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Monitoring Times

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Bandwidth:	1 Hz to 15 kHz *continuously variable in 1 Hz increments*
Sensitivity:	0.25 µV (AM, 10dB S/N)
S-meter sensitivity:	0.1 µV

www.winradio.com

Monitoring Times

Vol. 23, No. 7 July 2004

Cover Story

Romancing the River

By Gayle Van Horn

MT's Frequency Manager, Gayle Van Horn, evokes the magic and mystery of the mighty Mississippi from a recent radio road trip to New Orleans. She covers general background to marine monitoring and channel usage as well as specific VHF-FM traffic in the New Orleans area – including the new 12.5 kHz spacing. Story starts on page 12.

On Our Cover: Ships doing the dipsy-doodle around one of the river's most dangerous curves, right in the heart of the city. (Photo by Gayle Van Horn)

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Owners
Bob and Judy Grove
judy@grove-ent.com

Publisher
Bob Grove, W8JHD
bobgrove@monitoringtimes.com

Managing Editor
Rachel Baughn, KE4OPD
editor@monitoringtimes.com

Assistant Editor
Larry Van Horn, N5FPW

Art Director
Bill Grove

Advertising Svcs.
Beth Leinbach
(828) 389-4007
beth@grove-ent.com

Reviews:

With summertime storms you never know when the power might be out. Jock Elliott says an emergency "gottahave" is the C Crane Freeplay Plus. An AM/FM/SW radio with decent sound, it's also a flashlight. Best of all, it's rechargeable by any one of three methods so it's always ready to use (see page 86).

One tool that can be really handy for scanner hobbyists is a decoder that will display CTCSS, DCS, LTR and DTMF codes. The CSI Flex Series Multiprotocol Decoder will do just that, to help the monitor determine talk groups and trunked systems, among other uses. Even better, the decoder can be "flash" programmed to configure its brain to a different purpose, making the multiprotocol decoder also multipurpose (see page 78).

Ignore the butterfly logo and the name, and MixW is a sophisticated program for hams and SWLs alike. The program can encode or decode many different amateur modes, can tune your receiver by clicking on a spectrum display, and can even log your reception or amateur contact. This one is worth checking out (page 81).

Hobbyists who are limited in their ability to put up an outside antenna are almost forced to resort to an active antenna if they want more than basic reception. The AOR WL-500 Antenna goes a long way towards reducing some of the noise issues seen with other active antennas, and it's great for anyone needing a portable shortwave antenna for camping or travel (see page 82).

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THE VERY BEST IN SHORTWAVE RADIOS

YB 400PE AM/FM/ Shortwave Radio

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

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

$149.95

YB 550PE AM/FM/ Shortwave Radio

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

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

$99.95

S350 AM/FM/ Shortwave Radio

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

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

$99.95

FR200 AM/FM/ Shortwave Emergency Radio

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

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

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LETTERS TO THE EDITOR

Anything for a Sale?

George Zeller forwarded a recent cover of the Japanese Amateur Radio magazine, sent to him by Lee Reynolds, the loggings editor of *ACE* (Association of Clandestine Enthusiasts). I asked the rather rhetorical question of what was the radio connection on the cover? George later replied:

"Paul Lannuier, formerly of Gilfer Shortwave, has come to our rescue about the Japanese Ham Radio magazine with the creative cover layout. He understands a fair amount of Japanese and actually subscribes to the magazine that I sent you. He says that the content of that month's magazine was an antenna issue, just in case you are interested. It is hard to say what the woman on the cover has to do with antennas..."

Bruno the Scanner Dog

"Attached is a picture of Bruno (aka the 'Scanner Dog'), who is a 1 year old, 90 lbs Lab, that is part of our family.

"Bruno has finally settled down a bit since I am letting him listen to the scanner! Initially when we were exercising walking/running the dogs next to the Westover JARB fence line, I would be using an earphone/ear piece for monitoring the local activities inside the fence line as well as the local civilian public safety agencies. For some unknown reason Bruno didn't like the idea of the earphone and kept on jumping up on me and pulling the earphone out of my ear..... We finally got him not to do this – probably because I now let him listen to the scanner! ;)"

– Ken Windyka, Springfield MA Monitoring Area

Pet Peeves

Sterling Marcher writes about another kind of pet – pet peeves. He asks why not have a column for them? I say we do – The "Letters" column. Or even "Closing Comments" if your comment is too long for use in this column.

Here's one of Sterling's pet peeves:

"I have a large box full of AC/DC transformers (aka wallwarts) and there is no ID on them except their manufacturing names. Can't the manufacturers put a tiny tag on their wall warts showing what the transformer is for?"

Bring Back Radio Dramas

"Bravo to Greg Petro, on his excellent article *Sunday and the Philco*, March 2004.

"I too was fascinated by the theater of the air, and believe my early introduction to the likes of *Gunsmoke*, *Amos and Andy*, *X minus one*, *Fibber McGee and Molly*, right on to *Yours Truly, Johnny Dollar*, prepared me for television (my folks bought our first television in 1954).

"I got briefly nostalgized when these very same shows were broadcast on AFRTS, while serving in Germany in the Army from 1965 to 1967. So! Greg hit it on the nail, when he mentioned his visits to his grandparents and the thrill of listening to the fights on the Philco.

"I inherited the old Zenith table model I listened to in the early 1950s, which is now occupying a shelf in my garage. I look up on that shelf and smile. Thank goodness for Costco; in recent years I have collected the sets of tapes they offered for sale – the CBS collection – the Western radio series – and several I taped off the radio from PBS.

"At 58, I now long to see a revival of original radio drama programming. It is sort of hit or miss now, and some stations like KNX 1070 AM out of Los Angeles, which I can pick up here at night, run old-time radio shows. Even NPR and PBS have gotten away from original radio drama.

"I was asked not long ago, by my now-deceased father, what I would like to do if I had the money to do it. I answered without hesitation ... to run and program my own radio station. If that ever happens (and I if I had the money, for it would take a lot of it to do it) I would bring back radio drama original programming.

"Thanks again to Mr. Petro for bringing back memories of radio, and no matter what anyone says – back then, radio was king, and it gave us kids in the early fifties something that Game Boy or video games don't give – it spurred our imaginations."

- Stan Blumenthal, Oak Ridge, Oregon

Old Time Radio is still to be found with a little looking. In addition to the hundreds, if not thousands of recordings and scripts available for purchase or for download off the internet, some shows are being rebroadcast. For AM/FM, SW or satellite broadcasts of old-time shows, try the list at **http://www.old-time.com/ffiles/stations.otr**

To find on-line broadasts, try **http://www.yesterdayusa.com/**; **http://www.radiolovers.com/**; or **http://www.old-time.com/toc.html** for starters.

I noted in this month's edition of *Global Forum* (page 41) that Steve Cole's *Different Kind of Oldies Show* on WBCQ is being discontinued for lack of support. Still, WBCQ owns a substantial archive of Jean Shepherd's memorable radio broadcasts. Look around – you'll find you aren't alone in this particular area of nostalgia!

Still Going Strong

Martin Franko of Yorkton, Saskatchewan, sent a photocopy (not reproducible, unfortunately) of where he started in the scanning hobby – He says "This Realistic PRO 2001 scanner (from 1974), Mod 20-115, 29-year-old bird is still flying and gave me no trouble. Still in service today as a home base addition."

VHF LO	30-50 MHz	5 kHz
Ham	144 - 148 MHz	5 kHz
VHF Hi	148-174 MHz	5 kHz
Ham	430-450 MHz	12.5 kHz
UHF Lo	450-470 MHz	12.5 kHz
UHF Hi	470-512 MHz	12.5 MHz

Aid for Iraqi Amateurs

"The hams in Iraq need help in establishing ham radio in their country and for ham radio to survive after June 30th 2004 when the CPA hands over to the local authorities. It would be helpful if people could do what they can to support the Iraqi Association for Radio Amateurs at this sensitive time.

"This could be in the form of a letter of support for the future of the hobby in iraq from your national radio society or educational material to help run ham radio classes or perhaps you could send them ham radio publicity material."

"The chairman of the Iraqi Association for Radio Amateurs is Diya Yildz yildz@hotmail.com, or write: Diya Nassir, UN-WFP, Canal Hotel, Baghdad, Iraq."

– Ian Abel G3ZHI

My Start in Radio
By Peter Lautzenheiser

My interest in radio started as a child. Radio always fascinated me. My family didn't have a TV when I was growing up. Mom had a portable shortwave receiver when I was very young. I have only vague memories of this. She told me about hearing a party on a boat once. This was in AM band back then.

I listened to the broadcast band late at night. When I started elementary school in Akron, Ohio, the bus driver was a registered nurse who was married to a truck driver. There was a CB radio on the bus. Sometimes, she would let us talk on the CB to her husband. My handle was "Peter Rabbit." Once she talked to the Goodyear Blimp on the CB.

When I was little, one of the first things I thought I wanted to be when I grew up was a disc jockey on broadcast radio; now there's too much politics involved.

My first shortwave was a Christmas gift in 1985. It was a Radio Shack SW-60 portable and it had Shortwave, AM, VHF and UHF. I listened to medical stuff like emergency squad calls, and all kinds of businesses like construction companies, school bus communications, etc.

During my high school years I started listening to shortwave radio. I heard the upheaval when communism fell. It was some of the most exhilarating radio I've heard in all my time in the hobby. My early years in shortwave listening were totally enthralling. There was Mikhail Gorbachev shaking up the Soviet Union with *glasnost* and *perestroika*; it was interesting to see Russia transformed from a communist government to an elected one.

The inspiration for getting into shortwave radio was the fact that I read a lot of history. I'm a lifelong user of the local library. World War II history is what really got me into shortwave radio. When the 1981 baseball strike occurred, I started studying aviation to fill the time, and this led to the interest in military history in general, not just the Second World War. I wanted to listen to places I was reading about.

I'm in a wheelchair, and people were always telling me you can't do this or that. All they thought I could do was sheltered workshop stuff like paint ceramics and so on. Doctors told me not to mess with handwriting – all I could do was print. But the school found someone left handed and I learned handwriting.

When I graduated from Canton McKinley High School in 1988 I bought a Kenwood R-5000 communications receiver. I was twenty years old when I got the radio. I used money people gave me for graduation and from Social Security. This was my first tabletop radio.

The Kenwood R-5000 took awhile to learn to operate. The service man at Universal Radio didn't have much patience with beginners. Air Force electronics is what this man started in and he thought everybody should know what they're doing, My dad took me to see a local ham and he didn't think I could figure it out, either, but I did. This guy thought it was too complex for me. My beginner's radio – the SW-60 – was about the simplest radio you can get.

My major radio interests are shortwave broadcast listening (DXing or listening for distant stations); pirate radio (bootleg broadcasting on shortwave); and listening to the ham bands. My current radios are a Drake R8 B and Grundig YB-400PE I just got the Grundig recently serviced in California, and it's working well. With my Drake I'm using a Dressler antenna.

I have my own website called, "Peter's Hangar." On this site I have commentary on politics, foreign policy or whatever interests me. There is a radio section on this site with loggings (a list of stations actually heard). My intent is to learn website design. I need more practice than this site can give me. If anyone needs help with a site, contact: Peter J.Lautzenheiser <pjlaero@bright.net>

Catch you on the (amateur radio) ham bands. **http://www.bright.net/~pjlaero/**

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

Happy monitoring!

-Rachel Baughn, KE4OPD, editor

Monitoring and the Law

Jorge Rodriguez
jorgerodriguez@monitoringtimes.com

New Florida Law Could Ensnarl Legal Operators

Amateur radio operators as well as outlaw pirate radio broadcasters could face a third degree felony and a $5,000 fine in Florida under a new law which takes effect this month. Senate Bill 2714 relating to an unauthorized transmission to, or interference with, a public or commercial radio station, creates Florida Statute 877.27, which prohibits a person from making a radio transmission in Florida unless the person first obtains a license or an exemption from licensure from the Federal Communications Commission. The new law also prohibits an unlicensed radio or pirate radio transmission that interferes with a licensed public or commercial radio station.

Specifically, a person may not make, or cause to be made, a radio transmission in Florida unless the person obtains a license or an exemption from licensure from the Federal Communications Commission under 47 U.S.C. s. 301, or other applicable federal law or regulations. A person also may not perform an act, whether directly or indirectly, to cause an unlicensed radio transmission to interfere with a public or commercial radio station licensed by the Federal Communications Commission or to even enable the radio transmission or interference to occur.

In the wake of the new law, amateur radio operators in the state are concerned SB 2714 could be misconstrued to apply to anyone transmitting a signal, even an accidental interference, that affects public or commercially licensed broadcasters. This could include not only amateur radio operators, but anyone using the radio frequency spectrum.

The hope of some is that the FCC may intervene and issue a declaratory ruling noting at that there is federal preemption in this area and that control of the airwaves is their exclusive domain.

◆ Scanners in Virginia and West Virginia

In our continuing coverage of states that have specific statutes on the use and possession of scanners, this month we present the Virginia and West Virginia Statutes relating to such use and possession. West Virginia's brief law prohibits the use of what you hear over a police radio to further the commission of a crime. Virginia similarly prohibits the use of what you hear over a police radio if used to help commit a felony.

West Virginia Statutes §15-3-5

"Use of information obtained by interceptions of transmissions on department of public safety communications system forbidden; penalties.

"No person shall intercept any message or transmission made on or over any communications system established by the department of public safety and use the information obtained thereby to aid, abet or assist in committing a crime, or in violating any law of this state, or use the same in a manner which will interfere with the discharge of the department's operations.

"Any person who violates any provision of this section or of section two of this article shall be guilty of a misdemeanor, and, upon conviction thereof, shall be sentenced to confinement in the county jail for a period not to exceed one year or by a fine of an amount not to exceed five hundred dollars or by both such confinement and fine in the discretion of the court."

Code of Virginia § 18.2-462.1.

"Use of police radio during commission of crime.

"Any person who has in his possession or who uses a device capable of receiving a police radio signal, message, or transmission, while in the commission of a felony, is guilty of a Class 1 misdemeanor. A prosecution for or conviction of the crime of use or possession of a police radio is not a bar to conviction for any other crime committed while possessing or using the police radio."

◆ Radar Detectors in Virginia

While the days of the Virginia State Police sniffing out your FuzzBuster (tm) radar detector and seizing it are gone, it is still illegal to use radar detection devices in Virginia. Contrary to the state statute, some local government web sites such as the City of Fairfax advise that drivers may possess a detector even in a vehicle if the device has no power source and no one in the vehicle can access it. The actual statute, however, still prohibits possession in a motor vehicle, even if disconnected and not in actual operation.

§ 46.2-1079. Radar detectors

"A. It shall be unlawful for any person to operate a motor vehicle on the highways of the Commonwealth when such vehicle is equipped with any device or mechanism, passive or active, to detect or purposefully interfere with or diminish the measurement capabilities of any radar, laser, or other device or mechanism employed by law-enforcement personnel to measure the speed of motor vehicles on the highways of the Commonwealth for law-enforcement purposes. It shall be unlawful to use any such device or mechanism on any such motor vehicle on the highways. It shall be unlawful to sell any such device or mechanism in the Commonwealth. However, provisions of this section shall not apply to any receiver of radio waves utilized for lawful purposes to receive any signal from a frequency lawfully licensed by any state or federal agency.

"This section shall not be construed to authorize the forfeiture to the Commonwealth of any such device or mechanism. Any such device or mechanism may be taken by the arresting officer if needed as evidence, and, when no longer needed, shall be returned to the person charged with a violation of this section, or at that person's request, and his expense, mailed to an address specified by him. Any unclaimed devices may be destroyed on court order after six months have elapsed from the final date for filing an appeal.

"Except as provided in subsection B of this section, the presence of any such prohibited device or mechanism in or on a motor vehicle on the highways of the Commonwealth shall constitute prima facie evidence of the violation of this section. The Commonwealth need not prove that the device or mechanism in question was in an operative condition or being operated."

◆ Police Radio Jammer Gets 8 Years

Twenty-six year old Rajib Mitra of Brookfield, Wisconsin, has been sentenced to eight years under new guidelines that provide for harsher penalties under the Federal Sentencing Guidelines that took effect in November 2003. In March, a jury convicted Mitra, in the case of the "magic radio," of repeatedly interfering with the emergency communications radio system of the Madison Police department last year.

Federal District Judge John Shabaz could have added more time to the sentence for each of the times that Mitra interfered with the Madison police radio system, but he decided not to do so. The case is unique, since the United States charged Mitra's interference with the police communication system as interference with a critical infrastructure under the new post 9/11 guidelines and not under any of the traditional federal radio laws.

During the sentencing last May, Judge Shabaz noted the government's evidence showed Mitra also caused 36 other instances of interference over a dozen times starting in January of 2003.

Monitoring and the Law will have full coverage of how Mitra got himself into trouble with his scanners and radios in next month's issue.

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Hear more action on your radio scanner today. Order on-line at www.usascan.com for quick delivery. For maximum scanning satisfaction, control your Bearcat 245XLT from your computer running Windows. Order Scancat Gold for Windows, part number SGFW for $99.95 or the surveillance enhanced version with audio recording part number SGFWSE for $159.95.

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Bearcat 278CLT 100 ch. AM/FM/SAME WX alert scanner	$139.95
Bearcat 250D 1,000 ch. Trunktracker III handheld scanner	$339.95
Bearcat 245XLT 300 ch. Trunktracker II handheld scanner	$189.95
Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner	$84.95
Bearcat Sportcat 200 alpha handheld sports scanner	$159.95
Bearcat Sportcat 180B handheld sports scanner	$139.95
Bearcat 80XLT 50 channel handheld scanner	$99.95
Bearcat 60XLT 30 channel handheld scanner	$74.95
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RADIO HONOR ROLL

Amateur Radio "Just in Case"

Thirteen-year-old Jordan Webb KI4AVG took along his amateur radio handi-talkie when the Vine Middle Magnet school made a field trip to the Smoky Mountain National Park in Tennessee. As some of the group decided to take a dip in the pool at the base of Abrams Falls in Cades Cove, one of the swimmers got into trouble. While another student and two adults went to his rescue, Jordan also started into the water to help, but then he remembered his radio.

"So I went and grabbed it and told one of the teachers that if I could get to a high spot I might be able to get in communication with somebody," he says. "So I just started running up the mountain."

He made contact with James Bond K6SPY (yes, it's a vanity call) in Knoxville, who called for help. Although the rescue crew did not arrive in time to save Chris Drinkard, they did locate his body – found trapped in strong currents below the falls – within hours instead of days.

Cellular phones work in very few locations within the Park. Jordan Webb, who has had his license for nearly two years, said he looked at his radio before he left home that morning and thought, "Well, I might need it for something."

Cell Phones for Soldiers

Cell Phones for Soldiers was created by two teenagers, 13 year old Brittany Bergquist and her brother, 12 year old Robbie Bergquist of Norwell, Massachusetts. After reading a story about a soldier who ran up a huge phone bill calling home, the two teenagers decided to try to help soldiers serving in Iraq and elsewhere with pre-paid cell phones or calling cards.

Their parents, Bob and Gail Bergquist, are contacting cell phone companies to help out. They are also contacting representatives of the military to put a plan in place to distribute the cell phones and calling cards. They hope to begin the distribution by the end of summer.

In one week, the program had collected 120 phones and $70,000, not including prepaid calling cards and cell phones, which will be used to purchase cell and satellite phones for U.S. soldiers in Iraq. Check out **http://www.cellphonesforsoldiers.com**

CBs for Soldiers

We're scratching our heads over the wisdom of Carole Rorrer's campaign. When her son called from the desert of Iraq last month and said his National Guard unit needed CB radios to stay connected while traveling in supply convoys, she quickly rounded up a pair of radios she no longer used and sent them overseas. Now she's asking the Beaufort, SC, community to search their garages, attics and basements for unused CB radios.

Rorrer said she spoke with her son, a lieutenant, and a captain from his unit on a conference call, and that she's sure her son went through the proper chain of command.

The military is normally very specific on what type of equipment can be used; Frequencies must be coordinated with local usage, and most of the radios used by soldiers in combat are secure so the enemy can't intercept messages.

"I'm not sure whether the Army will let civilian type radios in the country," said Bobby Kreps, commander of the local AMVETS chapter. *MT* remembers when military units have gotten into hot water in the past by using Family Service Radios for squadron communications.

So far Rorrer has sent eight radios.

BROADCASTING

Florida Pirates Put on Notice

In April Florida passed legislation to make it a third-degree felony to broadcast without a license or to interfere with a licensed broadcast. Florida is thought to have more pirate stations than any other state; since 1997, the FCC has shut down more than 400 unlicensed stations in Florida.

It remains to be seen whether the FCC will declare the airwaves to be their exclusive domain and strike down the Florida law. So far, Citizens Band is the only radio service that local and state governments are allowed to regulate and enforce.

Pirates Interfere with Airband

In April, the FAA and local police busted a station in Lake Worth, Florida, which was blocking radio comms around the Lantana and Palm Beach International airports.

"That was one hell of a dirty transmitter," Terry Jones, a news helicopter pilot, told *The Palm Beach Post*.

In Australia, a teenager who pled guilty to interfering with radio communication at Perth Airport could be going to jail for two years or facing $13,000 (AUD) in fines, or both.

Gangland pirate

In an investigation that spanned six years and involved hundreds of Chicago federal authorities, including the Federal Communications Commission, 32 alleged members of the corporation-style gang Black Disciples were arrested in May, and 15 more were sought on charges that they took part in a multistate drug ring.

The Black Disciples even had their own radio station. They pirated 104.7 FM from Christian radio station WCFL, and made "public service announcements" to alert gang members to police activity. The pirate station was shut down and equipment seized, along with guns, drugs and more than $300,000.

Pirate Challenges FCC

San Francisco Liberation Radio, in operation since May 1993 and busted last October, went to court to seek the return of its seized equipment and the community's underground voice.

SFLR's lawyer argued before a U.S. District Judge that the seizure of the station's equipment in the October raid came without proper notice and violated constitutional protections of due process and the First Amendment.

SLFR is still alive today, albeit only via online streaming audio on the Internet.

Radio Caroline Turns 40

A part of youth, irreverence, and the independence of the 1960s, Radio Caroline turned 40 in March 2004. The British pirate, which thumbed its nose at the BBC and wall-to-wall Montovani stations by broadcasting rock and roll from an offshore ship, is still doing going strong, it says.

Forty years later, its fans says mainstream music radio has once again become bland and repetitive.

The station now operates legally and from the safety of dry land, in Maidstone, broadcasting via its website, Sky satellite and a subscription radio channel, for which you require a special radio.

Radio Luxembourg

Back in Radio Caroline's day, the only commercial alternative was Radio Luxembourg, which made so much money from record labels that it played only a minute of each song.

Luxembourg-based commercial broadcaster RTL Group appears to be considering reviving the English service, which ran until the early '90s on mediumwave 1440 kHz. It plans to broadcast in Digital Radio Mondiale (DRM) mode and has requested frequencies in the longwave, mediumwave and shortwave bands.

BULLETIN BOARD

July 3: Huntington Beach, CA
American Shortwave Listeners Club - ASWLC (6182 Ballad Lane in Huntington Beach, CA 92649); 12 Noon to 4pm. Phone: 714-846-1685 Email: wdx6aa@earthlink.net

July 10: S Milwaukee, WI
South Milwaukee ARC 37th Swapfest, American Legion Post #434 (9327 S Shepard Ave, Oak Creek, WI), Talk-in 146.52 simplex, 6:30am-2pmCDT, adm $5. Free parking, picnic area; refreshments, prizes - http://www.qsl.net/wa9txe or contact ryatex@aol.com; (414) 762-3235.

July 17, Loveland, CO
Northern Colorado Amateur Radio Club Superfest, Budweiser Events Center, Larimer County Fairgrounds (exit 259 US I-25), Talk-in 145.115(-100Hz), 8am-2pm. Commercial exhibits, computer/radio goodies and more. Free parking. Reservations and info: Willis Whatley WA5VRL 970-407-6599.

July 24: Cincinnati, OH
OH-KY-IN Hamfest, indoors and air-conditioned at Diamond Oaks Career Development Campus (6375 Harrison Ave: I-74 to Rybolt Rd/Harrison Ave exit #11; east on Harrison), talk-in 146.670 (-) Flea market 6am, vendors 8am-2pm, admission $6, under 12 free. Seminars, transmitter hunts, vendors, flea market, prizes, VE exams (8am, walk-ins ok), refreshments, free parking. Tickets, Bruce Vanselow, N8BV, 513-251-1555, n8bv@juno.com. http://www.ohkyin.org

COMMUNICATIONS

SCANNING

New York Statewide System

New York governor Pataki has been defending the ambitious statewide wireless emergency communications system contract recently awarded to M/A-Com after eight years of development. Contrary to early fears, the administration assures the system will not include any construction in the protected wilderness areas of the Adirondacks and Catskills, but will plan for a handful of towers to be erected in populated areas, and for repeaters mounted on emergency vehicles to be used as needed in outlying areas.

It could be two years before the pilot program is completed and three years after that before any kind of system is put into place, according to the administration. The M/ACom bid for the 20-year contract was $1 billion, as opposed to Motorola's $3 billion. Critics point to Pennsylvania, where a similar system is already three years late and double what the company bid.

Meanwhile, the network has no place to operate at this time, said the FCC. The additional channels the state counted on are television channels being used by mostly religious and ethnic television stations nationwide. California, Florida, Kentucky, New Jersey and Washington have also passed legislation to create wireless networks on the new television channels when available, according to the National Conference of State Legislatures.

"There are no channels left," said John McFadden, a vice president for Motorola, which has won contracts to build 22 of 25 states' emergency radio systems. "They asked the broadcasters to get off the channels, but they don't have to ... they are on the air now and they aren't going to just want to give up the channels." See *Scanning Report* for a more in-depth report on these developments.

Nextel Swap

By the time you read this, the FCC may finally have made a decision about the long-debated swap of Nextel's 800-MHz frequencies for spectrum out of the public safety allocations. FCC Chairman Powell was pushing for a decision by the end of May, but he has backed off his support for Nextel's plan.

Nextel's proposed solution is one that actually came out of Oregon. During the 2001 Oregon Legislature, a bill drafted by Sen. Rick Metsger brought together metro-area public safety officials and representatives of the wireless communications industry. That plan formed the basis for the proposal known as the "Consensus Plan," wherein the Federal Communications Commission would reassign radio frequencies to eliminate interference.

According to the *Washington Post*, Nextel competitor Verizon Wireless has won support from several dozen members of Congress and New York state Attorney General Eliot L. Spitzer. Nextel has the support of the Association of Public Safety Communications Officials and hundreds of local fire and police departments around the country.

Each side has threatened to sue if the FCC does not act in its favor.

Jammer Sentenced

Rajib Mitra, the University of Wisconsin graduate student convicted in federal court of intentionally jamming the Madison emergency radio system 37 times last year, was sentenced in federal court as a domestic terrorist Wednesday to eight years in prison, placed on three years' probation and ordered to make restitution of $6,005 to the Madison Police Department.

Although the government considered Mitra the equivalent of a domestic terrorist, based on an application of the Patriot Act that punishes the substantial disruption of a critical public infrastructure, Assistant U.S. Attorney Tim O'Shea said Mitra's crime stemmed more from "immaturity than ideology."

Australia debates media access

Australia's Premier Peter Beattie asked for a public inquiry before deciding whether the media would be granted access to police radio broadcasts once the network turns digital. Judges, civil libertarians, and academics will be weighing in against the Queensland Police Service which currently plans to deny access to the system.

EMERGING TECHNOLOGY

Robots

Robots have been big in the news lately. Robots are center-stage in NASA's exploration of the Mars landscape (see last month's feature story). Robots go where it's too dangerous or difficult for mankind to go – from performing surveillance or delivering supplies within a war zone to performing microscopic surgery.

A couple of ambitious applications for robots have surfaced in the news lately. Japan is working on developing robots for the care and even companionship of the elderly and disabled, in anticipation of a manpower shortage to take care of an aging generation.

Back in space, NASA has agreed to consider the feasibility of repairing the Hubble Telescope using a robot. Without the required maintenance, Hubble will inevitably fail around 2007 and reenter the atmosphere, but NASA administration has determined that manned trips to the Hubble involve too many risks to human life.

MISCELLANY

Tauzin Still Truckin'

Contrary to expectations, Senator Billy Tauzin did not retire from Congress for either of the lucrative jobs rumored to have been offered him. And the bleeding ulcer which hospitalized him revealed a rare intestinal cancer. Tauzin underwent surgery in April and plans to return to finish his term in Congress after recovery, according to his website.

Surround Sound

Whales are having a hard time being heard these days. Researchers say that "calls" made by killer whales in the Pacific Northwest are about 15 percent longer than they were in 1990, when whale watching began to take off.

The scientists say that, like humans, the whales are trying to adjust to the noise around them. "Sound is everything to these animals. They live in a world of sound the way we live in a world of sight," said Iain Kerr, a whale researcher at Oceans Alliance, a nonprofit research organization.

Killer Radio

William Joseph Wolfe of Henderson, Texas, was charged in May with attempted murder after he allegedly prepared his wife a bubble bath, complete with candles and music, then tried to electrocute her by pushing a radio into the tub.

Apparently such actions were unusual enough to alert his wife, Teresa Wolfe, who told the police she caught the radio before it hit the water and threw it out of the way.

"Communications" is compiled by editor Rachel Baughn from new reports sent in by our readers. Warm thanks to this month's contributors: via mail, Anonymous, NY; Harry Baughn, NC; Sterling Marcher, CA; Doug Robertson, CA; Brian Rogers, MI; Jim Rustik, WA; Richard Sklar, WA; and via email, Anonymous, Doug Chandler, John Figliozzi, Paul Jablonowski, Rick Kissell, John Mayson, Jerry None, Ira Paul, Bill Siedsma, Larry Van Horn, Peter Vieth, Jeff White, and Ed Yeary.
email: mteditor@monitoringtimes.com

Romancing the River

by Gayle Van Horn

Harbor tug Guardian on the Mississippi (Photo by Larry Van Horn)

Folklorists tell us there is magic in its brown waters and nowhere is this more true than in the city of New Orleans. They say, a visitor who drinks from it will surely return to that city; or if he washes his face in it, his luck is bound to change from bad to good. So goes the mystique of this mighty waterway...one that has traditionally been the great provider and the great destroyer.

What body of water are we talking about? – The Father of all Waters – the Mississippi River.

Live around "Old Man River" long enough and it will become a part of your life; it certainly did mine. And I admit it: I still miss monitoring the tugs, cruise ships, container ships and tankers that plod up and down the great river. I miss hearing the calliope play on the *Natchez* steamboat as she works the river giving tourists a river eye view of the surroundings.

Recently, I was able to return to New Orleans (pronounced "Nawlins" by the locals). It was a chance to once again experience the ambiance of the city, catch up on some southern culture and food, and do some monitoring of the VHF marine bands.

Pull up a Park Bench and a Whip Antenna

One of the best places to conduct a maritime monitoring session is on the east bank of the river, on the levee in front of Jackson Square. Find yourself an empty park bench, pull up your whip antenna on the scanner and experience first hand the pulse of the river unfolding before you.

From this vantage point you have the best location to see and monitor the traffic from barges, massive tankers, cruise ships and even the occasional naval vessel from any one of a number of countries.

Armed with Table One in this article, you can experience the lure of the river and its radio traffic, not unlike the experience of radio hobbyists that specialize in aircraft or railroad monitoring.

Port of New Orleans

Annually, over 6,000 vessels move through the Port of New Orleans on the Mississippi River. Ships are guided though New Orleans by light operators, watching from an office with a river view, high above the Nicholls Street wharf. The job demands good judgment, the ability to endure an eight hour-shift, and, above all, a knowledge of ships and the river. All operators must hold an accredited license. Armed with a phone, radio, log book, a hotline to the lighthouse upriver at Gretna, and a small radar screen, the operator's word is law as they are the eyes and ears to all river traffic in the port.

At Algiers Point, just down river, operators guide ships around what may be the most dangerous bend along the Mississippi River's 2,350 miles. Speedy currents sweep across the channel, dragging ships along for the ride. The force of the water coming around the bend creates swirling eddies strong enough to suck a tugboat upstream. Giant container ships down river can careen wildly, skidding around the corner like a car on ice. Tugboats caught in the onshore currents may find themselves pulled into the direction of onrushing freighters. Reflecting on the day, light operator Chris Johnson commented, "It goes by faster when it's busy," he said, "but it's real nerve-racking."

Algiers is home to the most active of the area's ferryboats. Ferries remain an integral part of river traffic and an alternate route into and out of New Orleans. Other ferry crossings include Gretna, Harvey, and the Chalmette Ferry in nearby St. Bernard Parish.

The Algiers Ferry carries passengers from downtown New Orleans to Algiers across the crescent path of the Mississippi. This is a great opportunity to listen to communications while getting a close-up view of cruise and container ships, tugs, NOAA vessels, and tankers, as well as the remarkable skyline of New Orleans. You might also be able to hear some distinctive music coming from the nearby French Quarter and Jackson Square during a ferry crossing.

River Pilots on the Mississippi

Decades before Mark Twain wrote a word about the Mississippi River, pilots were plying their trade along the waterways. In Louisiana, piloting dates back to the 1700s, during a time of brawling over the best river assignments, among many who lacked the skill and knowledge to handle the job.

Today, before becoming an accredited river pilot, a candidate must work as an apprentice, which means riding along with other pilots and learning the ropes. After completing the apprenticeship, candidates take a written examination

administered and graded by a panel of pilots. Once that exam is passed, the oversight board recommends their appointment to the governor, who officially commissions all river pilots.

At that point, pilots legally can go into business for themselves. Pilots, also called "Masters of the River," earn more than airline or cruiseship captains in a pressure-filled job. They indeed, command the river, though at great risk. One mistake could send a 100,000-ton tanker filled with explosive jet fuel into a paddle-wheel ship filled with tourists.

Monitoring river traffic in and around New Orleans is not restricted to the Mississippi River. Pleasure boats can be heard on Lake Ponchatrain, and barge and tug traffic is active on the Harvey and Intracoastal Canals.

Yamma'n'dem

Who doesn't enjoy a get-together with friends and family? But at a draw bridge? That's right, the drawbridge entering Plaquemines Parish over the Intracoastal Canal, just south of New Orleans on the west bank, remains a popular place to catch up on gossip or socialize. Once the draw bridge has been drawn up for passing marine vessels, truck and car doors have been known to fly open and the zydeco music begins. Soon the socializing begins with, "Hey dawling, how's yamamma'n'dem" ...a collective term spoken as one word to inquire about your immediate family. If the bridge is up long enough, due to an especially slow boat, you may hear the pop of a beverage can or two. Once the bridge returns to its normal position, so does the respective traffic until the next stopover.

This particular drawbridge over the Intracoastal has gained some notoriety in local circles. It is the only link from New Orleans into the town of Belle Chasse, home of Naval Air Station New Orleans and the rest of Plaquemines Parish down to Grand Isle, Louisiana. Consequently, it has earned a reputation as "one way in and one way out" – not exactly an encouraging thought during hurricane season. It does, however, stop many a law breaker, while the sheriff waits for them at the raised drawbridge!

Marine Communications Background

The Maritime, or Marine Services have evolved from the earliest practical uses of radio. In 1900, just six years after Marconi demonstrated his "wireless" radio, devices were being installed aboard ships to enable them to receive storm warnings transmitted from stations on shore. Today, the same principle applies in using both shipboard and land stations in the marine services to safeguard life and property at sea. Both types of stations are also used to aid marine navigation, commerce, and personal business, but such uses are secondary to safety, which has international priority.

The Marine Radio Services include the Maritime Mobile Service, the Maritime Mobile-Satellite Service, the Port Operations Service, the Ship Movement Service, the Maritime Fixed Service, and the Maritime Radio Determination Service. While these services classify the different types of marine radio communications we as monitors basically look at the marine band from two aspects – stations on land and stations aboard ships. The Federal Communications Commission (FCC) regulates this service both for ships of U.S. registry that sail in international and foreign waters, and for all marine activities in U.S. territory.

For this and other reasons, the rules from the FCC make a distinction between compulsory users of marine radio for safety at sea, and noncompulsory uses for purposes other than safety. In addition, rules concerning domestic marine communications are matched to requirements of the U.S. Coast Guard, which monitors marine distress frequencies continuously to protect life and property in U.S. waters.

Coast Stations and Their Frequencies

Land stations in the marine services are the links between vessels at sea and activities ashore. They are spread throughout the coastal and inland areas of the United States to carry radio signals and messages to and from ships on the water. These stations are generally characterized by the services they provide:

Public coast stations connect marine radios with the public switched telephone network. These stations are commonly known as "marine operators." VHF-FM band (156-162 MHz) public coast stations provide short-range communications for vessels not more than 30 nautical miles from shore. High seas band (2-27.5 MHz) public coast stations serve vessels far from shore. Some high seas stations can even serve vessels thousands of miles from land. Public coast stations are common carriers, and thus charge a fee for providing voice, telex, fax, or data transmission services. Nevertheless, public coast stations provide a vital public service, as they are reach well beyond the limits of terrestrial radio systems and are required by statute to relay distress messages free of charge.

Automated Maritime Telecommunications System (AMTS) stations are a special type of public coast station operating in the 216-220 MHz band. AMTS stations are licensed to provide coverage over an entire inland waterway or a substantial portion of an ocean coastline.

Private coast stations are not common carriers and they cannot charge for communications services. Instead, they provide information to associated vessels. Only those entities that provide some sort of service to vessels or control a bridge or waterway may become a private coast station licensee. Some common uses of private coast stations include: marinas, radio repair shops, bridges, locks and yacht clubs.

See Tables Two and Three for detailed VHF-FM marine band channel/frequency assignments.

The Spanish Navy sailing vessel Juan Sebastian de Elcano at the Bienville Street Wharf (Photo by Larry Van Horn)

Vessel Traffic Services (VTS)

The purpose of a Vessel Traffic Service (VTS) is to provide active monitoring and navigational advice for vessels in particularly confined and busy waterways. There are two main types of VTS, surveilled and non-surveilled.

A **surveilled** system consists of one or more land-based sensors (i.e. radar, AIS-see below and closed circuit television sites) which output their signals to a central location where operators monitor and manage vessel traffic movement.

Non-surveilled systems consist of one or more reporting points at which ships are required to report their identity, course, speed and other data to the monitoring authority. They encompass a wide range of techniques and capabilities aimed at preventing vessel collisions, rammings and groundings in the harbor, harbor approach and inland waterway phase of navigation. They are also designed to expedite ship movements, increase transportation system efficiency, and improve all-weather operating capability.

VHF-FM communications networks form the basis of most major services. Transiting vessels make position reports to a vessel traffic center by radiotelephone and are in turn provided with accurate, complete, and timely navigational safety information. The addition of a network of radars and closed circuit television cameras for surveillance and computer-assisted tracking, similar to that used in air traffic control, allows the VTS to play a more significant role in marine traffic management. This helps reduce vessel congestion, critical encounter situations, and the probability of a marine casualty resulting in environmental damage.

The United States Coast Guard (USCG) maintains nine Vessel Traffic Centers (VTC) and is in the process of developing another. Valdez, Seattle, San Francisco, Los Angeles, Houston, Morgan City, Louisville, Sault Ste. Marie, and New York currently have VTCs. A VTC in New Orleans and the lower Mississippi River is being developed. See table two for more specific information on VTS frequencies.

Monitoring Marine Communications

Almost every scanner sold since the advent of programmable scanners is capable of monitoring the VHF-FM Marine Band. Some even have specialized search routines preprogrammed to find activity in the listener's local area.

As far as reception range is concerned, the listener must remember that this is the VHF radio spectrum which is a line of sight band; range here is a function of antenna

Table 1: New Orleans Area VHF-FM Marine Band Station Sampler

KDO761	Chevron USA Inc	Ostrica Terminal	156.450 156.500 156.800
KEB	Dixie Carriers Inc	Belle Chasse	156.250 156.450 156.80 157.025
KEB449	Orleans Parish Levee District	New Orleans	156.450 156.650 156.800
KGA306	Venice Marina Inc	Venice	156.425 156.450 156.800 156.975
KGW340	Louisiana Dock Co LLC	Harahan	156.050 156.450 156.800
KIY809/KIY812	Associated Branch Pilots	Pilottown	156.275 156.450 156.800
KIZ426	Bisso Towboat Inc	New Orleans	156.275 156.450 156.800 157.025
KIZ472	State of Louisiana	Barataria Bridge	156.450 156.650 156.800
KJA549	State of Louisiana	Danziger Bridge	156.450 156.650 156.800
KJB352	Belle Chasse Marine Transportation Inc	Belle Chasse	156.450 156.500 156.800 161.600
KKQ311	Joseph C Domino Inc	Marrero	156.450 156.725 156.800 156.900 157.025
KKW601	Harbor Towing & Fleeting Inc	New Orleans	156.350 156.450 156.675 156.800 156.900
KLG315	State of Louisiana	New Orleans	156.450 156.650 156.700 156.800
KMB830	Northrop Grumman Ship Systems, Inc	Avondale	156.425 156.450 156.500 156.800
KMB882	AEP Elmwood LLC	Belle Chasse	156.450 156.725 156.800 156.950
KMD251	Plaquemines Parish	Point o La Hache	156.350 156.450 156.500 156.800
KPB516	Samedan Oil Corporation Venice		156.275 156.350 156.450 156.800
KQD	Electronic Services Inc	Westwego	156.450 156.800 156.950
KQU512	Cargill Inc	Westwego	156.450 156.725 156.800 156.900
KUF606	Belle Chasse Marine Transportation Inc	Alabo Street Wharf, New Orleans	156.450 156.500 156.800 161.600
KUZ378	Capital Marine Supply. L.L.C.	Algiers Fleet Office, New Orleans	156.350 156.450 156.725 156.800
KVF866	John W Stone Oil Distributors LLC	Gretna	156.450 156.800 156.975
KVR475	Western Towing Company	Harahan	156.450 156.675 156.800 157.025
KVR708	Crescent Towing & Salvage Co Inc	New Orleans	156.450 156.675 156.800 156.950
KWS651	American River Transportation Co	Waggaman	156.275 156.450 156.500 156.800
KYI272	Cross Marine Inc	Belle Chasse	156.450 156.500 156.800
KYX723	State of Louisiona	Rigolets Bridge	156.450 156.650 156.800
KYY220	State of Louisiana	Chef Menteur Bridge	156.450 156.650 156.800
KZG984	Vastar Resources Inc Venice		156.450 156.800 156.900 156.975
KZH852	Triple D Tugs Inc	Venice	156.350 156.450 156.800
KZJ346	John W Stone Oil Dist Inc Venice		156.450 156.800 156.975
KZP880	Lawrence Stipelcovich	Empire	156.450 156.800 156.975
KZV680	Baroid Corp	Venice	156.175 156.450 156.800
KZV684	Orleans Parish Levee District	South Shore Harbor Marina, New Orleans	156.450 156.475 156.800
KZV770	State of Louisiana	KZV770 Ostica Locks, Buras	156.450 156.650 156.800
KZV771	State of Louisiana	KZV771 Empire Lock	156.450 156.650 156.800
WBX	Assoc Federal Pilots & Dock Masters	Venice	156.450 156.800 156.975
WDT568	Orleans Parish Criminol Sheriffs Office	New Orleans	156.450 156.475 156.675 156.800
WDT572	State of Louisiana	Perez Bridge, Bella Chasse	156.450 156.650 156.800
WDT574	State of Louisiona	Algiers Intracoastal Waterway Bridge	156.450 156.650 156.800
WDT584	Azalea Fleet Inc	Waggaman	156.450 156.800
WHD625	Pike Shipping Co Inc	Harvey	156.450 156.500 156.800
WHD708	BP Oil Inc	Alliance Refinery, Belle Chasse	156.450 156.500 156.800
WHD746	Seabrook Marine Inc	New Orleans	156.425 156.450 156.500 156.800
WHD792	Jules L Schubert Marine Sales & Service Inc	New Orleans	156.425 156.450 156.800
WHF756	Suburban Gun & Rod Club	Davant	156.425 156.450 156.800
WHF866	CSX Transportation Inc	Chef Menteur Bridge	156.450 156.650 156.800
WHF868	State of Louisiana	New Orleans	156.450 156.650 156.700 156.800
WHG500	China Ship Supply Inc	Metairie	156.425 156.450 156.500 156.800
WHG584	Todd Michel Inc	Harvey	156.450 156.800 157.025
WHG661	O Meara Inc	New Orleans	156.450 156.500 156.800
WHG712	Mobex Network Services LLC	Jefferson Heights	217.0125 217.5125
WHG693	Mobex Network Services LLC	Venice	217.0125 217.5125
WHH211	Dynegy IT Inc	Warrens Venice Refinery Terminal	156.325 156.450 156.500 156.800
WHH308	South Shore Yacht Club	New Orleans	156.425 156.450 156.800
WHH393	Radio Holland USA B V	Harahan	156.450
WHU283	Megga Industries Inc	Buras	156.425 156.450 156.500 156.800
WHU627	Tulane Fleet Inc	Waggaman	156.450 156.500 156.725 156.800
WHV687	Channel Shipyard of New Orleans Inc	Waggaman	156.250 156.450 156.500 156.800
WHV920	Marmac Corp	Belle Chasse	156.450 156.800 156.900
WHV926	Buds Boat Rental Inc	Venice	156.250 156.450 156.800 156.950
WHW211	Union Pacific Railroad Co	Union Pacific Railroad Bridge at Harvey Canal	156.450 156.650 156.800
WHW213	Anthony J Bertucci Construction Co Inc	New Orleans	156.450 156.800 156.950
WHW530	Pontchartrain Materials Corp	New Orleans	156.450 156.500 156.800
WHW740	United Tugs Inc	Belle Chase	156.450 156.800 156.975
WHW759	State of Louisiana	Judge Seeber Bridge	156.450 156.650 156.800
WHX275	Textron Communications Inc	New Orleans	156.450 156.800 157.025
WHX302	Port Ship Service Inc	Belle Chasse	156.450 156.800 157.025 161.600
WHX433	E N Bisso & Son Inc	New Orleans	156.450 156.800
WHX681	Huey P Long Bridge Fleet Inc	Jefferson	156.250 156.450 156.800 157.025
WHX920	Gulf Coast Moriners Association	Grand Isle	156.425 156.450
WHX958	John W Stone Oil Distributor LLC	Belle Chasse	156.450 156.800
WPSI606	Plains Marketing LP	Venice	156.450 156.500 156.800
WPVL983	Mr. Loi Nguyen	Cut Off	156.350 156.450 156.800
WPWT355	Dominion Exploration and Production	New Orleans	156.450 156.500 156.800
WPZQ949	Kirby Inland Marine, LP	Harahan	156.450 156.675 156.800 157.025
WQA291	Jerrold M. Denet	Boothville	156.450 156.500
WQA300	Chevron USA Inc	Venice	156.325 156.450 156.500 156.800
WQA797	T T Coatings Inc	Westwego	156.350 156.450 156.800
WQB347	Jefferson Parish	La Palco Ave Drawbridge, Harvey	156.450 156.650 156.800
WQB384	Belle Chasse Marine Trans Inc	Point A La Hache	156.450 156.800 161.600
WQB436	Callais Marine Service of Venice Inc	Venice	156.450 156.800 156.900
WQZ227	Orleans Parish Levee District	New Orleans	156.425 156.450 156.800
WQZ296	Y & S Marine Inc	Buras	156.450 156.800 156.950
WRD832	Devon Energy Corp	Burrwood	156.450 156.500 156.800
WRD848	Port Ship Service Inc	Myrtle Grove	156.450 156.800 161.600
WRS928/WXF647	Vastar Resources Inc	Venice	156.450 156.800 156.900 156.975
WXZ471	State of Louisiana	New Orleans	156.450 156.650 156.700 156.800
WXZ553	State of Louisiana	New Orleans	156.450 156.650 156.700 156.800

height. The higher the antenna the more you are going to hear.

Frequency Refarming the Marine Band

Like many other areas of the radio spectrum, the VHF-FM marine band is very crowded. The FCC has now refarmed the marine radio spectrum from 25 kHz spacing to 12.5 kHz spacing. The new channels/frequencies are shown in Table Four.

River Magic

Whether you enjoy monitoring the big ships of the mighty river. ferryboats, or even communications from the area's many bridges, it is a fascinating pastime to listen to a scanner programmed for maritime monitoring in the Big Easy. While listening along New Orleans river front, it's not hard to imagine days of stately paddle wheels or flatboats. The magic and romance of the river is very much alive and well in the Crescent City of New Orleans.

Port of New Orleans Authority

Almonaster Ave Bridge	156.650
Florida Ave Bridge	156.650
St. Claude Ave Bridge	156.700
Seabrook Railroad Bridge	156.800

Table 2: U.S. VHF-FM Marine Radio Channels and Frequencies

Frequencies are in MHz. Modulation is narrowband FM.

