."

Both scanners will offer 1,100 channels, 10 banks and a frequency range of 25 MHz – 1300 MHz. The BC250D comprises all of the features of Uniden's market-leading BC780 XLT in a handheld model, plus adds APCO 25 capability and an additional 600 channels. Users of both models must purchase an APCO 25 card, the BCi25D, separately, to activate the APCO 25 monitoring feature.

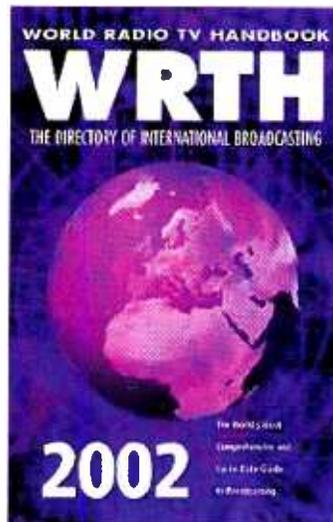
"We expect more big cities to migrate to the APCO 25 digital technology, like Los Angeles did this past year, to ensure agency interoperability among police, fire, EMTs and the like – and we know news organizations, businesses and consumers will want to monitor their signals." Uniden officials stressed that APCO 25 digital scanning technology enables reception of standard public safety operations, but in no way allows users to monitor encrypted signals.

Uniden anticipates the

Bearcat BC250D and BC785D to hit shelves in late 2002, but rumor has it that spring of 2003 is more likely. Keep tuned to *Monitoring Times* for updates!

WRTH 2002

World Radio TV Handbook, the ultimate reference source for the radio hobbyist, is now available in its 2002 edition. This expanded and improved edition



continues to receive generally favorable reviews among listeners, in contrast to the previous two years.

WRTH 2002 features include receiver reviews, propagation predictions, digital and longwave broadcasting sections. A look at "Hate Radio—the technology of Intolerance" delves into the concepts of hate radio and its dramatic growth. Clandestine radio station information has been added to the international section, an inviting addition for those who enjoy the intrigue of the underground. Worldwide medium wave and shortwave frequencies have been updated, as well as frequency and programming in all languages.

For the radio hobbyist, there are many welcome improvements in this 56th year of *WRTH*. Continuing complaints of inaccuracy from DXers led to the re-vamping of their global network of contributors for the National

and International Radio sections. The result is a more useful listening companion. Publisher Nicholas Hardyman promises "this year's edition is the beginning, not the end, of this new effort to get it right."

Due to the constant changes in broadcast frequency and staff personnel, no edition is likely to achieve consummate accuracy in its listings.

WRTH editors have indeed listened to their public and have worked to produce an edition that meets as many hobby demands as possible. It is a comprehensive guide for national and international radio broadcasting, and is clearly regaining the confidence of DXers. *WRTH* continues to be an essential reference for your desktop listening, and we congratulate the strides they have made thus far.

WRTH 2002 is available via Grove Enterprises, BOK-0302, \$24.95. 1-800-438-8155 US and Canada; 828-837-9200; Fax 828-837-2216; <http://www.grove-ent.com>. - Gayle Van Horn

DXing 101

One of the great mysteries of the amateur radio bands is, how does one learn to work DX (talking to distant amateur radio stations in countries outside your own)? Newcomers to the HF bands have lots of questions but don't know where to go to get the answers to such things as breaking the pileup, split operation, lists, nets, QSLing, prefixes, packet clusters, the internet,

zones and much more.

Most hams learn the fine art of being a successful DXer the hard way, by years of operating on the air in the school of hard knocks. Now that has finally changed: Rod Dinkins, AC6V – a ham DX veteran of 24 years – has put together one of the best all-around publications on getting started in this challenging aspect of ham radio called *DXing 101*.

One look at the contents of this 226-page book and you will see that Rod has left no stone unturned. The eight chapters of the spiral bound 8-1/2 by 11-inch book cover Introductory material, DX Equipment, Operating Aids, Propagation, Working DX, QSLing, DX Secrets, and Contesting. The appendix presents additional information from CW Operating Procedures to a Glossary of DX Terms.