Chnl	Ship Transmit	Ship Receive	Usage
01A	156.050	156.050	Port operations and commercial. Vessel Traffic System (VTS) available soon in the lower Mississippi River (New Orleans) area.
05A	156.250	156.250	Port operations. VTS available soon in the lower Mississippi River (New Orleans) area and now in Puget Sound (Seattle), WA.
06	156.300	156.300	Intership safety
07A	156.350	156.350	Commercial
08	156.400	156.400	Commercial (Intership only)
09	156.450	156.450	Boater calling. Commercial and non-commercial.
10	156.500	156.500	Commercial
11	156.550	156.550	Commercial. VTS in Berwick Bay (Morgan City), LA; Houston/Galveston, TX; New York, NY; Puget Sound (Seattle) Vancouver area; and St. Mary River (Sault Ste Marie), MI.
12	156.600	156.600	Port operations. VTS in Houston/ Galveston, TX; New York, NY, St. Mary River (Sault Ste Marie), MI; and San Francisco, CA.
13	156.650	156.650	Intership navigation safety (bridge-to-bridge). Ships greater than 20 meters length maintain a listening watch on this channel in United States waters. All VTS areas alternate channel, and VTS channel in Louisville, KY and Prince William Sound (Valdez), AK.
14	156.700	156.700	Port operations. VTS in New York, NY; Puget Sound (Seattle), WA and San Francisco, CA.
15	———	156.750	Environmental (receive only). Used by Class C EPIRBs.
16	156.800	156.800	International Distress, Safety and Calling. Ships required to carry radio, US Coast Guard and most coast stations maintain a listening watch on this channel.
17	156.850	156.850	State/Maritime control
18A	156.900	156.900	Commercial
19A	156.950	156.950	Commercial
20	157.000	161.600	Port operations (duplex)
20A	157.000	157.000	Port operations
21A	157.050	157.050	U.S. Coast Guard only
22A	157.100	157.100	Coast Guard Liaison and Maritime Safety Information Broadcasts. Broadcasts announced on channel 16.
23A	157.150	157.150	U.S. Coast Guard only
24	157.200	161.800	Public correspondence (Marine operator)
25	157.250	161.850	Public correspondence (Marine operator)
26	157.300	161.900	Public correspondence (Marine operator)
27	157.350	161.950	Public correspondence (Marine operator)
28	157.400	162.000	Public correspondence (Marine operator)
63A	156.175	156.175	Port operations and commercial. VTS available soon in the lower Mississippi River (New Orleans) area.
65A	156.275	156.275	Port operations
66A	156.325	156.325	Port operations
67	156.375	156.375	Commercial. Used for bridge-to-bridge communications in lower Mississippi River. Intership only.
68	156.425	156.425	Non-commercial
69	156.475	156.475	Non-commercial
70	156.525	156.525	Digital Selective Calling (voice communications not allowed this frequency)
71	156.575	156.575	Non-commercial
72	156.625	156.625	Non-commercial (Intership only)
73	156.675	156.675	Port operations
74	156.725	156.725	Port operations. VTS in Puget Sound (Seattle) Tofino area
77	156.875	156.875	Port operations (Intership only)
78A	156.925	156.925	Non-commercial
79A	156.975	156.975	Commercial. Non-commercial in the Great Lakes only.
80A	157.025	157.025	Commercial. Non-commercial in the Great Lakes only.
81A	157.075	157.075	U.S. Government only – environmental protection operations.
82A	157.125	157.125	U.S. Government only
83A	157.175	157.175	U.S. Coast Guard only
84	157.225	161.825	Public correspondence (Marine operator)
85	157.275	161.875	Public correspondence (Marine operator)
86	157.325	161.925	Public correspondence (Marine operator)
AIS1	———	161.975	Automatic Identification System (AIS)
AIS2	———	162.025	Automatic Identification System (AIS)
88A	157.425	157.425	Commercial, intership only.

Note that the letter "A" indicates simplex use of the ship station transmit side of an international duplex channel, and that operations are different from international operations on that channel. Some VHF transceivers are equipped with an "International – United States" switch for that purpose. "A" channels are generally only used in the United States and use is normally not recognized or allowed outside the U.S. The letter "B" indicates simplex use of the coast station transmit side of an international duplex channel. The U.S. does not currently use "B" channels for simplex communications in this band.

Table 3: VHF-FM Marine Channels List by Usage

The chart below summarizes a portion of the FCC rules — 47 CFR 80.371(c) and 80.373(f)

Automatic Identification System (AIS) – AIS1 (161.975) and AIS2 (162.025)

The AIS is a shipboard broadcast system that acts like a transponder, operating in the VHF maritime band, that is capable of handling well over 4,500 reports per minute and updates as often as every two seconds. It uses Self-Organizing Time Division Multiple Access (SOTDMA) technology to meet this high broadcast rate and ensure reliable ship-to-ship operation.

Picture a shipboard radar display, with overlaid electronic chart data, that includes a mark for every significant ship within radio range, each as desired with a velocity vector (indicating speed and heading). Each ship "mark" could reflect the actual size of the ship, with position to GPS or differential GPS accuracy. And if your shack were AIS equioped, by "clicking" on a ship mark you could learn the ship name, course and speed, classification, call sign, registration number, MMSI and other information.

Coast Guard Liaison – Channel 22

This channel is used by boaters to talk to the U.S. Coast Guard after contact is first made on channel 16.

Commercial – Channels 1[5], 7, 8, 9, 10, 11, 18, 19, 63[5], 67[7], 79, 80 and 88[1]

Working channels for working ships only. Traffic on these chan-

nels are about business or the needs of the ship. Channels 8, 67, 72 and 88 are assigned only for ship-to-ship messages.

Digital Selective Calling – Channel 70
This channel is reserved for distress and safety calling and for general purpose calling using only digital selective calling techniques (non-voice channel).

Global Maritime Distress and Safety System – Channel 70
VHF maritime channel 70 (156.525 MHz) is authorized exclusively for distress, safety and calling purposes using digital selective calling (DSC) techniques under the new Global Maritime Distress and Safety System (GMDSS). Some vessels are now equipped with DSC capability and will be using channel 70 for this purpose. It is essential that this channel be protected and no other uses are permitted.

International Distress, Safety and Calling – Channel 16
This channel is used to get the attention of another station (calling) or in emergencies (distress and safety).

Intership Safety – Channel 6
This channel is reserved for ship-to-ship safety messages, for search and rescue messages, and ships and aircraft of the U.S. Coast Guard.

Navigational – Channels 13 (Nationwide) and 67 (on the lower Mississippi River only).
These frequencies are also known as the bridge-to-bridge channels. These two channels are available to all ships (channel 67 is used on the lower Mississippi River only). Traffic consists of messages on ship navigation, for example, passing or meeting other ships. Traffic here is kept short and transmitter output powers cannot exceed more than one watt.
This is also the main working channel at most locks and drawbridges. All ships of a length 20 meters or greater are required to guard VHF channel 13, in addition to VHF channel 16, when operating within U.S. territorial waters. Users may be fined by the FCC for improper use of these channels.

Non-commercial – Channels 9[6], 67[7], 68, 69, 71, 72, 78, 79[4] and 80[4]
These are working channels for pleasure boats (non-commerical). Traffic must be about the needs of the ship. Typical uses include fishing reports, rendezvous, scheduling repairs, and berthing information. Channels 67 and 72 only are reserved for ship-to-ship messages.
The Federal Communications Commission established VHF-FM channel 9 as a supplementary calling channel for noncommercial vessels (recreational boaters) at the request of the Coast Guard. A ship or shore unit wishing to call a boater would do so on channel 9, and anyone (boaters included) wishing to call a commercial ship or shore activity would continue to do so on channel 16. Recreational boaters would continue to call the Coast Guard and any commercial facility on channel 16.
The purpose of the FCC regulation was to relieve congestion on VHF channel 16, the distress, safety and calling frequency. FCC regulations require boaters having VHF radios to maintain a watch on either VHF channel 9 or channel 16, whenever the radio is turned on and not communicating with another station.
Since the Coast Guard does not have the capability of announcing an urgent marine information broadcast or weather warning on channel 9, its use is optional. The FCC recommends that boaters normally keep tuned to and use channel 16 in those waters unless otherwise notified by the Coast Guard.

Public Correspondence (Marine Operator) – Channels 24, 25, 26, 27, 28, 84, 85, 86, 87 and 88[2]
Use these channels to call the marine operator at a public coast station. By contacting a public coast station, you can make and receive calls from telephones on shore. Except for distress calls, public coast stations usually charge for this service.

Port Operations – Channels 1[5], 5[3], 12, 14, 20, 63[5], 65, 66, 73, 74 and 77
These channels are used in directing the movement of ships in or near ports, locks or waterways. Messages must be about the operational handling movement and safety of ships. In certain major ports, Channels 11,12 and are not available for general port operations messages. Use channel 20 only for ship-to-coast messages. Channel 77 is limited to intership communications to and from pilots.

State/Maritime Control – Channel 17
This channel is used to talk to ships and coast stations operated by state or local governments. Traffic pertains to regulation and control, boating activities, or assistance to ships.

Weather (NOAA) Frequencies
On these channels you will receive weather broadcasts of the National Oceanic and Atmospheric Administration. These channels are only for receiving and mariners are not permitted to transmit on them.

WX1	162.550
WX2	162.400
WX3	162.475
WX4	162.425
WX5	162.450
WX6	162.500
WX7	162.525

Channel Superscript Translation
1. Not available in the Great Lakes, St. Lawrence Seaway, or the Puget Sound and the Strait of Juan de Fuca and its approaches.
2. Only for use in the Great Lakes, St Lawrence Seaway, and Puget Sound and the Strait of Juan de Fuca and its approaches.
3. Available only in the Houston and New Orleans areas.
4. Available only in the Great Lakes.
5. Available only in the New Orleans area.
6. Available for Intership, ship, and coast general purpose calling by noncommercial ships.
7. Available only in the Puget Sound and the Strait of Juan de Fuca.

Table 4: New VHF-FM Marine 12.5 kHz Narrowband Spaced Channels/Frequencies

Chnl	Ship	Ship & Coast	Coast
260	156.0375		160.6375
201	156.0625		160.6625
261	156.0875		160.6875
202	156.1125		160.7125
262	156.1375		160.7375
203	156.1625		160.7625
263	156.1875		160.7875
204	156.2125		160.8125
264	156.2375		160.8375
205	156.2625		160.8625
265	156.2875		160.8875
206	156.3125		160.9125
266	156.3375		160.9375
207	156.3625		160.9625
267		156.3875	
208		156.4125	
268		156.4375	
206		156.4625	
269		156.4875	
210		156.5125	
270		156.5375 DSC guardband	
211		156.5625	
271		156.5875	
212		156.6125	
272		156.6375	
213		156.6625	
273		156.6875	
214		156.7125	
274		156.7375	
215		156.7625	
275		156.7875 Guardband	
216		156.8125 Guardband	
276		156.8375	
217		156.8625	
277		156.8875	
218	156.9125		161.5125
278	156.9375		161.5375
219	156.9625		161.5625
279	156.9775		161.5775
220	157.0125		161.6125
280	157.0375		161.6375
221	157.0625		161.6625
281	157.0875		161.6875
222	157.1125		161.7125
282	157.1375		161.7375
223	157.1625		161.7625
283	157.1875		161.7875
224	157.2125		161.8125
284	157.2375		161.8375
225	157.2625		161.8625
285	157.2875		161.8875
226	157.3125		161.9125
286	157.3375		161.9375
227	157.3625		161.9625
287	158.3875		161.9875
228	157.4125		162.0125

The Potomac Tracon

By Jean Baker Hubbard

In the Baltimore-Washington area there are five major airports, all located within 150 miles of one another, and up until recently, each had its own TRACON. (A TRACON is a "traffic control" facility which handles the movement of aircraft traffic to and from an airport. These are commonly called Approach and Departure movements.) The TRACONS involved belonged to Baltimore-Washington International, Ronald Reagan Washington National Airport, Dulles International Airport, Richmond (Virginia) International Airport, and Andrews Air Force Base.

For the past four decades, extremely rigid routes were required to ensure the safety of aircraft flying from one TRACON's airspace to another. Also, national security requirements in and around the Washington, D.C. metropolitan area resulted in a number of special restrictions placed on airspace use. The combined factors of increased traffic volume, proximity of airports, the mix of aircraft with widely varying operating characteristics, and special use airspace requirements had compounded operational complexity and degraded overall operational efficiency.

On 14 December 2002, the Potomac Consolidated TRACON opened. This state-of-the-art facility, located in Virginia approximately 20 miles to the southwest of Dulles International Airport, consolidated the five existing TRACONS into one. It also allowed the Federal Aviation Administration to redesign the airspace in this area for more efficient, direct, and *safer* flight routings to and from the airports involved. Removing the barriers of rigid routes mentioned above allows aircraft to fly more direct routings and reach higher altitudes more quickly; the ability to stay higher longer results in less fuel burned and reduced noise impact.

On the other hand, little if any alteration has been made to final approach and departure routes, which are usually within five miles of an airport. It has been said that the new routes will save the users of this airspace – airlines, private pilots, and the military services – about $25 million annually.

Behind the Scenes

Three hundred controllers, engineers, and related personnel staff this facility, which is at work 24 hours a day, 365 days a year. The latest advances in technology include large, high-resolution monitors and touch screen displays to improve safety and efficiency in handling an air traffic volume of more than 5,000 flights per day within 23,000 square miles of airspace. The displays use flashing colors and vastly improve the ability of controllers to see aircraft previously obscured by weather fronts.

In the operations center, rear-projection displays show current aircraft positions, nationwide, regionally, or locally, overlaid on maps of geographical boundaries. These allow the controllers to predict congestion at any airport up to four hours in advance, establish appropriate delays for aircraft on the ground, and reroute aircraft to determine the most efficient route around severe weather. These displays provide critical SXGA resolution needed for very highly detailed flight information.

Within the TRACON, radar equipment allows the controllers to watch aircraft at distances from between 5 and 100+ miles of the facility. The controllers ensure that all aircraft departing or entering the airspace are kept separated at safe distances, and when necessary, the aircraft are rerouted to avoid dangerous weather patterns.

A TRACON's total airspace is divided into areas called sectors, and each of these sectors is assigned to a controller. That controller directs the movement of traffic in and out of his airspace on a radar screen and maintains voice contact with the pilots. Although the controller's individual responsibility is only for his or her own sector, all controllers within a consolidated TRACON such as Potomac have full radar information on all the aircraft that are under the control of the entire TRACON facility. And because they are co-located, these controllers are able to communicate with one another instantaneously – something which contributes significantly to assuring the safety of aircraft passengers.

By contrast, in the former individual TRACON environment, controllers in one TRACON had limited ability to communicate and coordinate with controllers in adjacent facilities, even though aircraft passed from the airspace of one TRACON into that of another.

Today, to assure the safety of hand-offs from one airspace to another, aircraft often must use longer routes than would be necessary in a single TRACON environment; however, some efficiency is sacrificed to safety concerns, as it should be in a system which puts safety first.

Consolidated Potomac TRACON

Dulles International Airport:
Potomac Approach – 120.450 (241-330), 124.650 (091-240), 126.100 (331-090)
Potomac Departure – 125.050 (300-120), 126.650 (121-299)

Baltimore-Washington International Airport:
Potomac Approach – 119.000 (020-100), 119.700 (131-190), 124.550 (101-130), 128.700 (181-019) 282.275 (020-100), 125.300, 290.475 (131-180), 307.900 (181-019), 317.425 (101-130), 291.625
Potomac Departure – 128.700 (181-019), 124.550 (101-130), 133.750

Ronald Reagan Washington National Airport:
Potomac Approach – 119.850 (West), 124.200 (East), 128.350 (19,000 ft down to 3000 ft Southeast)
Potomac Departure – 118.950 (West 9500 ft and below), 121.050 (West 10,000 ft up to FL 230), 125.650 (East 9500 ft and below) 126.550 (East 10,000 ft up to FL 190)

Richmond International Airport:
Potomac Approach – 126.400 (031-170), 126.800 (321-030), 134.700 (171-320), 118.200
Potomac Departure – 126.400 (031-170), 126.800 321-030), 134.700 (171-320)

Andrews Air Force Base:
Potomac Approach/Departure – 119.300, 335.500, 124.200, 118.950, 124.650

User-Controlled On-Line Tuner FAQs

By Jim Southwick, N7HFK
Photos By Leah Hogsten

Have you thought about getting a shortwave radio to listen to distant stations – whether it be broadcast, pirate radio, or ham radio? Maybe you are wanting a scanner to cover a broad range of frequencies and modes.

In theory, it sounds quite easy to purchase a radio and start listening. The problem is, though we all know the radio is only as good as the antenna system to which it is connected, we tend to forget this additional cost and hassle, yet we still hope for better than average reception. In many cases, antenna requirements can even be prohibitive depending on one's location and limitations.

If you are wanting to listen to a broad range of frequencies in various modes (AM, SSB, FM, CW, etc.), this can be a further complication – the cost can be fairly steep for sophisticated communications receivers.

The "UCOT"

Fortunately, these days, you can try out a variety of high-end systems without having to worry about buying the radio or the antenna system – if you have a computer connected to the internet. Even a dial-up line will work fine. Welcome to the world of the *user-controlled on-line tuner* – which, for easier reference in this article, we will refer to as a "*UCOT*."

Essentially, with a UCOT someone has already gone through the trouble and expense of buying the receiver and antenna system along with the software to serve it up through the internet. This allows you to tune the radio in real time, as if you were sitting right in front of it.

Of course, the down side is you may have to share this radio with other users, but you will find you can often have a radio to yourself at various times throughout the day and night. The benefits are great. (In fact, check out this month's *Utility World* column for one example of how remote monitoring can be used - *ed.*)

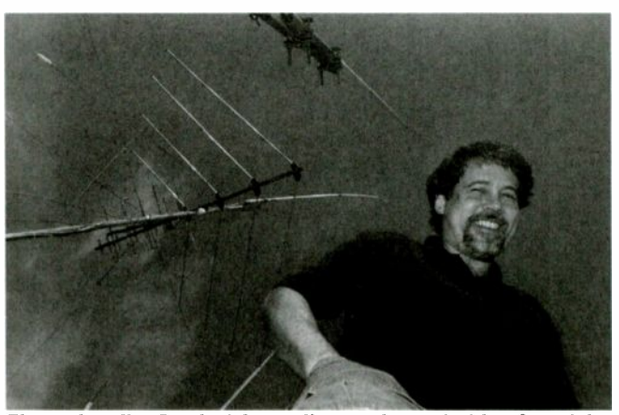
Borrowing an internet term, we'll provide some background on the subject as a series of FAQs (frequently asked questions).

Are there many UCOTs around?

Although these public on-line systems have been around for some time in various formats, they have never really become abundant due to the fact they are expensive to set up, run and maintain. So although there are sites coming on-line now and then, many other existing sites are shutting down or have gone private. Also many of the remaining sites have gone to a pay status in order to try to recoup some of the costs of running the system.

So are there any free sites?

The good news is, there are still some long time sites offering full access to the public and, yes, they are completely free. Many of these free sites are actually superior to the paid sites as they are offered up by ham radio operators who enjoy sharing their radios and antenna systems and get a kick out of providing the service. My own site at jimandleah.com was started on just that premise. I will list where you can go to find other various sites later in this article.



The author Jim Southwick standing on the roof with a few of the handful of antennas above him.

What types of UCOTs are there?

There are various software "styles" of on-line radio systems. Some of the oldest programs have been written privately and have a more "manual" feel to the software. That is, they do not provide real time feedback such as the signal strength of the received signal or graphing and chat capabilities. You basically enter the frequency and mode and then listen. However, the station quality is very good at the sites I have seen using their own written software. The others, as explained below, will provide a host of supporting information to the user in real time.

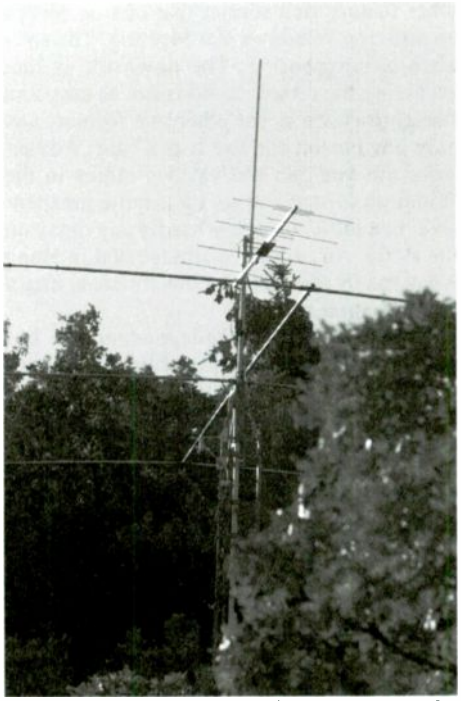
What are the most popular UCOTs?

Two of the most popular public versions that provide real time feedback and are very easy to use are called **Javoradio** – not to be confused with the trademark Java – (**http://www.javoradio.com**) and **Visualradio** (**http://www.visualradio.de**). With few exceptions neither version requires you to download anything and will usually work as soon as you access the page. The Javoradio network consists of many radios worldwide (mainly throughout Europe) and has a very user friendly format rich with features. Javoradio has done a nice job of making this system easy to use for the on-line listener. You are able to tune many parameters of the radio, get signal strength, access a directory of stations, and chat. The sites on Javoradio feature the Icom PCR100/1000 receivers exclusively.

Until about a year ago, the sites were actually free but have now unfortuntely gone to a paid status. However, the cost to use the receivers is quite minimal and they also will feature a couple of free sites of their choosing that you can tune into without paying. There are a couple of sites that feature very elaborate antenna systems that alone can make the cost of admission worth it – especially if you are into TV and FM radio DXing.

The Visualradio public network is smaller in scope, featuring only a handful of receivers, but they are completely free (we love free!), and can accommodate any type of computer controlled radio on the serving end. This can allow for some very high quality radios, as the PCRs do have their limitations.

Visualradios offer two different formats: Java (although they are not Javoradios) and Active/x. The VisualRadio java format basically



More antennas used located on a tower on the hillside behind my home. The current elevation is 5090 feet.

gives you tuning capability, S Meter, and a chat room. It is quite basic compared to the feature-rich format of the Javoradios. However, by downloading the free software (available on the main site or my site at jimandleah.com), one can take advantage of exclusive advanced features such as a signal vs. time graph, dx cluster, and a sophisticated display spectrum. The latter allows you to view a group of signals simultaneously for a segment of the band you are listening to and then choose the signal you want by just clicking on the graph. This is not available on the javoradios, and is a real advantage over basic scanning.

Both Visualradio and Javoradios have real time chat rooms so users can converse and share information while using the tuners. The chat window is a great place to meet people with common interests in online listening.

Let's move on to the actual operation of a UCOT once you get there.

On-line etiquette.

The first and foremost rule on any public UCOT is to ask before tuning! This is simply done by typing "May I tune?" in the chat room. Even if you think you are the only person using the radio, the owner of the radio may be using it at the time themselves. This is just a common courtesy and you will find in almost all cases the user will yield the control to you. If you experience problems with this, the owner of the UCOT will certainly want you to email them. When the system is busy, you may enjoy just listening to what others users are tuning.

Get to know the system you are using.

Each system is unique. Some may be designed for listening to VHF and UHF. Others may be designed mainly for listening to the HF spectrum. It doesn't do anyone any good if you are tuning for WWV and the UCOT only has an antenna good for UHF. A simple inquiry in the chat window will usually get a response from those that are familiar with the system. Often the web page will tell what you need to know about the UCOT and what it does.

What frequencies can I tune?

Since the majority of UCOTs are Icom PCR1000s, you will be able to tune from .100-1300 MHz (cellular excluded) and use all modes (CW, FM, USB, LSB and AM). This is a lot of frequency spectrum The type of antenna the owner has installed will be pretty obvious, depending on where you tune. Many owners have chosen to use a discone antenna which gives decent coverage of the VHF/UHF spectrum (50-1200 MHz) but really falls short on the HF spectrum (0-30 MHz).

Because I am a ham radio operator, I already had the antennas in place for the receiver. For my on-line tuner I currently use a tower mounted inverted V with a 45 foot apex the majority of time. This gives fairly broad coverage across the HF spectrum. For the higher frequencies I also feed the receiver simultaneously with a UHF/VHF yagi. This would be a disaster on transmit, but fortunately in receiving we don't have to worry about that when combining antennas.

For even better performance from this combination, you can purchase a splitter which minimizes the effects on one antenna detuning the other.

Who uses the UCOTs?

The UCOT's lend themselves to a host of purposes. Ham radio operators often use the receivers to check to see if they are being "heard" where the host site is located, and if so, test their signal strength. This is very useful for getting real time feedback of the band conditions, as well as determining one's audio quality.

Another group of users listens to the air traffic control broadcasts. Many of these broadcasts are carried on shortwave radio, so a good UCOT can pick up these signals for hundreds or thousands of miles. When combined with vith various sites that allow a listener to watch the progress of a plane in real time, you basically can follow a specific plane from origin to destination, all in real time. This aspect of the hobby really grew after 9/11, with people wanting to track a loved one who was traveling.

Still others like the public service broadcasts on the VHF/UHF spectrum. Unfortunately, many of these communications have gone to a trunking or digital system that is not available on the UCOTs. Yet another group of individuals enjoy late night AM broadcast radio DX. If a site has a decent antenna for the low part of the HF band, it will generally work quite well for AM DX.

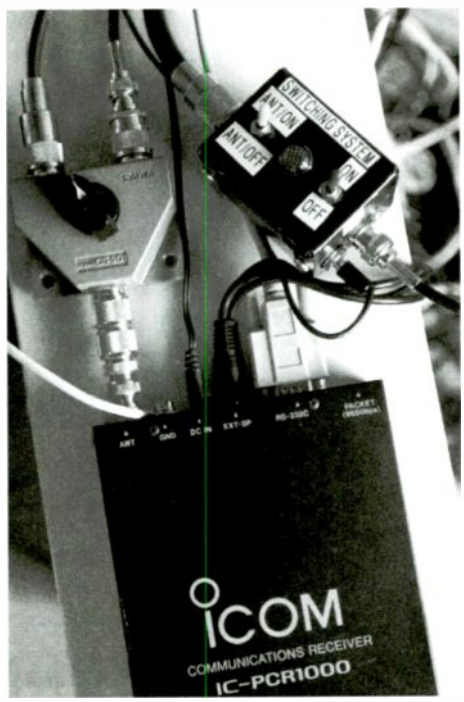
A few Javoradio sites actually feature large antenna arrays allowing users to listen to troposheric skip, meteor scatter, and other interesting conditions that mainly affect the VHF portions of the bands. This last group are usually people who just enjoy general listening across the bands, whether it be checking out the local FM radio stations, trying to tune into some cordless phone or baby monitors in the area (shame on you!) or just armchair shortwave listening.

My particular site has attracted a group of people who like to gather each night to tune in to the 80 meter band. Some enjoy listening to Art Bell and a group of other ham radio operators that get together on this band each nite. Since Art has retired from his late night radio show of many years during the weekdays, this allows the people who enjoyed his show to listen to him and others in a whole new context that is very relaxed and often humorous.

How can I set up my own public UCOT?

First of all, setting up a public UCOT is an expensive endeavor. Believe it or not, there are a couple of individuals who have set up tuning and transmitting capability UCOTs, but these systems are beyond the scope of this article. Even if it is just a receiver, it won't be much of a service if you start out with one that doesn't have decent reception or is very limited such as AM mode only. Word spreads fast and you will soon find your site is only good as a chat room for you and your friends. You also need decent uploading bandwidth, or your site will not be very enjoyable to listen to if it is constantly buffering on the audio.

Javoradio has the advantage of the software being free. Everybody loves free! The downside to this is that it requires a Linux OS based system, which most computer users are not set up for or familiar with. If you are – you're in luck! Remember, you are limited to an Icom PCR100/1000 receiver only with this software so you will need that before you even get started. You can go to **http://**



The most popular user controlled online tuner is the Icom PCR-1000 shown pictured here with a couple of antenna switches - one manufactured and one home built. Don't forget to ground the system (white wire in left of photo)

If you have modern ham equipment and antennas, you may be as close to setting up your own online tuner with just some additional software. Pictured here with the Kenwood TS-2000 which will work out of the box with VisualRadio. Many other modern transceivers will work as well.

www.javoradio.com for more details about what is involved and how you can get started.

Visualradio has the advantage of working with the Windows OS format and practically any type of ham radio/receiver that can be controlled by computer. Many people (especially hams) already have radios that can connect to their computer. The downside is, the company no longer currently sells the software for the basic amateur. Instead the software is marketed for commercial users, so although the sophistication of the commercial release is well beyond what most basic users would ever need, so is the price. However, as I write this article, I am told they are considering offering it again to the "amateur" user at a substantially reduced price.

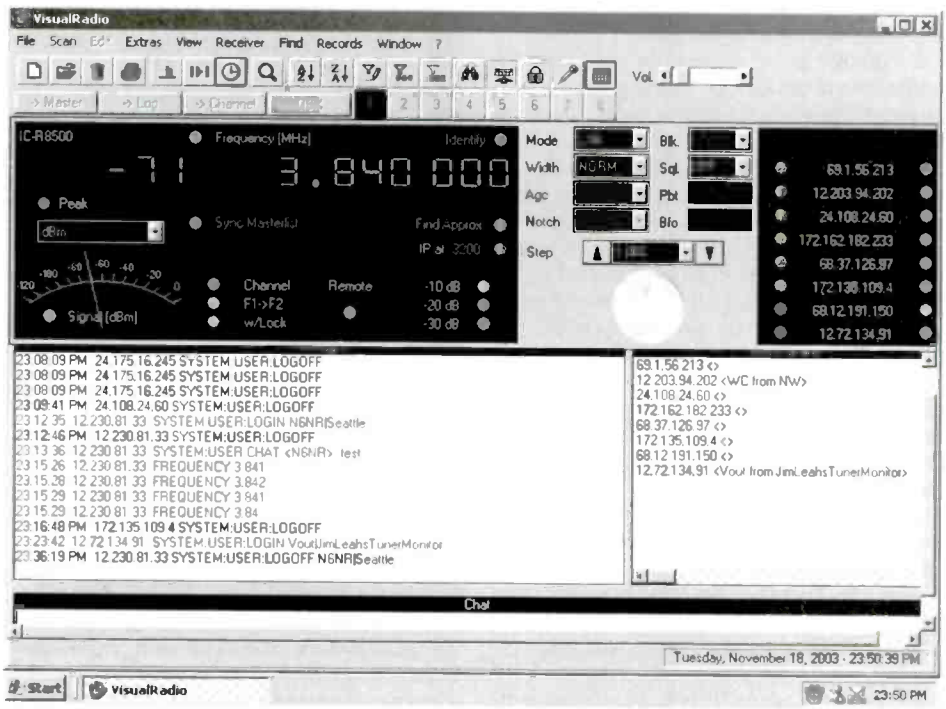
I have been a VisualRadio UCOT for over two years now and have found the software very flexible and feature rich. The java format is very straightforward and easy to use for anyone. However, by connecting to the active/x format, one discovers a whole new world in online radio features. You can go to **http://www.visualradio.de** for more information on this format. One can also view this format on my site at **http://www.jimandleah.com**

A third format that is being used is the RATS format by Kingsmith Software **(http://www.kingsmith-software.com)** This is another feature rich format that can be served up utilizing Windows Net Meeting. The software is inexpensive. The downside is that accessing the remote radio is not as easy and straightforward as the other two formats and only one person can use it at a time. Advantages are you can use various radios in the Windows format and set up is quite inexpensive. In addition, there is hardly any delay on the audio. An exclusive site located in Hong Kong has set one up under this format at **http://vr2hf.tripod.com**.

Just recently, an independent site has sprung up for the general public. This is apparently utilizing sophisticated software (including a band scope) and the software is offered for free if you host your site with him. The site is located in Salt Lake City, Utah. The software is currently written to run on Kenwood computer capable radios, but the developer has plans to expand to other manufacturers. It also is built on the Windows OS interface. You can access this site at **http://www.smeter.net**.

Last but not least, some who are into writing their own software have chosen to do just that. One of the oldest sites that is self-written is still available at **http://www.chilton.com** and has been operating since 1995.

There is a fairly complete list of most of the UCOTS in existence at the DX Zone site **(http://www.dxzone.com/catalog/Internet_and_Radio/Online_Receivers)**



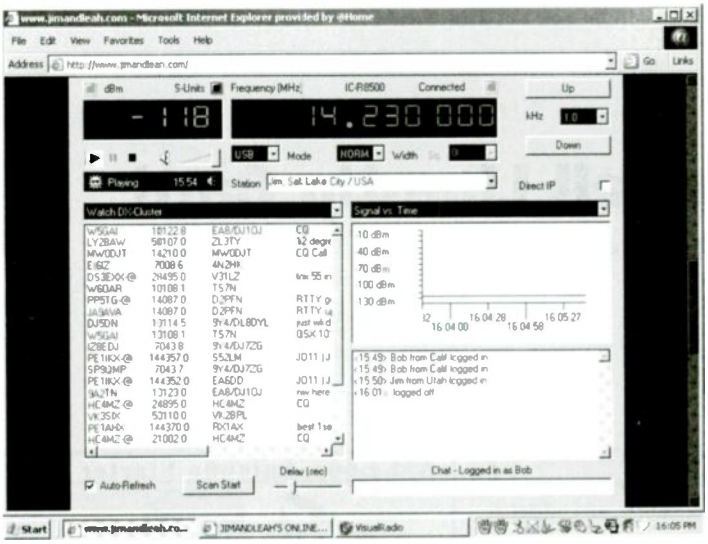
A screen shot of the VisualRadio software on the server side as well as a popular frequency often listened to at nightime by many users. The software also serves up a chatroom that is shown.

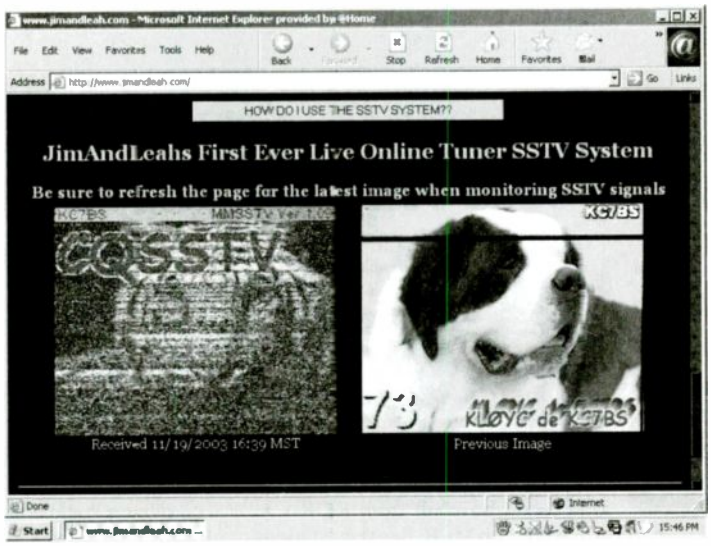
Setting up the audio.

The other aspect of UCOTs is, of course, providing the audio. This is actually a big consideration, because it can require large upload bandwidth if you are going to be able to serve up decent sounding audio to the most people possible at the same time. There are various encoding styles one can choose from, but suffice it to say, a full time high speed connection is practically mandatory.

Javoradios mainly use Real Audio as their encoder and Visualradios mainly use Windows Media Encoder. Both formats are available for free from the web. I am currently able to stream simultaneously to about 25 people using Windows Media Encoder, but because I sometimes exceed this number, I also stream the audio through live365.com. This can allow practically unlimited simultaneous listenership at a very high bit rate, but also requires a monthly fee from the UCOT owner, depending on how many streams one wants to provide, whether for free or for a membership fee.

If your site gets to this point, you are definitely doing this as a labor of love and you may want to at least ask for donations to try to offset the costs a little. However, realize that your outgo is going to far outweigh any money coming in. You will find if you do set up your site and you work to maintain a free, quality service, the rewards will be meeting a lot of great people who take almost as much pride in your UCOT as you do. You may even find someone will set up a forum if you attract a group of loyal listeners who





enjoy your system. *Midnighthams.com* was a forum that was started by a group of dedicated individuals who frequented my site and continue to do so.

Last but not least, you can even go the extra mile and provide other useful services that practically guarantee people will enjoy visiting your site. One of the neatest aspects of remote monitoring I have witnessed is listeners using the on-line radio in conjunction with software to view slow scan TV (SSTV) pictures. These are pictures transmitted by hams that can be viewed with the proper software on your computer.

A UCOT lends itself to this perfectly, so I feature an automatic picture viewing system on my site that doesn't require any software on the listener end. The listener only needs to tune the radio to the SSTV signal itself (usually 14.235 kHz), and the software on my end will automatically capture the image and upload it to my site. The auto ftp upload software is generously made available free from John Benedict (KE5RS) at **http://www.ke5rs.com**. This has been a popular aspect of my site that surprisingly other on-line tuners have not incorporated to date.

Providing a chat area is also beneficial. Because your listeners have alot of common interests, you will come up with all kinds of ideas. Feedback is guaranteed if you choose to chat with them!

In closing.

So whether you are interested in using a UCOT or in setting one up, you will find this is almost a hobby in itself – one that is currently a fairly well hidden secret to the general public. Their numbers are relatively few, but many UCOTs lie dormant waiting for someone to log on. It is my hope that the word will get out about how useful and fun these are, both to listen to and to operate if you so choose.

The Annual MT Baseball Line-Up Card

By Ken Reitz, KS4ZR

Baseball is the very definition of tradition. Since the first broadcast of Major League Baseball from KDKA in Pittsburgh in 1921, all MLB flagship stations have been found on the AM band. A glance at the station line-up below shows the tradition is alive and well. This may seem odd at a time when FM radio would appear to be a better choice, but the tradition of baseball on the radio is to provide coverage for the widely dispersed fan base in a team's region. It would take dozens of FM stations to provide the same coverage of one big AM station.

Receiver Options

The fact that AM still rules in baseball actually widens your receiver options, because it's possible to listen to baseball on everything from an old-fashioned oat box crystal set to a top-of-the-line stereo receiver. In fact, throughout the season I like to listen to baseball on as many types of radios as I can: I use a home-brew crystal set; a 1936 RCA table radio; a Kloss Model One; a car radio (preferably while parked on a hill or mountain top); and, of course, my old trusty Kenwood HF transceiver.

Each has its advantages and disadvantages, and none is really capable of overcoming the main problems of listening to the AM band in the summer. Because, unless you're living in a Major League city, you'll still have to contend with intense static crashes, fading, and adjacent channel interference.

There's nothing like the glow of an old tube model table radio and the mellow audio is perfect for listening to baseball. (Courtesy Phil's Old Radios http://www.antiqueradio.org)

For a real recreation of the early days of broadcast baseball, build your own crystal set and tune in KDKA, or any of the original baseball stations. These sets are cheap, easy to build, and it's something you can do with a kid which just might get them interested in radio. Over 100 plans for building crystal sets can be found at **http://www.crystalradio.net/crystalplans/index.shtml**.

Antenna Options

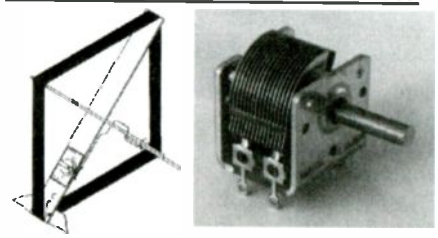
The main thing about listening to the AM band is to be able to increase the signal strength and decrease the amount of interference from stations operating on or near the flagship station's frequency. There are basically two ways to do this: Use of a highly directional small, tunable loop antenna, or (2) the use of a highly directional, high gain long wire or Beverage antenna.

The big advantage of the AM loop is that it's small and easily moved from room to room. The disadvantage is that it isn't a high gain antenna. The advantages of the Beverage antenna is that it is high gain and highly directional. On the downside, Beverage antennas are extremely long (700 to 2,000 ft) and can't be easily moved. To have directional flexibility you would need a very large piece of property or a block's worth of very cooperative neighbors. After using both for several years I've come to favor the loop for sheer convenience alone.

If you do opt for the Beverage, here are a couple of quick pointers. If the antenna is terminated at one end by a 400-600 Ohm resister attached to the end of the antenna and a good ground, it receives best in the direction in which it's laid out. By leaving off the resister it becomes bi-directional. If you're using a 50 Ohm coax cable to feed the antenna into your house, use a 9:1 balun to balance the feed line. You can buy one from Array Solutions at: **http://www.arraysolutions.com/Products/ice/reconly.html#Beverage%20Matching**. Or you can "roll your own" balun from plans found at this web site: **http:www.hard-core-dx.com/nordicdx/antenna/feed/9_1balun.html** .

By doing a little Internet reading you'll find that there are a large number of sites devoted to Beverage and loop antennas. One of the best sources I've found for both is: **http://www.hard-core-dx.com**.

AM Loop Antenna Starter Kit



Detailed Plans & Variable Capacitor

AM loop antennas are small, easily moved and do a great job of nulling out encroaching signals on the same frequency. You can buy an AM loop antenna or build one such as this kit from MTM Scientific. (Courtesy MTM Scientific)

Internet Options

The Internet has really come into its own with the availability of live broadcasts of baseball. While MLB's Office of the Commissioner has a death grip on the web sites of their MLB teams, such is not the case at the Minor League level. It's possible to hear a Minor League game at almost any time of the day via the Internet. It's a throwback to the good ol' days of Internet baseball action where you may listen to as many games as you like and you can tune in for free.

You'll hear a lot of young voices on these Minor League games as play-by-play announcers hone their skills and hope for a chance at the Bigs themselves. Tune in to teams such as the Midland Rock Hounds, Oklahoma City Yard Dawgs, Lansing Lugnuts or the Mississauga Ice Dogs. I listened earlier this season to a game between the Norwich (CT) Navigators and the Reading (PA) Phillies where the game time was 9:05am. That's not a typo. They were doing a double header from an earlier rainout with the second game already on the schedule at 11:05am. There was not much choice but to start the rained out game first.

The biggest surprise this year was that the price for a season's subscription to MLB's Game Day Audio did *not* go up as it had in the previous two years but, in fact, went down! The full season price is $14.95 down from last year's $19.95. At a time when stadium ticket prices continue to soar and salaries are completely out of control, Game Day Audio is clearly the best bargain in baseball.

MLB Radio Flagship Stations

TEAM	Call Letters		Freq. (kHz)	
Anaheim Angels	KSPN	710	XPRS	1090
Arizona Diamandbacks	KTAR	620	KSUN	1400
Atlanta Braves	WSB	750	WWWE	1100
Baltimare Orlales	WBAL	1090		
Boston Red Sox	WEEI	850	WROL	950
Chicago Cubs	WGN	720		
Chicago White Sax	WMVP	1000		
Cincinnati Reds	WLW	700		
Cleveland Indians	WTAM	1100		
Colorado Rockies	KOA	850		
Detroit Tigers	WXYT	1270		
Florida Marlins	WQAM	560	WQBA	1140
Houston Astros	KTRH	740	KLAT	1010
Kansas City Royals	KMBZ	980		
Los Angeles Dadgers	KFWB	980	KWKW	1330
Milwaukee Brewers	WTMJ	620		
Minnesata Twins	WCCO	830		
Montreal Expos	CHUM	1050	CKAC	730
New York Mets	WFAN	770	WADO	1280
New York Yankees	WCBS	660	WADO	1280
Oakland Athletics	KFRC	610		
Philadelphia Phillies	WPEN	950		
Pittsburgh Pirates	KDKA	1020		
San Diega Padres	KOGO	600	XEMO	860
San Francisca Giants	KNBR	680	KZSF	1370
Seattle Mariners	KOMO	1000	KKMO	1360
St. Louis Cardinals	KMOX	1120		
Tampa Bay Devil Rays	WFLA	970		
Texas Rangers	KRLD	1080	KESS	1270
Toronto Blue Jays	CJCL	590		

Satellite Radio Options

It would seem obvious that ESPN Radio and Fox Sports Radio would broadcast live baseball action throughout the week during the season from their national broadcast advantage on both Sirius and XM satellite radio. But, that's not happening. Instead, both are airing "Games of the Week" on the weekend throughout the season. And, as they did last year, ESPN Radio will broadcast all of the post season action in the League Championship Series and the World Series.

A major drawback to the Internet and Satellite option is that you can't watch the game on TV and listen to the satellite or Internet audio. This is because the technology of satellite uplinking and downlinking and Internet interconnectivity and buffering causes delays in the audio from the live action on TV. The out-of-sync audio will drive you mad.

Passing the Time

Baseball personifies the slow pace of creeping through the long hot days of summer. And nothing suits the game as much as listening to the routine descriptions of play as it happens or the unending recitation of the all important statistics as provided by play-by-play announcers. Listening to baseball on the radio naturally lends itself to multi-tasking. So, this summer as you listen, I invite you to visit a new web site developed by the Smithsonian Institution entitled Historic Baseball Guides 1889-1939. (**http://www.memory.loc.gov/ammem/spaldinghtml**).

Part of the American Memory web site, Historic Baseball Guides provides a collection of 35 of "Spalding's Official Base Ball Guide" and the "Official Indoor Base Ball Guide" (you probably didn't know about the promising Indoor Base Ball League) as originally published around the turn of the last century. Aside from the official rules, there's advice, for example, on how to teach baseball to girls. Here's an excerpt from a description of a 'round-the-world tour on which Mr. Spalding took his team in 1889:

"After leaving Australia the tourists called at Colombo, Ceylon, and from thence went to Cairo, and while in that city visited the Pyramids, and they managed to get off a game on the sands in front of the Pyramid Cheops on Feb. 9..."

It's all legendary stuff and should be required reading for youngsters who may think the only legends in the game are A Rod and Bonds.

MLB Radio On-line

Listen to every MLB game live on-line by signing up for MLB Game Day Audio: **http://www.mlb.com** click on "Audio" and then on "Game Day Audio." Season subscription is $14.95.

Minor League Baseball Radio

Minor League teams at the AAA level play a full 144 game schedule and most teams broadcast their games live via local radio stations or the Internet. To find the frequency of your local team do a Google search for that team's name. The home page usually has information on their flagship station or a link to the live broadcast. For a complete list of Minor League daily action check out **http://www.sportsjuice.com**. There is no charge for listening to Minor League games.

Propagation Outlook for July, August, September

By Tomas Hood, NW7US (AAM0EWA)

Solar Cycle 23 is in its final years, moving ever steadily toward the years of minimum activity. We expect the cycle to bottom out between the end of 2006 and the beginning of 2007. With the solar activity half of what it was just a year ago, is there hope for much life on the shortwave spectrum this summer? What can we expect on VHF?

As we move into the summer season, changes in the chemistry of the ionosphere cause changes in how radio signals are propagated from one region of the Earth to another. Propagation is significantly different during the summer than during the winter. This is why most International Shortwave Broadcasters have frequency and schedule changes between their winter and summer seasons. This is also why DXers consider the winter season, the DX season.

One would think that in the Northern Hemisphere the Maximum Usable Frequency on a given radio signal path would be higher during the summer than during the winter. With more hours of daylight, wouldn't the increased exposure to solar radiation cause greater ionization? Yet, a look at many signal paths reveals that there are higher peaks during the winter daytime than during the summer daytime. However, during the summer night, those same paths have higher MUFs than during the winter nights. This is known as "the Summer Anomaly."

A Matter of Chemistry

As scientists continue to explore, our understanding of how the ionosphere works becomes ever more accurate and clear. Research has revealed that the reason summer MUFs are lower during the day is due only in part to temperature differences. The rest of the story lies in ion chemistry.

In the lower part of our atmosphere below 100 km, atoms and molecules are well mixed by wind and temperature. Above 100 km, atoms and molecules are distributed vertically by gravity according to their atomic weights. The heaviest atoms, argon, settle toward the bottom of the ionospheric layers, while the lightest atoms, hydrogen, extend to the greatest heights.

The exact composition depends on temperature. In the winter, when atoms and molecules are colder, they move lower, in part causing the ionosphere to contain a greater density of oxygen atoms. During the summer, they move to greater heights as they warm up, and the ionosphere becomes dominated by a more even mixture of nitrogen and oxygen molecules. In this upper atmosphere, ionization is more affected by the geomagnetic field than by atmospheric turbulence.

Ionization is the creation of ions by atoms losing their electrons. This is caused by the energy of photons from sunlight breaking the electron away from the atom. In the absence of sunlight, these free electrons recombine with whatever nearby molecule or atom happens to be available.

Electrons do not always recombine with the relatively small number of positive ions available, but they may also become attached to some of the far more numerous neutral molecules, forming negative ions. This is a great thing for those who DX the lower part of the HF spectrum, as these electrons are not disassociated from the negative ions very quickly during the morning sunlight. Since these negative ions are more massive than electrons and positive ions, they do not absorb radio energy. This makes a morning window for low-band DXing.

During the summer, then, the ratio of atoms to molecules is less than the ratio during the winter. The make-up of the ionosphere during the winter favors the production of electrons from oxygen atoms over the losses of electrons by recombination in molecular interactions. Since the summer ionosphere has a mixture of nitrogen and oxygen molecules, more recombination takes place, and the ionosphere loses some of its ionization. If one looks at a given summertime signal path and compares it with the same path during the winter, it is clear that the Maximum Usable Frequency (MUF) will generally peak higher in the winter. However, the nighttime critical frequencies will generally be higher than in summer nighttime.

Making the Most of It

Taking this into consideration, as well as the fact that we're experiencing much less solar activity as we move toward the cycle minimum, is there much hope for hearing rare and weak shortwave stations during this summer season on the high frequencies? Most of the big-gun International Shortwave Broadcasters take the summer anomaly into consideration and adjust power, beam headings, and times, to overcome conditions. But, what about the lower-powered rare DX broadcaster?

Knowing the best times to catch a station can make your DX chasing more successful. You need to know when propagation will be best, as well as when a station is transmitting. Using the listings included in this magazine, as well as other resources such as the various lists on the Internet (see, for instance, my listings at **http://swl.hfradio.org/**), you can determine the windows of time that you might hunt for a station.

Armed with the times and frequencies, the next step is to do some propagation forecasting. The idea is to look for times when propagation is predicted to be good enough for a station's signal to propagate between its transmitter and your listening location.

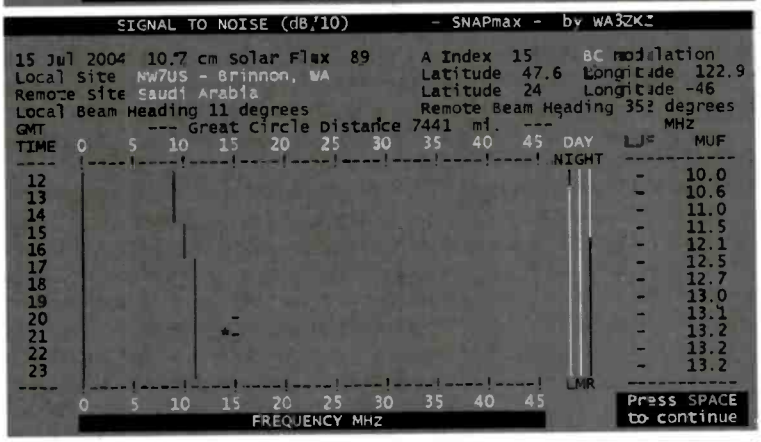
SnapMAX Forecasting

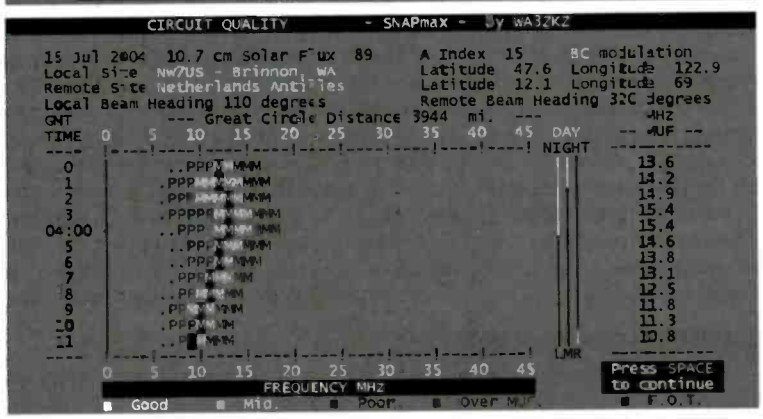
One software tool that might come in handy for this planning is ***SnapMAX***, by Crawford MacKeand, a Chartered Electrical Engineer in the United Kingdom. I evaluated version 5.01, which is a DOS executable application with supporting files. It ran fine for me under a DOS window in Windows98. It might not run on newer operating systems that don't support true DOS.

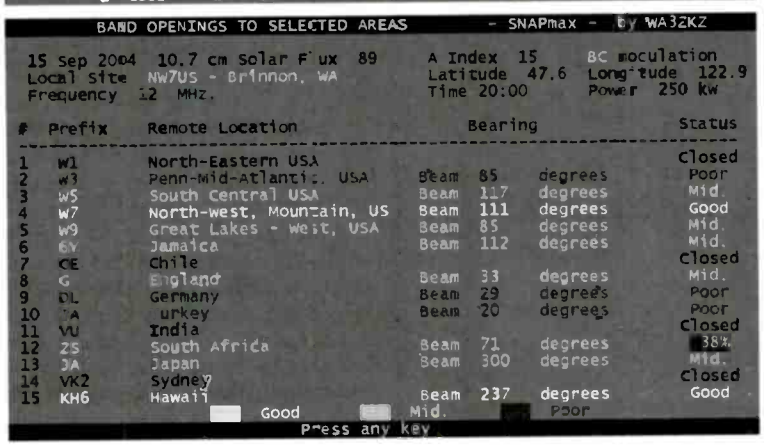
A useful feature of SNAPmax is the ability to select the Bandwidth and Modulation. From the main menu, selecting 'B' will bring up a new menu that allows you to select your operating mode. I selected 'BC' (using the 'B' item) as my Bandwidth and Modulation setting, because I wished to analyze shortwave radio broadcast signals. I set my latitude and longitude, and then selected Saudi Arabia (prefix of 'HZ') as the remote transmitting site, with a power level of 50 kW. I chose the "Signal-noise ratio (S units) shown vs. Frequency and Time" mode ('M' on the main menu, 'SN' on the submenu).

I set the Solar Flux to '89', the A-index to '15', and the K-index to '3'. I chose a local noise level of "Suburban." I selected the frequency of 9530, the frequency listed for the Voice of the Iraqi People. Although the transmission is targeting the Near Middle East, what would the likelihood be for me to hear such a broadcast? I hit the space bar. The first of two pages of resulting calculations are shown in Figure 1.

A blank space says that there is not likely to be enough signal level for a useful QSO. A dot (.) says that signal/noise ratio is up to 1 S-Unit below noise. A number in any space, and its associated display color in that space, will show by how many S-Units (arbitrarily set at 6 dB each) your desired received signal will exceed your local noise level. A plus sign (+) indicates that predicted signal level is more than 9 S-Units over noise. A star (*) shows that this signal (the level being indicated only by the color) is above the Maximum Usable Frequency or MUF and is prob-







ably present only 10 days in the month. A dash (-) shows signals probable on 5 days of the month. The narrow magenta strip that is shown around the 9 MHz frequency indicates no propagation is expected.

It is clear that in July 2004, a 50 kW signal from a broadcast station in Saudi Arabia will be a rare catch, probably not possible at all on 9530. Note the little dash, though, at about 15 MHz, around 2100 UTC. That indicates a very slight chance of reception on that frequency and time.

Figure 2 shows the same radio path between my location in western Washington State and Saudi Arabia, in terms of signal to noise ratio measured in S-units, units of 10 dB each. Note the same time and frequency around 15 MHz. The star at 2100 UTC just below 15 MHz indicates that this signal is above the predicted MUF, and is probable only 10 or less days of the month.

In SNAPmax, the MUF is defined as the maximum operable frequency on 15 days of the month. The FOT (abbreviated from the French term 'Frequence optime du travail', and about 0.8 x MUF) is defined as likely to be operable on 27 days of the month, or 90 percent of the month. FOT is shown by a magenta background if a signal is likely to be present, or a narrow magenta stripe if no signal is predicted.

How about stronger stations, this summer? How will reception be of, say, a transmitter in the Netherlands Antilles? I chose the Circuit Quality analysis mode, picking the remote transmitter site as being located in prefix 'PJ', and a transmitter power of 250 kW. Figure 3 shows the result. Based on this, reception of a station on a frequency around 12 MHz would be of medium quality.

I thought it might be interesting to see what bands might be open to various parts of the world. I used the default locations already set up by the program. Figure 4 reveals that in the middle of September, on 12 MHz, South Africa has a 38% reliability status, while Japan has only a mid-level quality, Australia would be "closed." These are based on a 250 kW signal using a dipole for reception, and assuming a high-gain antenna on the remote transmitter.

The best part of SNAPmax is the price. It is available free of charge from several freeware sites, as well as from Tyndar Press, P.O. Box 236, Montchanin, Delaware 19710. To make it convenient for you, I also have it available for download at my site, **http://hfradio.org/softdown.html** - under "Propagation Software." Don't forget to read the author's book, ***The Friendly Ionosphere***, also available from Tyndar Press. The author, Crawford MacKeand WA3ZKZ, may be contacted at *tyndar@juno.com*.

For trying to plan your DX hunting, you must arm yourself with a program like this, and time schedules of those stations you are trying to hear. Then you can maximize your energy around the times when reception is most probable.

HF Propagation July-September

July is a month of typical summer-time radio propagation on the high frequency bands. Solar absorption is expected to increase, as we move into a period of seasonally high absorption levels. This causes generally weaker signals during the hours of daylight when compared to reception during the winter and spring months. Nighttime usable frequencies to most parts of the world are higher than at any other time of the year, while the daytime usable frequencies are generally lower than those during winter.

Propagation on the higher frequencies will fluctuate less drastically during September, as the hours of sunlight are quite long and the ionosphere has very little time to recombine during the hours of darkness. Higher HF frequencies are going to be unusable over most paths, but when Sporadic-E (Es) openings occur, expect good domestic signals. These Es openings will be strong at times, and fairly common, but might be short-lived.

Solar activity is half of what it was last year. This results in lower maximum usable frequencies for the same period than last year. At the highest end of the HF spectrum, propagation from DX locations east and west are a rare event. North and South paths may still be hot, especially around sunrise and sunset. Nineteen and 16 meters will be the most reliable daytime DX band, while 19 and 22 may offer some

continued on page 83

Ken Reitz, KS4ZR
kenreitz@monitoringtimes.com

Keeping a Log: Options for SWLs & Hams

It always starts out innocently enough. You're tuning through your favorite band, let's say Medium Wave, and you come across a station from far way you've never heard before. You reach for a pad and pencil and make a note: WXYZ at 1520 playing "oldies" with ABC Network news. It's not long before scraps of paper give way to legal pads with some sort of informal organization. But, you find that you haven't left enough room for additional stations at a particular frequency or you'd like to know how many different states you've heard. Now you have to look through all the pages and add them up or, worse yet, start a new list.

❖ The Ham Advantage

Hams are usually meticulous log keepers because the FCC used to require a complete log of all on-air activities. That requirement no longer applies, but most hams still keep a log anyway. The reason is the same for all monitors: we simply can't remember the thousands of contacts or stations heard and have to jot them down in some sort of log.

Because of the earlier FCC requirement there are many pre-printed log books for hams and they are cheap. The ARRL makes a spiral bound, 50-page log with entries for 25 contacts per page, which sells for $5. In separate pages it also has a complete frequency listing for all ham bands; a list of international Q signals; the ITU phonetic alphabet; the Readability Strength Tone (RST) system of reporting received signals; a time conversion chart; a list of call sign prefixes and the countries to which they're assigned; a Grid Locator Map of North America; and a map of the U.S. and Canadian states and provinces broken into call districts.

The pages of the ARRL log are divided into convenient columns such as Date, Frequency, Time, Station Worked, Report and Comments. These are all quite useful to hams and this log can be easily adapted to be used by SWL, AM or Long Wave monitors. But, the problem with a paper log is that it's impossible to "mine" in the sense we've become accustomed with computer based data bases.

❖ The Software Advantage

A computer based log is the perfect solution to the needs of radio monitors. Some monitors use existing word processing software found on most computers and make up their own templates for their particular logging needs. These tend to fall short in the versatility department. However, if written correctly, a good logging program allows the user to mine the log for information pertinent to the needs of the individual.

There are several logging programs designed specifically for hams which are widely available via the Internet and which typically have free trial periods. Cost is usually between $20 and $40, but can be as high as $90 to be a registered user. Being a registered user allows you download updates and patches for various glitches which are bound to show up in the software.

Check out the chart below for a sampling of logging programs available to Hams and SWLers alike. For a more thorough list go to the DX Zone web site listed below and read details about each.

❖ Logger32

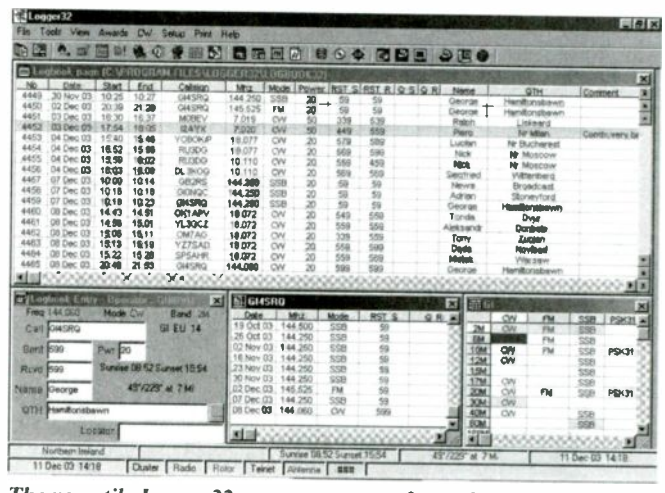
Most logging programs are similar and they all try to do what you really need such a program to do: log in the contacts (complete with special notes), bring up a list of other contacts with this particular person, note whether or not QSL cards have been exchanged, whether or not you need the country for DXCC (worked 100 countries) or need the state for WAS (Worked All States) awards. Most have provisions for special logging techniques when logging in a contest or special event such as Field Day.

MT Assistant Editor Larry Van Horn tipped me off to a versatile logging program called Logger32 which was written by Bob Furzer, K4CY, and is copyrighted by Zakanaka, Inc. (see chart below). Logger32 is free and may be used by anyone agreeing to abide by the rules laid out by the author.

Logger32 was designed primarily for amateurs and it is not set up for the needs of SWLers. For that (and general ham use, too) Larry recommends W3KM's GenLog. There are many other SWL programs to choose from as well which are in the list below.

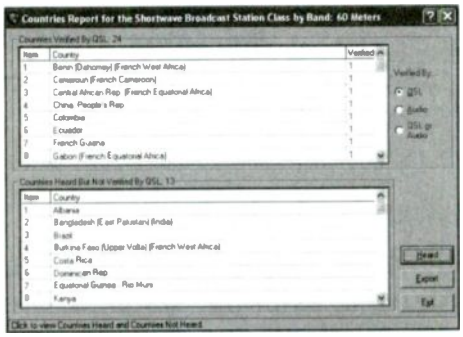
Your experiences may be different, but using a slow speed dial-up connection, I found that I had to download the program several times before finally getting it right. Once downloaded it proved to be a very practical and versatile program. The toolbar at the top of the Logger32 page lets you do all sorts of minor miracles. It even has a small, real-time greyline tracking map which shows the location of the sun, which areas of the globe are in dark, and which are in sunlight.

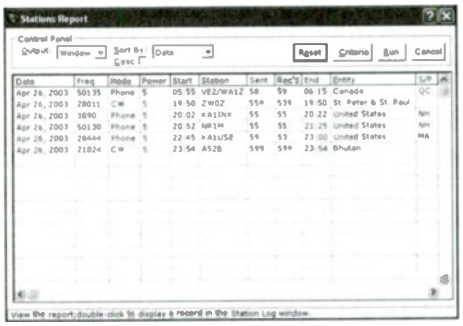
Logger32 organizes your contacts to keep track of the various awards you might be working toward; it affixes serial numbers to each contact for contest purposes; it will do a call sign lookup on QRZ.com (when connected to the Internet); or a CD ROM based lookup if you have a popular version such as *Buckmaster* or *Call Book* in your CD ROM reader; you can import or export log files to other programs, or do database maintenance. It can even rotate your antenna!



The versatile Logger32 program can perform all needed tasks and more, plus it's free!

When you download Logger32 you'll be getting the very latest information available, such as a complete list of "entities" or countries as used to track DXCC. For instance, by clicking on the "Countries Database Maintenance" icon you'll bring up the entities list. By further clicking on a particular country prefix on the list, such as YS for El Salvador, you'll bring up a screen which shows the various prefixes and call districts allotted to that country by the ITU (International Telecommunications Union). This window allows you to add, delete or modify that particular call prefix to your database. This way you can keep track of states, provinces or call districts in any number of different countries, a task nearly im-



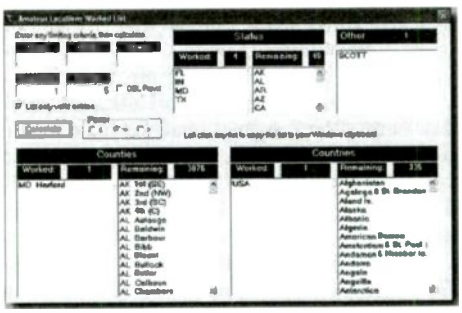


DXtreme sample log pages shows list of station classes available to log. (Courtesy Dxtreme Software)

possible with a paper log.

There is a link to a Logger32 forum on the KC4ELO web site listed below which contains extensive articles and comments from Logger32 users, including how to use new updates, what experiences other users are having and a host of other "must read" items.

Most importantly, Logger32 has extensive documentation in the convenient Help file. I highly recommend reading as much of the help file as you can before trying to use this program. You'll avoid a lot of frustration and learn about shortcuts which will make using the program much easier.



N3FJP's Amateur Contact software shows stations worked and those needed(Courtesy n3fjp.com)

❖ A Word of Caution

As great as any logging program is in keeping track of your listening or on-air activities you should always save your data to a back up zip drive, CD ROM, or even a lowly printout against the day when your computer gets fried or has an unforeseen melt-down. I've talked to more than a few hams whose entire electronic logs disappeared in such a catastrophic event. One ham, an avid DX contester, told me he lost a quarter of a million contacts in one such crash.

If you're a new ham, consider starting out right away with an e-log program. It will make keeping track of your activities a real breeze. Hams who are used to the old paper method of logging will take a while getting up to speed. You may have to spend hours doing data entry to transcribe hundreds of pages of earlier paper logs to be current. Remember that the biggest problem with data entry is trying to reduce the number of errors which in ham logs could make the difference between saving and throwing away a valuable DX contact.

❖ Logging Last Word

Your on-air activities will determine whether or not you really need a logging program. Many hams only operate on their 80, 40 or 20 meter groups whose members don't change throughout the years. There's little need for any log with them. However, if you're just catching the DX bug you'll be glad you started your ham career with a good logging program. It won't be long before you'll want to start adding up your life-long countries list or trying to find out just how many of the 3000 + counties in the U.S. you've worked. Doing this by hand, sorting through hundreds of pages of contacts, turns this task into a chore.

As with all computer programs there's a learning curve which will feel awkward at first. But, you'll find that the more you use any particular software the more at home you'll feel, and, the more you'll find features you hadn't known about before. It won't be long before you'll wonder how you ever did without logging software.

And, finally, before you choose which logging software to purchase, you'll want take advantage of the trial period most offer. Compare the features of each and find out how they apply to your own monitoring needs. Read the forums and other reports from users who've already shelled out the money to use them. If you can, ask some of your friends which programs they use and what their experiences have been.

❖ Chart

Here's an abbreviated list of logging software. A few are free, some require a minimum registration fee, all are copyrighted and have conditions against reproduction. Read all the fine print. Downloading extensive programs such as these may not be easy if you have a slow dial-up connection. Errors which may cause the program not to operate correctly may happen. Be aware that it's possible to download unwanted programs such as viruses whenever you download material from the Web. It's good practice to have an anti-virus program active on your computer.

DX 4 WIN - **http://www.dx4win.com**
DXbase logging program - **http://www.dxbase.com**
DXtreme Ham, SWL, BCB, LW & TV - **http://www.dxtreme.com**
GenLog, Ham & SWL - **http://www.qsl.net/w3km/gen_log.htm**
G0MDO EasiSWL v - **http://www.glenfieldho.freeserve.co.uk/easiswl.htm**
Logger32 Ham & SWL - **http://www.kc4elo.com**
M*Log Ham & SWL - **http://www.mtechnologies.com**
N3FJP general Ham logger - **http://www.n3fjp.com**
Many other programs including WLOG2000 Log book for SWL by HB9OAB; Winlog32; LogSWL, and many more may be found at - **http://www.dxzone.com/catalog/Software/Logging**

Ask Bob

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

❖ More on Repeater Offsets

Our May column discussed the standardized 5 or 3 MHz separation between repeater input and output frequencies in the 450-512 MHz UHF band. Long-time subscriber Ron Gilson prompts me with a very valid variance.

Along the Canadian border, there can be significant interference between our two countries because of different band planning. Ron informs us that one example is the bus and subway network in Buffalo, where offsets are 5.0125 MHz, and a commercial repeater has a 7 MHz offset! In order to coordinate with Canada, there are some federal agencies in the civilian 155 MHz VHF band.

Thanks, Ron, for reminding our readers – and me – of the FCC "Line A" geographical variance for frequency allocations.

Q. I hear a distinct hum from my old Bearcat scanner; what can be done to repair it? (Paul Kamalsky, email)

A. AC hum is common in all radio receivers as the filter capacitors begin to dry out over time; in fact, it is routine to replace them in old vacuum-tube radios during restoration. But it happens in solid-state radios as well. You can confirm that this is the problem if the hum is still heard when the volume control is turned fully down. If this is the case, the filter capacitors in the power supply section need to be replaced.

Q. I see references on the Grove antenna web page to a "dipole cluster;" just what does that mean? (Andy Entrekin, email)

A. A dipole is the simplest antenna, a long conductor, cut at its center and attached to a transmission line. In order to keep the standing wave ratio (SWR) low to avoid losses in the system, different lengths are used for different frequency ranges. For example, a five-foot dipole would be best for 90 MHz FM broadcasts, but for TV channel 2 (56 MHz), eight feet would be better. What if we simply take both dipoles, cross them at their centers like an "X" and connect their cut centers mutually to a transmission line? One element set (dipole) will work best at one frequency range, and the other on its own resonant range. That's the beginning of a dipole cluster!

Q. How many shortwave receivers can you run off one antenna, and what kind of splitter would you use? (Tom Claude, email)

A. If you have a passive splitter with no loss, you drop the signal 3 dB for each split; that's equivalent to half an S unit. You can actually drop quite a number of dB before you have a loss of signal above the noise, even though the S meter will read lower each time you do it. That's because the limiting noise in a shortwave receiver is atmospheric static, not the receiver sensitivity. All you are doing when you reduce the incoming signal level is reduce the signal and the noise proportionately, so if the signal was readable above the noise before the split, it will be after as well.

So far as the type of splitter, try a conventional TV splitter. Even though they are typically rated for 54-890 MHz or so, this is to reassure the user that it works throughout the TV range; it actually works much lower than that as well; I've used them down in the medium-wave broadcast band.

Q. What's inside the cylindrical "thingamajig" on some whip antennas, and what does it do? (Andy Entrekin, email)

A. It's not a "thingamajig," it's a "whatchamacallit," although engineers who want to impress their friends call it a "decoupling coil" or "loading coil."

It's simply a coil of wire inside a weatherproof jacket, and if it's all the way at the bottom of the element, it may be either an impedance-matching transformer (mostly found on transmitting antennas) or an "inductive reactance" to neutralize the "capacitive reactance" (radio-frequency resistance) that a too-short element has at a specific frequency range. You see the same thing, without its housing, on mobile cell-phone antennas.

If it's between element segments, it's more likely a decoupling coil, used to isolate one section from another so they can function independently rather than as one long element. This allows the sections to cover more than one band, or to add their mutual signal-gathering and signal-radiating patterns to provide gain.

Q. What frequencies are used for keyless-entry systems like garage door and vehicle lock systems? (Robert Homuth, KB7AQD, AZ)

A. The vast majority of them are on UHF channels in the 300-400 MHz range, and specific frequencies depend upon the manufacturer's own choices and the needs of his customer. Murata, a leading supplier of miniature oscillator resonators for this purpose, supplies them on 304.30, 315.00, 423.22, 433.87, 433.92 and 434.15 MHz. Just out of curiosity, I tested a garage-door remote I had available, and it was on 389.68 MHz. (See *Closing Comments* on page 92 for examples of interference with keyless entry systems - ed.)

Q. What HF SSB frequencies would a commercial aircraft pilot use in an emergency when he is out of VHF range? (Dale Unger, Baltimore, MD)

A. Over land in the U.S., only VHF channels are used. But over the vast ocean waters, depending upon the nature of the emergency, he might first elect to contact a long-distance operational control (LDOC) station monitoring aircraft in that particular air route.

If urgent, he may wish to try a "Mayday" and "Pan" distress call on one of the internationally-delegated marine channels like 2182 kHz (within 300 miles or so), 4125, 6215, 8291, 12290 or 16420 kHz to communicate with ships and coastal stations.

He may be asked to switch to a Coast Guard emergency frequency like 5696 or 8984 kHz for rescue coordination. Upon impact, an automatic distress beacon buoy is deployed on 121.5 MHz with a swept tone for radio direction finding (RDF).

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

Getting Started

Bright Ideas

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

49 I hate to state the obvious, but the busiest time of the year for monitoring is the July 4th weekend. Looks like another busy season. If you are camping out, you certainly want to hear the local park rangers, and emergency services including fire, life flight helicopters, search, and rescue. If you are stuck in the big city, your local parks will also be busy. The highway patrol will be active with holiday travelers in traffic accidents, where alcohol is usually a factor.

If you are a shortwave listener, perhaps this is the time to try scanning the higher bands. You can buy a scanner and if you don't like it, you can return it within 30 days if you buy from a reputable dealer such as Grove Enterprises or Radio Shack.

Away from the big metro areas, you will find most public safety agencies are still on ordinary VHF, and UHF. No special scanner needed here, no trunking information to digest or program. Just listen. Conversely, scanner listeners will find a relatively quiet RF setting out in the great outdoors for trying out shortwave HF listening.

50 Need to know some campground frequencies? Be clever in your research. Here is an example. In the Sierra Nevada Mountains, about 60 mikes east of Sacramento, is the Jenkinson Lake campground. It is operated by a local water utility district that owns the dam, lake area and adjoining forest land. The park rangers use a *utility company* frequency of 153.445 with a PL of 118.8. At least I hope that is still correct. These days everything seems subject to change.

For National Parks try **http://maxpages.com/frequencies/National_Parks_Freqs**

For National Forests try the back of the *Police Call* book, or search the web with the specific name of the forest you will be visiting. Example: **http://los_alamos.home.att.net/mob.htm**

For BLM sites: **http://www.geocities.com/CapeCanaveral/9952/gjac.htm**

For state parks try the 151.145-151.490, and 159.225-159.465 ranges of nationally dedicated forestry conservation frequencies.

For local parks, try local government listings (LG/L) or try the website for your local city.

You can always use the search mode on your scanner. A quick look at the antenna on the park ranger's truck will give you hint as to the specific range to search. It is usually in the 150-160 MHz range. Of course, the feds are in the 163-174 range.

I must admit, I usually carry my faithful Scout™ Frequency finder in my back pocket while walking the campground or talking to the ranger. I might get lucky if he transmits. I usually ask to look at his radio. The frequencies are often listed on the back. Think quick!

51 Last month I highlighted some ideas about monitoring wildland fires. I need to clarify some information about the new narrow band 7.5 kHz frequencies. I forgot to mention that you can often program the new splits into your current radio. Your radio was manufactured to a specification using 15 kHz wide spacing. Thus, you will hear the new frequencies as well as the old standard 15 kHz spacing.

You might need to reprogram your radio in 5 kHz steps to see if that improves your listening experience. Use your programming software to see if that allows the new frequencies. Try the 6.5 or even 12.5 kHz steps to see if you can line up the correct frequency. New ham radios transceivers usually have a "narrow deviation" setting which will work.

Early reports from government users indicate that their new narrow band radios are not working up to expectation, nor to standards. They are hearing many adjacent radio signals. As usual, the government didn't get it right. Look for the next generation of scanning receivers to have the 7.5 kHz step and meet the narrow band specification. Hello, manufacturers, are you listening?

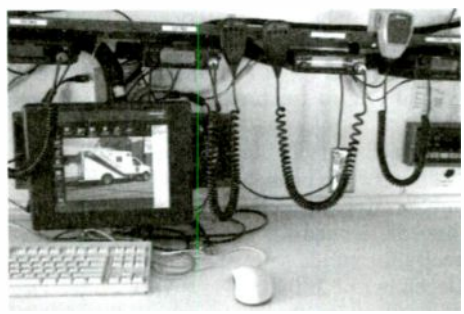
52 Want to watch the action? DVDs of last year's fires in southern California **can be found at http://www.firestormvideos.com**, or 1-800 549-3457.

53 I play an active role in major local fires. Part of our local Red Cross response plan requires listing to the scanner and contacting the Emergency Services Director of our local Red Cross Chapter. Our director, John, and several other key responders recently earned their ham ticket. There is much over-the-air coordinating of what is needed, who is going, what vehicles are responding, etc. This has really sped up our response time. What group are you volunteering with?

54 I had a visitor to radio ranch last week. This dedicated radio enthusiast wanted me to repair his radio and solder some Anderson connectors on his power cord. His radio was all but dead. I barely brought it back to life. What this person needed was new radio. Clearly, he could not afford one, so I grabbed an old scanner that had laid dormant in the shack for a long time. I slid in some new batteries and gave him the radio. He was overjoyed. I also printed out a few pages of frequencies for our area. I also passed along some back issues of *MT*.

We need to do all we can to keep our hobby thriving. I'll bet you have an old radio or two, that you could pass on to a friend. Christmas is not the only time for giving.

55 Monies from the federal government, via the Department of Homeland Security, is beginning to reach local and state agencies. Listen for new radio signal levels as new repeaters and frequencies are put into service. There is also much money for the new Community Emergency Response Teams (CERT.) If you are part of such a grass roots effort or would like to start one, check the FEMA webpage for free on-line training. Try **http://training.fema.gov/emiweb/IS/crslist.asp**



A Note to Our Readers

The internet is a constantly changing and evolving database. URLs that exist one month may not be there three months later. Since my column is written a couple of months before you read it, the site address may have changed or disappeared altogether. Please do your own search for the new site. My email box is full and I just don't have the time to respond to the dozens of emails I receive every month concerning URLs I mentioned.

If you wish to suggest a new idea, I will contact you *only* if I can use it. Ironically, most of the suggestions I receive are ones I have already listed in previous columns. You should buy the annual *MT Anthology* CD so you can research and use all those good bright ideas. The column started in January 2000.

I try hard not to repeat my own bright ideas or those that appear in any scanner hobby personal pages or other sources. It is also possible that your email was filtered out by the spam catcher. Please indicate "Bright Ideas" on the subject line of your email if you want a reply. I can not assist, nor respond to requests concerning frequencies, repairs, old manuals, etc. Thanks for understanding. Keep cool in the hammock, and I will see you next month.

Dan Veeneman
danveeneman@monitoringtimes.com

New York, New York

Radio frequencies are the lifeblood of every public safety radio system. As communities grow and safety responsibilities increase, congestion on these frequencies increases. This leads to a demand for more frequencies – a demand that is leading the Federal Communications Commission (FCC) to find new frequencies in unexpected places.

New York City Channel 16

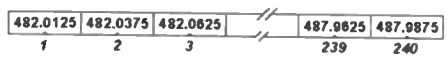
Earlier this year the FCC announced that television channel 16 in the New York Metropolitan Area would be permanently reallocated for use by public safety agencies. Channel 16 is a UHF (Ultra High Frequency) allocation between 482 and 488 MHz, which is typically used for broadcast television service.

Back in 1995 the FCC first allowed the temporary use of the 482-488 MHz band for public safety agencies, citing "an urgent and immediate need for additional spectrum capacity for public safety communications." In December of 2002 the New York Police Department submitted a report to the FCC suggesting the temporary assignments be made permanent, pointing to the $50 million investment that had been made in transmitters, repeater sites, and about 25,000 portable and mobile radios. Numerous city agencies all use these frequencies, including the New York Fire Department, Corrections, Health and Hospitals, Parks and Recreation, Sanitation, and the Transit Authority.

The report triggered a Notice of Proposed Rule Making (NPRM), which is the FCC's normal process for handling these types of changes. Part of the NPRM included a study from a communications consulting company that concluded there were no additional frequencies in any of the official public safety allocations that could be used in the New York metropolitan area. Every available channel was already in use within or near the city.

Several organizations responded to the NPRM, most of them asking for additional technical information about the city's use of the Channel 16 band. Interestingly, the city responded that the requested information was sensitive and should not be revealed to the public. The requesting organizations were eventually given access under a secrecy order, so the public still does not have official access to that information.

Channel 16 Layout



Channel 16 Band

The channel spacing in the 422 to 428 MHz band is 25 kHz, so the center frequencies for public safety use begins at 482.0125 MHz and then goes to 482.0375, 482.0625, and so on, up to 487.9875 MHz. Mobiles transmit 5 MHz higher than the repeater sites, so if you're close enough to the action you might be able to hear the officer or firefighter directly.

Many of the frequencies are used by the New York Fire Department. The New York Police Department also uses a number of frequencies, including five primary precinct tactical channels: 485.6125, 485.5875, 485.5625, 485.4875 and 485.4625 MHz. There are also four main citywide repeater frequencies operating on 470.6875, 470.7125, 470.8625 and 470.8875 MHz.

Besides numerous voice channels, the New York Police Department operates a number of Mobile Data Terminals (MDTs) using a signaling protocol called RD-LAP (Radio-Data Link Access Protocol) operating at 19.2 kilobits per second. For example, the MDT repeater installed at Bay Towers transmits on 484.6875 MHz and the repeater at JFK Plaza Hotel uses 484.4375 MHz. It's been reported that this digital traffic is encrypted.

The New York City Transit Authority is licensed for six fixed transmitter locations plus one temporary fixed: three in Kings County, one in Richmond County, one in Bronx County and one in New York County. The frequencies are 483.4625, 483.5375, 483.7125, 483.7875, 484.4625, 484.5375, 484.7875, 486.4625, 486.5375, 486.7125, 486.7875, 487.4625, 487.5375 and 487.7875 MHz.

Nearby counties and municipalities also use frequencies in the Channel 16 band. The County of Nassau has six repeaters located in East Meadow, Elmont, Matinecock, Massapequa Park, Syosset and Thomaston, operating on 483.8625, 484.1125, 484.3625, 484.6125 and 484.8625 MHz.

Here are some others:

East Rockaway Fire Department: 460.2625
Elmont Fire District: 484.9625 and 487.9625
Hagerman: 460.5250
Islip Fire District: 460.275
Jamesport Fire Department: 460.1875
Kings Point Police Department: 465.3875
Lindenhurst: 476.3500
Malverne: 470.825
New Rochelle: 484.9875 and 487.9875
Uniondale: 478.6125
Valley Stream: 472.9625
Yonkers Fire Department: 484.7125

Frequencies in the Channel 16 band are also in use in several other states, including California, Massachusetts and Texas. So, when you're looking for new areas to scan, sometimes it can pay off to check bands that you might otherwise skip over.

New York State System

In April of this year the State of New York announced that they had chosen M/A-Com to create a statewide radio network that is expected to cost at least $1 billion. This would be the largest technology contract in the history of the state and is expected to be funded, in part, through a surcharge on cellular telephone service.

Although details of M/A-Com's proposal have not yet been made public, when finalized the contract will be good for 20 years and include radios, infrastructure equipment, maintenance and service. The system is expected to be operational within five years and cover 95 percent of the state. It will replace a series of older radio systems (some of which have parts that date back to the 1960s) and will allow agencies from across the state to talk to each other more easily. Some state

officials have indicated that the project might be rolled out in stages, to test the system in one part of the state before committing to the entire project.

One sticking point for implementing a statewide radio network is how many towers will be needed in the Adirondacks and Catskills, two rural mountainous areas sensitive to environmental concerns. Cutting trees and putting power generators and fuel in a protected wilderness doesn't sit well with many nature conservancy groups, especially when some of those areas are protected by the state constitution.

The towers themselves will be required to withstand such heavy weather as ice storms and high winds, creating a challenge to camouflage or other ways of making them inconspicuous. A few days after the contract announcement, a proposal was floated to build repeaters only on land that was already developed and to use vehicle-mounted repeaters when in the mountains. How well this might actually work in practice was not detailed.

A serious concern for operating the new network is where to find available frequencies. Just as there is a shortage in New York City, so the rest of the state comes up short when looking for enough unused frequencies. Several years ago the FCC began a process to move television stations out of the 700 MHz band, currently occupied by channels 52-69, whenever at least 85 percent of their customers are able to receive digital television signals. Part of the vacated band would then be made available for public safety agencies.

The original plan called for TV stations to be moved out by 2006 as digital television replaced today's analog signals, but a slower than expected roll-out of digital technology has pushed that date out by probably three more years. However, New York is still expecting them to be available in 2006. Until then, the state claims they will be able to find enough channels to make the system work.

Another point of contention is the difference between M/A-Com's bid and the only other bid, submitted by Motorola. M/A-Com's bid of about $1 billion is so much less than Motorola's $3 billion proposal that many observers are wondering if the state's requirements were correctly understood. New York's request for proposal (RFP) runs more than 300 pages, spelling out in detail how the system is to be built and what must be done to make it work as intended. Motorola believes the M/A-Com bid cannot meet all of the requirements, but until the details of the winning proposal are made public it's difficult to prove.

M/A-Com is a subsidiary of Tyco International, which has been in the news recently for the excesses of former Chief Executive Officer Dennis Kozlowski. M/A-Com offers a number of radio products for public safety agencies, including EDACS (Enhanced Digital Access Communications System), ProVoice, and APCO Project 25 equipment. They also market a system known as *OpenSky*, which is a fully digital radio system based on the Internet Protocol (IP).

As you might expect, OpenSky is not directly compatible with Project 25. The digital messages carried on an OpenSky are proprietary to M/A-Com and do not conform to any public standard. In addition, the vocoder (voice encoder/decoder) is AMBE (Advanced Multi-Band Excitation), a slightly different design than the IMBE (Improved Multi-Band Excitation) vocoder used by Project 25 radios. To address these problems, M/A-Com is pushing an additional product that will allow OpenSky to interconnect with Project 25 systems.

❖ OpenSky in Pennsylvania

Some critics of the New York proposal point to the State of Pennsylvania, which has been working with M/A-Com for five years to install a statewide OpenSky system. Pennsylvania contracted with four vendors in 1999, with M/A-Com taking the largest financial slice to install OpenSky technology.

The Pennsylvania statewide system is now three years behind their original build-out schedule, which called for the network to be up and running by April 2001. The project cost has more than doubled, rising from $179 million to more than $400 million. Two state Representatives recently called for an audit of the project and public hearings to determine why the radio network is late and over budget.

Early in the Pennsylvania project the State indicated that receivers capable of monitoring OpenSky transmissions might be made available to media organizations, although they likely would be rather expensive. Regardless of price, as of this writing there are no commercially available scanners for OpenSky.

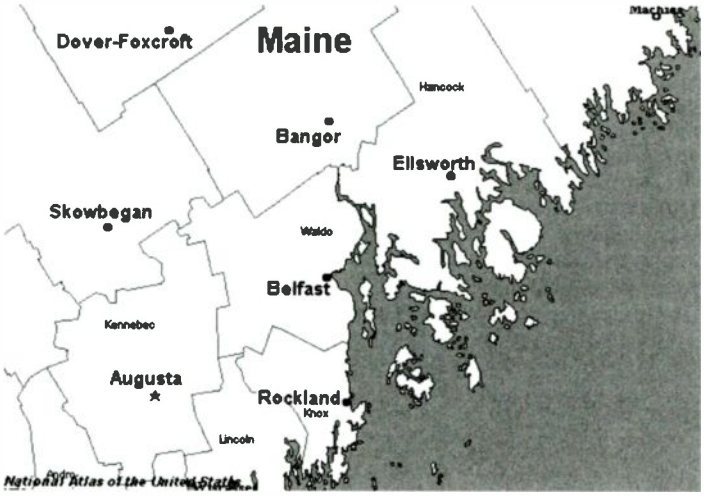
In addition to the state, the Counties of Cumberland and Lancaster have switched to OpenSky. Oakland County in eastern Michigan is currently in the process of migrating from a Motorola analog system to a 36-site OpenSky network for police, fire and emergency medical services.

❖ Maine Updates

Dear Dan,

Thank you very much for including my scanner loggings of Belfast, Maine, in your "Scanning Report" in the May 2004 issue of Monitoring Times.

My source is the book "Official Maine



Frequency Guide" by Robert A. Coburn, D. Loren Fields, and Scott Rice. I have the 7th Edition published in 1999, the latest. Those frequencies I reported are those I have received and can confirm - per instructions from MT! The book is a lot like Radio Shack's "Police Call" but it covers more private radio stations.

From it, I can answer your questions. 39.920 and 39.740 are both Waldo County base stations. 19 Congress Street is Waldo County Sheriff's Office and County Jail. It looks like the typical Maine farmhouse and connected bar – white, of course. From the local newspapers, drunk drivers must serve 48 hours in the lockup and this is where they are jailed.

155.520 is the Waldo-Hancock Counties tie-in.

I am mystified by 42.140. This is the primary frequency of the Maine State Highway, Division 3, Penobscot and Piscataquis Counties to the north with the headquarters at Bangor. The town of Know, where the transmitter is listed, is outside these counties and about 8 miles northwest of Belfast. I would have expected this station to be somewhere north of Bangor. It is quite hilly around here and I notice communication towers of all sorts on many hilltops. Unfortunately, I cannot identify any as yet.

More of a mystery is 483.600. As I lived in Cohasset, Massachusetts, for 70 years (it was founded by my ancestors over 300 years before), this was the primary frequency in my scanner. I heard the delivery service here in Belfast only before Christmas and not since. It is not listed in Coburn's book. I use a Radio Shack PRO-46. Is it possible for this to be an "image" as found on AM and SW radio? Is it possible that a public safety frequency can be used elsewhere as a temporary frequency for a private company? It was very loud so it must be here in Belfast somewhere.

By the way, Cohasset is no city. It was a small rural town for years with the major industries of fishing and farming. After World War II, it became part of the urban sprawl of Boston. I consider it now like the late Phil Harris song: "It ain't no town and it ain't no city, it's a place called Do-wah-dittie."

A couple more to add. 156.400 is the Belfast Harbor Master. She (the master is a woman) is beginning to get busy with the rumors of spring. The other is 145.490, the only ham repeater I have heard so far. It is quite loud, but Coburn lists it to an Ed Rotch in the town of Washington some 20 miles to the southwest of here.

Hope to be able to add more later on.

73, Bob

My copy of *The ARRL Repeater Directory* shows 145.490 as a repeater in Washington operated by Ed Rotch, who also operates amateur radio repeaters on 53.550 and 224.280 MHz. The Pen Bay Amateur Radio Club also operates a repeater on 147.060 MHz. All of these appear to be located on Lenfest Mountain in Washington, halfway between Augusta and Belfast.

❖ More Maine Updates

Greetings from Maine, Dan:

154.905 is the Maine State Police Zone #3 repeater system, with the Regional Communications Center located in Orono, Maine.

154.650 is Zone #2, Maine State Police, with four linked microwave repeaters to headquarters in Augusta. There is a fifth repeater located right at the Regional Communications Center (RCC) that can handle local, central Maine "trooper traffic."

155.055 MHz is the Region #4 Law Enforcement Repeater, part of eight separate regional repeater sites across the state (all VHF). It is located in the Ellsworth/Bar Harbor area on the peak of Cadillac Mountain on the mid-coast of Maine, and services Waldo and Hancock counties. All law enforcement agencies have privileges on this system across the state.

Hancock County has a new repeater going up; the frequency is 156.240. This is also a repeater in the little town of Sidney, off I-95 between Augusta and Waterville.

Waldo County has several repeaters, as follows:

Waldo Emergency Management Agency: 155.760, PL = 123.0
Waldo Sheriff's Office Belfast area law enforcement "chat": 155.130, PL = 127.3
Waldo Sheriff's Office Fire: 159.135, PL = 123.0 (Located on Mt. Waldo)
Waldo Sheriff's Office Fire north: 155.385R PL = 123.0
Waldo Sheriff's Office Prime: 156.030R PL = 127.3

The Belfast Fire Department is 155.805 with no "official" tone. Belfast Police Department is 155.130 with a transmit PL tone of 127.3. The official "Maine State Fire" is 154.310. Three "TAC" (tactical) channels are utilized both officially and unofficially throughout the state; they are 154.265, 154.280 and 154.295 MHz. Every fire buff should have these handy.

Public safety/EMS low-band VHF exists in theory only, with the exception being several fire departments located mid-coast and southern coastal Maine. 33.700 is an active EMS paging frequency in the mid-coast region. No police agency currently uses low-band, yet the Maine State Police have several licensed from the "good ol' days" back in the 1970s and before.

However, the Maine Department of Transportation has an extensive (and well-laid-out) VHF low band system, augmented by an ever-increasing VHF-hi network with UHF control links. 47.320 is the MDOT frequency for Division #5 and the secondary is 47.34.

This should clarify some things. All interested Maine scannists are encouraged to go to Yahoo! Groups and join the Scan-ME list/group that is on there. The URL is http://groups.yahoo.com/group/ScanMe/

All the best,

Loren Fields, N1UMF

(Yes, folks, "The Book" is in the works!)

❖ Deliberate Interference?

In Page and York Counties in southwest Maine there have been several incidents of what local officials there believe is deliberate interference. The Sheriff's Department is certain that the incidents of poor or no communication are not related to cell phone towers or blockage from geographic features. Public safety radio communications have been jammed, mostly on weekends and weekdays after 5:00 pm, including during a mobile home fire handled by the Waterboro Fire Department. The FCC is investigating.

Waterboro uses 460.550 MHz, as do a number of other fire departments. York County Emergency Communications is licensed for a number of frequencies, including 33.86, 154.190, 154.310, 460.625 and 460.550, operating from repeater towers in the towns of Action, Alfred, Cornish and Shapleigh.

If the perpetrator is ever found, he or she may face the same punishment given to a 25-year-old University of Wisconsin graduate student in May after being found guilty of interfering with the Madison radio system 37 times in 2003. He was charged as a terrorist under the PATRIOT Act for substantially disrupting a critical public infrastructure and sentenced to eight years in federal prison, three years of probation and ordered to pay $6,000 in restitution.

That's all for this month. You can check my website at **http://www.signalharbor.com** for more detailed information on scanners, frequencies and other radio-related material. I also welcome electronic mail at *danveeneman@monitoringtimes.com*. Until next month, happy scanning!

John David Corby, VA3KOT
johncorby@monitoringtimes.com

Digital Frequency Hunting at Toronto Airport

A *Scanning Canada* thank you card recently went out to *MT* reader Kenneth Pearson of Freehold, New Jersey, for prompting a further *ScanCan* investigation into the new radio system at Toronto airport's new giant terminal building. Kenneth wrote *MT* after seeing the picture of a Toronto airport radio in the April *Scanning Canada* column.

Kenneth wrote:

"I read your column every month in Monitoring Times. I saw in your April article a picture of a digital radio from Toronto's new airport terminal. The radio looks a lot like a Motorola r750 plus that was marketed by Nextel in the US. However, the Nextel radio was not used in the 900 MHz range and is currently not sold in the US. My questions for you are:

What frequencies in the 900 MHz band does the product use?

Is it a Nextel type system?"

First, let me thank Kenneth and other readers in the United States for their interest in Canada. Of all the mail received by *Scanning Canada*, about half comes from the fruited plain below the 49th parallel.

In response to Kenneth's questions; first of all, his identification of the radio in the picture is absolutely correct. The unit is indeed a Motorola r750 plus. *ScanCan*'s mole inside the Greater Toronto Airports Authority declined to hand out frequency information, so an investigation was launched using good, old fashioned sleuthing techniques.

Probing the whirled wild web revealed that Motorola produces two varieties of the r750 plus. One model is restricted to 800 MHz and the other includes 900 MHz. Examining the frequency specifications of the 900 MHz model revealed the first clue as to the potential users of these radios.

Motorola r750 plus Specifications:
Digital iDEN set with combined radio and cellular capability.
800 MHz band:
Transmit range 806-825 MHz , Receive range 851-870 MHz
900 MHz band:
Transmit range 896-901 MHz, Receive range 935-940 MHz

A search of Industry Canada's online database produced a list of licensees of frequencies in the specified range. One of the licensees turns out to be "Tele-Mobile Company" aka Telus Mobility, operator of a commercial digital phone/radio service called "Mike". Telus does not publish specifications for the radios used in its commercial Mike service, but it does reveal that Motorola is its radio equipment partner and that digital iDEN radios are used.

Close-up shot of control tower at the center of the airport property.

Unfortunately, at the time of writing this column, Telus was not licensed to operate on the frequencies used by the Motorola r750 plus radios in the new Terminal One. It is possible that the federal government's database is not up-to-date, or perhaps that the investigation should proceed in another direction.

The online database had to be interrogated from a number of different angles to produce further clues. Different queries produced varying results, but, finally, a small group of frequencies emerged that seemed to match the search requirements.

The Greater Toronto Airport's Authority is licensed to operate on a group of frequencies in the 800 MHz band that exactly match the specifications of Motorola's r750 plus. The frequency group is identified in this month's frequency table. Air Canada also uses frequencies that match the radio's specifications, but the radio in the picture belonged to Terminal 1 security and was most probably owned by the GTAA.

However, this doesn't answer the question of "What frequencies in the 900 MHz band does the product use?" The radio in April's picture is clearly labelled "900MHz", but no frequency allocations in that range are currently documented as being licensed for use at Terminal One.

Scanning Canada's opinion, based on the evidence available, is that 900 MHz band operation may be a future option and that the GTAA has purchased radios with sufficient flexibility to allow other services to be added later. Of course, the real story may be different. If readers have better information on this subject, your comments and corrections will be welcome.