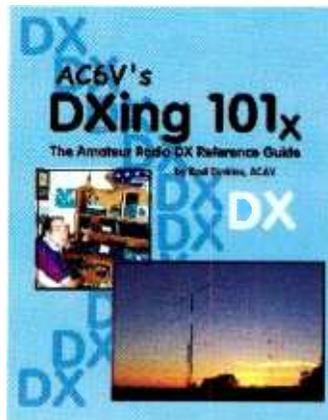
You can get more information on Rod's publication at his internet website: <http://ac6v.com/DXSAMPLE.htm>. For those that do not have access to the internet, send \$19.95 plus \$5 S&H check or money order only (no credit cards) to Rod Dinkins, AC6V, 4982 Marin Drive, Oceanside, CA 92056-4973.

While you're at it, you won't find a better website for ham radio links than Rod's main page, the *Amateur Radio and DX Reference Guide* on the web at <http://www.ac6v.com/>. Here you will find over 700 amateur radio topics, 6000 links and 125 pages of great ham info on the internet. This site is definitely worth a visit and bookmark if you are looking for amateur radio information. - Larry Van Horn, N5FPW

Book Reviews by Bob Grove

ARRL Ham Radio Interest Books:

The American Radio Relay League (ARRL) has prepared several different reading publications in an effort to entice young people into ham radio. We recently received three of these for



What's NEW

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our consideration to put in our local public school libraries.

"Archie's Ham Radio Adventure" is a free comic book and, as the cover title suggests, it's all about amateur radio! Archie gets into his usual tons of trouble, but with the whole Archie gang – and ham radio – there to assist, he naturally helps the good guys and catches the bad guys.



"Disappearing Act" and "Easy Target" (\$6 each) are but two titles from talented amateur radio novelist Cynthia Wall. Written for both youth and adults, these adventure books are sure to please the aspiring ham.

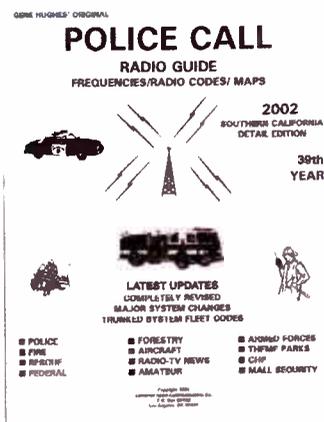
For orders or dealer information, call (888) 277-5289, or visit the ARRL web site at <http://www.arrl.org>.

Police Call Radio Guide

Southern California Detail Edition

With *Police Call's* Gene Hughes a California resident, it's not surprising that he publishes something just a little extra for his home state! This 2002 edition concentrates on public safety, conservation, military, federal government, and amusements.

For these types of communications, the detail edition takes on where the state-by-state direc-



tory leaves off, adding squelch tones, trunking talk groups, district maps, channel uses, unit designators, and tactical call signs.

Available for \$14.95 from U.S. Radio Data, 11 Deer Rd., Lebanon, NJ 08833

2002 Super Frequency List On CD

by Joerg Klingenfuss

Joerg Klingenfuss, probably the best-known shortwave frequency specialist, has released the newest edition of his comprehensive frequency directory on CD-ROM. More than 40,000 data entries cover both utilities and broadcasting (domestic, international, and clandestine). An extensive list of common abbreviations is included along with frequencies, countries, names, languages, call signs, and broadcasting times.



Hundreds of full-color screen shots are presented along

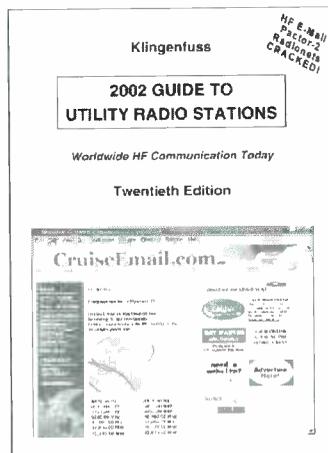
with digital decoding software for the utilities.