Lester B Pearson International Airport, Toronto
800/900MHz band frequencies
[Transmit/Receive]
Air Canada Remote Access Base

806.0250/851.0250	806.1250/851.1250
806.2750/851.2750	806.3250/851.3250
806.3750/851.3750	806.5750/851.5750
806.7750/851.7750	806.8250/851.8250
807.5500/852.5500	807.6750/852.6750
807.7250/852.7250	807.8250/852.8250
808.0500/853.0500	808.1500/853.1500
807.0500/852.0500	

Air Canada trunking repeater

851.0250/806.0250	851.1250/806.1250
851.2750/806.2750	851.3250/806.3250
851.3750/806.3750	851.5750/806.5750
851.7750/806.7750	851.8250/806.8250
852.0500/807.0500	852.5500/807.5500
852.6750/807.6750	852.7250/807.7250
852.8250/807.8250	853.0500/808.0500
853.1500/808.1500	

Air Canada (simplex)
851.9250/851.9250

Greater Toronto Airports Authority (unassigned location)

806.5000/851.5000	807.0000/852.0000
807.4000/852.4000	807.4750/852.4750

Note: This group fits the specifications for the Motorola r750plus digital iDEN sets used in the new terminal 1.

Greater Toronto Airports Authority Terminal 3

806.0750/851.0750	806.5250/851.5250
806.9750/851.9750	807.4250/852.4250
851.0750/806.0750	851.5000/806.5000
851.5250/806.5250	851.9750/806.9750
852.0000/807.0000	852.4000/807.4000
852.4250/807.4250	852.4750/807.4750

Telus Mobility (analog)

851.2250/806.2250	851.4250/806.4250
851.6750/806.6750	851.8750/806.8750
852.1250/807.1250	852.3250/807.3250
852.7750/807.7750	853.2250/808.2250
864.0750/819.0750	864.5250/819.5250
865.8750/820.8750	

Telus Mobility (digital, iDEN) Terminal 3 (believed to be a similar service to Nextel in the USA)

853.5375/808.5375	853.7375/808.7375
853.7625/808.7625	853.7875/808.7875
853.7875/808.7875	853.8125/808.8125
854.0875/809.0875	854.1875/809.1875
854.3625/809.3625	854.8375/809.8375
855.1375/810.1375	855.5375/810.5375
855.8125/810.8125	858.1875/813.1875
858.6875/813.6875	858.9125/813.9125
861.8375/816.8375	863.6125/818.6125
864.4125/819.4125	865.1125/820.1125
865.8375/820.8375	

Greater Toronto Airports Authority
(AVIS - Automatic Vehicle Identification System in the new giant parking garage)
915.0000/915.0000

This frequency is also used by Southern Ontario's Highway 407, Electronic Toll Route transponder system. It permits frequent users of these facilities to drive in and out without stopping for toll registration.

Terminal 1 Parking - Fleetcom Inc
937.8875/898.8875
937.9125/898.9125

Access to Pearson Airport

Now that the new terminal has been opened, the airport perimeter security stations have been removed and public access is permitted right inside the airport campus. This month's picture of Pearson Tower was taken at the very heart of the airport. Airport roads are still heavily patrolled by groundside security vehicles, but scanner operation right in the heart of the airport is now possible (although probably not officially sanctioned). Be discrete and be careful.

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

Morse Code Enters the 1970s!

Most people will tell you that the Morse Code is a dead language. Maybe so, but it has just added a new character. As of May 3rd, while this column is being written, the International Morse Code now officially includes the "at" sign (@), as made famous by Internet e-mail addresses. Yes, you can now send e-mail addresses in continuous-wave (CW) Morse telegraphy.

(You can also send Morse Code in your e-mail, using periods and hyphens, but most non-radio people will think you're pretty strange. This is not necessarily a big problem, since they probably think that already if you're into utilities.)

Some operators have put @ into their Morse for years, by using the letters "AT" run together. But this, unfortunately, creates the existing character for "W." People can tell the difference between W and @ from context, but computers can't. It's just one more reason "wetware" produces better copy.

All this became moot when the International Telecommunication Union (ITU) took the advice of the amateur groups who are keeping Morse going, and wrote a whole new draft recommendation for its use on the radio. Along with adding the @ sign, it transferred this code from the wireline to the radio section of the ITU. Originally, all this was supposed to become official in early July, but things happened a little fast, probably for the first time in the history of telegraphy.

The new character is the first to be added in several generations. It sounds like "AC" run together – didahdahdidahdit. The letters are kind of a memory device for "at, commercial," since the @ is still called the "commercial at sign" ("commat") in the standards for such things. Real old timers might remember when the only common use of the @ was to specify price per unit in business transactions.

Some of the hard core Morse Code fans are now grumbling that there is still no exclamation point. There used to be, but at some point apparently lost in ancient history, that character was changed to a comma. Ever since, official code tables have shown the ! as "None at present." A few years ago, all of us in one ham radio net actually started saying this in CW conversation, as in, "WOW NONE AT PRESENT." (Maybe utility fans really *are* strange.)

Some people are pushing for re-adoption of Morse's original exclamation point, which is dahdahdahdit. Unfortunately this already means

something else in Polish, Arabic, Greek, and Russian national versions of the Morse Code. (You haven't lived until you've attempted to copy someone sending CW in the Cyrillic alphabet, as Russian military intelligence stations frequently did until only a few years ago.)

This is of more than academic interest as long as there's any CW code left on utility airwaves. It's still out there. It's getting pretty rare, and if you hate Morse there's certainly no reason to torture yourself to learn it, but it's out there. Not bad for a simple, binary code invented 150 years ago by a portrait painter.

❖ Havana Harmonics

With tensions once again increasing between the United States and Cuba, it is probably no surprise that people all over the world are reporting mysterious gurgling noises on the high-frequency (HF) radio band. These come from Cuban jamming of Radio Marti and other stations. As always with Cuban radio engineering, however, there's way more to the story than that.

These high-powered transmitters are of a type known as "bubble" jammers, which cover the target signal with multi-frequency-shift-keyed audio pops of short duration. It sounds a bit like water gurgling down the bathroom sink. Hence the popular name given these transmissions – the "Havana Gurgler." This always sounds like some new rum drink, or what happens to people who have too many of the old ones.

For years, the gurglers have radiated some of the worst harmonics in recent history. Harmonics occur in any transmitter, creating spurious signals at integer multiples of the fundamental frequency. They are usually cancelled or filtered out. Not this time.

One gurgler is on the approximate frequencies of 18026 and 18090 kilohertz (kHz). These are in perfect time sync, and they most likely represent inverted double sidebands of the same suppressed-carrier transmitter, as spread out by the harmonic multiplication. Another gurgle hangs out around 14730. All of these are heard worldwide for a few hours daily, around 2300 Coordinated Universal Time. This is when Marti, a well-funded service of the Voice of America, is broadcasting to Cuba on 6030 and 7365.

This being afternoon in Los Angeles, propagation from Cuba is poor on such low frequencies. I needed to find another path. Therefore I got on the Internet, and surfed over to the remotely operated "DX Tuner" receiver in the Midwestern United States.

The DX Tuner network is very slick, and

RADIO Marti

worth another column in itself. It creates a virtual receiver on your computer, using Flash and a Java applet. Access is at **http://www.dxtuners.com**, and it can be a truly definitive way to check on the origins of unknown utility signals. For free, one gets a few busy "demo" receivers in the United States and Europe. Increasing subscription levels bring access to more radios, with far more bells and whistles. (See this month's feature article on User-Controlled, On-Line Tuners - ed.)

Bingo. Both Marti frequencies were audible, with jamming. Second harmonics (minus Marti) were on 12060 and 14730, and sure enough, very audible third harmonics were on 18090 and 22095. The signals were in good time sync, but spacing between the audio burst frequencies increased by the harmonic multiplier as they went up.

This spreading out is what gives the third harmonics their rather peculiar sound. It's easy to mistake them for military Automatic Link Establishment. Under perfect conditions, the jamming is far more random than ALE, but when HF fading and phase distortion go to work on them, things get a lot less certain. To the ear, the major giveaway is often just the jammer's hours-long duration.

Gurgle away until next month.

Utility World

Utility Logs

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

ABBREVIATIONS USED IN THIS COLUMN

AFB ..... Air Force Base
ALE ..... Automatic Link Establishment
AM ..... Amplitude Modulation
ANDVT ..... Advanced Narrowband Digital Voice Terminal
ARB ..... Air Reserve Base
ARQ ..... Automatic Repeat Request teleprinting system
AWACS ..... Airborne Warning And Control System
BICE ..... Bureau of Immigration and Customs Enforcement
CAMSLANT ..... Communication Area Master Station, Atlantic
CAMSPAC ..... Communication Area Master Station, Pacific
Coq-8 ..... Coquelet-8, French teleprinting system
CW ..... Morse code telegraphy ("Continuous Wave")
DEA ..... US Drug Enforcement Administration
DSC ..... Digital Selective Calling
E10a ..... Israeli intelligence "numbers", callup only
EAM ..... Emergency Action Message
FAX ..... Radiofacsimile
FEC ..... Forward Error Correction teleprinting system
HF-GCS ..... High-Frequency Global Communications System
LDOC ..... Long-Distance Operational Control
LSB ..... Lower Sideband
M22 ..... Israeli Navy 4XZ, weather and "numbers"
MARS ..... Military Affiliate Radio System
Meteo ..... Meteorological
MFA ..... Ministry of Foreign Affairs
MX ..... Russian solitary single-letter channel markers
MXC ..... Russian cluster single-letter beacons
PR ..... Puerto Rico
RSA ..... Republic of South Africa
RTTY ..... Radio Teletype
SHARES ..... SHAred RESources
SITOR-B ..... Simplex Teleprinting Over Radio, FEC mode
TSCC ..... Tactical Support Communications Center
UK ..... United Kingdom
Unid ..... Unidentified
US ..... United States
VOLMET ..... Flying Weather (loosely from French)

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

277.0 CHT-Chiltren, UK, non-directional CW beacon, at 2156. (Ary Boender-Netherlands)

284.5 DY-Duesseldorf, Germany, non-directional CW beacon, at 2159. (Boender-Netherlands)

309.0 WW-Antwerpen, Belgium, non-directional CW beacon, at 2150. (Boender-Netherlands)

311.0 LMA-Lima, Germany, non-directional CW beacon, at 2147. (Boender-Netherlands)

315.0 STK-Stadskanaal, Holland, non-directional CW beacon, at 2141. (Boender-Netherlands)

327.0 MVC-Merveille, France, non-directional CW beacon, at 2202. (Boender-Netherlands)

339.0 ZL-Maastricht, Holland, non-directional CW beacon, at 0711. (Boender-Netherlands)

347.0 MTN-Manston, UK, non-directional CW beacon, at 2151. (Boender-Netherlands)

360.5 MAK-Mackel, Belgium, non-directional CW beacon, at 2146. (Boender-Netherlands)

368.5 ELU-Luxembourg, non-directional CW beacon, at 2206. (Boender-Netherlands)

2187.5 J8VM5-Vessel *Baltic Trader*, with six DSC distress calls, starting at 0002. (Day Watson-UK)

3336.2 "L"-Russian single-letter CW marker (MX), at 2000. (Boender-Netherlands)

4232.8 NMF-US Coast Guard, Boston, MA (keyed by CAMSLANT), with FAX weather charts, simulcast on 6438.2, at 0331. (Bob Hall-RSA)

4372.0 "Lima"-US Navy, working "Hotel" on Virginia Capes operating area and frequency, at 0130. (Mark Cleary-SC)

4604.0 Red Fox 4-Civil Air Patrol, IL, directing Great Lakes Region net, at 2330. (Ron Perron-MD)

4716.6 "V-3-S"-Possible US Coast Guard, calling "M-4-G," then Group Key West, at 0104. (Cleary-SC)

4739.0 Red Talon 71K-US Navy, Spare Group report for Jaguar (new callsign for "Fiddle," TSCC Jacksonville, FL), at 0055. (Cleary-SC)

5450.0 MPL2-UK Royal Air Force VOLMET, aviation weather at 0456. (Ken Maltz-NY)

5690.0 Coast Guard 1712-US Coast Guard, patch via CAMSLANT to Clearwater Air, FL, at 2322. (Cleary-SC)

5696.0 Terminator 88-Possible UK Royal Air Force, changed callsign to Javelin 88 after working US Coast Guard Shark 11, at 0108. Borinquen Air-USCG, Aguadilla, PR, working CG 6578, at 0113. (Rick Baker-OH)

5711.0 King 16-US Air Force Rescue HC-130, calling Angel Ops, raised King 22, who relayed at 0251. (Cleary-SC)

5732.0 CAMSPAC-US Coast Guard, CA, working Coast Guard J24, who went to 7527 for Panther, at 0042. (Perron-MD) 24C-US DEA, working Panther (DEA, Bahamas), at 2352. (Cleary-SC)

5788.0 68-Danish Army, calling DK11 (group callsign), in ALE at 1431. (Watson-UK)

6200.0 CAMSLANT-US Coast Guard, VA, working Cutter *Eagle*, the Sailing Training Barque, at 1952. (Cleary-SC)

6246.6 "I-4-I"-US military, calling "R-0-G," went secure (ANDVT), at 2337. (Cleary-SC)

6330.0 LZW-Varna Radio, Bulgaria, CW identifier in SITOR bursts, at 0210. (Cliff Watts-TX)

6370.0 KPA 4Z5-Abnormal Israeli Intelligence AM callup string (E10a), simulcast on 6912, at 2000. (Boender-Netherlands)

6379.0 4XZ-Israeli Navy, Haifa (M22), CW marker and 5-letter groups, at 0223. (Watts-TX)

6449.7 PWZ-Brazilian Navy, Rio de Janeiro, RTTY navigation warnings in English, at 2145. (Hall-RSA)

6490.0 LOR-Argentine Navy, Puerto Belgrano, RTTY coastal warnings in Spanish, at 0320. (Hall-RSA)

6491.5 LOR-Argentine Navy, Puerto Belgrano, RTTY warnings in Spanish, at 0525. (Hall-RSA)

6496.4 CFH-Canadian Forces, Halifax, NS. FAX weather chart at 0612. (Hall-RSA)

6697.0 Gun Rack-US Military, with a 28-character EAM simulcast on 8992, 11244, and 13155, at 1835. (Jeff Haverlah-TX)

6709.0 TISCOM-US Coast Guard Telecommunications & Information Systems Command, new frequency for this net, sounding in ALE at 1335. (Perron-MD)

6715.0 ADW-US Air Force, Andrews AFB, VA, MCC, McClellan AFB, CA, and OFF, Offutt AFB, NE, all sounding in ALE, storting at 0158. (Jeff Seale-KY)

6721.0 Reach 3075 ALE initiated patch to Hilda for WX at Frankfurt, at 0213. (Cleary-SC)

6754.0 Trenton Military-Canadian Forces VOLMET, aviation weather at 0125. (Seale-KY)

6834.0 GYA-UK Royal Navy, Northwood, FAX weather chart for the Middle East, at 1918. (Watson-UK)

6900.0 Lecaire-French Embassy, Cairo, Egypt, calling Khartoum, Sudan, in ALE at 1653. (Watson-UK)

7360.0 Kohutkanet305-Unknown, possibly Czech Republic, calling NET305 in ALE, at 1802. (Perron-MD)

7527.0 J24-US Coast Guard helicopter, raised OPB in ALE, *[OPBAT, Operations Bahamas and Tortugas, also known as Panther-Hugh]* then working Panther in voice as 24C, at 0042. (Perron-FL) Foxtrot 41-US joint drug interdiction aircraft, setting radio guard with CAMSPAC at 0132. (Cleary-SC)

7633.5 Air Evac 637-US Air Force, patch via AFA1RE, Air Force MARS, ME, at 0059. (Cleary-SC)

7657.0 Javelin 88-UK Royal Air Force Nimrod on joint drug interdiction, working Panther (DEA, Bahamas), at 0033. (Cleary-SC)

7740.0 Rabat-French Embassy, Morocco, calling CER11 in ALE, also 9052 and 10825, at 1645. (Watson-UK)

7780.0 RAM-Israeli Air Force, ALE sound at 0255, also on8100, 8858, 9227.0, 10614, and 11491. (Perron-MD)

7851.0 AAR3FQ-US Army MARS, VA, control station for a regional net in LSB, checking in several stations at 2017. (Perron-MD)

8298.0 VTP13/14-Indian Navy, Vishakhapatnam , RTTY test loop at 2005. (Hall-RSA)
8303.0 LOR-Argentine Navy, Puerto Belgrano, RTTY 5-letter groups at 0525. (Hall-RSA)
8303.0 LOR-Argentine Navy, Puerto Belgrano, RTTY coastal warnings in Spanish, at 0630. (Hall-RSA)
8416.5 L2C-Argentine Navy, Buenos Aires, idling for hours, maybe days, in SITOR-B, at 1500. (Hall-RSA)
8419.0 WLO-Mobile Radio, AL, broadcasting SITOR-B maritime news at 2230. (Seale-KY)
8495.4 "M"-Russian CW cluster beacon, Magadan (MXC), also 10872.4, 13528.4, and 16331.4, at 2000. (Boender-Netherlands)
8825.0 ABC-Unid Venezuelan military headquarters, calling DIVIMCO1 in LSB ALE, also on 8280 and 12456, LSB, at 0022. (Perron-MD)
8867.0 Brisbane Radio-South Pacific air traffic control, working several aircraft at 0600. (Patrice Privat-France)
8912.0 CS1-US Customs Service, calling 134 (BICE aircraft), in ALE, then Hammer (Customs/BICE, March ARB, CA) calling 34K (same aircraft), clear and secure voice, at 0131. (Perron-MD) Javelin 88-UK Royal Air Force, British accent on voice, calling Panther (DEA, Bahamas), at 0136. (Glenn Blum-TX) Javelin 88, British accent, calling Panther at 0322. (Baker-OH)
8971.0 Bluestar-US Navy TSCC, Puerto Rico, working Cleveland 82 at 0525. (Allan Stern-FL) Wafer 24-US Navy, passing position of bird farm (aircraft carrier) to Golden Hawk (TSCC, Brunswick, ME), at 2234. (Cleary-SC)
8982.0 Rock Bottom Sierra-Possible US Navy TSCC, Rota, Spain, passing Spare Group and link coordination traffic with "1-J-I" and others, splattering US Coast Guard 8983, at 0510. (Baker-OH)
8983.0 Coast Guard 2136-US Coast Guard, setting radio guard with CAMSLANT, at 1325. (Baker-OH)
8992.0 LF04-US Navy P-3, patch to Eagle Base (Jacksonville, FL) via Puerto Rico HF-GCS, at 0039. (Perron-MD) Red Chalice 71F-US Navy, Spare Group report in patch via PR to Jaguar, at 0120. (Stern-FL, and Haverlah-TX) Cardfile 71J-US Navy P-3, patch via PR to Jaguar at 2258. (Cleary-SC)
9007.0 Rescue 342-Canadian Forces, patch to Rescue Coordination Center via Trenton Military, at 2128. (Cleary-SC)
9106.0 NNN0STE-US Navy/Marine Corps MARS, calling AAT3BFMARS, US Army MARS, in ALE on SHARES channel 5, at 2343. (Perron-MD)
10100.7 DDK9-Hamburg Meteo, Germany, RTTY synoptic weather code at 1705. (Hall-RSA)
10242.0 Omaha 41SK-US Customs Service, relay from Shark 23 (Coast Guard) to Hammer (US Customs, CA), at 0003. (Cleary-SC) UCG-US Coast Guard CAMSPAC, CA, raised helicopter F29 in ALE, then tried to work F216 (same aircraft?) in voice, no joy at 0107. (Perron-MD)
10600.0 ARMARIO-Venezuelan Navy, calling Navy base FALCON, in ALE at 1131. CUFAN3-Venezuelan Army Unified Command of National Armed Forces, calling MIRA1, ALE at 2236. (Perron-MD)
10871.9 "S"-Russian CW cluster beacon, Arkhangelsk (MXC), also 13527.9 and 16331.9, at 1903. (Boender-Netherlands)
10872.2 "F"-Russian CW cluster beacon, Vladivostok (MXC), at 1903. (Boender-Netherlands)
10872.3 "K"-Russian CW cluster beacon, Petropavlovsk-Kamchatskiy (MXC), at 1903. (Boender-Netherlands)
10886.2 Unid-Moscow Meteo, FAX weather charts at 1700. (Hall-RSA)
10913.5 ME1-US Federal Bureau of Investigation, Memphis, TN, calling AT1, Atlanta, GA, in ALE at 1515. (Perron-MD)
10993.6 "J-0-W"-Possible US Coast Guard, relaying position of "N-9-B" to Group Key West, at 0127. (Cleary-SC)
11175.0 Puerto Rico-US Air Force HF-GCS, Salinas, patch for Rats 69 to March ARB, CA, at 0630. (Stern-FL)
11205.0 Shark 71-US Joint Task Force-South, asking Smasher (Southern Command Flight Watch, Key West, FL) for a relay to Pope AFB operations, at 2113. (Perron-MD) Shark 33-US joint task force, checking in with Smasher at 2328. (Cleary-SC)
11220.0 Navy 676-US Navy, radio check with Andrews AFB, at 2254. (Cleary-SC)
11226.0 Goliath Bravo-US Air Force AWACS, ALE-initiated patch at 2244. (Cleary-SC)
11232.0 Sentry 06-US Air Force E-3B AWACS, patch to Tinker Metro via Trenton, at 0337. Talon 41-Probably US Navy on surveillance, patch via Trenton to Shearwater Ops, at 2209. (Cleary-SC)
11244.0 Extension-US military, with two 28-character EAMs simulcast on 8992, at 1455. (Haverlah-TX)
11247.0 NATO 05-Aircraft on North Atlantic Treaty Organization mission, working Architect, UK Royal Air Force, at 1300. (Privat-France)
11253.0 MVU-UK Royal Air Force VOLMET, aviation weather at 1710. (Maltz-NY)
11256.0 Addis-Ethiopian Airlines LDOC, Addis Ababa, working flight at 0058. (Baker-OH)
11300.0 Springbok 274-South African Airways, working what sounded like Brazzaville, Congo, at 0140. (Baker-OH)
11494.0 "03C"-US Customs, checking in with Panther (DEA, Bahamas), at 2045. (Cleary-SC)
11625.0 Montecano-Venezuelan Air Defense, calling CDDA, headquarters, in ALE at 2253. (Perron-MD)
12390.0 GYA-UK Royal Navy, FAX weather chart for the Middle East, at 1506. (Watson-UK)
12561.2 Foxtrot-US Navy "Echo Foxtrot" battle group net, working various single-letter callsigns at 0230. (Baker-OH)
12577.0 J8VM5-Vessel *Baltic Trader*, with three DSC distress calls, at 2327. (Watson-UK)
12806.5 NRV-US Coast Guard, Guam, SITOR-B weather at 1641. (Hall-RSA)
13155.0 Ditty Bag-US military, with 3 EAMs simulcast on 11244 and 8992, at 1625. (Haverlah-TX)
13211.0 Navy 515-US Navy P-3, working Andrews AFB at 1918. (Perron-MD)
13257.0 Canforce 1501-Canadian Forces, patch to "426 Squadron" via Trenton, at 1346. (Cleary-SC)
13511.0 4XZ-Israeli Navy, Haifa (M22), CW marker at 1622. (Hall-RSA)
13528.2 "F"-Russian CW cluster beacon, Vladivostok (MXC), at 2113. (Boender-Netherlands)
13528.3 "K"-Russian CW cluster beacon, Petropavlovsk-Kamchatskiy (MXC), at 2113. (Boender-Netherlands)
13597.0 JMW4-Tokyo Meteo, FAX weather charts at 1712. (Hall-RSA)
13907.0 "24C"-US Customs, working Panther at 0059. (Cleary-SC)
13927.0 Reach 423-US Air Force Air Mobility Command, morale patch via AFN2AC, Air Force MARS, Miami, at 2100. (Cleary-SC)
14470.0 CENTR2-Romanian MFA, Bucharest, calling VRO in ALE at 1837. (Perron-MD)
14493.5 LA1-US Federal Bureau of Investigation, Los Angeles, CA, working QT1, Quantico, VA, in ALE at 2048. (Perron-MD)
14671.0 Addisabeba-French Embassy, Addis Ababa, Ethiopia, calling Lecaire, Cairo, Egypt, in ALE at 1355. (Watson-UK)
15025.0 Red Talon 711 with Spare Group reports to Smasher, at 2155. (Cleary-SC)
15094.0 98KNY-SHARES station, Texas, passing ALE string, "ALE CHK IN KNY98 TEXAS" to KGD34NCC, SHARES Master Coordination Station, on channel 7, at 1607. VPEE982P-Unid SHARES, calling KGD34NCC in ALE at 2330. (Perron-MD)
16320.0 Addisabeba-French Embassy, Addis Ababa, calling Lecaire, Cairo, ALE at 0859 and 1931. (Watson-UK)
17477.0 Rabat, calling CER11 in ALE, also 18396, at 1231. (Watson-UK)
17487.0 KGD34NCC-SHARES Master Coordination Station, Arlington, VA, calling KSZ81, unknown SHARES station, ALE channel 8, at 1541. (Perron-MD)
18012.0 Cotam 1742-French Air Force, working Circus Vert (headquarters, Villacoublay), at 1209. (Privat-France)
18183.4 7RQ20-Algerian MFA, Algiers, Coq-8 election results to all stations, at 1510, then UN report in French to all embassies, at 1522. (Hall-RSA)
18261.0 GYA-UK Royal Navy, FAX weather chart for the Middle East, at 1530. (Watson-UK)
18396.0 Bujumbura-French Embassy, Bujumbura, Burundi, working Addisabeba in ALE, at 0857. (Watson-UK)
18571.5 Unid-Tunisian diplomatic, FEC operator chatter at 1611. (Hall-RSA)
19103.5 WAROPS-US Army Warrior Operations, probably the 1/228th Aviation in Honduras, sounding in ALE at 2142. (Perron-MD)
19958.0 Addisabeba-French Embassy, Addis Ababa, calling Lecaire, ALE at 0915. (Watson-UK)
20616.0 Lecaire-French Embassy Cairo, calling Khartoum in ALE at 0832, and CER41, Paris, ALE at 0852. (Watson-UK)

Mike Chace
mikechace@monitoringtimes.com

Globe Wireless Idle Signals Revealed (Part 2)

This month's column completes the story of decoding Globe Wireless' idle or channel-free signal to reveal the station identifier present in that signal – an exercise that provides an ideal tutorial to decomposing unknown signals bit-by-bit (pun intended!).

First, let's review where we got to last month. We know the following about the composition of the idle signal:

Speed:	100bd (or 10ms per bit)
Shift:	200Hz
ACF:	8 and 231
Synchronous:	Yes

After identifying these "external" characteristics of the signal, we had just started to look at the internal structure.

From the Outside to the Inside

For this job, we use a module that Hoka calls the Speed-Bit Analysis module. As you may recall from last month's column, this tool prints a line across the screen in a certain (user-settable) time period much like a fax machine. If a "1" is present, the line fills as it proceeds across the screen, if it's a "0" it leaves a blank behind and if there's no signal (noise), one generally sees neither solid white nor black.

To use this tool to uncover the internal features of the signal, one adjusts the time period in small steps, looking for a pattern that repeats vertically down the screen. Once a pattern emerges, we know that we have "synchronized" with some feature(s) of the signal.

In our case, we know that the signal has an ACF (autocorrelation function), so a good starting time period will be the repetition cycle time of the signal. We obtain this by multiplying the ACF (231 bits) by the bit time (10ms) of the signal, which is 2310ms. We indeed see a defined pattern with this setting (Figure 4).

We can also see that 50 idle signals are sent in a "round" – in 6 groups of 8 and one of two.

Figure 4: Speed-Bit Analysis

One can also see that there is also slight time shift (about 360ms) as each new group of 8 is sent. We're not yet sure why this happens.

In the case of the Hoka Speed-Bit Analysis module, one can move a left-hand and a right-hand vertical cursor over various parts of the signal and read the time period (and therefore, number of bits) between their start and end. In the case of the GW signal, we first measured the pause between bursts (780ms), which means that the actual burst is 2310-780=1510ms (or 151 bits) in length.

So, how do we get to see these all-important 151 bits?

Bit By Bit

For really digging into the guts of a signal, we use a tool called, quite simply, the Demodulator. This module allows one to set each signal parameter (modulation type, speed, shift, etc) and simply dumps the raw 1s and 0s it demodulates to a file. Here's what we see in the case of WNU's complete 151bit channel free signal burst:

```
1001010010C0000011100010100011000111 1
1011011000011010100111011010010111111001
0111100101111001011000110110001101100
0011011000110110001101100011011111111
```

As you can see, in itself, this is not very useful – we need a few other signals for comparison purposes and to test a few theories:

1. We need to take similar dumps from a number, perhaps all, of WNU's other channels. If the bit pattern varies, we can guess that the channel free signal carries frequency or channel information among other things.
2. We need to take similar dumps from other GW stations. By comparing the patterns, we may be able to tell the identifiers apart (if there are any!)

In the case of (1) what we found is that the bit pattern of the idle signal is the same on all channels used by a particular GW station. It's therefore probable that the channel-free signal contains no frequency or channel information.

In the case of (2) we checked most of the GW stations that were in range of our location (VCT, WNU, HEC, LSD836, KFS and KPH) and found that the leading portion of every station's channel free signal is the same:

```
1001010010000000111000101000110001111101
1011000011010100111011010010111111001011100
10111100101
```

It seems that we're on to something! Looking beyond this part of the signal, we find that that the trailing portion is different for each station. In the case of WNU, here is the trailing portion:

```
{trailing portion}
1000110110001101100011011000110110
0011101111111111
```

Working back carefully from the last 8 bit byte of all 1s, we can see that the channel free signal contains a unique 8 bit byte repeated six times:

```
10001101        10001101
10001101        10001101
10001101        10001101
11111111
```

We can therefore surmise that this repeated 8 bit byte is the station identifier. We've done it!

Ben Mesander, who first aroused suspicions that the GW channel-free signal contained an identifier, has written a free Linux program to decode the ID from bit-by-bit dumps such as that shown above. Others have now ported the program to Windows (see Resources).

With the help of these programs and other listeners around the world, Ben has now catalogued just about all of these unique identifiers. Well, nearly unique, as it turns out. The program has revealed that a few distant stations appear to carry the same ID.

Chris Smolinski has also added GW identification to his excellent MultiMode software for Mac OS X (see Resources).

Thanks again to Ben and other listeners for their help in writing this and last month's column.

Until next month, good digital DX.

Resources

Globe Wireless
http://www.globewireless.com
Hoka Elektronik
http://www.hoka.com, www.hoka.net
Ben's Globe Page
http://www.hungry.com/~ben/radio/gw.html
GW Idle Signal
http://neurosis.hungry.com/~ben/radio/GW_CH_free.wav
MultiMode
http://www.blackcatsystems.com/software/multimode.html

Global Forum

Shortwave Broadcasting

Glenn Hauser
P.O. Box 1684-MT, Enid, OK 73702
glennhauser@monitoringtimes.com
www.worldofradio.com

Information Radio Is Back - from Bahrain or Ships?

Jeff Weston, BDXC-UK, discovered a notice on a navigational warning website concerning the Persian Gulf, about Coalition Maritime Forces broadcasts on 6125 at 0300-0800 and 15500 at 1400-1900 UT. It said they began 15 April, with popular music and info in Arabic, Farsi, Hindi, Pashtu, Urdu and English, on how to identify and report terrorist activity at sea.

These two frequencies are among nine others in a Merlin schedule for A-04 for an as yet unheard station called "Radio for Peace," from sites in the UK and UAE, pointed out by Bernd Trutenau, *BC-DX*, although the times do not match exactly. Then Andy Sennitt at *Media Network* traced the origin of this to the Maritime Liaison Office (MARLO) in Bahrain. One of two handbills pictured on the MARLO web site mentions broadcasts on "Radio One," though it's not clear if this refers to shortwave. The mission of MARLO is to facilitate the exchange of information between the United States Navy and the commercial shipping community in the US Central Command's area of responsibility.

Mika Mäkeläinen, of dxing.info, who last year had visited Qatar and the Gulf, found out more from Liaison Officer Ken Gazzaway of MARLO in Bahrain. Transmissions originate from vessels operating in the Gulf of Oman and North Arabian Sea. Low power – only 250 watts – explained why DXers had not been able to monitor the transmissions. Negotiations were underway to transfer the transmissions to Merlin Communications via UAE or the UK. This would greatly increase power [250 or 500 kW]. The announcements also detail the Rewards for Justice program. U.S. offers rewards for information that prevents or favorably resolves acts of terrorism against the U.S.

Once the news was out, European DXers succeeded in picking up 15500-USB, starting with Jari Savolainen in Finland, around 1600 UT, but a lot of splatter from Kuwait on either side. It sounded like a psyop transmission, talking about a million-dollar(?) reward, with a phone number to call, 001 800 877 3927. Reception was better another day at 1730, with an ID sounding like "Radio Maulumat," the same name as the previous Information Radio broadcasts for Iraq and Afghanistan.

Three days later, on May 10, Dave Kernick in the UK heard Afghan music and ID at 1745 as "Radyo Ma'alumat." Thomas Roth in Germany also heard it, but with some interference also on USB, perhaps an attempt to jam. Another log from Savolainen said they seem to ID as "Radyo Maulumati" (differs a bit in each language). The e-mail address mentioned is mail@rewardsforjustice.net and see the website for more details about the program, if not about these specific transmissions: **http://www.rewardsforjustice.net**

◆ WRTH A04 Schedules

There is no more *SW Guide*, but *WRTH* provides over 200 A04 broadcasting schedules for International, Foreign service, and Target broadcasters, and a complete 'By Frequency' list. The file is just under 300k, 87 pages long, via **http://www.wrth.com/WRTHA04WEB.pdf** or **http://myweb.tiscali.co.uk/g4ucj** (Sean D. Gilbert, International Editor, *World Radio TV Handbook*)

BOLIVIA Reactivated? 5986v, Radio Integración, El Alto, Depto. La Paz, local news in Spanish, *Municipio Alteño al día*, ads, bad modulation ot 1125 11 May. And 4788, Radio Bollivián, San Borja, Depto. Beni, at 1110 (Rogildo F. Aragão, Quillacollo, Bolivia, *hard-core-dx*)

BOTSWANA I spoke to Mr Kingsley Reetsang, CE of R. Botswana, on 22 April regarding their absence from SW. He explained that they used to have three very old valve transmitters and over the years they used up two of them for spare parts for the last one. Now a valve on the last one failed and, because of the oge of the transmitter, a new valve has to be custom made. They would like to remain on SW and are currently contemplating whether to order the valve or to get a new (solid state) transmitter. In either case they don't expect to be on SW for a number of months. My personal opinion is that SW will not be a priority for them as the country seems to be well covered by MW transmitters, and the chances of R. Botswana returning to SW is probably not better than 50/50 (Vaclav Korinek, RSA, DSWCI *DX Window*)

Even the latest shortwave transmitters use a tube in the final PA stage (Kai Ludwig, Germany, *DX Listening Digest*)

RFE/RL Serbo-Croat service beamed to Europe, heard 1735-1800* on 15245 (Tony Rogers, Birmingham, BDXC-UK) New unusual usage; Botswana site surely was not designed to serve Europe, but they have a 10 degree antenna, so why not, especially if Greece, UK sites are full? (gh)

BRAZIL R. Senado, Brasília, 5990.30, also heard on 6366.80 at 1800, spur? (Björn Malm, Quito, Ecuador, *DXLD*)

CROATIA Future plans of Croatian Radio, from an interview in Spanish with Mr. Gorzic, on the station: we intend to improve the quality of the broadcast, very soon beginning to transmit with digitalized technology in excellent quality. We want to increase the duration of broadcasts in certain languages, add French and German, and lots of good Croatian music (via Emilio Pedro Povrzenic, Argentina, *DXLD*)

CZECH REPUBLIC The Czech state is almost certain to prolong the rent contract with Radio Free Europe/Radio Liberty for the former Federal Assembly building in Prague, which is to expire this year. So far the station has been unable to find a suitable building to move into. Plans to move the HQ grew more urgent after the terrorist attacks in the USA in September 2001, since the government was afraid that the building, in a highly frequented location close to Wenceslas Scuare, could be the target of terrorism (CTK news ogency)

DENMARK After many delays, World Music Radio began testing Moy 9 on 15810, from Ilskov near Karup in Central Jutland, with 500 watts (Stig Hartvig Nielsen, DSWCI *DX Window*) He said my report was first, at 1405 UT that day (Jari Savolainen, Finland, *DXLD*) The first legal SWBC from Danish soil since Radio Denmark closed down its SW transmitter at Herstedvester (Andy Sennitt, *Media Network* blog) Address is: WMR, PO Box 112, 8900 Randers, Denmark, wmr@wmr.dk (Dave Kenny, BDXC-UK) Tests were to follow on 5815 instead with 10 kW, and regular programming in a few weeks. Hope soon to commence on FM and Internet (Nielsen, World Music Radio, **http://www.wmr.dk** via *DXLD*)

ECUADOR 5966.51 had news until 0000, then modern pop/disco music and ads from Tena with "98.9 Ideal" IDs. Strong signal but low sound-quality. Presumably La Voz del Upano, Tena, also heard a year before on 5966.59, now relaying this FM station. See **http://www.kailaufen.de/CORAPE/radios.html** (Björn Malm, Ecuador, *DXLD*)

FINLAND *Nuntii Latini* from Radiophonia Finnica Generalis:

Sun	1555	NAm	15400, 1745
		EEu	5980, 1855
		Eu	11755 6120 9630
Mon	0245	NEu	5955, 0855
		As/Au	17660

Inquiries to *Nuntii Latini*, YLE Radio 1, Box 60, 00024 Yleisradio, Finland or nuntii.latini@yle.fi At the same time on other days, Special Finnish, simplified and at a slow speed (YLE Radio Finland A-04 program booklet via John S. Carson, OK, *DXLD*)

GREECE [and non] The Voice of Greece, only program in English relayed by Delano and easily audible in NAm, is *Hellenes Around the World*, scheduled Sat 1600-1700 on 17705, but very much subject to preëmption by ballgames in Greek (gh) English at 1830-1855 is fair to good on 12105 daily (Harold Sellers, Ont., *DXLD*) ID as "R. Philia," with news, weather, a feature on a Greek island, cultural calendar, Greek pops, good signal direct (Jim Clar, Rochester, NY, *DXLD*) Would be nice if VOG beef up its SW service in foreign languages for the Olympics, but no sign of any such plans (gh) M-F at 1200-1230 on 15650

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

there's a mailbag in Greek, *'O Tahidromos* (Marcelo Xavier Ferreira, Itambé, Paraná, via Célio Romais, *@tividade DX*)

GUATEMALA Radio Cultural was supposedly inactive on SW, but heard in late April on 3300 at 1132 (Adán González, Venezuela, *DXLD*) Numerous IDs at 1050-1110, very strong (Bob Wilkner, FL, *Cumbre DX*) 3300 on as early as 0935 (Dave Valko, Dunlo PA, *ibid.*) Maybe just a short-term test; also try 5955 (Hans Johnson, Naples FL, *ibid.*) unID religious station at 0120-0200 on 5954.98 could be this (Björn Malm, Quito, Ecuador, *DXLD*)

ICELAND RÚV newscasts in Icelandic, A04: Eu 1215-1300 15775, 1755-1825 13865. NAm 1410-1440 15775, 1835-1905 15775, 2300-2335 13865 in AM-compatible J3E mode (USB -6db carrier reduction). (Bernd Trutenau, Lithuania, *DXLD*)

IRAN [non] KRSI, Radio Voice Of Iran, Seday-e Iran, 1530-1730 is on 17525 ex-11520 [via FRANCE?]. Bubblejammer already there to spoil Israel's 1400-1525 Farsi program just continues (Silvain Domen, Belgium, *DXLD*) But KRSI was soon missing from 17525 (*Observer*, Bulgaria; Zacharias Liangas, Thessaloniki, Greece, *DXLD*) Then their website gave 17510: **http://www.krsi.net/us-en/todaysprogram.asp** (Silvain Domen, Belgium)

Radio Pedar on 15585 at 1730-1830 (ex-17735). Sidesplatter from VOA 15580 (Silvain Domen, Belgium, *DXLD*) via Rampisham, UK, 500 kW, 85 degrees, M-F, 15585 is excellent (*Observer*, Bulgaria) Opened late at 1734:28 but not in Farsi, Pushtu? 1754 Farsi discussion (Zacharias Liangas, Greece, *DXLD*)

ISRAEL Kol Israel SW broadcasts continued into mid-May, with some frequency changes; English at 1700 and 1900 heard on 17535 (gh, OK) 1900 also on 15640, nothing on 11605 (Scott R. Barbour, Jr., NH, DXLD) At 0400 on new 15640, ex-17600 (Chris Hambly, Victoria, *ibid.*) 0400 on 11590, fair to good (Steve Cross, Del City, OK, *ibid.*) Termination of SW is now foreseen for the end of the year, but the Reka network would be reorganized by June at the latest, to include English, French and Sponish, while the He network would be reserved for SW, with French at 0345, 1700 (Mati ben Avraham, Kol Israel via Jean-Michel Aubier)

KIRIBATI Radio Kiribati will resume our transmission soon on 9825 to target the Line islands (Kautabuki Rubeiariki (Ricky) of R. Kiribati via Ian Cattermole, NZ, *Cumbre DX*) So a close watch on 9825 would be a good idea (Cattermole, *ibid.*) Checked 9825 and it was clear 0700-0801, then Japon dominates 0801-0958; Cuba is on 9820 until 0700. When previously active, Kiribati was logged in USA as early as 0530, mostly 0630-0730, some at 0830; also used 9810 among others (Guy Atkins, WA, *ibid.*)

KUWAIT Radio Kuwait in Arabic noted from April 1: 1515-1800 on 11990. English 1800-2100 on 11990 is cancelled (*Observer*, Bulgaria)

LIBYA LJB in Arabic to Iraq for A-04: 1600-1803 on 11660 AM; 1803-1903 on 7425 USB, excellent here in Bulgaria; 11660 AM and 11890 USB, the latter co-channel Taiwan International in AM, also Arabic; 1900-2030 on 11660 AM, and 11660 also has interference problems (*Observer*, Bulgaria)

It seems likely that the two USB senders are Libyan based – maybe utility transmitters? (Noel R. Green, UK, *8C-DX*) 11890-USB also heard here in the 1200-1300 slot; LSB is not fully suppressed! There is 10-20% LSB mode portion left. But sideband splash from the IBB powerhouses. Direction finding at about 160-170 degrees from central Europe, which indicates that either the Sabrata or Sabhah sites are in use. So should be coming from former ute service, left over by the Libyan diplomatic service. RIZ company from Zagreb-Croatia delivered some transmitters two decades ago. Daily Arabic service to Iraq on USB heard 1203-1300 on 11890, QRM VOA; 1800-1900 and 2100-2200 7425 11890 (Wolfgang Büschel, Germany, *BC-DX* and *DXLD*)

[non] LJB relays via Issoudun, FRANCE for A-04:
1000-1100 21695
1100-1230 15610 17695 21675 21695
1230-1400 21675 21695
1400-1500 21675
1600-1700 15660 17695
1700-1800 15660 17635 17695 17880
1800-1900 15205 15660 17635 17695
1900-2000 15205 15315
2000-2030 11635 15315
2030-2130 11635

(extracted from HFCC by Dave Kenny, BDXC-UK *Communication*) English news monitored at 1140, 1730, 1820, 1920, 2030, 2120 (Mike Barraclough, World DX Club *Contact*) And those vary; why not schedule at the same time each hour so we can remember? (gh)

MADAGASCAR Kevin Chambers, Director of Engineering and KNLS Station Manager returned on April 11th from a trip to Madagascar. His purpose was to locate the land on which World Christian Broadcasting can build a new SW radio station. He was successful! Traveling with Chambers was Earl Young, World Christian Broadcasting's friend and consultant. Young is President of the United States-Madagascar Business Council and is directly responsible for World Christian's involvement in Madagascar and with the excellent rapport with Marc Ravalamanana, the President of that country. It appears the land will be given to World Christian Broadcasting at no charge. The site contains 42 hectares, which is slightly more than the desired 100 acres. Plans are to begin the fundraising for the Madagascar Project once the additional facility in Alaska is completed (WCBC *Latest News*)

On *DX Partyline* was an interview with Andy Baker about this. Strangely enough, Allen Graham did not ask him why there was a need for yet another evongelical station, as all the areas it would reach are already served by multiple SW services. What does WCBC have to offer that the others do not? How does its take on Christianity differ from the rest, if at all? Will this not serve further to alienate Muslims from the west? Such questions are best not raised, from the evangelists' point of view, for whom there is never enough (Glenn Hauser, *DXLD*)

MONGOLIA English from Voice of Mongolia is now at 1000-1030 on 12085 for SAs and at 1500-1530, 2000-2030 on 12015 bath for Eu (Allen Dean, UK, World DX Club *Contact* via Mike Barraclough)

NEW ZEALAND It is with regret that we note the passing of William Dennis Roodhouse-Hill, a.k.a. Rudi Hill, who died in Auckland on Friday 30 April 2004, aged 83 In the years before RNZ International was relaunched in 1990, Rudi was the sole employee and sent out tapes of programmes to stations throughout the Pacific. His Pacific Link was the only news exchange programme that took news about the Pacific Islands to the people of the South Pacific. *On the March*, a band music programme he started during this time continued on RNZI until 1998. The obituary his family placed in the paper said it all: "Great friend to many, and respected colleague to the good people at Radio New Zealand International." (RNZI website)

NIGERIA Voice of Nigeria was forced off the air April 20 after an electrical transformer outside its Lagos headquarters exploded. VON made efforts to provide a skeleton service by moving its outside broadcast van to Ikorodu town, on the eastern outskirts of the city, where its transmitters are located. Poor funding is one of the major problems of the Voice of Nigeria. Workers allege that they are owed about three million naira ($23,000) in unpaid allowances (SAPA/AFP via Artie Bigley) It was off about a week, heard again April 27 in English at 0650 on 15120 (Mike Barraclough, UK, *DXLD*) Schedule highly unreliable (Thorsten Hallmann, Münster, Germany, **http://africa.coolfreepage.com/africalist** DXLD)

PAKISTAN For A-04, the Islamabad API-2 100 kW transmitter uses 7130 at 0600-1115, including brief English news at 0800 and 1100, as on the external service. The *Current Affairs* program, portly in English is on Islamabad API-4, 100 kW, 6225 at 0200-0400 & 1300-1800 (R. Pakistan via Noel Green, DSWCI *DX Window*)

PAPUA NEW GUINEA Re last month's report of a new Catholic Radio Network SW transmitter on 4960, Wayne Wilson of T.E. PNG Ltd., the communications firm handling the installation, replied to my enquiry that the delivery to Vanimo had been delayed, but when running, main radiation from the antenna is designed to be high angle, near vertical incidence to reflect back to PNG and out to about 1000 km, so it will we interesting to see if the signal reaches the US. The other [two] stations in the 3200 - 3400 kHz band are meant to be running 10,000 watts, whereas the Vanimo CRN Transmitter will be 1000 watts (Guy Atkins, WA, *Cumbre DX*)

PARAGUAY According to press sources, the technical improvements (including transmitter repairs) at Radio Nacional were made thanks to a $50,000 donation from the Korean government, via its embassy in Asunción. A program by Paraguayan resident Nicanor Duarte Frutos called *Habla el presidente* (a similar idea used by President Chávez in Venezuela and also relayed via RHC) has started on ZP1 Radio Nacional, every Wednesday at 1030-1200 (*Última Hara* via Horacio A. Nigro, Uruguay, *DXLD*) 9736.9, signing on at *0802 with music *Pajaro Campana*, ID, distorted audio (Takeshi Sejimo, *Radio Nuevo Mundo* via Hideki Watanabe)

PERÚ On 5699.76, Radio Frecuencia, San Ignacio, at 0140 in May. Reactivated, had been off two years waiting for a license. One hour with nonstop Peruvian music; the DJ talked just twice (Björn Malm, Quito, Ecuador, *DXLD*)

SAINT HELENA I was very happy May 6, 2004, to find a letter from St Helena in my mailbox! It contained a full data QSL for the final broadcast, October 23, 1999. Thanks a lot to Radio St. Helena and all who helped in organizing the QSLs after such a long time!! (Eike Bierwirth, Leipzig, Germany, *DXLD*) DSWCI member Robert Kipp has been helping the new station manager at Radio St. Helena, Ralph Peters, to clarify the QSL situation now that Tony Leo has retired (Anker Petersen, Chairman DSWCI)

Radio St. Helena has mailed the last batch of QSL cards for their special broadcast of October 1999, with St. Helena postage stamps and transported by the mail ship *RMS St. Helena* via Cape Town. Along with the QSLs sent by the (now retired) former Station Manager Tony Leo in 2000, 2001, and 2002, this batch will now take care of all known outstanding reception reports for the 1999 broadcast. The new QSL Policy of the new Station Manager regarding the special shortwave broadcasts from RSH is:

- 1999 and 1998: RSH can still verify these broadcasts.
- 1997: RSH will TRY to verify. No promise of success.
- 1996 and earlier: RSH can NOT verify these any longer, sorry.

Radio St. Helena thanks *all* its friends around the world for their interest in St. Helena, for their patience over the years, and for their help in clarifying the QSL card situation. Good health and good DX to ALL of you (Ralph Peters, Station Manager at Radio St. Helena and Robert Kipp via Anker Petersen, *DXLD*)

SIERRA LEONE R. UNAMSIL, 6140v: After a few years received another QSL as a form letter, a paper and a T-shirt (XL to my great luck). Is the station just on frequency nowadays, so that is the reason we can't hear them, or is it the tropical weather that has degraded the antennas and transmitter? (Jan Edh, Sweden, *SW Bulletin*) QSL from R. UNAMSIL on 6137.7 which after nearly two years replied with a letter, T-shirt, paper and schedule. V/s was Sheila Dallas, Station Manager & Executive Producer (Dan Olsson, *ibid.*)

Some details from the reply to me after one year: We broadcast in English and in four major national languages; Mende spoken in the Eastern Region of the country, Themne spoken in the Northern Region and Limba spoken in Northern and Southern Regions. Frequency 6140 kHz - transmitter Harris make – 1 kW.

2300-0600 local time (= UT) Mon, Thu and Sun is *Contingent's Night*. Each of our military contingents is given a chance to run their own programmes on these nights. They talk about their various countries and the similarities and differences. They introduce their music and stories which make the nights interesting. On other nights from 2200-0700 it's indeed the *Night Line* music and sensitisation programme on pertinent issues with Sierra Leone's Nr. 1 DJ.

Your reception report and that of the more than 100 persons like you from

all around the world is helping us tremendously to adjust our output. We hope that in the next few months you will be able to get us much clearer (via Torre Ekblom, Finland, DSWCI *DX Window*)

SLOVAKIA Further to last month's lead story about RSI ceasing SW broadcasts – Pete Miller announced on *Slovakia Today* that R. Slovakia would continue until the end of June *but* your letters can make the difference, so write in to englishsection@slovakradio.sk (Nick Sharpe, UK, World DX Club) Odd that the English section was not campaigning more vigorously for support earlier in the month like the other language sections were (Andy Sennitt, Holland) The planned shut-down of RSI on SW has been postponed until July 1 (Kai Ludwig, Germany, *DXLD*)

Members of the parliamentary Media Committee disagreed with cancellation of the SWBC of RSI. "I will speak to ministers and try to bring arguments explaining the importance of sustaining SWBC of RSI," said Slovak Radio director general Jaroslav Reznik, speaking after the Parliamentary Media Committee had decided not to cancel the shortwave broadcasting as of July 1. MPs active in the Media Committee were asking the Culture and the Finance Ministers to secure financing to the international service of the Slovak Radio. The vice chairman of the Media Committee defined the possible cancellation of this international service as absurd during the time of Slovakia's EU entry. There are about 150,000 listeners of RSI worldwide. If Slovak Radio stopped its international broadcast on SW, there would be about 20,000 left to tune in via Internet and satellite receivers (slovensko.com via Ulis R. Fleming, Mike Terry)

The Slovak Syndicate of Journalists requested that the government allocate the funds to preserve Radio Slovakia International. SRo director general Jaroslav Reznik said that he would switch off RSI as of July 1 if he did not receive Sk75 million (1.9 million) to continue the broadcast. SRo propases that funding for RSI could be provided from the Foreign Affairs Ministry (*Slovak Spectator* via Mike Terry, Kim Elliott)

SOMALIA R. Galkayo, 6980 AM, increased hours to 0400-0600 and 1000-1800 with English at 1730-1800. In mid April, Sam Voron reported that power on SW was 15 Watts but had been heard in Europe! He was then starting to build a SW amplifier (via Tarmo Kontro, *dxing.info*)

SRI LANKA SLBC All Asia Service, 15745, noted off frequency at 15747.98, at 1430 very nice oldies before 1500 news. Same later in April, May with *Classic Gold* at 1430 and all afternoon (Christer Brunström, Sweden, *SW Bulletin*, Jouko Huuskonen, Finland, *DXLD*)

SWITZERLAND For those lamenting having missed SRI's final English broadcast: Dave Zantow refers us to an audio file of it at **http://real.sri.ch/ramgen/sri/en/nb/ennca.rm** still functioning a month later, and let us hope eternally. Includes features on ICRC, UN, Swissair, Nick Lombard on history of SRI since 1935. He admits that "sliding out of SW" was a huge mistake, but no alternative now. Then anthem and several minutes of the music-box interval signal (Glenn Hauser, OK, *World Of Radio*)

THAILAND Seeing that the new relays via Greenville at 0030 and Delano at 0300 on 5890 are working well, R. Thailand dropped the direct broadcasts from Udorn, 15395 as of April 18 (Andy Sennitt, Mark J. Fine, *DXLD*; Fyodor Brazhnikov, Irkutsk, *open_dx* via *Signal*)

TIBET [non] A-04 schedule for Voice of Tibet, clandestine via 100 kW Tajikistan, at 117 degrees and 100 kW Uzbekistan at 131 degrees, includes many alternate frequencies [allowing it to hop around trying to avoid Chinese communist jamming]: 1212-1300 Dushanbe 15645, 15635, 15660, or 15680; Tashkent 17525, 17505, 17745, 17765; and 21520, 21545, 21550, 21560, 21590, or 21720; 1430-1517 Tashkent 17540, 17520, 17765, 17800, 21650, or 21720 (*Observer*, Bulgaria)

TUNISIA In the spirit of *Review of International Broadcasting*, I recommend tuning in RTV Tunisiènne on 7275 and 9720. During the 0400 UT hour they bomb in here with good Arabic-style music with minimal interruptions – good listening and an example of one of the benefits of listening to SW (Will Martin, MO, *World Of Radio*) Also post 0500

TURKEY Voice of Turkey, English at 1230-1325 moved to 15535 from 15405 to avoid HCJB Australia in English (*Observer*, Bulgaria) 15535 and 15225 also announced and heard (David Crystal, Israel, *DXLD*)

U K [non] Radio Ezra has a new series [13 weeks as before?] of weekly English language broadcasts from Sunday 6th June towards Eu/NAf/ME on 17490 at 0900-0930 via Krasnodor, Russia. Radio Ezra is the Radio Outreach Project for the World Karaite Movement and the only counter-missionary radio station in the world. Reception reports are very welcome and a QSL certificate will be issued to any correct reports received. Refer to the station website: **http://www.radioezra.com** and World Karaite movement **http://www.karaites.info** (John D. Hill (Station Owner) via Swopan Chakroborty, India and Roberto Scaglione, Sicily, *DXLD*)

UNITED NATIONS [non] UN Radio from New York, M-F, English to Africa at 1730-1745 noted on 15495, 300 kW via Skelton, England (Livinus Torty, Chad, AWR *Wavescan*)

U S A AFGE Local 1812 has obtained a copy of a document the Broadcasting Board of Governors refused to provide us directly, *Global Vision 2010*. Though sketchy, it confirms what employees had suspected for a long time. The BBG wants to privatize, although they do say it will be "limited de-federalization". The BBG's supposed need to "de-federalize" is based on their specious claim that with VOA it is forced to manage according to "burdensome government rules." The document also cites the need to combine with the private sector and uses the supposed "successes" of the new broadcasts to the Middle East as models. It also establishes in writing what had been widely believed by many to be a major goal of the BBG – conversion of the VOA to TV.

"Anticipating the shift from radio to TV and the Internet in large parts of our audience's world, we must develop television as the première, and the internet as the companion, instrument of America's international broadcasting effort." The Union has also filed a grievance against the Broadcasting Board of Governors for its refusal to bargain over the Reorganization of the Voice of America radio with Worldnet television (AFGE Local 1812)

VOA's expanded service to Pakistan, *Radio Aap Ki Dunyaa* in Urdu, officially launched on 10 May with the addition of MW 972 kHz via Orzu, Tajikistan, 12 hours a day starting at 1400; the SW segments are now:

0100-0200: 7155 MOR, 9835 KAV, 11805 UDO
1400-1500: 9510 UDO, 11790 KAV, 15170 KAV, 15255 IRA
1700-1800: 11905 PHT, 12155 IRA, 15545 IRA

IRA = Iranawila, Sri Lanka; KAV = Kavalla, Greece; MOR = Briech, Morocco; PHT = Tinang, Philippines; UDO = Udon Thani, Thailand (Bernd Trutenau, Lithuania, *World Of Radio*)

Allan Weiner was interviewed by Frans Vossen at Kulpsville, for RVi *Radio World*. He gave some technical details: WBCQ has four transmitters of up to 50 kW, homebuilt or converted:

1 – Harris PDM, former MW unit
2 - Technical Material Corp. converted, from the 1960s
3 - Collins, modified, ex-military/commercial
4 - Combination of a Collins and a TMC Antennas:
    1 - log periodic beam, rotatable but fixed
    2 - small curtain array
    3 - 705-foot rhombic with two transmitters diplexed into it

(via gh, *DXLD*)

WBCQ now has one of the best and most complete collections of the Jean Shepherd program. Through Michael Ketter's Complex Variables Studio, each Shepherd program is restored and assembled for completeness, including period commercials. Airtimes are: Mon 2100-2200 UT on 7415; Sunday 2200-2300 on 5105 (Allan Weiner, *DXLD*)

Goodbye on the 26th of June – yes, it will be real nostalgia in the nostalgia world of pop music on the last Saturday of June 2004. Steve Cole gave us the sad news on his WBCQ *Different Kind of Oldies Show*. Though we enjoy his one-of-a-kind show on SW, I guess very few of us are able to support financially his good work. One listens to some stations because of some specific programs; once gone they will hardly catch our attention again (Raúl Saavedra, Costa Rica, *DXLD*)

WWCR's May schedule showed that Ragam is gone, the Tamil music show which ran since January, Sundays at 1300-1500 on 9985, tsk. Now filling those two hours is yet another pseudoshow from stealth creationist Rod Hembree, *Quick Study Radio* (Glenn Hauser, OK, *DXLD*)

The National Association of Shortwave Broadcasters at its 2004 annual meeting on May 7 elected Doug Garlinger as its new president. He is the former Director of Engineering for LeSEA Broadcasting, which owns SW stations WHRA, WHRI and KWHR. A few months ago, he left LeSEA to take an engineering position in Hawaii, but continues to be active in issues of importance to SW broadcasters.

NASB welcomed its newest member, KVOH [17775], which was recently sold by Word Broadcasting (WJIE in Kentucky) to a Hispanic church in Los Ángeles and is now known as La Voz de la Restauración.

Also, the membership agreed to extend the Voice of the NASB DRM (digital shortwave) broadcasts once the current series ends in July. The original series was beamed to Europe, but the new series will be beamed to DRM listeners in North America.

NASB also hosted a meeting of the new USA DRM Group, at the HQ of Radio Free Asia in Washington, to form a national organization to promote the development of DRM (Digital Radio Mondiale) in the US. Outgoing NASB President Jeff White was elected Chairman of the new USA DRM Group (Jeff White, NASB)

VENEZUELA [non] After a few weeks, the new Radio Nacional de Venezuela relays in Spanish schedule appeared on the RNV website, pointed out by Francisco Jackson dos Santos, in radioescutas, **http://www.rnv.gov.ve/noticias/index.php?act=ST&f=22&t=5173** and if you prefer, a colorful map at **http://www.rnv.gov.ve/noticias/uploads/ondacorta1.jpg** linked from an April 22 press release. Trouble is, nowhere is there any hint that the broadcasts are actually transmitted from Cuba, which is patently obvious to us! Why are they hiding this? Do they think we're stupid?

Also, the schedules are given in local time of the target area, without specifying as such – and DST was ignored in the US, so even the local times are wrong. Confirmed by actual monitoring, the correct schedule in UT as of May, with published target areas, was:

1900-2000 13740 San Francisco
2000-2100 9550 Caribbean
2000-2100 15230 Buenos Aires
2000-2100 17705 Rio de Janeiro
2100-2200 6000 Washington
2100-2200 11875 Chile
2300-2400 11760 Central America
2405 9820 Chicago

The final two broadcasts were once monitored one sesquiminute apart. Original announcements claimed they were one dekaminute apart (Glenn Hauser)

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

Global Forum

Broadcast Logs

Gayle Van Horn
gaylevanhorn@monitoringtimes.com

0035 UTC on 13695
THAILAND: Radio. News talk on playwright into business news. Item on joint venture from Thai Airlines to merge with Singapore Air for cheaper fares. (Howard Moser, Lincolnshire, IL) Khmer service 7260, 1115. (Gayle Van Horn, Brasstown, NC)

0001 UTC on 9736.9
PARAGUAY: Radio Nacional de Paraguay. Several IDs while monitoring program promos and band anthems. Colombian music followed by Spanish announcers' discussions. (Harald Frodge, Midland, MI)

0205 UTC on 9560
CANADA: Radio Korea Intl relay. Male with newscast and ID, // 15575 via South Korea. (Stewart MacKenzie, Huntington Beach, CA) **CFRX** 6070, 2149-2207+ *Sky Watch Traffic* report. (Frodge, MI)

0308 UTC on 6925 USB
PIRATES: Big Thunder Radio. Pop and weird tunes. Music relatively clean, but voice barely audible. Subsequent lagging 0330-0341* including rock tunes. ID per FRN posts. **Voice of Captain Ron SW** 6925 USB, 2245-2355+; **Lubavitcher/Chassidic Radio** noted from Brooklyn, New York 1709.85AM, 2350-2408+. (Frodge, MI).

0356 UTC on 6210
ETHIOPIA: Radio Fana. Poss. Amharic. Male/female duo with talks to 0400. Mention of Radio Fana at 0408 then "tinny" sound for Horn of Africa music. Fair signal // 6940. (Scott Barbour, Intervale, NH) **Voice of Tigray Revolution** 5500, 0412-0433 // 6350 poor. (Barbour, NH)

0418 UTC on 6019.96
PERU: Radio Victoria. Religious program to a capella hymns and station identification. Peruvians audible; **Radio Melodia** 5906.40, 0425-0430; **Radio Union** 6115, 0438-0443; **Radio Ancash** 4991.24, 0918-0930; **Radio Altura** 5014.37, 0300-0315; **Radio Del Pacifico** 4975, 0830+. (Arnaldo Slaen, Buenos Aires, ARG)

0430 UTC on 9875
RUSSIA: Voice of. Dramatic story segment to 0500 station identification. (Moser, IL) 9890, 1931 with report on the 1924 *Art Festival* held in the United States. Moscow *Mailbag* 9665, 0120. (Bob Fraser, Belfast, ME) **VOR** 12070, 2052-2059. (Frodge, MI) Russia's **Radio Rossii** 5940, 0920 in Russian. Fair-poor signal quality // 7320. (Van Horn, NC)

0518 UTC on 9615
NEW ZEALAND: Radio NZ Intl. Lengthy discussion on water rights for agricultural area into stock report. (Moser, IL) News report 9885 at 0800. (Fraser, ME)

0850 UTC on 4722.83
BOLIVIA: Radio Uncia. (Tent) Spanish/Aymara. Several regional tunes and regional announcements and time check. Bird signal at 0900 into Andean music and Aymara programming. Only partial ID audible mentioned "onda corta de 60 metros." Bolivia's **Radio San Gabriel** 6085, 0955-1010 in Spanish/Aymara programming. (Slaen, ARG) **Radio Mallku** 4796.52, 0925-0931. (Slaen, ARG)

0854 UTC on 4845
BRAZIL: Radio Meterologia. Portuguese. Station ID including station slogan and international news. Brazilians logged; **Radio Difusora Acreana** 4885, 0928-0935; **Radio Educacao Rural** 4925, 2220-2226 and 2300-2305; **Radio Cancao Nova** 9675, 2250-2259. **Nacional de Amazonia** 6183, 0845. (Slaen, ARG)

0900 UTC on 3990.30
SURINAME: Radio Apintie. Identification into Hindi by announcer. ID and jingle into talk show. Jingle ad pauses past 1005. Next night audible at 0430 in Dutch with oldies tunes. (Garcia, MD)

0930 UTC on 4939.7
VENEZUELA: Radio Amazonas. Spanish sign on with national anthem and the revolution anthem. SW and MW frequency quote and mention of *Free Territory of the Continent*. (Garcia, MD)

1144 UTC on 3375
PAPUA NEW GUINEA: Radio Western Highlands. Vernacular Papuan pop tunes of fair-good quality. PNGs noted: **Radio Milne Bay** 3365, 1145; **Radio East Sepik** 3335, 1147; **Radio Gulf** 3245, 1149; **Radio Southern Highlands** 3275, 1148; **Radio Saundaun** 3205, 1151; **NBC** 4890, 1152. (Jerry Lineback, KS/NASWA Flash Sheet)

1150 UTC on 15700
BULGARIA: Radio. Bulgarian folk music. Report on Bulgaria's role in NATO on 9700 // 11700 at 2317. (Fraser, ME) 7500, 0240 Bulgarian service. (Weronka, NC)

1500 UTC on 17870
CLANDESTINE-GERMANY: Radio Rhino Intl Africa. ID and opening of Trini Lopez tune. News bulletin on broken negotiations with international committee. Speech for exiled official into prayers. Sign-off at 1559. (Garcia, MD)

1505 UTC on 15410
USA: Radio Farda. Farsi ID into possible news format and talk. (Sam Wright, Biloxi, MS)

1730 UTC on 11890
PHILIPPINES: Radyo Pilipinas. English sign-on into national news and interview with Manila Bishop from the Catholic church. **Radio Veritas** 15360, 1500 English sign-on ID in Filipino service. (Garcia, MD) **VOA-Philippines** relay 15225 at 1755 with news commentary.(Fraser, ME)

1730 UTC on 9785
TURKEY: Voice of. Station sign-on into national newscast. Classical Turkish music 9830, 2340. (Fraser, ME)

1825 UTC on 17834.85
EL SALVADOR: Radio Imperial. (Tent.) Spanish program possibly called, "La Hora de la Palabra de Dios." Possible ID spot at 1832, accasional fair signal peak. Best heard in months. Usually only heard as a heterodyne. (Frodge, MI)

2021 UTC on 9895
NETHERLANDS: Radio. Research File focus on dinosaurs. Madagascar relay 7120 poor but readable. (Bob Fraser, Belfast, ME) 11655, 2017-2039 with *Euroquest* program. (Barbour, NH)

2142 UTC on 7105
BELARUS: Radio Minsk. Folk music at tune-in followed by news regarding national environmental concerns and US Embassy in Belarus. ID, "You are listening to Radio Minsk" between segments. Local music at 2115 followed by ID. Fair signal though audio quality a bit "muffled". (Barbour, NH)

2214 UTC on 6015
TURKEY: Voice of. *Last Week in Turkey* news segments // 9655. (Fraser, ME).

2215 UTC on 6180
CYPRUS: Cyprus BC Corp. Greek. Balalaika interval signal into extended announcements. Greek tune at 2245 // 7210, 9760. (Garcia, MD)

2300 UTC on 12115
ICELAND: Rikisutvarpid. Presumed Icelandic news and pop music to item about Reykjavic. Audible the next morning on 12865 USB at 1410. (Garcia, MD)

2301 UTC on 7460
WESTERN SAHARA: Radio Nacional del Sahara, Algeria. Spanish ID, frequency quote into pop tunes by Julio Iglesias. Islamic studies and traditions closing at 00002 with national anthem. (Garcia, MD)

2318 UTC on 9590
ROMANIA: Radio Romania Intl. *Challenge for the Future* to eastern Euro news. Differing ID as "Bucharest Radio International." feature on music festival. (Frodge, MI)

2346 UTC on 6140
COLOMBIA: Radio Melodia. Spanish identification including medium wave frequency. "Todo Musica es la Hora Melodia" into newscast at 0000. (Garcia, MD) 6139.73, 1032-1049 with web, phone number and ID. (Barbour, NH)

2350 UTC on 6925 USB
PIRATES: Undercover Radio. Very good reception with ID and email address. Comments of, "Don't let them see us, don't let them know what we are doing." Numbers sequence from 2354-00 to sign-off. (Joe Wood, Vonore, TN)

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

The QSL Report

Gayle Van Horn
gaylevanhorn@monitoringtimes.com

Hot July QSLing

You asked for it, and we listened! For this scorching month of July (at least for most of us) this month is devoted to nothing but QSLs! If you haven't shared your QSLing contributions, and/or best-ever tale, why not?

July is a great month for Holiday DXing of shortwave, utility, medium wave and the amateur bands. Contributions are always welcomed via email or regular mail, and if you need a personal reply please include a self-addressed-envelope. Good luck on your summer (or winter for our southern hobbyists) DXing and QSLing! Make it a super hot July...wherever the DX takes you.

AMATEUR RADIO

Montserrat (NA-103) 20 meter SSB. Full data color volcano aerial card. Received in 188 days for a SASE to Joyce M. Swallow- QSL Manager N8QET, 3137 Compton Road, Cincinnati, OH 45251-2645. (Larry Van Horn N5FPW, NC)

Canada-Prince Edward Island (NA-029) 10 meter SSB. Full data color card. Received in 63 days for mint stamps and SAE to: Michael J. McGirr, 3441 W. Oak Hill Dr., Crete, IL 60417. (Van Horn, NC)

Turks and Caicos Island, 80/40/15 meters SSB. Full data color cards. Received in 26 days from Jim R. Iori-from QSL Manager, 814 Basswood Ct., Orange Park, FL 32065. (Van Horn, NC)

ANGUILLA

Caribbean Beacon, 6090 kHz. Full data card signed by Doris Hussington. Received in 375 days for an English report and one US dollar. Station address: P.O. Box 690, Anguilla, British West Indies. (Joe Wood, Vonore, TN)

BONAIRE

AWR, 6165 kHz. Full data Noah's Ark card with site as 150 kW. Signed with illegible signature, plus pocket calendar and stickers. Received in 89 days for an IRC. (Scott Barbour, Intervale, NH)

CLANDESTINE/ PIRATES

WBMR-Black Mt. Radio, 6924.9 kHz. Full data jpeg QSL from Mike O. Farad. Received in 23 minutes for a report to: wbmrradio@hotmail.com. (Harold Frodge, Midland, MI)

Radio Free Cascadia International, 15045 kHz. Full data studio card unsigned. Station letter and *Five Days Over Seattle* audio CD. Received in 172 days for a pirate report and one US dollar. Station address: P.O. Box 703, Eugene, OR 97440. (Bill Wilkins, Springfield, MO: John Wilkins, Wheat Ridge, CO)

Voice of Captain Ron SW., 6925 kHz. Full data email verification, plus a friendly letter. Received in three days for an email report to: captainronswr@yahoo.com. (Andrew Yoder, PA/Cumbre DX)

DENMARK

Radio Danmark, 7560 kHz. Full data unsigned verification letter for "last day of service Dec. 31, 2003." Received in 90 days for an English report and two US dollars. Station address: Rosenorns Alle 22, DK-1999 Frederiksberg C, Denmark. Report sent to: rdket@dr.dk. (Arnaldo Slaen, Buenos Aires, ARG)

GERMANY

Bible Voice-High Adventure Gospel Communications Ministry, 15680 // 13725 kHz. Full data two colored graphic email reply from Gertrude Sheridan. Received in 14 days for an email report to: mail@biblevoice.org Station website: http://www.biblevoice.org. (Gayle Van Horn, NC)

Bible Voice

THANK YOU FOR LISTENING!
Reception Confirmation

Date: Aug. 29/03
Aug. 30/03
Bible Voice: Middle East I
Central Africa I
Frequency: 15680
13725
Time: 1525, 1643-1700 UTC
1916 UTC

Name: Gayle Van Horn
Frequency Manager
Address: c/o Monitoring Times Magazine
7540 Highway 64 West
Brasstown, NC 28902
USA

mail@biblevoice.org
www.biblevoice.org

"A voice of one calling..." Isaiah 40.3

ICELAND

AFRTS, 13855 kHz USB. No data reply with site only as Grindavik, from Patricia Huizinga-OIC. Received in one day for an email report to: keflavik@mediacen.navy.mil. Friendly email reply from Navy Chaplin Bruce Pierce, who operates a ham station there. (Barbour, NH)

ISRAEL

Galei Zahal-IDFR, 6973 kHz. Full data *Microphone Man* card with handwritten reply. Website http://www.glz.msn.co.il. Received in 70 days for an English report and one IRC. (Barbour, NH)

MEDIUM WAVE

KBRI, 1570 kHz AM. Handwritten verification letter signed by Joey Rodgers-Manager, plus bumper stickers and business card. Received in 75 days for an AM report. Station address: c/o Brinkly Radio, 1501 S. Main Street, Brinkley, AR 72021. (Patrick Martin, Seaside, OR)

KEVA, 1240 kHz AM. Full data QSL card signed by Michael J. Richard-QSL/DX Test Coordinator. Received in 37 days for a taped report of their special DX Test. Station address: P.O. Box 190, 568 Airport Road, Evanston, WY 82930. (Patrick Griffith-N0NNK, Westminster, CO) 45 days response for same. (Martin, OR)

KKOL, 1300 kHz AM. Second verification letter from Richard Harris-Contract Engineer, plus coverage map. Received in 31 days, as I wanted to QSL this station operating from the ship. They claim their signal goes well into Vancouver, but you sure would not know it from this direction. Station address: Salem Radio Seattle, 2815 Second Avenue, Seattle, WA 98124. (Martin, OR)

WQMA, 1520 kHz AM. Very nice full data letter marked as "QSL # 2", signed by Paul Walker-Asst. Program Director, plus transmitter photo. Received in 43 days for an AM report, tape of DX Test, and one US dollar. Station address: 1820 West Marks Road, Marks, MS 38646. (Griffith, CO)

TAJIKISTAN

Radio Free Asia, 15680 kHz. Full data Dalai Lama card signed by A.J. Janitschek-Manager, plus personal letter, schedule and RFA sticker under separate cover. Both received in seven days for US mint postage (returned). Station address: Suite 300, 2025 M. Street NW, Washington DC 20036. (Barbour, NH)

ZAMBIA

ZNBC, 4910 kHz. Full data white logo postcard signed by Patrick Nkulsa. Received in 50 days for an English report, CD and one US dollar. Station address: Mass Media Complex, Alick Nkhata Road, P.O. Box 50015, Lusaka 10101, Zambia. (Yoder, PA/Cumbre DX)

July Holiday DXing

British Virgin Is. Territory Day, July 1
Hong Kong Region Establishment Day, July 1
Burundi Independence Day, July 1
Canada Day, July 1
Rwanda Independence Day, July 1
Belarus Independence Day (from German troops) July 3
Philippines Independence Day (from USA) July 4
USA Independence Day, July 4
Cayman Is. Constitution Day, July 5
Cape Verde Independence Day, July 5
Venezuela Independence Day, July 5
Malawi Republic Day, July 6
Nepal B'd King Gyanendra, July 7
Solomon Is. Independence Day, July 7
Palau Constitution Day, July 9
Bahamas Independence Day, July 10
Mongolia Independence/Revolution Day, July 11
Kiribati Independence Day, July 12
France Bastille Day, July 14
French Guiana Bastille Day, July 14
French Polynesia Bastille Day, July 14
Iraq Revolution Day, July 17
Colombia Independence Day, July 20
Belgium Independence Day, July 21
Egypt Revolution Day, July 23
Cuba Rebellion Day, July 26
Liberia Independence Day, July 26
Peru Independence Day, July 28
Vanuatu Independence Day, July 30

John Figliozzi
johnfigliozzi@monitoringtimes.com

Keep Relaxing! It's *Still* Summer!

Last month, we began a discussion about summertime shortwave listening. Hey, that radio likes getting out into the fresh air as much as you do! Packing it away just because it's not prime DX season is as unfair to your electronic friend as it is to you! And here's more proof.

❖ Sunday Mornings

Arguably, for many of us, this remains the most relaxing time of the week, no matter the season. Very few of us feel guilty about pouring another cuppa and sitting barefoot in the sun or shade (whether outside or inside) while paging through the Sunday paper. Add that shortwave radio to the mix and you'll really be living!

My favorite Sunday morning listening for many years has been **RCI's (Radio Canada International)** nine to noon (EDT) offering. Michael Enright's ***The Sunday Edition*** has occupied this slot the last few years and, while I have to say I've enjoyed previous iterations a bit more, this remains a most enjoyable three hours. Enright has grown into the program – and it into him – and everything about this association seems to have become much more comfortable with time.

During July and August, Enright takes a sabbatical and the program becomes ***The Summer Edition*** [1308-1600 UT, *9515/13655/17800 kHz.*]. The already pretty easygoing, but always topical, agenda of arts and ideas gets even a little more breezy during the height of the summer warmth. A guest host guides us through a combination of current items, a little music, and replays of the best interviews and documentary reports from the past season.

It's that last part I like best about ***The Summer Edition***. Inevitably over time, I've had to miss listening on one Sunday or other and, consequently, I get a second chance to hear some great radio.

Of course, as is always the case with shortwave, there are alternatives. If you're more the Sunday morning "hard news" type, there's the **BBC's** ***Talking Point*** [1405-1500, *15190*]. This program allows you to interact over "hot" current events via text and telephone.

Want to start your Sunday with a cool beat? Tune in ***Sounds Nordic*** [**R. Sweden**, 1230-1300 or 1330-1400, *15240*].

Perhaps you feel that religion should be a part of your day of rest. **Radio Australia** has ***The Spirit of Things*** [1205-1300, *9580/9590*] and **Encounter** [1305-1600, *9590*]. **MT's** *Shortwave Guide* program schedule pages detail several further options.

❖ A Season of Sport

For real fans, every season is sports season, but interest seems more intense and widespread in summer – often to the point where the term "leisure activity" seems more antonym than synonym.

In England, football (soccer) season is over until August; but that only gives other popular competitions an opportunity to shine. ***Sportsworld*** [A 1405-1700 and S 1605-1700, 15190] is the **BBC's** showcase for sport and features a number of important international and domestic cricket and rugby matches, as well as the Wimbledon Lawn Tennis Championships (June 21- July 4). You can be kept up-to-date with BBC World Service coverage plans via e-mail by subscribing to a free service at http://fs3.emv2.com/uk/bbcws/join.htm and the sports calendar overall by accessing http://news.bbc.co.uk/sport2/hi/results_and_fixtures/calendar/3131808.stm.

Down under in Australia and New Zealand, the weather is cooler but the contests are hot. The Kiwis are in the midst of prime season for their national passion – rugby. **RNZI (R. New Zealand International)** gleefully cuts into its regular program schedule to give full play by play coverage to the matches of the national team, the All Blacks. During July, the All Blacks will be competing for the Tri-Nations and Bledisloe cups and the country will be preparing for this year's in-country NPC season, which commences on August 15 and continues into October. Full details about the various competitions are available at <http://nzrugby.com> and an updated schedule of matches broadcast can be had from <http://rnzi.com>.

Australia is a divided country when it comes to sports passions: Melbourne is the center of a unique game known as Australian Rules Football; Sydney is the hotbed of rugby aficionados. **Radio Australia** is careful to grant equal time to each in its ***Grandstand*** sports service relay of domestic network coverage [S/A 0200-0700, 17580], focusing in on the former on Saturdays and the latter on Sundays. The season concludes with Grand Final playoffs and championships in September. **RA's** internet site <http://abc.net.au/ra> updates its coverage plans and the **ABC's** sports page on the 'net <http://abc.net.au/sport> provides copious background information.

Here in the U.S., it's baseball season, of course; and I'm often asked if shortwave offers any coverage. For those who have receivers with single sideband (ssb) reception capability, I can answer "yes". **The American Forces Network** is again broadcasting on shortwave, but on ssb only, and baseball is a prominent part of its schedule. (Ken Reitz updates his list of MW stations broadcasting "MLB" in this month's issue and, to be truthful, that's the better radio bet for stateside listeners. But **AFN** does provide an additional option.) Sports airs on the ***Interruptible Voice Channel (IVC)***, which is the program feed **AFN** broadcasts on shortwave. Current frequencies and schedules, including baseball broadcast schedules, can be had from this web page: <http://myafn.dodmedia.osd.mil/radio/shortwave/>. Be aware that **AFN** uses Pacific time as its reference point.

❖ Music and More

Music goes with nearly every activity and summer is no exception. A great daily morning program with a wide and intelligently presented variety of global sound is ***The Planet*** on **Radio Australia** [M-F 1305-1400, 9590]. On the other side of the day, **RNZI** presents a nightly hour of familiar tunes on ***Wayne's Music*** [*M-F* 0105-0200, *15720*]. Sunday nights are prime time for lively Cuban rhythms [**R. Habana Cuba**, *M* 0200-0300 & 0400-0500, *6000/9820*; 0600-0700, *9550/9820/11760*], or hear traditional Chinese tintamarre in ***Jade Bells and Bamboo Pipes*** [**R. Taiwan International**, *W* 0220 & 0320 UT, *5950*].

There are loads of other options detailed in our monthly *Shortwave Guide* and you can just do some bandscanning yourself anytime for still more!

Until August, good *easy* listening!

How to Use the Shortwave Guide

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af

① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

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

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

Find the station you want to hear.

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

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

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

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

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

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

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

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

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

Choose a program or station you want to hear.

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

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

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

MT Monitoring Team

Gayle Van Horn, Frequency Manager, gaylevanhorn@monitoringtimes.com
John Figliozzi, Program Manager, johnfigliozzi@monitoringtimes.com
Mark Fine, VA, markfine@monitoringtimes.com

Program Highlights

John Figliozzi

❖ BBC Notes

The Proms

The *110th BBC Promenade Concerts* series begins on July 16 and continues until September 11. This unique summer music festival is renown for its accessibility, in terms of program, price and availability. This issue of *MT* was prepared in late May and the BBC World Service schedule was not yet available; so about the only things we can say with certainty about the World Service coverage of *The Proms* are that the first and last nights will be "on" and more concerts will be presented in-between at various times of the day and night.

In addition to the several selected World Service broadcasts, *every* Proms concert (over 70 of them!) will be broadcast by BBC Radio 3. The good news for international fans is that *all* of these broadcasts will be streamed over the internet from the Radio 3 web site. Many also will be repeated there each afternoon at 2, London time (1300 UT), and some will be archived for one week on the Proms web site. Consult <http://bbc.co.uk/proms/radiotv/> for full broadcast information. The official website for *The Proms* is <http://bbc.co.uk/proms>.

Letter

...is the name of the program replacing Alistair Cooke's *Letter from America*. It's a fitting title: honoring the tradition, whilst moving to – of necessity – an entirely new concept. One of a panel of international commentators reflects on some latest developments in his or her part of the world. [BBCam S 0432, 1132]

❖ Other Notes

Radio Taiwan International now produces a single one hour package of programs each day (instead of the previous two). The programs, for the most part, are shorter, fresher sounding and presented with more "snap."

Many favorites remain – among them, *Jade Bells and Bamboo Pipes* – but there are numerous new timings. For full details, consult this month's *MT* program listings for RTI's 0200 and 0300 broadcasts...

In another welcome development, **Radio Slovakia International** received a reprieve. Their 0100 listings return to this month's *MT*.

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

0000	0007		Sierra Leone, SLBS	3316do		
0000	0015	vl	Cambodia, National Radio Of	11940as		
0000	0027		Czech Rep, Radio Prague Intl	7345na	9440na	
0000	0030		Egypt, Radio Cairo	11725na		
0000	0030		Japan, Radio	13650as	17810as	
0000	0030		Netherlands, Radio	9845na		
0000	0030		Serbia & Montenegro, Intl Radio	9580na		
0000	0030		Thailand, Radio	5890va	9570va	
0000	0030		UK, BBC World Service	3915as	5970as	
			6195as 9410as	9740as	11945as	11995as
			15280as	15360as	17655va	17790as
0000	0030		USA, Voice of America	7215va	15185va	
			17820va			
0000	0045		India, All India Radio	9705as	9950as	
			11620as	11645as	13605as	
0000	0057		Canada, Radio Canada Intl	9640as	15205as	
0000	0059		Germany, Deutsche Welle	7130as	9505as	
			9825as			
0000	0059		Spain, Radio Exterior Espana	15385na		
0000	0100		Anguilla, Caribbean Beacon	6090am		
0000	0100		Australia, ABC NT Alice Springs	2310irr	4835do	
0000	0100		Australia, ABC NT Katherine	5025do		
0000	0100		Australia, ABC NT Tennant Creek	4910do		
0000	0100		Australia, Radio	9660pa	12080va	13630pa
			15240pa	17750pa	17775as	17795as
			21725as			
0000	0100		Canada, CBC Northern Service	9625do		
0000	0100		Canada, CFRX Toronto ON	6070do		
0000	0100		Canada, CFVP Calgary AB	6030do		
0000	0100		Canada, CKZN St John's NF	6160do		
0000	0100		Canada, CKZU Vancouver BC	6160do		
0000	0100		China, China Radio Intl	6145va		
0000	0100		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa		
0000	0100	vl	Croatia, Croatian Radio	9925ca		
0000	0100	mtwhf	Germany, Bible Voice Broadcasting		6010na	
0000	0100		Guyana, Voice of	3290do		
0000	0100		Japan, Radio	6145ca		
0000	0100		Malaysia, Radio Malaysia	7295do		
0000	0100		Namibia, Namibian BC Corp	3270af	3290af	
			6060af			
0000	0100		New Zealand, Radio NZ Intl	15720pa		
0000	0100		Sierra Leone, Radio UNAMSIL	6139af		
0000	0100		Singapore, Mediacorp Radio	6150do		
0000	0100	vl	Solomon Islands, SIBC	5020do	9545do	
0000	0100		UK, BBC World Service	5975ca	7545af	
			9825ca	11835ca	12095ca	
0000	0100		Ukraine, Radio Ukraine Intl	7545na		
0000	0100		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0000	0100		USA, KAIJ Dallas TX	13815va		
0000	0100		USA, KTBN Salt Lake City UT	7505na	15590na	
0000	0100		USA, KVOH Rancho Simi CA	17775as		
0000	0100		USA, KWHR Naalehu HI	17510as		
0000	0100		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
0000	0100		USA, WBOH Newport NC	5920am		
0000	0100		USA, WEWN Birmingham AL	5825na	7425na	
			13615va			
0000	0100		USA, WHRA Greenbush ME	7580va		
0000	0100		USA, WHRI Noblesville IN	5745am	7315am	
0000	0100		USA, WINB Red Lion PA	9320am		
0000	0100		USA, WJIE Louisville KY	13595am		
0000	0100		USA, WRMI Miami FL	7385am	9955am	
0000	0100		USA, WTJC Newport NC	9370na		
0000	0100		USA, WWCR Nashville TN	3210na	5070na	
			7465na	13845na		
0000	0100		USA, WWRB Manchester TN	5050na	5085na	
			6890na			
0000	0100		USA, WYFR Okeechobee FL	6065na	9505na	
			15130sa			
0000	0100		Zambia, Radio Christian Voice	4965af		
0015	0030	twhfa	Austria, Radio Austria Intl	9870sa		
0015	0100	va/mtwhf	Germany, Bible Voice Broadcasting		7210as	
0030	0100		Australia, Radio	9660pa	12080va	13630pa
			15240pa	15415as	17750pa	17775as
			17795as	21725as		
0030	0100		Iran, Voice of the Islamic Rep	9905sa		
0030	0100		Lithuania, Radio Vilnius	11690na		
0030	0100		Sri Lanka, SLBC	6005as	11905as	15745as
0030	0100		Thailand, Radio	5890na		
0030	0100		UK, BBC World Service	6195as	9410as	
			9740as 11955as	15280as	15310as	15360as
			17655as	17790as		
0030	0100		USA, Voice of America	7215va	11760va	
			15185va	15290va	17740va	17820va
0045	0100	twhfa	Austria, Radio Austria Intl	9870sa		
0045	0100		Germany, Pan American BC	9740eu		
0045	0100		Pakistan, Radio	9340as	11565as	
0055	0100		Italy, RAI Intl	12005na		

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

0100	0115		Italy, RAI Intl	12005na		
0100	0115		Pakistan, Radio	9340as	11565as	
0100	0127		Czech Rep, Radio Prague Intl	6200na	7345na	
0100	0128		Vietnam, Voice of	6175na		
0100	0130	s	Germany, Universal Life	9485as		
0100	0130		Hungary, Radio Budapest	9590na		
0100	0130	mtwhfa	Serbia & Montenegro, Intl Radio	9580na		
0100	0130		Uzbekistan, Radio Tashkent Intl	7190as	6165as	
			9715as			
0100	0156		Romania, Radio Romania Intl	9690na	11940na	
			15430na	17760na		
0100	0159		Canada, Radio Canada Intl	9755am	11990am	
			13710am			
0100	0159	DRM	China, China Radio Intl	6140na		
0100	0200		Anguilla, Caribbean Beacon	6090am		
0100	0200		Australia, ABC NT Katherine	5025do		
0100	0200		Australia, ABC NT Tennant Creek	4910do		
0100	0200		Australia, HCJB	15560pa		
0100	0200		Canada, CBC Northern Service	9625do		
0100	0200		Canada, CFRX Toronto ON	6070do		
0100	0200		Canada, CFVP Calgary AB	6030do		
0100	0200		Canada, CKZN St John's NF	6160do		
0100	0200		Canada, CKZU Vancouver BC	6160do		
0100	0200		China, China Radio Intl	9580am	9790ca	
0100	0200		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa		
0100	0200	vl	Croatia, Croatian Radio	9925na		
0100	0200		Cuba, Radio Havana	6000nc	9820na	
0100	0200	mtwhf	Germany, Bible Voice Broadcasting		6010na	
0100	0200		Guyana, Voice of	3290do		
0100	0200		Indonesia, Voice of	9525as	11785as	15150al
0100	0200		Iran, Voice of the Islamic Rep	9905sa		
0100	0200		Japan, Radio	6025va	11860as	15325as
			17560va	17685pa	17810as	17835am
			17845sa			
0100	0200		Malaysia, Radio Malaysia	7295do		
0100	0200		Namibia, Namibian BC Corp	3270af	3290af	
			6060af			
0100	0200	DRM	Netherlands, Radio	15525na		
0100	0200		New Zealand, Radio NZ Intl	15720pa		
0100	0200		North Korea, Voice of	3560as	7140as	
			9345am	9720as	11735am	13760as
			15180as			
0100	0200		Russia, Voice of	5945me	9665na	15595na
			17660na			
0100	0200		Sierra Leone, Radio UNAMSIL	6139af		
0100	0200		Singapore, Mediacorp Radio	6150do		
0100	0200	vl	Solomon Islands, SIBC	5020do	9545do	
0100	0200		Sri Lanka, SLBC	6005as	11905as	15745as
0100	0200		UK, BBC World Service	5975ca	6195as	
			9410as 9525ca	9825ca	11835ca	12095ca
			15280as	15310as	15360as	17790as
0100	0200		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0100	0200		USA, KAIJ Dallas TX	5755va		
0100	0200		USA, KJES Vado NM	7555na		
0100	0200		USA, KTBN Salt Lake City UT	7505na		
0100	0200		USA, KVOH Rancho Simi CA	9975as		
0100	0200		USA, KWHR Naalehu HI	17510as		
0100	0200	mtwhf	USA, Voice of America	7115va	9885va	
			11705va	11725va		
0100	0200		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
0100	0200		USA, WBOH Newport NC	5920am		
0100	0200		USA, WEWN Birmingham AL	5825na	7425na	
			13615va			
0100	0200		USA, WHRA Greenbush ME	7580va		
0100	0200		USA, WHRI Noblesville IN	5745am	7315am	
0100	0200		USA, WINB Red Lion PA	9320am		
0100	0200		USA, WJIE Louisville KY	13595am		
0100	0200		USA, WRMI Miami FL	7385am	9955am	
0100	0200		USA, WTJC Newport NC	9370na		
0100	0200		USA, WWCR Nashville TN	3210na	5070na	
			5935na	7465na		
0100	0200		USA, WWRB Manchester TN	5050na	5085na	
			6890na			
0100	0200		USA, WYFR Okeechobee FL	6065na	9505na	
			15060va			
0100	0200		Zambia, Radio Christian Voice	4965af		

SELECTED PROGRAMMING BEGINS ON PAGE 57

0105	0120	sm	Austria, Radio Austria Intl	9870am		
0115	0120	mtwhf	Kyrgystan, Radio Kyrghyz	4010irr	4795irr	
0115	0130		Austria, Radio Austria Intl	9870am		
0130	0145		Germany, Pan American BC	9495eu		
0130	0200		Australia, Radio	9660pa	12080va	13630pa
			15240pa	15415as	17750as	17775as
			17795as	21725as		
0130	0200		Sweden, Radio	6010na	9435va	
0130	0200		USA, Voice of America	9775am	13740am	
0135	0150	sm	Austria, Radio Austria Intl	9870am		
0140	0200		Vatican City, Vatican Radio	9650as	12055as	
0145	0200		Albania, Radio Tirana Intl	6115eu	7160eu	
0145	0200		Austria, Radio Austria Intl	9870am		

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

0200	0230		Austria, AWR Europe	9820as		
0200	0230	fmw	Belarus, Radio Belarus Intl	9650eu	12055eu	
0200	0230	vl	Croatia, Croatian Radio	9925na		
0200	0230		Iran, Voice of the Islamic Rep	9905sa		
0200	0230	a	UK, Wales Radio Intl	9795na		
0200	0230		USA, KJES Vado NM	7555na		
0200	0257		Canada, Radio Canada Intl	15510as	17860as	
0200	0300		Anguilla, Caribbean Beacon	6090am		
0200	0300	twhfa	Argentina, RAE	11710na		
0200	0300		Australia, ABC NT Alice Springs	2310irr	4835do	
0200	0300		Australia, ABC NT Katherine	5025do		
0200	0300		Australia, ABC NT Tennant Creek	4910do		
0200	0300		Australia, HCJB	15560pa		
0200	0300		Australia, Radio	9660po	12080va	13630po
			15240pa	15415as	17750as	17750as
			21725as			
0200	0300		Bulgaria, Radio	9700no	11700na	
0200	0300		Canada, CBC Northern Service	9625do		
0200	0300		Canada, CFRX Toronto ON	6070do		
0200	0300		Canada, CFVP Calgary AB	6030do		
0200	0300		Canada, CKZN St John's NF	6160do		
0200	0300		Canada, CKZU Vancouver BC	6160do		
0200	0300		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa		
0200	0300		Cuba, Radio Havana	6000na	9820na	
0200	0300		Egypt, Radio Cairo	11855na		
0200	0300	mtwhf	Germany, Bible Voice Broadcasting		6010na	
0200	0300		Guyana, Voice of	3290do		
0200	0300		Malaysia, Radio Malaysia	7295do		
0200	0300		Myanmar, Radio	7185do		
0200	0300		Namibia, Namibian BC Corp	3270af	3290af	
			6090af			
0200	0300		New Zealand, Radio NZ Intl	15720pa		
0200	0300		North Korea, Voice of	4405as	11845as	
			15230as			
0200	0300	as	Philippines, Radio Pilipinas	11885me	15120me	
			15270me			
0200	0300		Russia, Voice of	5945me	9665na	9860na
			15595na	17660na		
0200	0300		Sierra Leone, Radio UNAMSIL	6139af		
0200	0300		Singapore, Mediacorp Radio	6150do		
0200	0300	vl	Solomon Islands, SIBC	5020do	9545do	
0200	0300		South Koreo, Radio Korea Intl	9560na	11810na	
			15575na			
0200	0300		Sri Lanka, SLBC	6005as	11905as	15745as
0200	0300		Taiwan, Radio Taiwan Intl	5950na	9680na	
			11875as	15320as	15465as	
0200	0300		UK, BBC World Service	5975ca	6195me	
			9410va	9750af	9825ca	11760me
			11835ca	11955as	12095ca	15280as
			15310as	15360as	17790as	
0200	0300		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0200	0300		USA, KAIJ Dallas TX	5755va		
0200	0300		USA, KTBN Salt Lake City UT	7505na		
0200	0300		USA, KVOH Rancho Simi CA	9975as		
0200	0300		USA, KWHR Naalehu HI	17510as		
0200	0300	mtwhf	USA, Voice of America	7115va	9885va	
			11705va	11725va		
0200	0300		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
0200	0300		USA, WBOH Newport NC	5920am		
0200	0300		USA, WEWN Birmingham AL	5825na	7425na	
			13615va			
0200	0300		USA, WHRA Greenbush ME	7580va		
0200	0300		USA, WHRI Noblesville IN	5745am	7315am	
0200	0300		USA, WINB Red Lion PA	9320am		
0200	0300		USA, WJIE Louisville KY	13595am		
0200	0300		USA, WRMI Miami FL	7385am	9955am	
0200	0300		USA, WTJC Newport NC	9370na		
0200	0300		USA, WWCR Nashville TN	3210na	5070na	
			5935na	7465no		
0200	0300		USA, WWRB Manchester TN	5050na	5085na	
			6890na			
0200	0300		USA, WYFR Okeechobee FL	5985na	6065na	
			9505na	11855ca	15255ca	
0200	0300		Zambia, Radio Christian Voice	4965af		
0215	0230		Nepal, Radio	3230as	5005as	6100as
			7165as			
0230	0258		Vietnam, Voice of	6175na		
0230	0300		Albania, Radio Tirana Intl	6115eu	7160eu	
0230	0300		Hungary, Radio Budapest	9790na		
0230	0300		Sweden, Radio	6010na		
0250	0300		Vatican City, Vatican Radio	7305am	9605am	
0250	0300		Zambia, Radio	4910do		