This newest CD is available for only \$24.95 plus \$3.50 U.S. shipping from Grove Enterprises, PO Box 98, Brasstown, NC 28902; phone toll-free (800) 438-8155, or order by email to order@grove-ent.com.

2002 Guide to Utility Stations

by Joerg Klingenfuss

Each annual edition of this top-selling directory of shortwave utility stations seems to get thicker, and with good reason: this latest edition sports 600 pages with more than 10,100 entries in frequency order, plus an alphabetical listing of countries, subdivided into agencies and frequencies as well!



Listings provide the shortwave utilities listener with frequency, call sign, location, mode, and even data protocols for digital modes. Introductory text discusses various services and modes, along with equipment specifications and recommendations. An extensive list of commonly-encountered abbreviations along with their meanings is included.

\$40 Euro (about \$35 US) includes worldwide shipping from Klingenfuss Publications, Hagenloher Str. 14, D-72070 Tuebingen, Germany; or email

klingenfuss@compuserve.com, or visit his web site at <http://www.klingenfuss.org>.

2002 Shortwave Frequency Guide

by Joerg Klingenfuss

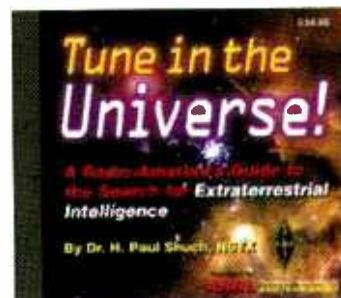
For combination utilities/broadcast listeners who want a ready, comprehensive reference, nothing can beat the *2002 Shortwave Frequency Guide*. 20,000 entries combine the essential elements of the *Guide to Utility Stations* with an exhaustive by-frequency listing of international broadcasters, including languages and schedules. An alphabetical cross-reference is provided as well. This dual directory is an excellent value.

\$35 Euro (about \$30 US) includes worldwide shipping from Klingenfuss Publications, Hagenloher Str. 14, D-72070 Tuebingen, Germany; or email klingenfuss@compuserve.com, or visit his web site at <http://www.klingenfuss.org>.

Tune In The Universe! CD-ROM

by Dr. H. Paul Shuch

Subtitled, "A Radio Amateur's Guide to the Search for Extraterrestrial Intelligence," this delightful CD is packed with easy-to-read and informative history, hints, and how-tos on building and operating a microwave earth receiving station in the quest for signals from aliens in the cosmos. Each page includes



What's NEW

Tell them you saw it in *Monitoring Times*

a table of contents for immediate point-and-click access.

Author Paul Shuch, N6TX, is perhaps the best-known proponent of this search, with his legions of followers in the growing SETI League, a global band of listening enthusiasts now more than 1000 strong.

Navigating the CD is quite intuitive: hypertext-linked sections concentrate on the evolution of the SETI program with credit to its founders and supporters; a technical section which guides the beginner and the advanced amateur through the phases of system design and

implementation; and the author's own "memoir" department which includes songs he has written ("...music is my second love").

But of immediate interest to the reader is, of course, the technical area, and in this the CD excels. Following the enjoyable introductory articles is the real meat of the work, with major chapters entitled: *Are we Alone?* *Ask Dr. SETI*, *Searching for Life*, and finally, *Your SETI Station*.

Are we Alone? is a collection of the author's well-considered reflections about the stars, planets, extraterrestrial life, intelligence, and communications,

while *Ask Dr. SETI* is an FAQ assemblage about astrophysics, biochemistry, philosophy, sociology, technology, and related articles.

The approach is cookbook, but not intended for board-level assembly: rather, lists of sources for component equipment and accessories are provided. Extensive tutorial sections – including spreadsheets – allow the appropriate selection of antenna, receiver, cables (RF, DC, audio, and control), computer, and software.

Tune in the Universe on CD-ROM is available for \$24.95

from the American Radio Relay League (ARRL); see their web site at <http://www.arrl.org>, or call 860-594-0200 for ordering.

Books and equipment for announcement or review should be sent to "What's New?" c/o *Monitoring Times*, P.O. Box 98, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to mteditor@grove-ent.com.