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

0300	0315		Vatican City, Vatican Radio	17590va		
0300	0327		Czech Rep, Radio Prague Intl	7345na	9870na	
0300	0330		Egypt, Radio Cairo	11855na		
0300	0330	as	Philippines, Radio Pilipinas	11885me	15120me	
			15270me			
0300	0330		Thailand, Radio	15395na		
0300	0330		Vatican City, Vatican Radio	9660af		
0300	0350		Turkey, Voice of	6020va	6140va	7270me
0300	0355		South Africa, Channel Africa	3345af	6160af	
			9770af			
0300	0400		Anguilla, Caribbean Beacon	6090am		
0300	0400		Australia, ABC NT Alice Springs	2310irr	4835do	
0300	0400		Australia, ABC NT Katherine	5025do		
0300	0400		Australia, ABC NT Tennant Creek	4910do		
0300	0400		Australia, Radio	9660pa	12080va	13630pa
			15240po	15415os	17750as	17750as
			21725os			
0300	0400		Canada, CBC Northern Service	9625do		
0300	0400		Canada, CFRX Toronto ON	6070do		
0300	0400		Canada, CFVP Calgary AB	6030do		
0300	0400		Canada, CKZN St John's NF	6160do		
0300	0400		Canada, CKZU Vancouver BC	6160do		
0300	0400		China, China Radio Intl	9690am	9790ca	
0300	0400		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa		
0300	0400		Cuba, Radio Havana	6000na	9820na	
0300	0400	mtwhf	Germany, Bible Voice Broadcasting		6010na	
0300	0400	vl	Guotemala, Radio Cultural	3300am		
0300	0400		Guyana, Voice of	3290do		
0300	0400		Japan, Radio	21610pa		
0300	0400		Malaysia, Radio Malaysia	7295do		
0300	0400		Malaysia, Voice of	6175as	9750as	15925as
0300	0400		Namibia, Namibian BC Corp	3270af	3290af	
			6090af			
0300	0400		New Zealand, Radio NZ Intl	15720pa		
0300	0400		North Korea, Voice of	3560as	7140as	
			9345as 9720as			
0300	0400		Oman, Radio	15355af		
0300	0400		Russia, Voice of	7300no	9665na	9860na
			15595na	17660na		
0300	0400		Sierra Leone, Radio UNAMSIL	6139af		
0300	0400		Singapore, Mediacorp Radio	6150do		
0300	0400	vl	Solomon Islands, SIBC	5020do	9545do	
0300	0400		Sri Lanka, SLBC	6005as	11905as	15745as
0300	0400		Taiwan, Radio Taiwan Intl	5950na	15215na	
			15320as			
0300	0400		Uganda, Radio	4976do	5026do	7196do
0300	0400		UK, BBC World Service	5975ca	6195eu	
			9410va	11760me	11835ca	12095va
			15280as	15310as	15360as	15575me
			17760as	17790as	21660as	
0300	0400		Ukraine, Radio Ukraine Intl	7545na		
0300	0400		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0300	0400		USA, KAIJ Dallas TX	5755va		
0300	0400		USA, KTBN Salt Lake City UT	7505na		
0300	0400		USA, KVOH Rancho Simi CA	9975as		
0300	0400		USA, KWHR Naalehu HI	17510as		
0300	0400	mtwhf	USA, Voice of America	6080af	7105af	
			7290af 7340af	9885af	12080af	17895af
0300	0400		USA, Voice of America	9620va	11695va	
0300	0400		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
0300	0400		USA, WBOH Newport NC	5920am		
0300	0400		USA, WEWN Birmingham AL	5825na	7425na	
			13615va			
0300	0400		USA, WHRA Greenbush ME	7580va		
0300	0400		USA, WHRI Noblesville IN	5745am	7315am	
0300	0400		USA, WINB Red Lion PA	9320am		
0300	0400		USA, WJIE Louisville KY	13595am		
0300	0400		USA, WMLK Bethel PA	9465eu	9955al	
0300	0400		USA, WRMI Miami FL	7385am	9955am	
0300	0400		USA, WTJC Newport NC	9370na		
0300	0400		USA, WWCR Nashville TN	3210na	5070na	
			5770no	5935na		
0300	0400		USA, WWRB Manchester TN	5050na	5085na	

			6890na		
0300	0400		USA, WYFR Okeechobee FL	6065na	9505va
			11740na		
0300	0400		Zambia, Radio	4910do	
0300	0400		Zambia, Radio Christian Voice	4965af	
0300	0400	vl	Zimbabwe, ZBC Corp	5975do	
0330	0357		Czech Rep, Radio Prague Intl	11600va	15600va
0330	0358		Vietnam, Voice of	6175ca	
0330	0400		UAE, Radio Dubai	12005na	13675na 15400no
0330	0400		UK, BBC World Service	3255af	6005af
			6190af 7120af	7160af	12035af 15420af
0330	0400	mtwhf	USA, Voice of America	6080af	7105af
			7290af 9885af	12080af	17895af
0345	0400		Tajikistan, Radio	7245irr	

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

0400	0430		Belgium, Radio Vlaanderen Intl	11635na	
0400	0430	vl	Croatia, Croatian Radio	9480na	12105va
			12110va		
0400	0430		France, Radio France Intl	9550af	9805af
			11955af 13610af		
0400	0430		Sri Lanka, SLBC	6005as	11905as 15745as
0400	0430	mtwnf	USA, Voice of America	4960af	6080af
			7290af 9575af	9885af	12080af 17895af
0400	0456		Romania, Radio Romania Intl	11820na	15140no
			15235na	17860na	
0400	0458		New Zealand, Radio NZ Intl	15720pa	
0400	0459		Germany, Deutsche Welle	7225af	9630af
			9710af 11945af		
0400	0500		Anguilla, Caribbean Beacon	6090am	
0400	0500		Australia, ABC NT Alice Springs	2310irr	4835do
0400	0500		Australia, ABC NT Katherine	5025do	
0400	0500		Australia, ABC NT Tennant Creek	4910do	
0400	0500		Australia, Radio	9660po	12080va 13630pa
			15240pa	15515va	17750as 21725as
0400	0500		Canada, CBC Northern Service	9625do	
0400	0500		Canada, CFRX Toronto ON	6070do	
0400	0500		Canada, CKZN St John's NF	6160do	
0400	0500		Canada, CKZU Vancouver BC	6160do	
0400	0500		China, China Radio Intl	6190am	9560am
			9755am		
0400	0500		Costa Rica, University Network	5030am	6150am
			7375am	9725so	
0400	0500		Cuba, Radio Havano	6000na	9820na
0400	0500	mtwhf	Germany, Bible Voice Broadcasting		6010na
0400	0500		Germany, Overcomer Ministries	9770au	
0400	0500		Germany, Radio Africa Intl	13810af	
0400	0500		Guyana, Voice of	3290do	
0400	0500		Malaysia, Radio Malaysia	7295do	
0400	0500		Malaysia, Voice of	6175as	9750as 15295as
0400	0500		Namibia, Namibian BC Corp	3270af	3290af
			6090af		
0400	0500		Netherlands, Radio	6165na	9590na
0400	0500	DRM/os	Netherlands, Radio	15400au	
0400	0500		Russia, Voice of	7300na	9665na 15595no
			17660na		
0400	0500		Sierra Leone, Radio UNAMSIL	6139af	
0400	0500		Singapore, Mediacorp Radio	6150do	
0400	0500	vl	Solomon Islands, SIBC	5020do	9545do
0400	0500		Ugondo, Radio	4976do	5026do 7196do
0400	0500		UK, BBC World Service	3255af	5975ca
			6005af 6190af	6195eu	7120af 7160af
			9410va	11760me	11835ca 12035af
			12095va	15280as	15310as 15360as
			15420af	15575me	17760as 17790as
			21660as		
0400	0500		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	7507usb 10320usb
			12133usb	12579usb	13362usb 13855usb
0400	0500		USA, KAIJ Dallas TX	5755va	
0400	0500		USA, KTBN Salt Lake City UT	7505na	
0400	0500		USA, KVOH Rancho Simi CA	9975as	
0400	0500		USA, KWHR Naalehu HI	17780as	
0400	0500		USA, Voice of America	9620va	11695va
0400	0500		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
0400	0500		USA, WBOH Newport NC	5920am	
0400	0500		USA, WEWN Birmingham AL	5825na	7425no
			13615va		
0400	0500		USA, WHRA Greenbush ME	7580va	
0400	0500		USA, WHRI Noblesville IN	5745am	7315am
0400	0500		USA, WJIE Louisville KY	7490am	13595am
0400	0500		USA, WRMI Miami FL	7385am	9955am
0400	0500		USA, WTJC Newport NC	9370na	
0400	0500		USA, WWCR Nashville TN	3210na	5070na
			5770na	5935na	
0400	0500		USA, WWRB Manchester TN	5050na	5085na
			6890na		
0400	0500		USA, WYFR Okeechobee FL	6855va	7355va
			9715na		
0400	0500		Zambia, Radio	4910do	
0400	0500		Zambia, Radio Christian Voice	4965af	
0400	0500	vl	Zimbabwe, ZBC Corp	5975do	
0415	0420	mtwhf	Kyrgystan, Radio Kyrghyz	4010irr	4795irr
0430	0500		Nigeria, Radio/Enugu	6025do	
0430	0500		Nigeria, Radio/Ibadan	6050do	
0430	0500		Nigeria, Radio/Kaduna	4770do	6090do
0430	0500		Nigeria, Radio/Lagos	3326do	4990do
0430	0500		Serbia & Montenegro, Intl Radio	9580va	
0430	0500		Swaziland, TWR	4775af	6120af
0430	0500	mtwhf	USA, Voice of America	4960af	6080af
			7290af 9575af	11835af	12080af 17895af
0445	0500		Italy, RAI Intl	6110af	7235af 9875af
0459	0500		New Zealand, Radio NZ Intl	9615pa	

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

0500	0530		France, Radio France Intl	11850af	13610af
			15155af		
0500	0530		UK, BBC World Service	6005af	6190af
			7160af 11765af	11940af	11955as 15280as
			15310as	15360as	15420af 17640af
			17760me	17790as	17885af 21660as
0500	0530		Vatican City, Vatican Radio	9660af	11625af
			13765af		
0500	0559		Germany, Deutsche Welle	9630af	9700af
			12045af	15410af	17860af
0500	0559		Germany, Radio Africa Intl	13810af	
0500	0600		Anguilla, Caribbean Beacon	6090am	
0500	0600		Australia, ABC NT Alice Springs	2310irr	4835do
0500	0600		Australia, ABC NT Katherine	5025do	
0500	0600		Australia, ABC NT Tennant Creek	4910do	
0500	0600		Australia, Radio	9660po	12080va 13630pa
			15160pa	15240as	15415va 15515as
			17750as	21725as	
0500	0600		Canada, CBC Northern Service	9625do	
0500	0600		Canada, CFRX Toronto ON	6070do	
0500	0600		Canada, CKZN St John's NF	6160do	
0500	0600		Canada, CKZU Vancouver BC	6160do	
0500	0600		China, China Radio Intl	9560am	9755na
0500	0600		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	
0500	0600		Cuba, Radio Havana	9550am	9655na
			9820na		
0500	0600	mtwhf	Germany, Bible Voice Broadcasting		6010na
0500	0600		Guyana, Voice of	3290do	
0500	0600		Japan, Radio	5975va	6110na 7230va
			15195va	17810va	21755va
0500	0600		Malaysia, Radio Malaysia	7295do	
0500	0600		Malaysia, Voice of	6175as	9750as 15295as
0500	0600		Namibia, Namibian BC Corp	6060af	6175al
0500	0600		New Zealand, Radio NZ Intl	9615pa	
0500	0600		Nigeria, Radio/Enugu	6025do	
0500	0600		Nigeria, Radio/Ibodon	6050do	
0500	0600		Nigeria, Radio/Kaduna	4770do	6090do
0500	0600		Nigeria, Radio/Lagos	3326do	4990do
0500	0600		Nigeria, Voice of	7255af	15120af
0500	0600		Russia, Voice of	21790pa	
0500	0600		Sierra Leone, Radio UNAMSIL	6139af	
0500	0600		Singapore, Mediacorp Radio	6150do	
0500	0600	vl	Solomon Islands, SIBC	5020do	9545do
0500	0600		South Africa, Chonnel Africa	7210af	9770af
0500	0600		Swaziland, TWR	6120af	7205af 9500af
0500	0600		Uganda, Radio	4976do	5026do 7196do
0500	0600		UK, BBC World Service	9410me	11760me
			15565me	15575me	
0500	0600		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	7507usb 10320usb
			12133usb	12579usb	13362usb 13855usb
0500	0600		USA, KAIJ Dallas TX	5755va	
0500	0600		USA, KTBN Sa't Lake City UT	7505na	
0500	0600		USA, KVOH Rancho Simi CA	9975as	
0500	0600		USA, KWHR Naalehu HI	11565as	17780as
0500	0600	mtwhf	USA, Voice of America	6035af	6080af
			6180af 7290af	12080af	
0500	0600		USA, WBCQ Kennebunk ME	5105na	7415na
0500	0600		USA, WBOH Newport NC	5920am	
0500	0600		USA, WEWN Birmingham AL	5825na	7425na
			13615va		
0500	0600		USA, WHRA Greenbush ME	11730no	
0500	0600		USA, WHRI Noblesville IN	5745am	7315am
0500	0600		USA, WJIE Louisville KY	7490am	13595am
0500	0600		USA, WMLK Bethel PA	9465eu	9955al
0500	0600		USA, WRMI Miami FL	7385am	9955am
0500	0600		USA, WTJC Newport NC	9370na	
0500	0600		USA, WWCR Noshville TN	3210na	5070no
			5770na	5935na	
0500	0600		USA, WYFR Okeechobee FL	6855va	9355eu
0500	0600		Zambia, Radio Christian Voice	9865af	
0500	0600	vl	Zimbobwe, ZBC Corp	5975do	
0505	0530	s	Austria, Radio Austria Intl	17870me	

0515	0525		Rwanda, Radio 6005do		
0525	0600	vl	Ghana, Ghano BC Corp	3366do	4915do
0530	0600		Georgia, Radio Georgia	11805eu	
0530	0600		Serbia & Montenegro, Intl Radio	9580va	
0530	0600		Thailand, Radio 21795eu		
0530	0600		UAE, Radio Dubai 15435va	17830va	21700va
0530	0600		UK, BBC World Service	6005af	6190af
			7160af 11765af 11940af	11955as	15310as
			15360as 15420af	17640af	17760as
			17790as 21660as		
0535	0600	s	Austria, Radio Austria Intl	17870me	

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

0600	0603	vl	Croatia, Croatian Radio	9480na	12105va
			12110va		
0600	0620		Vatican City, Vatican Rodio	4005eu	5890eu
			7250eu		
0600	0630		France, Radio France Intl	11665as	11725as
			15155as 17800as	21620as	
0600	0630		Swaziland, TWR 6120af	7205af	9500af
0600	0630	mtwhf	USA, Voice of America	6035af	6180af
			12080af		
0600	0659		Germany, Deutsche Welle	7170af	15275af
			17860af 21675af		
0600	0700		Anguilla, Caribbean Beacon	6090am	
0600	0700		Australia, ABC NT Alice Springs	2310irr	4835do
0600	0700		Australia, ABC NT Katherine	5025do	
0600	0700		Australia, ABC NT Tennant Creek	4910do	
0600	0700		Australia, Radio 9660pa	11880pa	12080va
			13605pa 13630po	15160pa	15240as
			15415va 15515va	17750as	
0600	0700		Canada, CFRX Toronto ON	6070do	
0600	0700		Canada, CFVP Calgary AB	6030do	
0600	0700		Canada, CKZN St John's NF	6160do	
0600	0700		Canada, CKZU Vancouver BC	6160do	
0600	0700		Costa Rica, University Network	5030am	6150am
			7375am 9725sa	11870sa	
0600	0700		Cuba, Radio Havana	9550am	9655na
			9820na		
0600	0700	mtwhf	Germany, Bible Voice Broadcasting		6010na
0600	0700		Germany, Deutsche Welle	6140eu	
0600	0700		Germany, Radio Africa Intl	15435af	
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do
0600	0700		Guyana, Voice of 3290do		
0600	0700		Japan, Radio 7230va	11715va	11740va
			11690va 11760va	13630va	15195va
			17870va 21755va		
0600	0700		Liberia, ELWA 4760do		
0600	0700		Malaysia, Radio Malaysia	7295do	
0600	0700		Malaysia, Voice of 6175as	9750as	
0600	0700		Namibia, Namibian BC Corp	6060af	6175al
0600	0700		New Zealand, Radio NZ Intl	9615pa	
0600	0700		Nigeria, Radio/Enugu	6025do	
0600	0700		Nigeria, Radio/Ibadan	6050do	
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do
0600	0700		Nigeria, Radio/Lagos	3326do	4990do
0600	0700		Nigeria, Voice of 7255af	15120af	
0600	0700		Papua New Guinea, NBC	4890do	9675irr
0600	0700		Russia, Voice of 21790pa		
0600	0700		Sierra Leone, Radio UNAMSIL	6139af	
0600	0700		Singapore, Mediacorp Radio	6150do	
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do
0600	0700		South Africa, Channel Africa	7210af	15215af
0600	0700		UK, BBC World Service	6005af	6190af
			7160af 9410eu 11760af	11940af	12095eu
			15485eu 15545af	15565me	15575me
			17640af		
0600	0700as		UK, BBC World Service 17885af		
0600	0700		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb	7507usb	10320usb
			12133usb 12579usb	13362usb	13855usb
0600	0700		USA, KAIJ Dallas TX 5755va		
0600	0700		USA, KTBN Salt Lake City UT	7505na	
0600	0700		USA, KVOH Rancho Simi CA	9975as	
0600	0700		USA, KWHR Naalehu HI	11565as	17780as
0600	0700		USA, Voice of America	6080af	7290af
0600	0700		USA, WBCQ Kennebunk ME	5105na	7415na
0600	0700		USA, WBOH Newport NC	5920am	
0600	0700		USA, WEWN Birmingham AL	5825na	7425na
			7580va 13615na		
0600	0700		USA, WHRA Greenbush ME	11730na	
0600	0700		USA, WHRI Noblesville IN	5745am	7315am
0600	0700		USA, WJIE Louisville KY	7490am	13595am
0600	0700		USA, WMLK Bethel PA	9465eu	9955al
0600	0700		USA, WRMI Miami FL	7385am	9955am
0600	0700		USA, WTJC Newport NC	9370na	
0600	0700		USA, WWCR Nashville TN	3210na	5070na
			5770na 5935na		
0600	0700		USA, WYFR Okeechobee FL	7355eu	11530eu
			11580eu		
0600	0700	vl	Vanuatu, Radio 4960do	7260do	
0600	0700		Yemen, Rep of Yemen Radio	9780me	
0600	0700		Zambia, Radio Christian Voice	9865af	
0600	0700	vl	Zimbabwe, Z8C Corp	5975do	
0630	0645		Vatican City, Vatican Radio	5890va	15595va
0630	0700		Bulgaria, Radio 11600eu	13600eu	
0630	0700		Swaziland, TWR 7205af	9500af	
0630	0700		Vatican City, Vatican Radio	11625af	13765af
			15570af		
0645	0700	as	Albania, TWR 11865eu		
0645	0700	as	Monaco, TWR 9870eu		

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

0700	0705		New Zealand, Radio NZ Intl	9615pa	
0700	0715		Israel, Kol Israel 9435eu	11590eu	15640eu
			17600va		
0700	0720		UK, BBC World Service	6190af	11765af
			11940af 15400af		
0700	0720	as	UK, BBC World Service	17885af	
0700	0726		Romania, Radio Romania Intl	11830na	15150na
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu
0700	0730		Belgium, Radio Vlaanderen Intl	5985eu	
0700	0730	o	Tibet, Xizong PBS 9490as	9580as	
0700	0730		UK, BBC World Service	15565me	15575me
0700	0750	as	Albania, TWR 11865eu		
0700	0750	as	Monaco, TWR 9870eu		
0700	0800		Anguilla, Caribbean Beacon	6090am	
0700	0800		Australia, ABC NT Alice Springs	2310irr	4835do
0700	0800		Australia, ABC NT Katherine	5025do	
0700	0800		Australia, ABC NT Tennant Creek	4910do	
0700	0800		Australia, Radio 9580pa	9660pa	11880pa
			12080va 13630pa	15160pa	15240as
			15415va 15515as	17750as	
0700	0800		Canoda, CFRX Toronto ON	6070do	
0700	0800		Canada, CFVP Calgary AB	6030do	
0700	0800		Canada, CKZN St John's NF	6160do	
0700	0800		Canada, CKZU Vancouver BC	6160do	
0700	0800		Costa Rica, University Network	5030am	6150am
			7375am 9725sa	11870sa	
0700	0800		Eqt Guinea, Radio Africa	15184af	
0700	0800		France, Radio France Intl	15605af	
0700	0800	as	Germany, Bible Voice Broadcasting		5905eu
0700	0800	mtwhf	Germany, Bible Voice Broadcasting		6010na
0700	0800		Germany, Deutsche Welle	6140eu	21675af
0700	0800		Germany, Radio Africa Intl	15435af	
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do
0700	0800		Guyana, Voice of 3290do	5950do	
0700	0800	vl/as	Italy, IRRS 13840va		
0700	0800		Liberia, ELWA 4760do		
0700	0800		Malaysia, Radio Malaysia	7295do	
0700	0800		Malaysia, Voice of 6175as	9750as	
0700	0800		Myanmar, Radio 9730do		
0700	0800		Nigeria, Radio Enugu	6025do	
0700	0800		Nigeria, Radio/Ibadan	6050do	
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do
0700	0800		Nigeria, Radio/Lagos	3326do	4990do
0700	0800		Nigeria, Voice of 7255af	15120af	
0700	0800		Papua New Guinea, NBC	4890do	9675irr
0700	0800		Russia, Voice of 17495pa	17525pa	17635pa
			21790pa		
0700	0800		Sierra Leone, Radio UNAMSIL	6139af	
0700	0800		Singapore, Mediacorp Radio	6150do	
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do
0700	0800		South Africa, Channel Africa	11825af	
0700	0800		Swaziland, TWR 7205af	9500af	
0700	0800		Taiwan, Radio Taiwon Intl	5950na	
0700	0800		UK, BBC World Service	11955as	15310as
			15360as 15545af	17760as	17790as
			21660as		
0700	0800		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb	7507usb	10320usb
			12133usb 12579usb	13362usb	13855usb
0700	0800		USA, KAIJ Dallas TX 5755va		
0700	0800		USA, KTBN Salt Lake City UT	7505na	
0700	0800		USA, KVOH Roncho Simi CA	9975as	
0700	0800		USA, KWHR Naalehu HI	11565as	17780as
0700	0800		USA, WBCQ Kennebunk ME	5105na	7415na
0700	0800		USA, WBOH Newport NC	5920am	
0700	0800		USA, WEWN Birmingham AL	5825na	7425na
			7580na 11875va		
0700	0800		USA, WHRA Greenbush ME	11730na	
0700	0800		USA, WHRI Noblesville IN	5745am	7315am
0700	0800		USA, WMLK Bethel PA	9465eu	9955al
0700	0800		USA, WRMI Miami FL	7385am	9955am
0700	0800		USA, WTJC Newport NC	9370na	
0700	0800		USA, WWCR Nashville TN	3210na	5070na
			5770na 5935na		
0700	0800		USA, WYFR Okeechobee FL	9715va	9930va
0700	0800	vl	Vanuatu, Radio 4960do	7260do	
0700	0800		Zambia, Radio Christion Voice	9865af	

0706	0800		New Zealand, Radio NZ Intl	9885pa		
0715	0800	mtwht	Albania, TWR	11865eu		
0715	0800	mtwht	Monaco, TWR	9870eu		
0720	0800		UK, BBC World Service	6190af	11765af	
			11940af	15400af		
0730	0745		Vatican City, Vatican Radio	4005va	5890va	
			6185va	7250va	9645va	11740va
			15595va			
0730	0800		Georgia, Radio Georgia	11910eu		
0730	0800	as	Guam, TWR/KTWR	15205as		
0730	0800	as	UK, BBC World Service	15575me	17885af	
0730	0800		UK, BBC World Service	11760me	15565me	
0740	0800	mtwht	Guam, TWR/KTWR	15205as		
0745	0800	mtwht	Guam, TWR/KTWR	11840as		
0755	0800	s	Monaco, TWR	9870eu		

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

0800	0820	smtwhf	Albania, TWR	11865eu		
0800	0820	mtwhfs	Monaco, TWR	9870eu		
0800	0830		Australia, ABC NT Katherine	5025do		
0800	0830		Australia, ABC NT Tennant Creek	4910do		
0800	0830		Malaysia, Voice of	6175as	9750as	
0800	0830		Myanmar, Radio	9730do		
0800	0845	s	Germany, Bible Voice Broadcasting		5905eu	
0800	0900		Anguilla, Caribbean Beacon	6090am		
0800	0900		Australia, ABC NT Alice Springs	2310irr	4835do	
0800	0900		Australia, HCJB	11750pa		
0800	0900		Australia, Radio	5995pa	9580va	9590as
			9710pa	12080va	13630pa	15415as
			15515va	17750as		
0800	0900		Canada, CFRX Toronto ON	6070do		
0800	0900		Canada, CFVP Calgary AB	6030do		
0800	0900		Canada, CKZN St John's NF	6160do		
0800	0900		Canada, CKZU Vancouver BC	6160do		
0800	0900		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870sa	
0800	0900		Eqt Guinea, Radio Africa	15184af		
0800	0900		Germany, Deutsche Welle	6140eu	21675af	
0800	0900	DRM	Germany, Deutsche Welle	15440af		
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do	
0800	0900		Guam, TWR/KTWR	15205as		
0800	0900	mtwht	Guam, TWR/KTWR	11840as		
0800	0900		Guyana, Voice of	3290do	5950do	
0800	0900		Indonesia, Voice of	9525as	11785as	15150al
0800	0900	vl/as	Italy, IRRS	13840va		
0800	0900		Liberia, ELWA	4760do		
0800	0900		Malaysia, Radio Malaysia	7295do		
0800	0900		New Zealand, Radio NZ Intl	9885pa		
0800	0900		Nigeria, Radio Enugu	6025do		
0800	0900		Nigeria, Radio/Ibadan	6050do		
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do	
0800	0900		Nigeria, Radio/Lagos	3326do	4990do	
0800	0900		Nigeria, Voice of	7255af	15120af	
0800	0900	vl	Pakistan, Radio	17835eu	21465eu	
0800	0900		Papua New Guinea, NBC	4890do	9675irr	
0800	0900		Russia, Voice of	17495pa	17525pa	17635pa
			21790pa			
0800	0900		Sierra Leone, Radio UNAMSIL	6139af		
0800	0900		Singapore, Mediacorp Radio	6150do		
0800	0900	vl	Solomon Islands, SIBC	5020do	9545do	
0800	0900		South Korea, Radio Korea Intl	13670eu		
0800	0900		Swaziland, TWR	7205af	9500af	
0800	0900		Taiwan, Radio Taiwan Intl	9610au		
0800	0900		UK, BBC World Service	6190af	11760me	
			11955as	12095eu	15310as	15360as
			15400af	15485eu	15565me	15575me
			17760as	17790as	17830af	21470af
			21660as			
0800	0900		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0800	0900		USA, KAIJ Dallas TX	5755va		
0800	0900		USA, KNLS Anchor Point AK	11765as		
0800	0900		USA, KTBN Salt Lake City UT	7505na		
0800	0900		USA, KWHR Naalehu HI	11565as	17780as	
0800	0900		USA, WBCQ Kennebunk ME	5105na	7415na	
0800	0900		USA, WBOH Newport NC	5920am		
0800	0900		USA, WEWN Birmingham AL	5825na	7425na	
			7580na	11875va		
0800	0900		USA, WHRI Noblesville IN	5745am	7315am	
0800	0900		USA, WJIE Louisville KY	7490am	13595am	
0800	0900		USA, WMLK Bethel PA	9465eu	9955al	
0800	0900		USA, WRMI Miami FL	7385am	9955am	
0800	0900		USA, WTJC Newport NC	9370na		
0800	0900		USA, WWCR Nashville TN	3210na	5070na	
			5770na	5935na		
0800	0900		USA, WYFR Okeechobee FL	5950af	9930af	
0800	0900	vl	Vanuatu, Radio	4960do	7260do	
0800	0900		Zambia, Radio Christian Voice	9865af		
0805	0900	s	Greece, Voice of	9420eu	15630eu	15650af
0815	0900	as	Guam, TWR/KTWR	15330as		
0830	0850		Bangladesh, Bangla Betar	7185as	9550as	
0830	0900		Australia, ABC NT Katherine	2485do		
0830	0900		Australia, ABC NT Tennant Creek	2325do		
0830	0900		Georgia, Radio Georgia	11910me		
0830	0900		Lithuania, Radio Vilnius	9710eu		

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

0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do	
0900	0929		Czech Rep, Radio Prague Intl	21745va		
0900	0930		Guam, TWR/KTWR	11840as		
0900	1000		Anguilla, Caribbean Beacon	6090am		
0900	1000		Australia, ABC NT Alice Springs	2310do	4835irr	
0900	1000		Australia, ABC NT Katherine	2485do		
0900	1000		Australia, ABC NT Tennant Creek	2325do		
0900	1000		Australia, HCJB	11750pa		
0900	1000		Australia, Radio	9580va	9590as	11880as
			12080va	13630pa	15415as	
0900	1000		Australia, Voice Intl	11955as	13685as	
0900	1000		Canada, CFRX Toronto ON	6070do		
0900	1000		Canada, CFVP Calgary AB	6030do		
0900	1000		Canada, CKZN St John's NF	6160do		
0900	1000		Canada, CKZU Vancouver BC	6160do		
0900	1000		China, China Radio Intl	15210pa	17690pa	
0900	1000		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
0900	1000		Eqt Guinea, Radio Africa	15184af		
0900	1000	mtwhf	Germany, Bible Voice Broadcasting		6010na	
0900	1000	DRM/ m-f	Germany, Deutsche Welle	15440af	17700af	
0900	1000		Germany, Deutsche Welle	6140eu	21675af	
0900	1000		Guyana, Voice of	3290do	5950do	
0900	1000	vl/as	Italy, IRRS	13840va		
0900	1000		Malaysia, Radio Malaysia	7295do		
0900	1000		Malaysia, Voice of	15295as		
0900	1000	DRM	Netherlands, Radio	9815eu		
0900	1000		New Zealand, Radio NZ Intl	9885pa		
0900	1000		Nigeria, Radio Enugu	6025do		
0900	1000		Nigeria, Radio/Ibadan	6050do		
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do	
0900	1000		Nigeria, Radio/Lagos	3326do	4990do	
0900	1000		Nigeria, Voice of	7255af	15120af	
0900	1000	v	Pakistan, Radio	17835eu	21465eu	
0900	1000		Palau, KHBN	15725as		
0900	1000		Papua New Guinea, NBC	4890do	9675irr	
0900	1000		Singapore, Mediacorp Radio	6150do		
0900	1000	vl	Solomon Islands, SIBC	5020do	9545do	
0900	1000	s	UAE, Radio UNMEE	21460af		
0900	1000		UK, BBC World Service	6195as	9605as	
			9740as	11760me	12095eu	15190ca
			15310as	15360as	15485eu	15575me
			17640me	17760as	17790as	21660as
0900	1000		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0900	1000		USA, KAIJ Dallas TX	5755va		
0900	1000		USA, KTBN Salt Lake City UT	7505na		
0900	1000		USA, KWHR Naalehu HI	11565as	17780as	
0900	1000		USA, WBCQ Kennebunk ME	5105na	7415na	
0900	1000		USA, WBOH Newport NC	5920am		
0900	1000		USA, WEWN Birmingham AL	5825na	7425na	
			11875na			
0900	1000		USA, WHRA Greenbush ME	11730na		
0900	1000		USA, WHRI Noblesville IN	5745am	7315am	
0900	1000		USA, WJIE Louisville KY	7490am	13595am	
0900	1000		USA, WRMI Miami FL	7385am	9955am	
0900	1000		USA, WTJC Newport NC	9370na		
0900	1000		USA, WWCR Nashville TN	5070na	5770na	
			5935na	9475na		
0900	1000		USA, WYFR Okeechobee FL	5950na		
0900	1000	vl	Vanuatu, Radio	4960do	7260do	
0900	1000		Zambia, Radio Christian Voice	9865af		
0910	0930	s	Armenia, Voice of	4810eu	15270as	
0930	1000	smwhfa	Greece, Voice of	9420eu	15630eu	15650af
0945	1000	DRM	Netherlands, FEBA	9815eu		

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

1000	1029		Germany, Deutsche Welle	15190as	15350as	
			17820as			
1000	1030		Guam, AWR/KSDA	11560as	11930as	
1000	1030		Mongolia, Voice of	12085as		
1000	1030		UK, BBC World Service	6195as	9605as	
			9740as	15310as	15360as	15360as
			17760as	17790as	21660as	
1000	1059		New Zealand, Radio NZ Intl	9885pa		
1000	1100		Anguilla, Caribbean Beacon	11775am		
1000	1100		Australia, ABC NT Alice Springs	2310do	4835irr	
1000	1100		Australia, ABC NT Katherine	2485do		

1000	1100		Australia, ABC NT Tennant Creek	2325do		
1000	1100		Australia, HCJB	11750pa		
1000	1100		Australia, Radio	5995pa	6020pa	6035va
			9475as	9560as	9580va	9590as	11880va
			12080as	13630pa		
1000	1100		Australia, Voice Intl	11955as	13685as	
1000	1100		Canada, CFRX Toronto ON	6070do		
1000	1100		Canada, CFVP Calgary AB	6030do		
1000	1100		Canada, CKZN St John's NF	6160do		
1000	1100		Canada, CKZU Vancouver BC	6160do		
1000	1100		China, China Radio Intl	6040na		
1000	1100		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
1000	1100		Eqt Guinea, Radio Africa	15184af		
1000	1100	mtwhf	Germany, Bible Voice Broadcasting		6010na	
1000	1100	DRM/ m-f	Germany, Deutsche Welle	15440eu	17700eu	
1000	1100		Guyana, Voice af	3290do	5950do	
1000	1100		India, All India Radio	13695as	15020as	
			15260as	15410as	17510au	17800as
			17895as			
1000	1100	vl/as	Italy, IRRS	13840va		
1000	1100		Japan, Radio	6120ca	9695as	11730as
			17585eu	17720va	21755va	
1000	1100	vl	Libya, Voice of Africa	21695af		
1000	1100		Malaysia, Radio Malaysia	7295do		
1000	1100		Malaysia, Voice of	15295as		
1000	1100	DRM	Netherlands, Radio	9815eu		
1000	1100		Netherlands, Radio	9785au	12065as	13710as
			13820as			
1000	1100		Nigeria, Voice of	7255af	15120af	
1000	1100		North Korea, Voice of	3560as	11710am	
			11735na	13650as	15180as	
1000	1100		Palau, KHBN	15725as		
1000	1100		Papua New Guinea, NBC	4890do	9675irr	
1000	1100		Singapore, Mediacorp Radio	6150do		
1000	1100	vl	Solomon Islands, SIBC	5020do	9545do	
1000	1100		South Africa, Channel Africa	11825af		
1000	1100		UK, BBC World Service	6190af	11940af	
			12095eu	15485eu	17885af	21470af
1000	1100	as	UK, BBC World Service	15190ca	15400af	
			17830af			
1000	1100	DRM/ m	UK, Christian Voice	9760eu		
1000	1100		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1000	1100		USA, KAIJ Dallas TX	5755va		
1000	1100		USA, KTBN Salt Lake City UT	7505na		
1000	1100		USA, KWHR Naalehu HI	9930as	11565as	
1000	1100		USA, WBCQ Kennebunk ME	5105na		
1000	1100		USA, WBOH Newport NC	5920am		
1000	1100		USA, WEWN Birmingham AL	7425na	7520na	
			11875na			
1000	1100		USA, WHRI Noblesville IN	9495am	9850am	
1000	1100		USA, WINB Red Lion PA	9320am		
1000	1100		USA, WJIE Louisville KY	7490am	13595am	
1000	1100		USA, WRMI Miami FL	7385am	9955am	
1000	1100		USA, WTJC Newport NC	9370na		
1000	1100		USA, WWCR Nashville TN	5070na	5770na	
			5935na	15825na		
1000	1100		USA, WYFR Okeechobee FL	5950na	9755sa	
1000	1100	vl	Vanuatu, Radio	4960do	7260do	
1000	1100		Zambia, Radio Christian Voice	9865af		
1015	1100		Guam, TWR/KTWR	9865as		
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do	9704da
1030	1057		Czech Rep, Radio Prague Intl	9880eu	11615eu	
1030	1100	mt hfa	Guam, AWR/KSDA	11900as		
1030	1100		Iran, Voice of the Islamic Rep	15600as	17660as	
1030	1100		UAE, Radio Dubai	13675va	15370va	15395va
			21605eu			
1030	1100	t	UAE, Radio UNMEE	21550af		
1030	1100		UK, BBC World Service	6195as	9740as	
			15310as	17760as	17790as	
1030	1100		Vatican City, Vatican Radio	5890eu		

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

1100	1104	vl	Pakistan, Radio	17835eu	21465eu	
1100	1115	mtwhfa.vl	Vanuatu, Radio	4960do	7260do	
1100	1128		Vietnam, Voice of	7285as		
1100	1130		Tibet, Xizang PBS	4920as	6110as	9490as
1100	1130	t	UAE, Radio UNMEE	21550af		
1100	1130		UK, BBC World Service	6190af	6195ca	
			11940af	15190ca	15400af	17790ca
			17830af	17885af	21470af	
1100	1159		Germany, Deutsche Welle	15105as	17820as	
			21650as	21820as		
1100	1200		Anguilla, Caribbean Beacon	11775am		
1100	1200		Australia, ABC NT Alice Springs	2310do	4835irr	
1100	1200		Australia, ABC NT Katherine	2485do		
1100	1200		Australia, ABC NT Tennant Creek	2325do		
1100	1200		Australia, Radio	5995pa	6020pa	6035va
			9475as	9560as	9590va	9590as	11880va
			12080as			
1100	1200		Australia, Voice Intl	13685as		
1100	1200		Canada, CFRX Toronto ON	6070do		
1100	1200		Canada, CFVP Calgary AB	6030do		
1100	1200		Canado, CKZN St John's NF	6160do		
1100	1200		Canada, CKZU Vancouver BC	6160do		
1100	1200		China, China Radio Intl	6040am	11750ca	
1100	1200		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
1100	1200		Ecuador, HCJB	12005va	21455am	
1100	1200	mtwhf	Germany, Bible Voice Broadcasting		6010na	
1100	1200	DRM	Germany, Deutsche Welle	15440eu		
1100	1200	s	Germany, Overcomer Ministries	6110eu		
1100	1200		Iran, Voice of the Islamic Rep	15600as	17660as	
1100	1200	vl/as	Italy, IRRS	13840va		
1100	1200	f	Italy, IRRS	15665af		
1100	1200		Japan, Radio	6120na	9695as	11730as
			17585eu			
1100	1200	vl	Libya, Voice of Africa	15610af	17695af	
			21675af	21695af		
1100	1200		Malaysia, Radio Malaysia	7295do		
1100	1200		Malaysia, Voice of	15295as		
1100	1200		Netherlands, Radio	11675na		
1100	1200		New Zealand, Radio NZ Intl	9885pa		
1100	1200		Papua New Guinea, NBC	4890do	9675irr	
1100	1200		Singapore, Radio Singapore Intl	6080as	6150as	
1100	1200		South Africa, Channel Africa	11825af		
1100	1200		Taiwan, Radio Taiwan Intl	7445as		
1100	1200		UK, BBC World Service	6195as	9740as	
			12095eu	15310as	15485eu	17760as
			17790as			
1100	1200		Ukraine, Radio Ukraine Intl	15415eu		
1100	1200		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1100	1200		USA, KAIJ Dallas TX	5755va		
1100	1200		USA, KTBN Salt Lake City UT	7505na		
1100	1200		USA, KWHR Naalehu HI	9930as	11565as	
1100	1200		USA, WBCQ Kennebunk ME	5105na		
1100	1200		USA, WBOH Newport NC	5920am		
1100	1200		USA, WEWN Birmingham AL	7425na	7520na	
			11875na			
1100	1200		USA, WHRI Noblesville IN	9495am	9850am	
1100	1200		USA, WINB Red Lion PA	9320am		
1100	1200		USA, WJIE Louisville KY	7490am	13595am	
1100	1200		USA, WRMI Miami FL	7385am	9955am	
1100	1200		USA, WTJC Newport NC	9370na		
1100	1200		USA, WWCR Nashville TN	5070na	5770na	
			5935na	15825na		
1100	1200		USA, WYFR Okeechobee FL	5850na	5950na	
			6015na	7355na	9755na	11855na
1100	1200		Zambia, Radio Christian Voice	9865af		
1101	1200		Germany, Overcomer Ministries	9485eu	11950eu	
			13650eu	15235me	15265me	17590af
			17735as	21590af	21760af	
1130	1200		Belgium, Radio Vlaanderen Intl	9940as		
1130	1200		Bulgaria, Radio	11700eu	15700eu	
1130	1200	vl/as	Germany, Bible Voice Broadcasting		12065 aas	
1130	1200		UK, BBC World Service	6190af	6195ca	
			11940af	15190ca	17830af	17885af
			21470af			
1130	1200	f	Vatican City, Vatican Radio	15595va	17515va	
1145	1155		Rwanda, Radio	6055do		

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

1200	1215	vl	Cambodia, National Radio Of	11940as		
1200	1230		France, Radio France Intl	17815af	25820af	
1200	1230	vl	Libya, Voice of Africa	15610af	17695af	
			21675af	21695af		
1200	1230		Malaysia, Voice of	15295as		
1200	1230		UAE, AWR Africa	15135as		
1200	1230		Uzbekistan, Radio Tashkent Intl	7285as	9715as	
			15295as	17775as		
1200	1245	vl/mtwhf	Germany, Bible Voice Broadcasting		12065as	
1200	1259		Canada, Radio Canada Intl	9660am	15190as	
			13655am	15190as	17800am	
1200	1259		New Zealand, Radio NZ Intl	9885pa		
1200	1259		Poland, Radio Polonia	9525eu	11820eu	
1200	1300		Anguilla, Caribbean Beacon	11775am		
1200	1300		Australia, ABC NT Alice Springs	2310do	4835irr	
1200	1300		Australia, ABC NT Katherine	2485do		
1200	1300		Australia, ABC NT Tennant Creek	2325do		
1200	1300		Australia, Radio	5995pa	6020pa	6035va
			9475as	9560as	9590as	11880as	
1200	1300		Australia, Voice Intl	13685as		
1200	1300		Canada, CBC Northern Service	9625do		
1200	1300		Canada, CFRX Toronto ON	6070do		
1200	1300		Canada, CFVP Calgary AB	6030do		
1200	1300		Canada, CKZN St John's NF	6160do		

1200	1300		Canada, CKZU Vancouver BC	6160da	
1200	1300		China, China Radio Intl	9730as	11760pa
			11980pa 15415as		
1200	1300		Costa Rica, University Network	9725am	11870am
			13750am		
1200	1300		Ecuador, HCJB 12005va	21455am	
1200	1300	mtwhf	Germany, Bible Voice Broadcasting		6010na
1200	1300	DRM	Germany, Deutsche Welle	9655eu	15440eu
1200	1300		Malaysia, Radio Malaysia	7295do	
1200	1300	DRM	Netherlands, Radio 9815eu		
1200	1300		Papua New Guineo, NBC	4890do	9675irr
1200	1300		Singapore, Radio Singopore Intl	6080as	6150as
1200	1300		South Koreo, Radio Korea Int'l	9650ca	
1200	1300		Taiwan, Radio Taiwan Intl	7130as	
1200	1300		UK, BBC World Service	6195va	9740as
			12095eu 15190ca	15310as	15485eu
			17760as 17790as		
1200	1300		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb	7507usb	10320usb
			12133usb 12579usb	13362usb	13855usb
1200	1300		USA, KAIJ Dallas TX 13815va		
1200	1300		USA, KTBN Salt Lake City UT	7505na	
1200	1300		USA, KWHR Naalehu HI	9930as	11565as
1200	1300		USA, KWHR Naalehu HI	9930as	11565as
1200	1300		USA, Voice of America	6160va	9645va
			9760va 15240va		
1200	1300		USA, WBCQ Kennebunk ME	9330na	17495na
1200	1300		USA, WBOH Newport NC	5920am	
1200	1300		USA, WEWN Birmingham AL	7425na	7520na
			9355na 13615na		
1200	1300		USA, WHRI Noblesville IN	9495am	9850am
1200	1300		USA, WINB Red Lion PA	13570am	
1200	1300		USA, WJIE Louisville KY	7490am	13595am
1200	1300		USA, WRMI Miami FL	9955am	15725am
1200	1300		USA, WTJC Newport NC	9370na	
1200	1300		USA, WWCR Nashville TN	7465na	9985na
			13845na 15825na		
1200	1300		USA, WWRB Manchester TN	9320na	12170na
1200	1300		USA, WYFR Okeechobee FL	5850no	5950na
			6015no 13695na	17750na	
1200	1300		Zambia, Radio Christian Voice	9865af	
1205	1215	as	Austria, Radio Austria Intl	6155eu	13730eu
			17715va		
1215	1230		Austria, Radio Austria Intl	6155as	13730eu
			17715va		
1215	1230	as	India, TWR 7560as		
1215	1300		Egypt, Radio Cairo 17670as		
1230	1258		Vietnam, Voice of 9840va	12020va	
1230	1300		Australia, HCJB 15405pa		
1230	1300	vl	Libya, Voice of Africa	21675af	21695af
1230	1300		Sri Lanka, SLBC 6005as	11930as	15745as
1230	1300		Sweden, Radio 13580va	15240na	15735va
1230	1300		Thailand, Radio 9855va		
1230	1300		Turkey, Voice of 15255va	15535eu	
1230	1300	a	UK, Wales Radio Intl 17745au		
1235	1245	as	Austria, Radio Austria Intl	6155eu	13730eu
			17715va		
1245	1300	mtwhf	Austria, Radio Austria Intl	17715as	
1245	1300	os	Austria, Radio Austria Intl	6155eu	13730eu

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

1300	1329		Czech Rep, Radio Prague Intl	13580eu	21745af
1300	1330		Australia, HCJB 15405pa		
1300	1330	DRM	Canada, Radio Canada Intl	9815eu	
1300	1330		Ecuador, HCJB 12005va	21455am	
1300	1330		Egypt, Radio Cairo 17670as		
1300	1330		Turkey, Voice of 15255va	15535eu	
1300	1356		Romania, Radio Romania Intl	11830eu	15105eu
1300	1400		Anguilla, Caribbean Beacon	11775am	
1300	1400		Australia, Radio 5995pa	6020pa	9475as
			9560as 9580va 11660as		
1300	1400		Canada, CBC Northern Service	9625do	
1300	1400		Canada, CFRX Toronto ON	6070do	
1300	1400		Canada, CFVP Calgary AB	6030do	
1300	1400		Canada, CKZN St John's NF	6160do	
1300	1400		Canada, CKZU Vancouver BC	6160do	
1300	1400		Canada, Radio Canada Intl	9515am	13655am
			17800sa		
1300	1400		Chino, Chino Radio Intl	7405am	9570am
			11760pa 11980as	15180as	
1300	1400		Costa Rica, University Network	9725am	11870am
			13750am		
1300	1400	mtwhf	Germany, Bible Voice Broadcasting		6010na
1300	1400	DRM	Germany, Deutsche Welle	9655eu	15440eu
1300	1400		Germany, Deutsche Welle	6140eu	
1300	1400		Germany, Overcomer Ministries	6110eu	13810me
1300	1400		Jordan, Radio 11690eu		
1300	1400	vl	Libya, Voice of Africa	21675af	21695af
1300	1400		Malaysia, Radio Malaysia	7295do	
1300	1400		New Zealand, Radio NZ Intl	6095pa	
1300	1400		North Korea, Voice of	4405as	9335eu
			11710na 13760eu	15245am	
1300	1400		Papua New Guinea, NBC	4890do	9675irr
1300	1400		Singapore, Radio Singapore Intl	6080as	6150as
1300	1400		South Korea, Radio Korea Intl	9570as	9700as
1300	1400		Sri Lanka, SLBC 6005as	11930as	15745as
1300	1400		UK, BBC World Service	6190af	6195va
			9740as 11940af 12095eu	15190af	15310as
			15420af 15485eu	17760as	17790as
			17830af 17885af	21470af	
1300	1400		USA, Armed Forces Radio	4319usb	5446usb
			5765usb 6350usb	7507usb	10320usb
			12133usb 12579usb	13362usb	13855usb
1300	1400		USA, KJES Vado NM	11715na	
1300	1400		USA, KNLS Anchor Point AK	11870as	
1300	1400		USA, KTBN Salt Lake City UT	7505na	
1300	1400		USA, KVOH Rancho Simi CA	9975as	
1300	1400		USA, KWHR Naalehu HI	9930as	11565as
1300	1400		USA, Voice of America	9645va	9760va
1300	1400		USA, WBCQ Kennebunk ME	9330na	17495na
1300	1400		USA, WBOH Newport NC	5920am	
1300	1400		USA, WEWN Birmingham AL	7425na	7520na
			9355na 13615na		
1300	1400		USA, WHRA Greenbush ME	17560na	
1300	1400		USA, WHRI Noblesville IN	9850am	15105am
1300	1400		USA, WINB Red Lion PA	13570am	
1300	1400		USA, WJIE Louisville KY	7490am	13595am
1300	1400		USA, WRMI Miami FL	9955am	15725am
1300	1400		USA, WTJC Newport NC	9370na	
1300	1400		USA, WWCR Nashville TN	7465na	9985na
			13845na 15825na		
1300	1400		USA, WWRB Manchester TN	9320na	12170na
1300	1400		USA, WYFR Okeechobee FL	11560na	11830na
			11865as 11970as	13695na	17750na
1300	1400		Zambia, Radio Christian Voice	9865af	
1305	1315	mtwhfa	Turkmenistan, Turkmen Radio	5015as	
1310	1320		Israel, Kol Israel 15640va	17535va	
1315	1330	a	Russia, TWR 9485eu		
1330	1400	s	Australia, HCJB 15405as		
1330	1400		Guam, AWR/KSDA 11980as		
1330	1400	mtwhfa	Guam, AWR/KSDA 15275as		
1330	1400		India, All India Radio	9690as	11620as
			13710as		
1330	1400		Laos, National Radio	7145as	
1330	1400	DRM	Netherlands, Radio 9815eu		
1330	1400		Sweden, Radio 15240na	15735va	
1330	1400		UAE, Radio Dubai 13630eu	13675eu	15395eu
			21605eu		
1330	1400		Uzbekistan, Radio Tashkent Intl	7285as	9715as
			15295as 17775as		