MT REVIEW

With that sort of a name, I'd expect something pretty special. The "Miracle Whip" is a 48-inch telescoping whip integrated with an impedance matcher and terminated with a PL-259 connector; it is primarily intended to be used with low-power HF transceivers like the Yaesu FT-817 running no more than 5-10 watts. It utilizes a hand-wound, high-Q, toroidal autotransformer with nearly 50 switch contacts for fine tuning from below 2 MHz to above 30 MHz.

At VHF and UHF, the switch bypasses the tuner, allowing direct connection of the 48-inch telescoping whip to the PL-259, allowing trimming of the antenna length to frequency. The whip can also be swiveled on its base, favoring the polarization of the arriving wave front for maximum signal capture.

Such an arrangement might have been intended for transmitting, but it

would seem to be an attractive alternative for desktop communications receivers as well. After all, a whip that can be impedance-matched to a transceiver might improve receiver performance, too.

To test that hypothesis, we set up the popular Drake R8B general coverage receiver on a workbench and fitted the SO-239 antenna connector with the Miracle Whip. A 48-inch telescoping whip with a right-angle PL-259 connector stood by as a comparison antenna.

Tuning the receiver through its range from the 1 MHz AM broadcast band to 27 MHz CB, we alternated between the fully-extended Miracle Whip and the untuned whip. To verify our results, we sampled a variety of signals on a variety of frequencies. The results were surprising – and very impressive.

As expected, the upper register (27 MHz) showed little improvement, about 3 dB over the plain whip, but the lower we tuned, the greater the signal strength improvement. Around 18 MHz the Miracle Whip was 10 dB stronger than the



The Miracle Whip

By Bob Grove

plain whip; at 9-12 MHz around 12 dB better; at 5-7 MHz the improvement was a good 18 dB; and by the time we tuned down to our local 1320 kHz broadcaster, the Miracle Whip showed a 27 dB signal strength enhancement – nearly five S units – compared to the same-length extendable whip!

Adjusting the unit properly is simplicity itself: Select the operating frequency and tune the single knob for maximum signal or background noise. That's it!

The Bottom Line:

But if an impedance-matching device increases both the signal and the background noise, how is that any different from simply turning up the volume control? Just because the S-meter reads higher, won't the noise go up, too?

Yes; in some cases, where the receiver already has sharp filters, chances are that impedance matching won't help much. On the Drake R8B there was little improvement in signal-to-noise ratio,

but on receivers with wider filters and "broader front ends," the extra measure of selectivity the Miracle whip adds can improve the S/N ratio. Better, it also reduces intermod and image response on the shortwave frequencies, and for QRP (low-power) transmitters and transceivers, the tuning will measurably improve radiated efficiency.

The Miracle Whip carries a three-year warranty against original factory defects (not burnout from excessive transmit power!). Cost is \$129 including Parcel Post from PO Box 48144, 5678 Park Avenue, Montreal, Quebec, Canada, H2V 4S8; or phone toll-free (866) 311-6511. For more information, visit their web site at: <http://www.miracleantenna.com>.



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- Charles (Chuck) Boehnke
Keaau, Hawaii

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- Don Nauer

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1-3/4" SQUARE DISPLAY AD: \$50 per issue if camera-ready copy or, \$85 if copy to be typeset. Photo-reduction \$5 additional charge. For more information on commercial ads, contact Beth Leinbach, 828-389-4007.

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antenna plus 100' of coax cable. \$750. Will pay shipping and insurance upon receipt of cashier's check or money order. W.E. Quigley, (815) 433-2722.

FOR SALE: Kenwood 5000 shortwave receiver. Wide-band filter. Excellent Shape. Grove skywire

FOR SALE: Uniden BC-9000 XLT scanner. Like new. Complete. \$250. (206) 985-6983 or leave message.

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By Bob Grove,
Publisher

Selling the Spectrum

A recent editorial in the *L.A. Times* highlighted once again efforts of Congress to sell rights to the radio spectrum. Estimated at \$387 billion, it's a prize plum. Broadcasters are particularly keen on being the victors, and a quick look at the re-election campaign contributions made by the National Association of Broadcasters (NAB) to our illustrious elected officials reveals why this particular lobby has been so successful.