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

1400	1415		Russia, FEBA 9495as		
1400	1415		Seychelles, FEBA 9495as		
1400	1430		Thailand, Radio 9830as		
1400	1459	cs	Canada, Radio Canada Intl	9515as	
1400	1500		Anguilla, Caribbean Beacon	11775am	
1400	1500		Australia, Radio 5995pa	6080pa	7260as
			9475as 9590as 11660as	11750as	
1400	1500		Canada, CBC Northern Service	9625do	
1400	1500		Canada, CFRX Toronto ON	6070do	
1400	1500		Canada, CFVP Calgary AB	6030do	
1400	1500		Canada, CKZN St John's NF	6160do	
1400	1500		Canada, CKZU Vancouver BC	6160do	
1400	1500		China, China Radio Intl	7405am	11675as
			11765as 13685af	13680am	15125af
1400	1500		Costa Rica, University Network	9725am	11870am
			13750am		
1400	1500		France, Radio France Intl	7175as	9580as
			11610as 17515as	17620as	
1400	1500	mtwhf	Germany, Bible Voice Broadcasting		6010na
1400	1500	vl/h	Germany, Bible Voice Broadcasting		17485as
1400	1500		Germany, Deutsche Welle	6140eu	
1400	1500		Germany, Overcomer Ministries	6110eu	13810me
			17550as 21590sa		
1400	1500		Germany, Pan American BC	15650eu	
1400	1500		India, All India Radio	9690as	11620as
			13710as		
1400	1500		Japan, Radio 7200as	11730as	11840pa
1400	1500		Jordan, Radio 11690eu		
1400	1500	vl	Libya, Voice of Africa	21675af	
1400	1500		Netherlands, Radio 9890as	11835as	12075as
1400	1500		New Zealand, Radio NZ Intl	6095pa	
1400	1500		Oman, Radio 15140eu		
1400	1500	DRM	Russia, Voice of 15780va		
1400	1500		Russia, Voice of 7390as	9745as	12055as
			15780as 17645as		
1400	1500		Singapore, Mediacorp Radio	6150do	
1400	1500		South Africa, Channel Africa	11825af	
1400	1500		Sri Lanka, SLBC 6005as	11930as	15745as

1400	1500		Taiwan, Radio Taiwan Intl	15265as		
1400	1500		UK, BBC World Service	6190af	6195as	
			7105as 9740as	11940af	12095eu	15190ca
			15310as	15485eu	15565me	15575me
			17790as	17830af	17885af	21470af
			21660af			
1400	1500		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1400	1500		USA, KJES Vado NM	11715na		
1400	1500		USA, KTBN Salt Lake City UT	7505na	15590na	
1400	1500		USA, KWHR Naalehu HI	9930as	11565as	
1400	1500		USA, Voice of America	6160va	7125va	
			9760va	15160va	15425va	
1400	1500		USA, WBCQ Kennebunk ME	7415na	9330na	
			17495na			
1400	1500		USA, WBOH Newport NC	5920am		
1400	1500		USA, WEWN Birmingham AL	7425na	7520na	
			9355na	9955na	15745na	
1400	1500		USA, WHRA Greenbush ME	17560na		
1400	1500		USA, WHRI Noblesville IN	9850am	15105am	
1400	1500		USA, WINB Red Lion PA	13570am		
1400	1500		USA, WJIE Louisville KY	7490am	13595am	
1400	1500		USA, WRMI Miami FL	7385am	15725am	
1400	1500		USA, WTJC Newport NC	9370na		
1400	1500		USA, WWCR Nashville TN	7465na	9985na	
			13845na	15825na		
1400	1500		USA, WWRB Manchester TN	9320na	12170na	
1400	1500		USA, WYFR Okeechobee FL	11560na	11830as	
			11970na	17750na		
1400	1500		Zambia, Radio Christian Voice	9865af		
1415	1430		Nepal, Radio	3230as	5005as	6100as
			7165as			
1430	1500	vl/a	Germany, Bible Voice Broadcasting			5945as
1430	1500	vl/s	Germany, Bible Voice Broadcasting			5890as
1430	1500		Myanmar, Radio	5040do	5985do	

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

1500	1528		Vietnam, Voice of	7285va	9840va	12020va
1500	1530		Hungary, Radio Budapest	6025eu	9715eu	
1500	1530		Mongolia, Voice of	12085eu		
1500	1530		Sri Lanka, SLBC	6005as	11930as	15745as
1500	1530		UK, BBC World Service	6190af	11860af	
			11940af	15400af	15420af	17830af
			21470af	21490af	21660af	
1500	1557		Canada, Radio Canada Intl	15455as	17720as	
1500	1559	as	Canada, Radio Canada Intl	9515am	13655am	
			17800am			
1500	1600		Anguilla, Caribbean Beacon	11775am		
1500	1600		Australia, Radio	5995po	6080pa	7260as
			9475as 9590as	11660as	11750as	
1500	1600		Canada, CBC Northern Service	9625do		
1500	1600		Canada, CFRX Toronto ON	6070do		
1500	1600		Canada, CFVP Calgary AB	6030do		
1500	1600		Canada, CKZN St John's NF	6160do		
1500	1600		Conada, CKZU Vancouver BC	6160do		
1500	1600		China, China Radio Intl	7160as	9785as	
			9795af 11940af	13685am	13640af	15125af
1500	1600		Costa Rica, University Network	9725am	11870am	
			13750am			
1500	1600	vl/s	Germany, Bible Voice Broadcasting			17510me
1500	1600	mtwhf	Germany, Bible Voice Broadcasting			6010na
1500	1600		Germany, Deutsche Welle	6140eu		
1500	1600		Germany, Overcomer Ministries	6110eu	13810me	
			21590sa			
1500	1600		Germany, Pan American BC	15650me		
1500	1600		Guom, TWR/KTWR	12105as		
1500	1600		Japan, Radio	6190as	7200om	9505os
			11730vo			
1500	1600		Jordan, Radio	11690na		
1500	1600		Myanmar, Radio	5040do	5985do	
1500	1600		New Zealand, Radio NZ Intl	6095pa		
1500	1600		North Korea, Voice of	4405eu	9335eu	
			11710na	13760eu	15245am	
1500	1600		Russia, FEBA	7350as		
1500	1600		Russia, Voice of	4940me	4965me	4975me
			7325me	7390as	11500as	11985me
1500	1600		Seychelles, FEBA	7365as		
1500	1600		Singapore, Mediacorp Radio	6150do		
1500	1600		South Africa, Chonnel Africa	17770af		
1500	1600		UK, BBC World Service	5975as	6195as	
			7105as 9740as	12095eu	15190ca	15310as
			15485eu	15565me	17790as	
1500	1600		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1500	1600		USA, KJES Vodo NM	11715na		
1500	1600		USA, KTBN Salt Lake City UT	15590na		
1500	1600		USA, KVOH Rancho Simi CA	17775as		
1500	1600		USA, KWHR Naalehu HI	9930as	11565as	
1500	1600		USA, Voice of America	6160af	7125va	
			9590af 9760af	9845af	12040af	15550af
1500	1600		USA, WBCQ Kennebunk ME	7415na	9330na	
			17495na			
1500	1600		USA, WBOH Newport NC	5920am		
1500	1600		USA, WEWN Birmingham AL	9955na	11530na	
			15745na			
1500	1600		USA, WHRA Greenbush ME	17650na		
1500	1600		USA, WHRI Noblesville IN	13760am	15105am	
1500	1600		USA, WINB Red Lion PA	13570am		
1500	1600		USA, WJIE Louisville KY	7490am	13595am	
1500	1600		USA, WRMI Miami FL	7385am	15725am	
1500	1600		USA, WTJC Newport NC	9370na		
1500	1600		USA, WWCR Nashville TN	9475na	12160na	
			13845no	15825na		
1500	1600		USA, WWRB Manchester TN	9320na	12170na	
1500	1600		USA, WYFR Okeechobee FL	6280na	11830na	
			17750na			
1500	1600		Zambia, Radio Christian Voice	9865af		
1510	1525		Austria, Radio Austria Intl	13775ca		
1515	1530		Vatican City, Vatican Radio	12065va	13765va	
			15235va			
1525	1540	as	Austria, Radio Austria Intl	13775ca		
1530	1545		India, All India Radio	9910as		
1530	1550		Vatican City, Vatican Radio	12065va	13765va	
			15235va			
1530	1600		Georgia, Radio Georgia	6180me		
1530	1600		Germany, Bible Voice Broadcasting			17510eu
1530	1600		Iran, Voice of the Islamic Rep	9635as	11650as	
1530	1600		UAE, AWR Africa	15225as		
1530	1600		UK, BBC World Service	6190af	11940af	
			15400af	17830af	21470af	21660af
1540	1555		Austria, Radio Austria Intl	13775ca		
1545	1600	vl/mtwhfa	Germony, Bible Voice Broodcasting			15680me
1555	1600	as	Austria, Radio Austria Intl	13775ca		

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

1600	1615		Pakistan, Radio	11570va	11850va	15100vo
			15725vo			
1600	1627		Czech Rep, Radio Prague Intl	5930eu	17485af	
1600	1628		Vietnam, Voice of	7220as	9550as	11630va
			13740va			
1600	1630		Guam, AWR/KSDA	15235as		
1600	1630		Iran, Voice of the Islamic Rep	9635as	11650as	
1600	1630		UK, BBC World Service	6190af	11940af	
			15400af	17830af	21470af	21660af
1600	1635		UAE, Radio Dubai	13630am	13675eu	15395eu
			21605eu			
1600	1645	vl/h	Germany, Bible Voice Broadcasting			15680me
1600	1659		Germany, Deutsche Welle	6170as	7225as	
			17595as			
1600	1700		Anguilla, Caribbean Beacon	11775am		
1600	1700		Australia, Radio	5995pa	6080po	7220as
			7260as 9475as	11660as		
1600	1700		Canado, CBC Northern Service	9625do		
1600	1700		Canado, CFRX Toronto ON	6070do		
1600	1700		Canada, CFVP Calgary AB	6030do		
1600	1700		Canodo, CKZN St John's NF	6160do		
1600	1700		Canada, CKZU Vancouver BC	6160do		
1600	1700		China, China Radio Intl	9440af	9570af	
			9795af 11900af	11940af	13640af	
1600	1700		Costa Rica, University Network	11870am	13750am	
1600	1700		Ethiopia, Radio	5990af	7110af	7165af
			9560af 9704af	11800af		
1600	1700		France, Radio France Intl	6010af	6170af	
			9730af 11615af	15160af	15605af	
1600	1700	mtwhf	Germany, Bible Voice Broadcasting			6010na
1600	1700	DRM	Germany, Deutsche Welle	6140eu		
1600	1700	a	Greece, Voice of	7475eu	9420eu	15630eu
			17705na			
1600	1700		Jordan, Radio	11690na		
1600	1700	vl	Libya, Voice of Africa	15660af	17695af	
1600	1700		New Zealand, Radio NZ Intl	6095pa		
1600	1700		North Korea, Voice of	3560me	9975af	
			11735af			
1600	1700		Russia, Voice of	5945me	7320as	11985af
			11985me	12055va		
1600	1700		South Korea, Radio Korea Intl	5975va	9870va	
1600	1700		Taiwan, Radio Taiwan Intl	11550as		
1600	1700		UK, BBC World Service	3915as	5975as	
			6195as 7160as	9410va	12095va	15190ca
			15310as	15485eu	15565me	17790as
1600	1700		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1600	1700		USA, KTBN Salt Lake City UT	15590na		
1600	1700		USA, KVOH Rancho Simi CA	17775as		
1600	1700		USA, KWHR Naalehu HI	9930as		
1600	1700		USA, Voice of America	6160va	7125va	
			9700va	9760va	9850af	12080af

			13600af 15205af	15225af	15255va	
			15410af 15580af	17895af		
1600	1700		USA, WBCQ Kennebunk ME	9330na	17495na	
1600	1700		USA, WBOH Newport NC	5920am		
1600	1700		USA, WEWN Birmingham AL	11530va	13615va	
			15745va			
1600	1700		USA, WHRA Greenbush ME	17650na		
1600	1700		USA, WHRI Noblesville IN	13760am	15105am	
1600	1700		USA, WINB Red Lion PA	13570am		
1600	1700		USA, WJIE Louisville KY	7490am	13595am	
1600	1700		USA, WMLK Bethel PA	9465eu	15265al	
1600	1700		USA, WRMI Miami FL	9955am	15725am	
1600	1700		USA, WTJC Newport NC	9370na		
1600	1700		USA, WWCR Nashville TN	9475na	12160nc	
			13845na 15825na			
1600	1700		USA, WWRB Manchester TN	9320na	12170nc	
1600	1700		USA, WYFR Okeechobee FL	6085as	6280ra	
			11830na 11865na	15130eu	17750eu	
			18980eu 21455va	21525va		
1600	1700		Zambia, Radio Christian Voice	4965af		
1615	1630		Vatican City, Vatican Radio	15595va		
1630	1700		Egypt, Radio Cairo 9855af			
1630	1700		Guam, AWR/KSDA 11975as	15235as		
1630	1700		UK, BBC World Service	6190af	11940af	
			15400af 15420af	17830af	21470af	
			21660af			
1630	1700	as	UK, BBC World Service	11860af	21490af	
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio	4930as		
1645	1700		Tajikistan, Radio 7245irr			

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

1700	1715	vl/t	Germany, Bible Voice Broadcasting		15680me	
1700	1715		Israel, Kol Israel 11605va	15640va	17535vc	
1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485af	
1700	1728		Vietnam, Voice of 9725au			
1700	1730		France, Radio France Intl	15605af	17605af	
1700	1745		UK, BBC World Service	3255af	6005af	
			6190af 9630af 15400af	15420af	17830af	
			21470af			
1700	1759		Poland, Radio Polonia	7265eu	7285eu	
1700	1800		Anguilla, Caribbean Beacon	11775am		
1700	1800		Australia, Radio 5995pa	6080pa	7220as	
			7260as 9475as 11880as			
1700	1800		Canada, CBC Northern Service	9625do		
1700	1800		Canada, CFRX Toronto ON	6070do		
1700	1800		Canada, CFVP Calgary AB	6030do		
1700	1800		Canada, CKZN St John's NF	6160do		
1700	1800		Canada, CKZU Vancouver BC	6160do		
1700	1800		China, China Radio Intl	9570af	11670vo	
			11900af 11940af	13640af		
1700	1800		Costa Rica, University Network	11870am	13750am	
1700	1800		Egypt, Radio Cairo 9855af			
1700	1800		Eqt Guinea, Radio Africa	7189af	15184al	
1700	1800	mtwhf	Germany, Bible Voice Broadcasting		6010na	
1700	1800	as	Germany, Bible Voice Broadcasting		15235me	
1700	1800	DRM	Germany, Deutsche Welle	6140eu		
1700	1800		Germany, Radio Africa Intl	13820af	15715af	
			17550af			
1700	1800		Japan, Radio 9535am	11970eu	15355af	
1700	1800	vl	Libya, Voice of Africa	15660af	17635af	
			17695af 17880af			
1700	1800		New Zealand, Radio NZ Intl	6095pa		
1700	1800		Russia, Voice of 7350as	9890eu	11510af	
			11675af 11985af			
1700	1800	DRM/as	Russia, Voice of 11675eu			
1700	1800		South Africa, Channel Africa	15245af		
1700	1800	DRM	Sweden, Radio 5955eu			
1700	1800		Taiwan, Radio Taiwan Intl	11550as		
1700	1800		UK, BBC World Service	3915as	5975as	
			6195as 7160as 9410eu	9510as	12095va	
			15310as 15485eu	15565me		
1700	1800		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb 6350usb	7507usb	10320usb	
			12133usb 12579usb	13362usb	13855usb	
1700	1800		USA, KTBN Salt Lake City UT	15590na		
1700	1800		USA, KVOH Rancho Simi CA	17775as		
1700	1800		USA, KWHR Naalehu HI	9930as		
1700	1800		USA, Voice of America	6020va	6160va	
			7125va 9640va	9700va	9760va	
			9850af 15255va 15410af	15580af		
1700	1800		USA, WBCQ Kennebunk ME	9330na	17495na	
1700	1800		USA, WBOH Newport NC	5920am		
1700	1800		USA, WEWN Birmingham AL	11530va	13615va	
			15685va 15745va			
1700	1800		USA, WHRA Greenbush ME	17650na		
1700	1800		USA, WHRI Noblesville IN	9495am	13760am	
1700	1800		USA, WINB Red Lion PA	13570am		
1700	1800		USA, WJIE Louisville KY	7490am	13595am	
1700	1800		USA, WMLK Bethel PA	9465eu	15265al	
1700	1800		USA, WRMI Miami FL	9955am	15725am	
1700	1800		USA, WTJC Newport NC	9370na		
1700	1800		USA, WWCR Nashville TN	9475na	12160na	
			13845na 15825na			
1700	1800		USA, WWRB Manchester TN	9320na	12170na	
1700	1800		USA, WYFR Okeechobee FL	17795eu	18980eu	
			21455eu			
1700	1800		Zambia, Radio Christian Voice	4965af		
1715	1730		Vatican City, Vatican Radio	4005va	5890va	
			7250va 9645va	15595va		
1730	1745	mtwhf	UK, United Nations Radio	7170af	15495me	
			17810af			
1730	1800		Belgium, Radio Vlaanderen Intl	9925eu	11640eu	
1730	1800		Bulgaria, Radio 9500eu	11500eu		
1730	1800		Georgia, Radio Georgia	11910eu		
1730	1800		Guam, AWR/KSDA 9385me			
1730	1800		Liberia, ELWA 4760do			
1730	1800	vl	Philippines, Radio Pilipinas	11720me	15190me	
			17720me			
1730	1800		Swaziland, TWR 3200af	9500af		
1730	1800	mtwhfa	Sweden, Radio 6065eu			
1730	1800	mtwhf	USA, Voice of America	11975af	17895af	
1730	1800		Vatican City, Vatican Radio	13765af	15570af	
			17515af			
1735	1745	vl/th	Paraguay, Radio Nacional	9739sa		
1745	1755	mtwhfa	Turkmenistan, Turkmen Radio	4930as		
1745	1800		Bangladesh, Bangla Betar	7185eu	9550eu	
			15520eu			
1745	1800		India, All India Radio	7410eu	9445af	
			9950eu 11620eu	11935af	13605af	
			15075af 15155af	17670af		
1745	1800		UK, BBC World Service	3255af	6190af	
			15400af 15420af	17830af	21470af	

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

1800	1810		Zanzibar, Voice of Tanzania	11734do		
1800	1828		Vietnam, Voice of 11630va	13740vc		
1800	1830		Egypt, Radio Cairo 9855af			
1800	1830	vl/h	Germany, Bible Voice Broadcasting		13710me	
1800	1830	s	Germany, Universal Life	15675af		
1800	1830		South Africa, AWR Africa	3215af	3345af	
			12130af			
1800	1830		UK, BBC World Service	3255af	5975as	
			6190af 6195eu 9410eu	9510as	12095me	
			15310me 15400af	15420af	17830af	
			21470af			
1800	1850		New Zealand, Radio NZ Intl	6095pa		
1800	1856		Romania, Radio Romania Intl	11940eu	15380eu	
1800	1859		Canada, Radio Canada Intl	9530af	11770af	
			13730af 15255as			
1800	1859		Germany, Radio Africa Intl	13820af	15715af	
			17550af			
1800	1900		Anguilla, Caribbean Beacon	11775am		
1800	1900	mtwhf	Argentina, RAE 9690eu	15345eu		
1800	1900		Australia, Radio 6080pa	7220as	7240va	
			7260as 9475as 11880as			
1800	1900		Australia, Voice Intl 6115as			
1800	1900		Bangladesh, Bangla Betar	7185eu	9550eu	
			15520eu			
1800	1900		Canada, CBC Northern Service	9625do		
1800	1900		Canada, CFRX Toronto ON	6070do		
1800	1900		Canada, CFVP Calgary AB	6030do		
1800	1900		Canada, CKZN St John's NF	6160do		
1800	1900		Canada, CKZU Vancouver BC	6160do		
1800	1900		China, China Radio Intl	11670va	11940va	
			13640va 13760va			
1800	1900		Costa Rica, University Network	11870am	13750am	
1800	1900		Eqt Guinea, Radio Africa	7189af	15184al	
1800	1900	vl/as	Germany, Bible Voice Broadcasting		5970eu	
			11965as 13710me			
1800	1900	mtwhf	Germany, Bible Voice Broadcasting		6010na	
1800	1900		India, All India Radio	7410eu	9445af	
			9950eu 11620eu	11935af	13605af	
			15075af 15155af	17670af		
1800	1900		Latvia, Laser Radio 9290eu			
1800	1900		Liberia, ELWA 4760do			
1800	1900	vl	Libya, Voice of Africa	15205af	15660af	
			17635af 17695af			
1800	1900		Netherlands, Radio 6020af	9895af	11655af	
1800	1900	vl	Philippines, Radio Pilipinas	11720me	15190me	
			17720me			
1800	1900		Russia, Voice of 9480af	9745eu	9820eu	
			11510eu			
1800	1900		Sierra Leone, Radio UNAMSIL	6139af		
1800	1900		Swaziland, TWR 3200af	9500af		
1800	1900		Taiwan, Radio Taiwan Intl	3965eu		
1800	1900		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb 6350usb	7507usb	10320usb	
			12133usb 12579usb	13362usb	13855usb	
1800	1900		USA, KJES Vado NM	15385na		
1800	1900		USA, KTBN Salt Lake City UT	15590no		

1800	1900		USA, KVOH Rancho Simi CA	17775as		
1800	1900		USA, Voice of America	6040va	9760va	
			9770va	9850af	11975af	15410af
			15580af	17895af		
1800	1900		USA, WBCQ Kennebunk ME	9330na	17495na	
1800	1900		USA, WBOH Newport NC	5920am		
1800	1900		USA, WEWN Birmingham AL	11530va	13615va	
			15685va	15745va		
1800	1900		USA, WHRA Greenbush ME	17650na		
1800	1900		USA, WHRI Noblesville IN	9495am	13760am	
1800	1900		USA, WINB Red Lion PA	13570am		
1800	1900		USA, WJIE Louisville KY	7490am	13595am	
1800	1900		USA, WMLK Bethel PA	9465eu	15265al	
1800	1900		USA, WRMI Miami FL	9955am	15725am	
1800	1900		USA, WTJC Newport NC	9370na		
1800	1900		USA, WWCR Nashville TN	9475na	12160na	
			13845na	15825na		
1800	1900		USA, WWRB Manchester TN	9320na	12170na	
1800	1900		USA, WYFR Okeechobee FL	17795eu	18980eu	
1800	1900		Yemen, Rep of Yemen Radio	9780me		
1800	1900		Zambia, Radio Christian Voice	4965af		
1830	1845		Germany, IBRA Radio	9520af		
1830	1855		Greece, Voice of	12105eu		
1830	1900		Georgia, Radio Georgia	11760eu		
1830	1900		Serbia & Montenegro, Intl Radio	6100eu		
1830	1900		South Africa, AWR Africa	12130af		
1830	1900		Turkey, Voice of	9785eu		
1830	1900		UK, BBC World Service	3255af	6055af	
			6190af 9630af	15400af	15420af	17820af
			21470af			
1845	1900	mtwhfa	Albania, Radio Tirana Intl	7210eu	9520eu	
1845	1900		Congo, RTV Congolaise	4765af	5985af	
1851	1900		New Zealand, Radio NZ Intl	9845pa		

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

1900	1915		Congo, RTV Congolaise	4765af	5985af	
1900	1915	vl/o	Germany, Bible Voice Broadcasting		13710me	
1900	1920		Turkey, Voice of	9785eu		
1900	1928		Vietnam, Voice of	11630va	13740va	
1900	1930	vl/s	Germany, Bible Voice Broadcasting		5970eu	
1900	1930	s	Germany, Universal Life	13820me		
1900	1930		Hungary, Radio Budapest	3975eu	6025eu	
			11720eu			
1900	1930	vl	Philippines, Radio Pilipinas	11720me	15190me	
			17720me			
1900	1945		India, All India Radio	7410eu	9445af	
			9950eu	11620eu	11935af	13605af
			15075af	15155af	17670af	
1900	1950		New Zealand, Radio NZ Intl	9845pa		
1900	1959		Germany, Deutsche Welle	13590af	15545af	
			17770af			
1900	2000		Anguilla, Caribbean Beacon	11775am		
1900	2000		Australia, Radio	6080pa	7220as	7240va
			9500as 11650as	11880as		
1900	2000		Australia, Voice Intl	6115as		
1900	2000		Canada, CBC Northern Service	9625do		
1900	2000		Canada, CFRX Toronto ON	6070do		
1900	2000		Canada, CFVP Calgary AB	6030do		
1900	2000		Canada, CKZN St John's NF	6160do		
1900	2000		Canada, CKZU Vancouver BC	6160do		
1900	2000		China, China Radio Intl	7145af	9440af	
			9585af 11940af			
1900	2000		Costa Rica, University Network	11870am	13750am	
1900	2000		Eqt Guinea, Radio Africa	7189af	15184al	
1900	2000	mtwhf	Germany, Bible Voice Broadcasting		6010na	
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do	
1900	2000	vl/osmtwh	Italy, IRRS	5755va		
1900	2000		Latvia, Laser Radio	9290eu		
1900	2000		Liberia, ELWA	4760do		
1900	2000	vl	Libya, Voice of Africa	15205af	15315af	
1900	2000		Malaysia, Radio Malaysia	7295do		
1900	2000		Namibia, Namibian BC Corp	3270af	3290af	
			6060af			
1900	2000		Netherlands, Radio	7120af	9895af	11655af
			17810af			
1900	2000	as	Netherlands, Radio	15315na	17660na	17735na
1900	2000		Nigeria, Radio/Enugu	6025do		
1900	2000		Nigeria, Radio/Ibadan	6050do		
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do	
1900	2000		Nigeria, Radio/Lagos	3326do	4990do	
1900	2000		Nigeria, Voice of	7255af	15120af	17800af
1900	2000		North Korea, Voice of	4405eu	13760eu	
			15245eu			
1900	2000		Russia, Voice of	7310eu	7440eu	9890eu
1900	2000		Sierra Leone, Radio UNAMSIL	6139af		
1900	2000		Sierra Leone, SLBS	3316do		
1900	2000	vl	Solomon Islands, SIBC	5020do	9545do	
1900	2000		South Africa, Channel Africa	3345af		
1900	2000		South Korea, Radio Korea Intl	5975va	7275eu	
1900	2000	a	Sri Lanka, SLBC	6010eu		
1900	2000		Swaziland, TWR	3200af		
1900	2000		Thailand, Radio	7155eu		
1900	2000		Uganda, Radio	4976do	5026do	7196do
1900	2000		UK, BBC World Service	3255af	6005af	
			6190af 6195eu	9410eu	9630af	12095af
			15310me	15400af	17830af	
1900	2000		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1900	2000		USA, KAIJ Dallas TX	13815va		
1900	2000		USA, KJES Vado NM	15385na		
1900	2000		USA, KTBN Salt Lake City UT	15590na		
1900	2000		USA, KVOH Rancho Simi CA	17775as		
1900	2000		USA, Voice of America	4950af	6040va	
			9760va	9770af	9850af	11975af
			13670af	15410va	15445af	15580af
			17895af			
1900	2000	mtwhf	USA, Voice of America	5965va	9840va	
			11720va	11970va	13725va	15205va
1900	2000		USA, WBCQ Kennebunk ME	7415na	9330na	
			17495na			
1900	2000		USA, WBOH Newport NC	5920am		
1900	2000		USA, WEWN Birmingham AL	11530va	13615va	
			15685va	15745va		
1900	2000		USA, WHRA Greenbush ME	17650na		
1900	2000		USA, WHRI Noblesville IN	9495am	13760am	
1900	2000		USA, WINB Red Lion PA	13570am		
1900	2000		USA, WJIE Louisville KY	7490am	13595am	
1900	2000		USA, WMLK Bethel PA	9465eu	15265al	
1900	2000		USA, WTJC Newport NC	9370na		
1900	2000		USA, WWCR Nashville TN	9475na	12160na	
			13845na	15825na		
1900	2000		USA, WYFR Okeechobee FL	6085af	15130eu	
			17750eu	17795eu	17845va	18980va
1900	2000	vl	Vanuatu, Radio	4960do	7260do	
1900	2000		Zambia, Radio Christian Voice	4965af		
1900	2000	vl	Zimbabwe, ZBC Corp	5975do		
1915	1925		Rwanda, Radio	6005do		
1915	1945	f	Germany, Bible Voice Broadcasting		9425af	
1930	2000	t h	Belarus, Radio Belarus Intl	7105eu	7210eu	
1930	2000		Belgium, Radio Vlaanderen Intl	9925eu		
1930	2000	mtw	Germany, AWR	15175eu		
1930	2000		Iran, Voice of the Islamic Rep	9800af	11750eu	
1930	2000		Papua New Guinea, NBC	4890do	9675irr	
1930	2000		Sweden, Radio	6065va		
1930	2000		USA, Voice of America	7260me	9680me	
			13635me			
1935	1955		Italy, RAI Intl	5970eu	9605eu	
1945	2000	f	Germany, Bible Voice Broadcasting		12050af	
1951	2000		New Zealand, Radio NZ Intl	11725pa		

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

2000	2015		Israel, Kol Israel	11605va	15640va	17535va
2000	2027		Czech Rep, Radio Prague Intl	5930eu	11600va	
2000	2030	f	Germany, Universal Life	5775va		
2000	2030		Iran, Voice of the Islamic Rep	9800af	11750eu	
2000	2030	vl/asmtwh	Italy, IRRS	5775va		
2000	2030	vl	Libya, Voice of Africa	11635af	15315af	
2000	2030		Mongolia, Voice of	12015eu		
2000	2030		USA, Voice of America	4950af	6040va	
			6095va	9760va	9770va	9850af
			11855af	11975af	13670af	15410af
			15445af	17745af		
2000	2030		Vatican City, Vatican Radio	9660eu	11625eu	
			13765eu			
2000	2030		Vietnam, Voice of	7220as	9550as	
2000	2045		Swaziland, TWR	3200af		
2000	2050		New Zealand, Radio NZ Intl	11725pa		
2000	2059		Canada, Radio Canada Intl	5850eu	7235eu	
			11690af	13700eu	17870eu	
2000	2059		Germany, Deutsche Welle	7130af	13820af	
			15205af			
2000	2059	mtwhf	Spain, Radio Exterior Espana	9570va	15290va	
2000	2100		Anguilla, Caribbean Beacon	11775am		
2000	2100		Australia, ABC NT Alice Springs	2310do	4835irr	
2000	2100		Australia, ABC NT Katherine	2485do		
2000	2100		Australia, ABC NT Tennant Creek	2325do		
2000	2100		Australia, Radio	6080pa	7220as	9500as
			11650as	11880as		
2000	2100		Australia, Voice Intl	6115as		
2000	2100		Canada, CBC Northern Service	9625do		
2000	2100		Canada, CFRX Toronto ON	6070do		
2000	2100		Canada, CFVP Calgary AB	6030do		
2000	2100		Canada, CKZN St John's NF	6160do		
2000	2100		Canada, CKZU Vancouver BC	6160do		
2000	2100		China, China Radio Intl	7190eu	9600eu	
			11640eu	11940va	13630af	
2000	2100		Costa Rica, University Network	13750am		
2000	2100		Eqt Guinea, Radio Africa	7189af	15184al	
2000	2100	mtwhf	Germany, Bible Voice Broadcasting		6010na	

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2000	2100		Germnay, Overcomer Ministries	9755af		
2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do	
2000	2100		Indonesia, Voice of	9525as	11785as	15150al
2000	2100		Latvia, Laser Radio	9290eu		
2000	2100		Liberia, ELWA	4760do		
2000	2100		Malaysia, Radio Malaysia	7295do		
2000	2100		Namibia, Namibian BC Corp 6060af	3270af	3290af	
2000	2100		Netherlands, Radio 17810af	7120af	9895af	11655af
2000	2100	as	Netherlands, Radio	15315no	17660na	17735na
2000	2100		Nigeria, Radio/Enugu	6025do		
2000	2100		Nigeria, Radio/Ibadan	6050do		
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do	
2000	2100		Nigeria, Radio/Lagos	3326do	4990da	
2000	2100		Nigeria, Voice of	7255af	15120af	17800af
2000	2100		Papua New Guinea, NBC	4890do	9675irr	
2000	2100		Russia, Voice of	7310eu	11980eu	
2000	2100		Sierra Leone, Radio UNAMSIL	6139af		
2000	2100		Sierra Leone, SLBS	3316do		
2000	2100	vl	Solomon Islands, SIBC	5020do	9545do	
2000	2100		South Africa, AWR Africa	7170af		
2000	2100		Ugando, Radio	4976do	5026do	7196do
2000	2100		UK, BBC World Service 6190af 6195eu 15400af	3255af	6005af 9410eu	9630af 17830af 12095af
2000	2100		USA, Armed Forces Radio 5765usb 12133usb	4319usb 12579usb	5446usb 13362usb	6350usb 7507usb 10320usb 13855usb
2000	2100		USA, KAIJ Dallas TX	13815va		
2000	2100		USA, KTBN Salt Lake City UT	15590na		
2000	2100		USA, KVOH Rancho Simi CA	17775as		
2000	2100		USA, KWHR Naalehu HI	11565as		
2000	2100		USA, WBCQ Kennebunk ME 17495na	7415na	9330na	
2000	2100		USA, WBOH Newport NC	5920am		
2000	2100		USA, WEWN Birmingham AL 15745va	11530va	13615va 17595va	
2000	2100		USA, WHRA Greenbush ME	17650na		
2000	2100		USA, WHRI Noblesville IN 13760am	5745am	9495am	
2000	2100		USA, WINB Red Lion PA	13570am		
2000	2100		USA, WJIE Louisville KY	7490am	13595am	
2000	2100		USA, WMLK Bethel PA	9465eu	15265a	
2000	2100		USA, WRMI Miami FL	9955am	15725am	
2000	2100		USA, WTJC Newport NC	9370na		
2000	2100		USA, WWCR Nashville TN 13845na	9475na	12160na 15825na	
2000	2100		USA, WWRB Manchester TN	9320na	12170na	
2000	2100		USA, WYFR Okeechobee FL 17795eu	17575sa 17845eu	17750eu 18980eu	
2000	2100	vl	Vanuatu, Radio	4960do	7260do	
2000	2100		Zambia, Radio Christian Voice	4965af		
2000	2100	vl	Zimbabwe, ZBC Corp	5975do		
2005	2100		Syria, Radio Damascus	12085eu	13610eu	
2025	2045		Italy, RAI Intl	6185af	9570af	11880af
2030	2045		Thailand, Radio	9680eu		
2030	2058		Vietnam, Voice of 13740va	9725va	11630va	11775va
2030	2100	t h	Belarus, Radio Belarus Intl	7105eu	7210eu	
2030	2100		Cuba, Radio Havana	9505eu	11760eu	
2030	2100		Egypt, Radio Cairo	15375af		
2030	2100	vl	Libya, Voice of Africa	11635af		
2030	2100	DRM	Netherlands, Radio	9800na		
2030	2100		Turkey, Voice of	7170as		
2030	2100	f	UK, Wales Radio Intl	7150eu	7325eu	
2030	2100	os	USA, Voice of America 11975af 17745af	13670af	4950af 15410af	9850af 15445af
2030	2100		Uzbekistan, Radio Tashkent Intl 11905eu	5025eu	9545eu	
2040	2100	mtwhfa	Armenia, Voice of	4810eu	9960eu	
2040	2100		Vatican City, Vatican Radio	6185eu		
2045	2100		India, All India Radio 9910au	9950au	7410eu 11620eu	9445eu 11715au
2050	2100		Vatican City, Vatican Radio 5890eu	7250eu	4005eu	5890eu
2051	2100		New Zealand, Radio NZ Intl	15720pa		
2055	2100	DRM	Vatican City, Vatican Radio	9800eu		

2100 UTC - 5PM EDT / 4PM CDT / 2PM PDT

2100	2120		Turkey, Voice of	7170as		
2100	2130		Australia, ABC NT Katherine	2485do		
2100	2130		Australia, ABC NT Tennant Creek	2325do		
2100	2130		Australia, Radio 11650as	7220as 11880as	9500as 17715pa	9660pa 21740as
2100	2130		China, China Radio Intl	11640af	13630af	
2100	2130		Cuba, Radio Havana	9505eu	11760eu	
2100	2130		Hungary, Radio Budapest	6025va	11830va	
2100	2130		Serbia & Montenegro, Intl Radio	6100eu		
2100	2130		South Korea, Radio Korea Intl	3955eu		
2100	2130	DRM	Vatican City, Vatican Radio	9800eu		
2100	2159	DRM	Canada, Radio Canada Intl	9800na		
2100	2159		Germany, Deutsche Welle 15205af	9440af	11865af	
2100	2159	as	Spain, Radio Exteriar Espana	9570eu	9640eu	
2100	2200		Anguilla, Caribbean Beacon	11775am		
2100	2200		Australia, ABC NT Alice Springs	2310da	4835irr	
2100	2200		Austria, AWR Europe	15130af		
2100	2200		Bulgaria, Radio	5800eu	7500eu	
2100	2200		Canada, CBC Northern Service	9625da		
2100	2200		Canada, CFRX Toronto ON	6070do		
2100	2200		Canada, CFVP Calgary AB	6030do		
2100	2200		Canada, CKZN St John's NF	6160do		
2100	2200		Canada, CKZU Vancouver BC	6160do		
2100	2200		Costa Rica, University Network	13750am		
2100	2200		Egypt, Radio Cairo	15375af		
2100	2200		Eqt Guinea, Radio Africa	7189af	15184al	
2100	2200	mtwhf	Germany, Bible Voice Broadcasting		6010na	
2100	2200	vl	Ghana, Ghana BC Corp	3366do	4915do	
2100	2200		Guyana, Voice of	3290do	5950do	
2100	2200		India, All India Radio 9910au	9950au	7410eu 11620eu	9445eu 11715au
2100	2200		Japan, Radio 11855af	6035pa 17825pa	6055eu 21670pa	6180eu
2100	2200		Latvia, Laser Radio	9290eu		
2100	2200		Liberia, ELWA	4760do		
2100	2200		Malaysia, Radio Malaysia	7295do		
2100	2200		Namibia, Namibian BC Corp 6060af	3270af	3290af	
2100	2200	DRM	Netherlands, Radio	15150eu		
2100	2200		New Zealand, Radio NZ Intl	15720pa		
2100	2200		Nigeria, Radio/Enugu	6025do		
2100	2200		Nigeria, Radio/Ibadan	6050do		
2100	2200		Nigeria, Radio/Kaduna	4770do	6090do	
2100	2200		Nigeria, Radio/Lagos	3326do	4990do	
2100	2200		Nigeria, Voice of	7255af	15120af	17800af
2100	2200		North Korea, Voice of 15245eu	4405eu	13760eu	
2100	2200		Papua New Guinea, NBC	4890do	9675irr	
2100	2200		Sierra Leone, Radio UNAMSIL	6139af		
2100	2200		Sierra Leone, SLBS	3316da		
2100	2200		Syria, Radio Damascus	12085eu	13610eu	
2100	2200		UK, BBC World Service 5975ca 6195va 17830af	3255af 6005af 9410eu	5965as 6110as 12095ca	6190af 15400af
2100	2200		Ukraine, Radio Ukraine Intl	7420eu		
2100	2200		USA, Armed Forces Radio 5765usb 12133usb	4319usb 12579usb	5446usb 13362usb	6350usb 7507usb 10320usb 13855usb
2100	2200		USA, KAIJ Dallas TX	13815va		
2100	2200		USA, KTBN Salt Lake City UT	15590no		
2100	2200		USA, KVOH Rancho Simi CA	17775as		
2100	2200		USA, KWHR Naalehu HI	11565as		
2100	2200		USA, Voice of America 15410af	11975af 15445af	13670af	
2100	2200		USA, WBCQ Kennebunk ME 9330na	5105na 17495na	7415na	
2100	2200		USA, WBOH Newport NC	5920am		
2100	2200		USA, WEWN Birmingham AL 15745va	11530va 17595va	13615va	
2100	2200		USA, WHRA Greenbush ME	17650na		
2100	2200		USA, WHRI Noblesville IN 13760am	5745am	9495am	
2100	2200		USA, WINB Red Lion PA	13570am		
2100	2200		USA, WJIE Louisville KY	7490am	13595am	
2100	2200		USA, WMLK Bethel PA	9465eu	15265al	
2100	2200		USA, WRMI Miami FL	9955am	15725am	
2100	2200		USA, WTJC Newport NC	9370na		
2100	2200		USA, WWCR Nashville TN 13845na	9475na 15825na	12160na	
2100	2200		USA, WWRB Manchester TN	9320na	12170na	
2100	2200		USA, WYFR Okeechobee FL 17845sa	17575sa 18930eu	17795eu 18980va	
2100	2200	vl	Vanuatu, Radio	4960do	7260do	
2100	2200		Zambia, Radio Christian Voice	4965af		
2100	2200	vl	Zimbabwe, ZBC Corp	5975do		
2115	2130		UK, BBC World Service	11675ca	15390ca	
2115	2200		Egypt, Radio Cairo	9990eu		
2130	2145	tf	UK, BBC World Service	11680ca		
2130	2156		Romania, Radio Romania Intl 15285eu	7285eu 17735eu	9725eu	
2130	2200	mtwhfa	Albania, Radio Tirana Intl	7130eu	9540eu	
2130	2200		Australia, ABC NT Katherine	5025do		
2130	2200		Australia, ABC NT Tennant Creek	4910do		
2130	2200		Australia, Radio 12080va	9660pa 17715po	11650as 17585pa	11880va 21740as
2130	2200		Guom, AWR/KSDA	11850as	11980as	
2130	2200		Sweden, Radio	6065va	9880va	
2130	2200		Uzbekistan, Radio Tashkent Intl 11905eu	5025eu	9545eu	

Shortwave Guide

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

2200	2205		Syria, Radio Damascus	12085eu	13610eu
2200	2225		Israel, Kol Israel 11605va	15640va	17535va
2200	2229		Canada, Radio Canada Intl 15170am	5960am	13785am
2200	2229		Germany, Deutsche Welle	9800na	
2200	2230		Belgium, Radio Vlaanderen Intl	11635na	
2200	2230	vl	Croatia, Croatian Radio	9925sa	
2200	2230		India, All India Radio 9910au 9950au	7410eu 11620eu	9445eu 11715au
2200	2230		Liberia, ELWA 4760do		
2200	2230	smtwhf	Serbia & Montenegro, Intl Radio	7230pa	
2200	2245		Egypt, Radio Cairo 9990eu		
2200	2250		Turkey, Voice of 9830va		
2200	2259		Germany, Deutsche Welle	7115as	9720as
2200	2300		Anguilla, Caribbean Beacon	6090am	
2200	2300		Australia, ABC NT Alice Springs	2310do	4835irr
2200	2300		Australia, ABC NT Katherine	5025do	
2200	2300		Australia, ABC NT Tennant Creek	4910do	
2200	2300		Australia, Radio 11880va 17715pa 17585pa	13620pa 21740as	15320pa
2200	2300		Canada, CBC Northern Service	9625do	
2200	2300		Canada, CFRX Toronto ON	6070do	
2200	2300		Canada, CFVP Calgary AB	6030do	
2200	2300		Canada, CKZN St John's NF	6160do	
2200	2300		Canada, CKZU Vancouver BC	6160do	
2200	2300		China, China Radio Intl	9880eu	
2200	2300		Costa Rica, University Network	13750am	
2200	2300		Cuba, Radio Havana	9550am	
2200	2300		Eqt Guinea, Radio Africa	7189af	15184al
2200	2300	mtwhf	Germany, Bible Voice Broadcasting		6010na
2200	2300		Germany, Overcomer Ministries 9480sa 9695af 11950va	6045eu 9730as 12020va	6055na 9745as 11935va
2200	2300	vl	Ghana, Ghana BC Corp	3366do	4915do
2200	2300		Guyana, Voice of 3290do		
2200	2300		Malaysia, Radio Malaysia	7295do	
2200	2300		Namibia, Namibian BC Corp 6060af	3270af	3290af
2200	2300	DRM	Netherlands, Radio 15525na		
2200	2300		New Zealand, Radio NZ Intl	15720pa	
2200	2300		Nigeria, Radio/Enugu	6025do	
2200	2300		Nigeria, Radio/Ibadan	6050da	
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do
2200	2300		Nigeria, Radio/Lagos	3326do	4990do
2200	2300		Nigeria, Voice of 7255af	15120af	17800af
2200	2300		Papua New Guinea, NBC	4890do	9675irr
2200	2300		Sierra Leone, Radio UNAMSIL	6139af	
2200	2300		Sierra Leone, SLBS 3316do		
2200	2300	vl	Solomon Islands, SIBC	5020do	9545do
2200	2300		Taiwan, Radio Taiwan Intl	15600eu	
2200	2300		UK, BBC World Service 7105as 9605as 17830af	5965as 9740as	6195va 11955as 15400af
2200	2300		USA, Armed Forces Radio 5765usb 12133usb	4319usb 6350usb 12579usb	5446usb 7507usb 13362usb 13855usb 10320usb
2200	2300		USA, KAIJ Dallas TX 13815va		
2200	2300		USA, KTBN Salt Lake City UT	15590na	
2200	2300		USA, KVOH Rancho Simi CA	17775as	
2200	2300		USA, KWHR Naalehu HI	17510as	
2200	2300		USA, Voice of America 15290va 15290va	7215va 15305va	15185va 17820va
2200	2300		USA, Voice of America 15290va 15290va	7215va 15305va	15185va 17820va
2200	2300		USA, WBCQ Kennebunk ME 9330na 17495na	5105na	7415na
2200	2300		USA, WBOH Newport NC	5920am	
2200	2300		USA, WEWN Birmingham AL 13615na 15745na	9355na	9975af
2200	2300		USA, WHRA Greenbush ME	17650na	
2200	2300		USA, WHRI Noblesville IN 13760am	5745am	9495am
2200	2300		USA, WINB Red Lion PA	13570am	
2200	2300		USA, WJIE Louisville KY	7490am	13595am
2200	2300		USA, WMLK Bethel PA	15265eu	
2200	2300		USA, WRMI Miami FL	9955am	15725am
2200	2300		USA, WTJC Newport NC	9370na	
2200	2300		USA, WWCR Nashville TN 12160na 13845na	7465na	9475na
2200	2300		USA, WWRB Manchester TN 6890na	5050na	5085na
2200	2300		USA, WYFR Okeechobee FL 15770na	11740na	15695na
2200	2300	vl	Vanuatu, Radio 4960do	7260da	
2200	2300		Zambia, Radio Christian Voice	4965af	
2205	2230		Italy, RAI Intl 11895as		
2230	2257		Czech Rep, Radio Prague Intl	7345na	9415na
2230	2259		Canada, Radio Canada Intl 12035as	9525as	11810as
2245	2300		India, All India Radio 11620as 11645as	9705as	9950as 13605as

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

2300	0000		Anguilla, Caribbean Beacon	6090am	
2300	0000		Australia, ABC NT Alice Springs	2310do	4835irr
2300	0000		Australia, ABC NT Katherine	5025do	
2300	0000		Australia, ABC NT Tennant Creek	4910do	
2300	0000		Bulgaria, Radio 9700na	11700na	
2300	0000		Canada, CBC Northern Service	9625do	
2300	0000		Canada, CFRX Toronto ON	6070do	
2300	0000		Canada, CFVP Calgary AB	6030do	
2300	0000		Canada, CKZN St John's NF	6160do	
2300	0000		Canada, CKZU Vancouver BC	6160do	
2300	0000		China, China Radio Intl 13680ca	5990na	6145am
2300	0000		Costa Rica, University Network	13750am	
2300	0000		Egypt, Radio Cairo 11725na		
2300	0000	mtwhf	Germany, Bible Voice Broadcasting		6010na
2300	0000	DRM	Germany, Deutsche Welle	9800as	
2300	0000	vl	Ghana, Ghana BC Corp	3366do	4915do
2300	0000		Guyana, Voice of 3290do		
2300	0000		India, All India Radio 11620as 11645as	9705as	9950as 13605as
2300	0000		Malaysia, Radio Malaysia	7295do	
2300	0000		Namibia, Namibian BC Corp 6060af	3270af	3290af
2300	0000		New Zealand, Radio NZ Intl	15720pa	
2300	0000		Papua New Guinea, NBC	4890do	9675irr
2300	0000		Sierra Leone, Radio UNAMSIL	6139af	
2300	0000		Sierra Leone, SLBS 3316do		
2300	0000		Singapore, Mediacorp Radio	6150do	
2300	0000	vl	Solomon Islands, SIBC	5020do	9545do
2300	0000		USA, Armed Forces Radio 5765usb 12133usb	4319usb 6350usb 12579usb	5446usb 7507usb 13362usb 13855usb 10320usb
2300	0000		USA, KAIJ Dallas TX 13815va		
2300	0000		USA, KTBN Salt Lake City UT	15590na	
2300	0000		USA, KVOH Rancho Simi CA	17775as	
2300	0000		USA, KWHR Naalehu HI	17510as	
2300	0000		USA, Voice of America 12055as 13755as	9725as 15145as	11965as
2300	0000		USA, WBCQ Kennebunk ME 9330na	5105na	7415na
2300	0000		USA, WBOH Newport NC	5920am	
2300	0000		USA, WEWN Birmingham AL 13615na 15745na	9355na	9975af
2300	0000		USA, WHRA Greenbush ME	7580va	
2300	0000		USA, WHRI Noblesville IN 13760am	5745am	9495am
2300	0000		USA, WINB Red Lion PA	9320am	
2300	0000		USA, WJIE Louisville KY	7490am	13595am
2300	0000		USA, WRMI Miami FL	7385am	9955am
2300	0000		USA, WTJC Newport NC	9370na	
2300	0000		USA, WWCR Nashville TN 9475na 13845na	5070na	7465na
2300	0000		USA, WWRB Manchester TN 6890na	5050na	5085na
2300	0000		USA, WYFR Okeechobee FL 11855na 17750na	5985na 15255na	11740na
2300	0000		USA, WYFR Okeechobee FL 17750na	5985sa	11855ca
2300	0000	vl	Vanuatu, Radio 4960do	7260do	
2300	0000		Zambia, Radio Christian Voice	4965af	
2300	2306		Nigeria, Radio/Lagos	3326do	
2300	2330		Australia, Radio 9660pa 15320as 17585pa 21740as	12080va 17715as	13620as 17795va
2300	2330	vl	Croatia, Croatian Radio	9925sa	
2300	2330		Cuba, Radio Havana	9550am	
2300	2330		UK, BBC World Service 6195as 9605as 15280as	3915as 9740as	5965as 11945as 11955as
2300	2356		Romania, Radio Romania Intl 9645au	7280au 11940au	9590au
2300	2359		Germany, Deutsche Welle 15135as	7115as	9890as
2330	0000		Australia, Radio 9660pa 15320as 17585pa 17795as 21740as	12080va 17715pa	13620as 17750as
2330	0000		Lithuania, Radio Vilnius	9875na	
2330	0000		UK, BBC World Service 6035as 6195as 11955as 15280as	3915as 9605as	5965as 9740as 11945as
2330	0000		USA, Voice of America 11805as 15145as	7225as 11965as 15205as	7260as 12055as 13725as
2330	2358		Vietnam, Voice of 9840as	12020as	
2330	2359	DRM	Sweden, Radio 9800na		

Headnotes:

1. Reception of Deutsche Welle's 0400, 0500, 0600, 1600, 1900, 2000 and 2100 broadcasts have proven generally reliable for some North American listeners, so we list the programs available at these time. Consult the frequency section of the SWG for channels to try. A suitably enhanced antenna for your receiver will help in some cases.
2. **Listings for US-based independent shortwave broadcasters are limited to general interest** programming that departs from their largely primary formats of religious and political fare. Please be aware that the schedules of these stations can be quite fluid and subject to change with little or no advance notice.
3. **BBCWS stream abbreviations:** (am)=Americas; (eaf)=East Africa; (eu)=Europe/North Africa; (me)=Middle East; (waf)=West Africa. This month, during the hours that the (am) stream is unavailable, we've identified the streams and frequencies that may provide acceptable reception for some North American listeners. A suitably enhanced antenna will help.
4. **The Voice of Turkey, Voice of Nigeria, Voice of Vietnam and Channel Africa** program schedules are somewhat dated, but we have not been successful thus far in obtaining updates directly from these stations. Another request has been made and the old schedules remain here with the expectation that changes have been minimal. Apologies for any inconvenience.
5. **If you find an error in the listings, please consider it your solemn responsibility to let us know! Corrective e-mails (and postal mail) and updated program schedules are most welcome! Special thanks to John Babbis of Silver Spring, MD for providing the Voice of Greece's summer schedule.**

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

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

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

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

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

RADIO NETHERLANDS
0000 S/M News; T-A Newsline; 0005 S Wide Angle (in-depth), M Europe Unzipped; 0025 S The Week Ahead (on RN), M Insight (commentary); 0030 S Amsterdam Forum (conversations), M Vox Humana (culture, T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO NEW ZEALAND INTERNATIONAL
0000 S/A News, M-F Midday Report; 0012 S The Week in Parliament, A Focus on Politics; 0033 S Spectrum (life in NZ), A The Sampler (latest CDs).