But the *Times* correctly points out that the stated use for the additional spectrum, high-definition digital television (HDTV) hardly justifies this valuable award. For the past six years after receiving the spectrum, fewer than a million Americans – that's one-fourth of one percent – have bothered to buy a set. The remaining 260 million or so of us are perfectly content with standard terrestrial and satellite TV.

In the meantime, members of the broadcasting industry hold on to both the analog and digital spectrum, an excessively valuable asset that could translate to cash if they resold it, especially since they were given the bands for free.

But whose property is the spectrum, anyway? The Federal Communications Commission (FCC) allocates the broadcasting spectrum to "serve the public interest;" the implication being that there is an expectation on its use, a "lien," so to speak. But after all, the powerful and well-heeled NAB is crassly commercial; it shouldn't be expected to hand back such a possession voluntarily.

So, who needs spectrum?

The issue of congestion among radio users is especially felt in metropolitan areas. But it has been largely resolved by two technologies and a reassignment: narrowband modulation systems, trunking, and reallocation of unused UHF-TV channels to public safety. The results have been quite satisfactory, and their implementations have only begun.

With land mobile users reasonably satisfied, at least for the time being, and broadcasting loaded with unused spectrum, who else is hurting? Certainly not the aeronautical services. Europe has already adopted 8.33 kHz channel spacing instead of the wasteful 25 kHz (down from 100 kHz just a few years ago), and with major U.S. manufacturers providing that equipment, it is likely that the U.S. will follow.

And how about the military? A scan of the 225-400 MHz UHF military aircraft band will reveal how underutilized that slot is. There just aren't that many military aircrafts in flight at any one time. Other military communications have been following a gradual trend toward microwave satellites for years; much of their vacant spectrum is already being reassigned to non-military land mobile.

Federal government agencies also under-utilize their spectrum, and spread-spectrum technologies allow multiple users simultaneously; they aren't hurting for space, either.

The Private Sector

Most recently, the Federal Communications Commission (FCC) adopted a Report and Order reallocating 27 megahertz of highly-desirable spectrum, much of it to the fixed and mobile services as well as the Wireless Medical Telemetry Service. The bands include 216-220, 1390-1395, 1427-1429, 1432-1435, 1670-1675, and 2385-2389 MHz.

But the new awards were placed on hold following the attack on the World Trade Center, and Congressman Curt Weldon's (R-PA) proposal for a 24 MHz swath of UHF-TV spectrum for Homeland Security communications has at least temporarily redirected priorities.

Cell phone providers claim that if they had more spectrum, they could have accommodated the wireless overload caused by the WTC tragedy. The overload was a combination of a surge in use of cell phones during that period, coupled with damage caused to cell sites in the affected area.

One of the largest claimants for spectrum is the wireless industry; the recent debacle between the FCC and NextWave is a key illustration. NextWave is fighting to keep the spectrum award for which it paid \$500 million of the \$4.7 billion auction selling price before it went bankrupt in 1999.

NextWave claims that it is trying to emerge from bankruptcy, but that it needs the spectrum to do it. Critics – many of them competitors – claim that NextWave is merely trying gain legal title to the spectrum in order to sell it to its competitors like Verizon, AT&T, Sprint PCS, Cingular Wireless, and Nextel Communications, who are steadfastly trying to implement their third-generation ("3G") wireless technology. That original \$4.7 billion dollar spectrum is now worth some \$16 billion according to government sources.

Industry analysts suggest that an alternative to additional spectrum is directing the FCC to lift the spectrum cap on existing spectrum. Such basic rule changes would permit greater usage and control for existing bands with fewer restrictions.

It might appear that many claims for the requirement of additional spectrum are exaggerated. But if it's available and it's valuable, why not grab it? That seems to be the prime mover in the current scramble for spectrum. The classical clash between greed and necessity, which readily translates to power, profit, and politics.

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