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

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

WBCQ, Maine
5105 kHz.: 0000 M Firesign Theatre Hour (classic satire)
7415 kHz.: 0000 S Different Kind of Oldies Show, M Radio New York International, A Allan Weiner Worldwide.
9330 kHz.: 0000 S Allan Weiner Worldwide.

WHRA, Maine
7580 kHz. 0005 T-A For the People (continued).

WHRI, Indiana
7315 kHz.: 0030 S DXing with Cumbre.

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

BBC WORLD SERVICE (am)
0100 D News; 0106 S Play of the Week (radio theatre), M The Ticket (global arts survey), T Health Matters, W Go Digital, H Discovery (science), F One Planet (ecology), A Science in Action, 0132 T Quiz or panel game, W Music Review, H/A Westway, F The Word (writing & writers) [exc. 25th, World Book Club (discussion)]; 0145 H Heart & Soul (beliefs & values), A What's the Problem (advice).

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

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

RADIO AUSTRIA INTERNATIONAL
0105 S/M Insight Central Europe; 0115 T-A Report from Austria; 0125 S/M Listener Letters; 0135 S/M Insight Central Europe; 0145 T-A Report from Austria; 0155 S/M Listener Letters.

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

RADIO CANADA INTERNATIONAL
0100 S/M News, T-A The World at Six (domestic main evening newscast); 0105 S Business Sense, M Maple Leaf Mailbag (w/CIDX report bimonthly); 0135 S/A Sci-Tech File, M/H Spotlight: (arts & culture), T Media Zone (journalists discuss), W Maple Leaf Mailbag (w/CIDX report bimonthly), F Business Sense.

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

RADIO NETHERLANDS
0100 S/M News; T-A Newsline; 0105 S Wide Angle (in-depth), M Europe Unzipped; 0125 S The Week Ahead (on RN), M Insight (commentary); 0130 S Amsterdam Forum (conversations), M Vox Humana (culture), T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO JAPAN - NHK WORLD
0100 D News; 0110 S Pop Joins the World, M-F Songs for Everyone, A Hello from Tokyo (listener contact); 0115 M-F 44 Minutes (magazine).

RADIO NEW ZEALAND INTERNATIONAL
0100 S/A RNZ News, M-F Pacific Regional News; 0106 S At the Movies, M-F Wayne's Music (favorites), A Your Money; 0130 S Bookmarks, A Saturday Comedy Zone.

RADIO PRAGUE
0100 D News; 0105 S Magazine, M Mailbox, T-A Current Affairs; 0110 S Letter from Prague, M ABC of Czech (the language), W Czech Science, H Witness (eyewitness to history), A The Arts; 0115 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Economic Report, A Stepping Out (Prague nightlife).

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

VOICE OF RUSSIA
0100 D News; 0111 S/M Moscow Mailbag, T-A Commonwealth Update; 0130 D News in Brief; 0132 S Moscow Yesterday & Today, M Timelines, T Folk Box, W Jazz Show, H Musical Portraits, F Moscow Calling, A Christian Message from Moscow; 0146 F Music At Your Request; 0154 H Russia: People & Events.

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

RADIO SWEDEN
0130 S Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); 0145 T Sports Scan, W Close Up (profiles of Swedes-1st), F Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

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

WBCQ, Maine
5105 kHz.: 0100 M Tesla's Ear.
7415 kHz.: 0100 S Marion's Attic (vintage recordings), M Radio New York International (cont'd), T The Secular Bible Study, A Tasha Takes Control.
9330 kHz.: 0100 M Odin Lives (old Norse legends/music)

WHRA, Maine
7580 kHz.: 0105 S Turn Your Radio On (southern gospel music).

WHRI, Indiana
7315 kHz.: 0105 S Turn Your Radio On (southern gospel music).

0200 UTC/ 10pm E/7pm P - Page 46 Freqs

BBC WORLD SERVICE (am)
0200 D The World Today; 0232 S Global Business, M World Business Review, T-A World Business Report; 0245 M Instant Guide (background), T/W/F/A Analysis, H From Our Own Correspondent.

RADIO AUSTRALIA
0200 D News; 0205 S Margaret Throsby (interviews and music), A Background Briefing (documentary); 0210 M-F The World Today (ABC Radio flagship news program); 0255 T-F Stock Market Report, A Reporter's Notebook.
[Special service: 0205 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only.]

RADIO BULGARIA
0200 D News; 0210 S Views Behind the News, M Folk Studio (Bulgarian folk music), T-A Events and Developments; 0220 T Sports, W-S Timeout for Music; 0230 W-M Keyword Bulgaria (Bulgaria and things Bulgarian); 0240 S Radio Bulgaria Calling (for radio hobbyists), M Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places), T Answering Your Letters, W Magazine Economy, H The Way We Live, F History Club, A Arts and Artists.

RADIO HABANA CUBA
0200 D International News; 0210 M From Habana (Cuban musicians), T-S National News; 0215 T-S Reports and music; 0230 M The Jazz Place or Top Tens, T-S News Bulletin; 0235 S World of Stamps, T-A Reports and music; 0250 S Cuban music.

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

RADIO NEW ZEALAND INTERNATIONAL
0200 D RNZ News; 0205 S Feature, M-F In Touch with New Zealand (music, interviews, variety), A Eureka! (science)*; 0230 A Health Matters [or] Environment Matters*.
[*may be preempted by live sport]

RADIO ROMANIA INTERNATIONAL
0200 D Radio Newsreel; 0210 S The Week, M Focus, T-A Commentary; 0215 S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate), A Challenge for the Future or Terra 21st Century [programs alternate]; 0220 S RRI Encyclopedia, T Political Flash, W European Horizons; 0225 S Roots (culture/traditions), T/H Business Update, W Tourist News, F Listeners' Letterbox, A Practical Guide; 0230 S Radio Pictures, M Romanian Itineraries, H Visit Romania, A Cultural Survey; 0235 S Romanian Itineraries, M Listeners' Letterbox, T Performing Arts, W Talking Points or Living Romania [programs alternate], H Partners in a Changing World, F Guest at the Microphone, A Over Coffee (with artists); 0240 S, Bucharest Along the Centuries, T Pages of Romanian Literature, M/F Skylark (folk music), H Stage and Screen, A Off Bucharest; 0245 S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Folk Music Box; 0250 M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

RADIO TAIWAN INTERNATIONAL
0200 D News; 0210 S News Talk, M Taiwan Economic Journal, T Kaleidoscope (society), W On the Job, H Trends, F Politics Today, A Bookworm; 0220 S Taipei Magazine, M Discover Taiwan, T Mailbag Time, W Jade Bells & Bamboo Pipes (traditional music), H People, F Culture Express, A Stage, Screen & Studio; 0230 M Asia Pacific (from R. Australia); 0235 S Sound Postcard, H Wisdom.com, F New Music Lounge, A Groove Zone; 0240 S Hakka World (indigenous culture), T Sound Postcard; 0245 T Let's Learn Chinese, W Life Unusual (the offbeat), H Instant Noodles (the weird).
[This schedule also airs at 0700 for western North America.]

VOICE OF RUSSIA
0200 D News; 0211 M Sunday Panorama, T-S News & Views; 0230 D News in Brief; 0232 S Songs from Russia, M/F Russian by Radio, T Kaleidoscope (Russian events), W Musical Portraits, H Moscow Yesterday & Today, A Audio Book Club (Russian lit.); 0246 S You Write to Moscow; 0254 S/W Russia: People & Events.

WBCQ, Maine
5105 kHz.: 0200 M Squad 51.
7415 kHz.: 0200 S Pan Global Wireless, M Radio New York International (cont'd).

WHRA, Maine
7580 kHz.: 0230 S World Harvest Country Style, M DXing with Cumbre.

WRMI, Florida
7385 kHz: 0230 S Voice of the NASB (US sw broadcasters consortium).

WWCR, Tennessee
3210 kHz.: 0200 M Cyber Line (digital communications).
5070 kHz.: 0200 S DX Partyline; 0230 S World of Radio.

RADIO BUDAPEST
0230 D News; 0235 S Insight Central Europe; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gatepost (letters), T-F Hungary Today (current events magazine), A The Week; 0250 A DX Corner.

RADIO SWEDEN
0230 S Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); 0245 T Sports Scan, W Close Up (profiles of Swedes-1st), F Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

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

0300 UTC/ 11pm E/8pm P - Page 46 Freqs

BBC WORLD SERVICE (am)
0300 D News; 0306 S From Our Own Correspondent, M Talking Point (phone-in)[taped S 1406], T-F Outlook (magazine), A Pick of the World (BBC's best); 0332 S The Interview (trends); 0345 M-F Off the Shelf (book readings), A Write On (letters).

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

RADIO AUSTRALIA
0300 D News; 0305 S Australian Express (magazine), A Rural Reporter; 0310 M-F Regional Sports Report; 0320 M-F Life Matters (social issues); 0330 S Jazz Notes, A Australian Country Style; 0354 Heywire (young rural Australian opinion).
[Special service: 0305 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only.]

RADIO HABANA CUBA
0300 D International News; 0310 M Weekly Review, T-S National News; 0315 T-S Viewpoint; 0330 M Reports & Music, T-S News Bulletin; 0335 T-A Time Out (sports); 0340 S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; 0350 M Breakthrough (science report).

RADIO NEW ZEALAND INTERNATIONAL
0300 S/A* RNZ News, M-F Pacific Regional News; 0305 S RPM (documentaries)*, A Home Grown (NZ music)*; 0308 M-F Dateline Pacific; 0330 M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent, A Musical Chairs (artist spotlight)*.
[*may be preempted by live sport]

RADIO PRAGUE
0300 D News; 0305 S Magazine, M Mailbox, T-A Current Affairs; 0310 S Letter from Prague, M ABC of Czech (the language), W Czech Science, H Witness (eyewitness to history), A The Arts; 0315 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Economic Report, A Stepping Out (Prague nightlife).

RADIO TAIWAN INTERNATIONAL
0300 D News; 0310 S News Talk, M Taiwan Economic Journal, T Kaleidoscope (society), W On the Job, H Trends, F Politics Today, A Bookworm; 0320 S Taipei Magazine, M Discover Taiwan, T Mailbag Time, W Jade Bells & Bamboo Pipes (traditional music), H People, F Culture Express, A Stage, Screen & Studio; 0330 M Asia Pacific (from R. Australia); 0335 S Sound Postcard, H Wisdom.com, F New Music Lounge, A Groove Zone; 0340 S Hakka World (indigenous culture), T Sound Postcard; 0345 T Let's Learn Chinese, W Life Unusual (the offbeat), H Instant Noodles (the weird).
[This schedule also airs at 0700 for western North America.]

RADIO UKRAINE INTERNATIONAL
0300 D News; 0310 S Ukrainian Diary (weekly review), M Music from Ukraine, T-A Ukraine Today (magazine); 0315 S The Whole World on the Radio Dial (DX program); 0330 S Hello From Kiev (listener letters/music), M Roots (culture & education); 0345 T-A Closeup (current issues).

Shortwave Guide

VOICE OF AMERICA, Africa Service
0300 M-F Daybreak Africa (morning newsmagazine); 0330 M-F News Headlines; 0333 M-F Business Report; 0345 M-F Dateline (documentary); 0355 M-F Opinion Roundup.

VOICE OF RUSSIA
0300 D News; 0311 S Music & Musicians, M This is Russia, T Musical Portraits, W/A Moscow Mailbag, H Science Plus, F Newmarket; 0330 D News in Brief; 0332 M Moscow Calling, T/H/A The River of Time, W Guest Speaker, F Russian history/culture; 0347 W Ladies of Character.

VOICE OF TURKEY
0300 D News; 0310 D Press Review; 0315 S Outlook, M Tunes Spanning Centuries, T Last Week, W Live From Turkey, H Review of the Foreign Media, F Big Powers & the Armenian Problem, A Archaeological Settlements in Turkey; 0320 S The Stream of Love or DX Corner, T Hues & Colors of Anatolia, H Letterbox; 0325 M/A Music, F In the Wake of a Contest; 0330 S/T Music; 0335 S Turkish Arts, M Turks in the Mirror of Centuries, T From Past to Present, H Turkey's Off the Beater Track Sites, F The Culture Parade, A The Travel Itinerary of Anatolia.

WBCQ, Maine
5105 kHz.: 0300 M The Pirate's Cove.
7415 kHz.: 0300 S Michael Ketter Show (satire/free form), M Radio New York International (cont'd).
9330 kHz.: 0300 S Radio Timtron Worldwide.

WHRI, Indiana
7315 kHz.: 0302 S 20 The Countdown Magazine (Christian rock charts);
5745 kHz.: 0300 S Powersource Top 20 (Christian rock music)

WRMI, Florida
7385 kHz.: 0300 S World Radio Network (relay), M VCS Radio (Christian hard rock).

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

0400 UTC/ 12am E/9pm P - Page 47 Freqs

BBC WORLD SERVICE (am)
0400 D World Briefing; 0432 S Letter (from a global correspondent), M-F The World Today, A Reporting Religion; 0445 S Instant Guide (backgrounder).

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

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

RADIO AUSTRALIA
0400 D News; 0405 S The Europeans, A Books & Writing; 0410 M-F Margaret Throsby (interviews and music); 0430 S The Chat Room (interviews); 0435 A Book Talk; 0455 M-F Perspective (commentary).
[Special service: 0405 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only.]

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

RADIO NETHERLANDS
0400 S/M News; T-A Newsline; 0405 S Wide Angle (in-depth), M Europe Unzipped; 0425 S The Week Ahead (on RN), M Insight (commentary); 0430 S Amsterdam Forum (conversations), M Vox Humana (culture), T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO NEW ZEALAND INTERNATIONAL
0400 S/A RNZ News; 0405 S Sunday Drama* (radio plays), M-F In Touch with NZ (continues from 0205), A Home Grown (cont'd from 0305).

RADIO ROMANIA INTERNATIONAL
0400 D Radio Newsreel; 0410 S The Week, M Focus, T-A Commentary; 0415 S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate), A Challenge for the Future or Terra 21st Century [programs alternate]; 0420 S RRI Encyclopedia, T Political Flash, W European Horizons; 0425 S Roots (culture/traditions), T/H Business Update, W Tourist News, F Listeners' Letterbox, A Practical Guide; 0430 S Radio Pictures, M Romanian Itineraries, H Visit Romania, A Cultural Survey; 0435 S Romanian Itineraries, M Listeners' Letterbox, T Performing Arts, W Talking Points or Living Romania [programs alternate], H Partners in a Changing World, F Guest at the Microphone, A Over Coffee (with artists); 0440 S, Bucharest Along the Centuries, T Poges of Romanian Literature, M/F Skylark (folk music), H Stage and Screen, A Off Bucharest; 0445 S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Folk Music Box; 0450 M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

RVi, Belgium
0400 S Music from Flanders, M Radio World, T-A News; 0404 T-A Flanders Today (incl. press review, reports & CD of the Week); 0408 M Tourism in Flanders; 0414 M Brussels 1043 (letters).

VOICE OF AMERICA, Africa Service
0400 M-F News & Reports; 0415 M-F Focus (a topic in-depth); 0423 M-F Sports; 0430 M-F Daybreak Africa (morning newsmagazine).

VOICE OF RUSSIA
0400 D News; 0411 S/M Musical Portraits, T/F Moscow Mailbag, W/A Science Plus, H Newmarket (business); 0430 D News in Brief; 0432 S Kaleidoscope, M Audio Book Club, T Music Around Us, W Moscow Yesterday & Today, H Folk Box, F Audio Book Club (Russian lit.), A Timelines; 0447 T Music At Your Request.

WBCQ, Maine
7415 kHz.: 0400 S Tom & Darryl (electronic media), M-A Amos 'n Andy; 0415 M World of Radio, T Odin Lives (old Norse myths/music).

WHRI, Indiana
7315 kHz.: 0400 S 20 The Countdown Magazine (continued).
5745 kHz.: 0400 S Powersource Top 20 (continued).

WRMI, Florida
7385 kHz.: 0400 S World Radio Network (relay), M Wavescan; 0430 M World Radio Network (relay).

WWCR Tennessee
5070 kHz.: 0400 S Cyber Line (digital communications).

0500 UTC/ 1am E/10pm P - Page 47 Freqs

BBC WORLD SERVICE (eu) - 6195, 9410, 12095
0500 D The World Today; 0532 S Reporting Religion, A People & Politics.

BBC WORLD SERVICE (waf) - 7160
0500 D The World Today; 0529 D African News; 0532 S African Perspective (life in Africa), M-F Network Africa, A African Quiz (current events-1st A) [or] This Week & Africa (exc. 1st A).

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

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

DEUTSCHE WELLE
0500 News; 0505 S Religion & Society, M Hard to Beat (sport), T-A Newslink Africa; 0515 S German by Radio, M Inspired Minds; 0530 S Africa This Week, M Hits in Germany [or] Melody Time, T A World of Music, W Arts on the Air, H Living in Germany, F Cool (youth culture), A Focus on Folk; 0545 H Europe in Capitals.

RADIO AUSTRALIA
0500 D News; 0505 S All in the Mind (the brain), A Australian Express (magazine); 0510 M-F Pacific Beat (Pacific islands magazine w/sports @ 0530); 0530 S The Ark (religious history), A All in the Mind; 0535 M-F On the Mat (regional issues); 0549 S The Pulse (Aussie music now).
[Special service: 0505 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only.]

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

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

RADIO NEW ZEALAND INTERNATIONAL
0500 S/A RNZ News; M-F Checkpoint; 0510 S Religion feature or series, A Tagata O Te Moana (Pacific magazine); 0540 S Jazz Spotlight

VOICE OF AMERICA, Africa Service
0500 M-F News & Reports; 0523 M-F Sports Report; 0530 M-F News Headlines; 0533 M-F Business Report; 0545 M-F Dateline (documentary); 0555 M-F Opinion Roundup.

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

WBCQ, Maine
7415 kHz.: 0500 S Juliet's Wild Kingdom.

WHRI, Indiana
7315/5745 kHz.: 0500 A DXing with Cumbre; 0530 A World Harvest Country Style.

WRMI, Florida
7385 kHz.: 0500 S/M World Radio Network (relay).

WWCR, Tennessee
5070 kHz.: 0530 M-F Natural Health Clinic.

0600 UTC/ 2am E/11pm P - Page 48 Freqs

BBC WORLD SERVICE (eu) - 9410, 12095
0600 D The World Today; 0632 S The Interview (trends), A World Football.

BBC WORLD SERVICE (waf) - 7120
0600 D The World Today; 0629 S News Update, M-A African News; 0632 S World Business Review, M-F Network Africa, A African Quiz (1st A) [or] This Week & Africa; 0645 S The Instant Guide (backgrounder).

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

DEUTSCHE WELLE
0600 D News; 0605 S Inside Europe, M Mailbag, T-A Newslink Africa; 0630 T Insight (international issues), W World in Progress (development), H Money Talks (business), F Living Planet (environment), A Spectrum (sci-tech); 0645 T Business German.

RADIO AUSTRALIA
0600 D News; 0605 S The Buzz (sci-tech), A Verbatim (oral histories); 0610 M-F Regional Sports Report; 0620 M Ockham's Razor (science opinion), T In Conversation (about science), W Lingua Franca (about language), H The Ark (religious history), F Inside Out (Pacific views); 0630 S Hit Mix (pop/rock), A In Conversation; 0635 M Hit Mix, T Music Deli (diverse world/folk),W Jazz Notes, H Australian Country Style.
[Special service: 0605 S/A Grandstand (live sports action) on 9660, 12080, 15240, 17750 kHz. only. (continues to 0800)]

RADIO HABANA CUBA
0600 D International News; 0610 M From Habana (Cuban musicians), T-S National News; 0615 T-S Reports and music; 0630 M The Jazz Place or Top Tens, T-S News Bulletin; 0635 S World of Stamps, T-A Reports and music; 0650 S Cuban music.

RADIO JAPAN - NHK WORLD
0600 D News; 0610 S Weekend Japanology (Japanese life), M-F Songs for Everyone, A Pop Joins the World; 0615 M-F Asian Top News (headlines from region's radio); 0625 M Japan Musicscape, T Basic Japanese for You, W Japan Music Travelogue, H Brush Up Your Japanese, F Music Beat; 0654 S Japan Music Scene.

RADIO NEW ZEALAND INTERNATIONAL
0600 D RNZ News; 0607 S Mana Korero (Maori magazine), M-F Worldwatch & Pacific Report, A The Mix ('live' music acts); 0630 M Letter (from a global correspondent); 0645 M-F Storytime.

VOICE OF AMERICA, Africa Service
0600 S/A News & Reports, M-F Daybreak Africa (morning newsmagazine); 0623 S/A Sports; 0630 S/A News Headlines; 0633 S/A Main Street (life in America).

VOICE OF NIGERIA
0600 D Nigeria/Africa/World News (magazine); 0630 S In the News, A News Maker; 0645 A Window on Abuja.

WBCQ, Maine
7415 kHz.: 0600 M Joe Mazza Show (cont'd)

WHRI, Indiana
7315 kHz.: 0605 A Turn Your Radio On (southern gospel music).
5745 kHz.: 0630 S DXing with Cumbre.

WRMI, Florida
7385 kHz.: 0600 S/M World Radio Network (relay)[continues to 0900].

WWCR, Tennessee
3210 kHz.: 0630 S World of Radio.

1000 UTC/6am E/3am P - Page 49 Freqs

BBC WORLD SERVICE (am)
1000 S/A News, M-F World Briefing; 1006 S From Our Own Correspondent, A Documentary; 1032 S In Praise of God (worship service), M-F World Business Report, A World Football; 1045 M-F Sports Roundup.

RADIO AUSTRALIA
1000 D News; 1005 S Keys to Music (enjoying the classics), M-F Asia Pacific (regional current affairs), A Background Briefing; 1030 M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor; 1055 A Correspondent's Notebook.

RADIO JAPAN - NHK WORLD
1000 D News; 1010 S Weekend Japanology, M-F Songs for Everyone, A Hello from Tokyo (listener contact); 0015 T-A 44 Minutes (magazine); 0054 M Japan Music Scene.

RADIO NEW ZEALAND INTERNATIONAL
1000 D News; 1012 S Mediawatch, M-F Late Edition (the day's news), A Deep Purple (relaxing music/nostalgia); 1035 S Sunday Supplement (NZ opinions).

WHRI, Tennessee
9495 kHz.: 1005 S Turn Your Radio On (southern gospel music).

WWCR, Tennessee
15825 kHz.: 1000 M-F Worldwide Country Radio; 1015 S Ask WWCR.
5070 kHz.: 1010 S A View from Europe; 1030 A World of Radio

1100 UTC/ 7am E/4am P - Page 50 Freqs

BBC WORLD SERVICE (am)
1100 D World Briefing; 1105 M-F Caribbean Morning Report; 1110 M-F Sports Caribbean; 1115 M-F Caribbean Magazine; 1120 D British News; 1132 S Letter (from a global correspondent), M Instant Guide (background), TWFA Analysis, H From Our Own Correspondent; 1145 A-H Sports Roundup, F Football Extra.

CHINA RADIO INTERNATIONAL
1100 D Real Time Beijing (world/national/city news, business, sports, press, sci-tech, culture, show-biz, music, features); 1115 S China Beat (popular music), A China Roots (traditional music).

HCJB ECUADOR
1100 S Let My People Think, M-F Insight for Living, A Down Gilead Lane; 1130 S Renewing Your Mind, M-F Family Life Today, A Adventures in Odyssey.

RADIO AUSTRALIA
1100 D News; 1105 S Sunday Profile (current events), M-A Asia Pacific (regional current affairs); 1130 S Speaking Out (Aboriginal affairs), M-H Bush Telegraph (rural life), F The Chat Room (interviews), A All in the Mind (the brain).

RADIO JAPAN - NHK WORLD
1100 D News; 1110 S Hello from Tokyo (listener contact), M-F Songs for Everyone, A Pop Joins the World; 1115 M-F Asian Top News (headlines from region's radio); 1125 M Japan Musicscape, T Basic Japanese for You, W Japan Music Travelogue, H Brush Up Your Japanese, F Music Beat.

RADIO NETHERLANDS
1100 S/A News; M-F Newsline; 1106 S Wide Angle, A Europe Unzipped; S The Week Ahead, A Insight (comment); 1130 S Vox Humana (culture), M Research File (science) T EuroQuest (Europe in context), W Weekly Documentary, H Dutch Horizons, F The Good Life (development issues), A Amsterdam Forum (conversations).

RADIO NEW ZEALAND INTERNATIONAL
1100 S/A RNZ News, M-F Pacific Regional News; 1105 S/A Forces Programme (for NZ personnel serving in PNG & E. Timor); 1108 M-F Dateline Pacific; 1130 M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.

RADIO SWEDEN
1130 S In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); 1145 M Sports Scan, T Close Up (profiles of Swedes-1st), H Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

WWCR, Tennessee
5070 kHz.: 1110 A A View from Europe.

1200 UTC/ 8am E/5am P - Page 50 Freqs

BBC WORLD SERVICE (am)
1200 D Newshour; 1205 M-F Caribbean Business; 1210 M-F Caribbean Morning Report 2nd Edition; 1220 M-F Caribbean Magazine; 1230 M-F Newshour (cont'd.).

HCJB ECUADOR
1200 S Moody Presents, M-F Morning in the Mountains, A Hour of Decision; 1215 M-F Proclaim; 1230 S The Living Word, M-F Renewing Your Mind, A DX Partyline.

RADIO AUSTRALIA
1200 D News; 1205 S The Spirit of Things (spiritual matters), M-H Late Night Live (discussion & interviews), F Sound Quality (innovative music), A The Music Show; 1255 S The Pulse (Aussie music now).

RADIO CANADA INTERNATIONAL
1200 M-F News; 1205 M-F The Current (current affairs-joined in progress).

RADIO KOREA INTERNATIONAL
1200 D News; 1210 S Korean Pop Interactive (requests), M-F News Commentary, A Worldwide Friendship (letters, DX news); 1215 M-F Seoul Calling (magazine).
1230 S Korean Pop Interactive (cont'd), M-F Seoul Calling (cont'd), A Worldwide Friendship (cont'd); 1245 M Korea Today & Tomorrow (peninsula issues), T Korean Kaleidoscope (Korean society), W Wonderful Korea (tourism), H Seoul Report (interviews).

RADIO NEW ZEALAND INTERNATIONAL
1200 S-F RNZ News, A Forces Programme (cont'd.); 1205 S Sportsworld (recap magazine), M-F Late Edition.

RADIO SWEDEN
1230 S In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe

(Europe magazine-1st week)/Sweden Today (2nd)/ Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); 1245 M Sports Scan, T Close Up (profiles of Swedes-1st), H Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

WHRI, Indiana
9495 kHz.: 1230 A DXing with Cumbre.
9840 kHz.: 1205 A Turn Your Radio On (southern gospel music).

WRMI, Florida
15725 kHz.: 1200 A World Radio Network (relay)

1300 UTC/ 9am E/6am P - Page 51 Freqs

BBC WORLD SERVICE (am)
1300 D News; 1306 S From Our Own Correspondent (background), M-F Outlook (magazine), A Pick of the World (BBC's best); 1332 S In Praise of God; 1345 M-F Off the Shelf (book readings), A Write On (letters).

CHINA RADIO INTERNATIONAL
1300 D News & Reports; 1310 S Report on Developing Countries; 1315 A Cutting Edge (sci/tech); 1320 S CRI Roundup; 1330 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA
1300 D News; 1305 S Encounter (religion in Australia), M-F The Planet (diverse music from around the world), A The Music Show (cont'd); 1355 S Perspective (commentary).

RADIO CANADA INTERNATIONAL
1300 D News; 1305 S The Sunday Edition, M-F Sounds Like Canada (Canadian magazine); A The House (Canadian politics).

RADIO NEW ZEALAND INTERNATIONAL
1300 S/A RNZ News, M-F Pacific Regional News; 1305 S Tagata o te Moana, A New Music Releases; 1308 M-F Dateline Pacific; 1330 M Mailbox (letters & DX news) or RNZI Talk (station info), T Tradewinds (Pacific commerce), W The World in Sport, H Pacific Correspondent, F Sports Story.

WHRA, Maine
17560 kHz.: 1330 S World Harvest Country Style.

WHRI, Indiana
15105 kHz.: 1330 S World Harvest Country Style.

WRMI, Florida
15725 kHz.: 1300 A World Radio Network (relay).

WWCR Tennessee
15825 kHz.: 1300 M-F Worldwide Country Radio.

1400 UTC/ 10am E/7am P - Page 51 Freqs

BBC WORLD SERVICE (am)
1400 D News; 1406 S Talking Point (live phone-in), M/W Documentaries, T Masterpiece (arts ideas), H Assignment, F Sports International, A Sportsworld (live action); 1432 M Music Feature, T White Label (new music), W Charlie Gillett (world music), H Music Biz, F John Peel (eclectic).

CHINA RADIO INTERNATIONAL
1400 D News & Reports; 1410 S Report on Developing Countries; 1415 A Cutting Edge (sci/tech); 1420 S CRI Roundup; 1430 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA
1400 D News; 1405 S The Science Show, M-F PM (domestic early evening newscast), A Background Briefing (documentaries); 1455 S Business Weekend, M-F Perspective (informed opinion), A Correspondent's Notebook.

RADIO CANADA INTERNATIONAL
1400 D News; 1405 S The Sunday Edition (cont'd.), M-F Sounds Like Canada (cont'd., including 1430 F C'est La Vie (life in French Canada), 1445 T-F Out Front (first person views of life), A Vinyl Cafe.

RADIO NEW ZEALAND INTERNATIONAL
1400 D RNZ News; 1405 S In a Mellow Tone, M-F Wayne's Music, A Spiritual Outlook.

WRMI, Florida
15725 kHz.: 1400 S/A World Radio Network (relay).

1500 UTC/ 11am E/8am P - Page 52 Freqs

BBC WORLD SERVICE (am)
1500 D News; 1506 S Documentary, M Health Matters, T Go Digital, W Discovery (science), H One Planet (ecology), F Science in Action, A Sportsworld (live action from 1406); 1532 S In Praise of God (worship service), M Quiz [or] panel game, T Music Review, W/F Westway (drama serial), H The Word (writers & writing) [exc. 24th, World Book Club (discussion)]; 1545 W Heart & Soul (beliefs & values), F What's the Problem? (advice).

CHINA RADIO INTERNATIONAL
1500 D News & Reports; 1510 S Report on Developing Countries; 1515 A Cutting Edge (sci/tech); 1520 S CRI Roundup; 1530 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA
1500 D News; 1505 S The National Interest, M-F Asia Pacific (regional current affairs), A Educational series; 1530 M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor; 1555 S Perspective (informed opinion), A Business Weekend.

RADIO AUSTRIA INTERNATIONAL
1505 S/A Insight Central Europe; 1515 M-F Report from Austria; 1525 S/A Listener Letters; 1535 S/A Insight Central Europe; 1545 M-F Report from Austria; 1555 S/A Listener Letters.

RADIO CANADA INTERNATIONAL
1500 D News; 1505 S The Sunday Edition (cont'd.), A Quirks & Quarks (science).

RADIO JAPAN
1500 D News, 1505 S Hello from Tokyo (letters), M-F Songs for Everyone, A Pop Joins the World; 1515 M-F Asian Top News (reports from region's radio); 1525 M Japan Musicscape, T Basic Japanese for You, W Japan Music Travelogue, H Brush Up Your Japanese, F Music Beat.

RADIO NEW ZEALAND INTERNATIONAL
1500 S/A RNZ News, M-F Pacific Regional News; 1505 S/A Forces Radio; 1508 M-F Dateline Pacific; 1530 M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.

WHRI, Indiana
15105 kHz.: 1530 S DXing with Cumbre.
13760 kHz.: 1500 A DXing with Cumbre.

WRMI, Florida
15725 kHz.: 1500 S/A World Radio Network (relay).

1600 UTC/ 12pm E/9am P - Page 52 Freqs

BBC WORLD SERVICE (am)
1600 S/A News, M-F Europe Today; 1606 S Sunday Sportsworld, A Sportsworld (live action from 1406).

DEUTSCHE WELLE
1600 D News; 1605 S Mailbag, M-F Newslink Asia, A Hard to Beat (sport); 1615 A German by Radio; 1630 M Insight (international issues), T World in Progress (development), W Money Talks (business), H Living Planet (environment), F Asia This Week, A Cool! (youth culture); 1645 M Europe in Capitals (city profile).

RADIO AUSTRALIA
1600 D News; 1605 S Books & Writing, M-F Bush Telegraph (rural/outback Australia), A Hindsight (social history); 1635 S Book Talk.

VOICE OF AMERICA, Africa Service
1600 S/A Nightline Africa (weekend newsmagazine), M-F News & Reports; 1615 M-F Focus (a topic in-depth); 1623 M-F Sports; 1630 M-F Africa World Tonight.

VOICE OF GREECE
1600 A Hellenes Around the World (Greek popular & traditional music, letters).

WBCQ, Maine
17495 kHz.: 1600 A Allan Weiner Worldwide.

WHRI, Indiana
15105 kHz.: 1600 A Sports Spectrum Live

WRMI, Florida
15725 kHz.: 1600 A World Radio Network (relay).

WWCR, Tennessee
15825 kHz.: 1600 S Latin Catholic Mass, M-F Worldwide Country Radio.

1700 UTC/ 1pm E/10am P - Page 53 Freqs

BBC World Service (eaf) - 21470
1700 D News; 1706 D Focus on Africa; 1745 S-H Sports Roundup, F Football Extra.

BBC World Service (me) - 12095, 15565
1700 D World Briefing; 1720 D British News; 1732 S Instant Guide (backrounder), M-F World Business Report, A The Interview (trends); 1745 S-H Sports Roundup, F Football Extra.

CHANNEL AFRICA, South Africa
1700 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Tam Tam Express (governance in Africa).

RADIO AUSTRALIA
1700 D News; 1705 S Sound Quality (innovative music), M-F Australia Talks Back (phone-in), A The Spirit of Things (spiritual matters).

RADIO JAPAN - NHK WORLD
1700 D News; 1710 S Pop Joins the World, M-F Songs for Everyone, A Hello from Tokyo (listener contact); 1715 M-F 44 Minutes (feature magazine).

VOICE OF AMERICA, Africa Service
1700 S Reporters' Roundtable, M-A News; 1706 M-F Talk to America (global phone-in), A News & Reports; 1720 A Sports; 1730 S Music Time in Africa; 1733 A Press Conference USA.

ALL INDIA RADIO
1745 M Light Music, T Karnatak Instrumental Music, W Folk Songs, H-S Devotional Music.

WBCQ, Maine
17495 kHz.: 1700 A Zombo's Mondo Record Party.

WRMI, Florida
15725 kHz.: 1700 S/A World Radio Network (relay).

WWCR, Tennessee
15825 kHz.: 1715 W Ask WWCR (exc. 2nd/3rd W).
12160 kHz.: 1710 S A View from Europe; 1730 S Ask WWCR.

1800 UTC/ 2pm E/11am P - Page 53 Freqs

1800 D News; 1810 D Commentary; 1815 W Instrumental Music—Old Masters, H-T Hindustani Classical Vocal Music; 1830 S Sports Roundup (1st wk)/Feature (2nd)/Film Story (3rd)/Discussion (4th), M Faithfully Yours (letters), T Cultural Talk, W Book Review (1st)/Window on Science (2nd/4th)/Times & Lives (biography-3rd), H General Talk, F Focus (magazine-1st)/Horizon (literature-2nd/4th)/Music (3rd), A For Youth (1st)/Indian Classics (books-2nd)/From the Archives (3rd)/Quiz Time (4th); 1840 M DXers Corner (2nd/4th), T Film Songs of Yesteryears, W Hits from Films, H Light Karnatak Music, F Light Instrumental Music; 1850 M Film Songs, F Light Music.

BBC WORLD SERVICE (eaf) - 21470
1800 S/A News, M-F World Briefing; 1806 S From Our Own Correspondent, A The Ticket (global arts revue); 1820 M-F British News; 1832 S Global Business (trends), M/F Fast Track (African sport), T Postmark Africa (answers), W Africa Live (phone-in), H Artbeat.

BBC WORLD SERVICE (me) - 12095
1800 D News; 1806 S Pick of the World (BBC's best), M/W Documentaries, T Masterpiece (cultural ideas), H Assignment (one topic), F Sports International (magazine); 1832 M Music Feature, T White Label (new music releases), W Charlie Gillett (world music), H The Music Biz, F John Peel (electic music); 1845 S Write On (letters).

RADIO AUSTRALIA
1800 D News; 1805 S-H Pacific Beat (Pacific islands magazine), F Pacific Review, A Best of 'Late Night Live' (interviews); 1830 F Country Breakfast (rural life); 1835 M-F On the Mat (regional issues).

VOICE OF AMERICA, Africa Service
1800 S/A News & Reports, M-F Africa World Tonight; 1805 S On the Line (US foreign policy), A Our World (science magazine); 1830 S/A News Headlines, W Straight Talk Africa (continental phone-in); 1833 S/A On the Line (US foreign policy); 1855 S/A Government Editorial.

WBCQ, Maine
17495 kHz.:1800 A Radio Timtron Worldwide.

WHRI, Indiana
9495 kHz.: 1800 A World Harvest Country Style; 1805 S Pat Boone (variety), M-F Chuck Harder (populist political phone-in)

WRMI, Florida
15725 kHz.: 1800 S/A World Radio Network (relay).

WWCR,Tennessee
12160 kHz.: 1800 M-F Natural Health Clinic, A Real Talk Radio; 1830 M-F Stairway to Health.

1900 UTC/ 3pm E/12pm P - Page 54 Freqs

ALL INDIA RADIO
1900 D News; 1905 D Press Review; 1910 S Women's World, M/W/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interviews-2nd/4th), H Panorama of Progress, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); 1920 S/M/W/F Film Songs, T Light Classical Music, H Light Instrumental Music, A Karnatak Classical Music; 1930 D Commentary; 1935 S/H/F Film Songs, M Karnatak Vocal Music, T Folk Songs, W/A Light Music.

BBC WORLD SERVICE (eaf) - 12095
1900 D News; 1901 A In Concert; 1906 S Top of the Pops (British music charts), M-F Focus on Africa; 1932 M-F World Business Report; 1945 MTHF Analysis, W From Our Own Correspondent.

BBC WORLD SERVICE (waf) - 15400, 17830
1900 S/A World Briefing, M-F News; 1906 M-F Focus on Africa; 1920 S/A Sports Roundup, 1932 S The Interview (trends), M-F World Business Report, A Voices from the Market (drama series); 1945 MTHF Analysis, W From Our Own Correspondent.

DEUTSCHE WELLE
1900 News; 1905 S Hard to Beat (sport), M-F Newslink Africa, A Religion & Society; 1915 S Inspired Minds, A German by Radio; 1930 S Hits in Germany [or] Melody Time, M A World of Music, T Arts on the Air, W Living in Germany, H Cool (youth culture), F Focus on Folk, A Africa This Week; 1945 W Europe in Capitals.

RADIO AUSTRALIA
1900 D News; 1905 F Rural Reporter, A Australia All Over; 1910 S-H Pacific Beat (regional magazine w/ Sport @ 1929); 1930 F Australian Country Style (music); 1935 M-F The Best of 'Breakfast' (interviews).

RADIO NETHERLANDS
1900 S Documentary, A Vox Humana (culture); 1930 S/A News; 1935 S Wide Angle (in-depth), A Europe Unzipped; 1955 S The Week Ahead (on RN), A Insight (commentary).

VOICE OF AMERICA, Africa Service
1900 S News & Reports, M-F News, A Hip Hop Connections (music); 1906 M-F Border Crossings (music—exc. *T Housecall (medical info)*); 1923 S Sports; 1930 S Music Time in Africa (part 2), M-F World of Music, A News Headlines; 1933 A Press Conference USA.

VOICE OF NIGERIA
1900 S Youth Forum, M Our Cities, T Our Environment, W Who Are the Nigerians?, H Listeners' Letters, F Nigerian Scene, A Folktales; 1915 H Wheel of Progress, F Business Weekly, A Nigerian Newsletter; 1930 S Window on Abuja, M Perspectives, T African Monarchy, W Theatre on the Air, H Women and Development, F Weekend Magazine, A Time for Highlife; 1945 S From the Bookshelf, T Listeners' Letters.

WBCQ, Maine
7415 kHz.: 1945 M-F Planet World News.
9330 kHz.: 1945 A Planet World News.

WHRI, Indiana
9495 kHz.: 1905 M-F Chuck Harder (continued); 1930 A DXing with Cumbre.

WRMI, Florida
15725 kHz.: 1900 S/A World Radio Network (relay).

WWCR, Tennessee
15825 kHz.: 1900 A U.S. Presidential Radio Address/ Democratic Response.
12160 kHz.: 1900 A Real Talk Radio (continues); 1930 S Ken's Country Classics.

2000 UTC/ 4pm E/1pm P - Page 54 Freqs

BBC WORLD SERVICE (eaf)(waf) - 12095, 15400, 17830
2000 D Newshour.

DEUTSCHE WELLE
2000 D News; 2005 S Mailbag, M-F Newslink Africa, A Inside Europe; 2030 M Insight (international issues), T World in Progress (development), W Money Talks (business), H Living Planet (environment), F Spectrum (sci-tech); 2045 M Business German.

RADIO AUSTRALIA
2000 D News; 2005 F Pacific Review, A Australia All Over; 2010 S-H Pacific Beat (regional magazine w/ Sport @2029), 2030 F The Buzz (technology).

RADIO NETHERLANDS
2000 S Vox Humana (culture), A Amsterdam Forum (conversations); 2030 S/A News; 2035 S Wide Angle (in-depth), A Europe Unzipped; 2055 S The Week Ahead (on RN), A Insight (commentary).

VOICE OF NIGERIA
2000 S News Bulletin, M-F Sixty Minutes, A African Hour; 2015 S Sports Roundup; 2030 S In the News.

VOICE OF AMERICA, Africa Service
2000 S/A Nightline Africa (weekend magazine), M-F Africa World Tonight.

ALL INDIA RADIO
2045 D Press Review; 2050 S/T Instrumental Music, M/F Folk Songs, W Light Music, H Classical Indian Vocal Music, A Regional Indian Devotional Music.

WBCQ, Maine
7415 kHz.: 2000 S/A The Last Roundup.
17495 kHz.: 2030 A World of Radio.

WHRI, Tennessee
5745 kHz.: 2000 S World Harvest Country Style.

WRMI, Florida
15725 kHz.: 2000 A World Radio Network (relay).

WWCR, Tennessee
15825 kHz.: 2000 H DX Partyline; 2030 H World of Radio, F Ask WWCR.
12160 kHz.: 2000 S Worldwide Country Radio; 2030 A World of Radio.

2100 UTC/ 5pm E/2pm P - Page 55 Freqs

ALL INDIA RADIO
2100 D News; 2105 D Commentary; 2111 S Regional Film Songs, M/A Classical Indian Vocal Music, T Karnatak Vocal Music, W/H Instrumental Music, F Orchestral Music; 2120 S Sports Roundup (1st wk)/Feature (2nd)/Film Story (3rd)/Discussion (4th), M Faithfully Yours (letters), T Cultural Talk, W Radio Newsreel, H Panorama of Progress, F Focus (magazine-1st wk)/Horizon (literature-2nd/4th)/ Indian Music (3rd), For Youth (1st)/Indian Classics (books-2nd)/From the Archives (3rd)/Quiz Time (4th); 2130 M DXers Corner (2nd/4th), T/W Film Songs, H Classical Half-Hour, A Old Film Songs; 2140 F Film Songs; 2145 M Film Songs; 2150 S Karnatak Vocal Music.

BBC WORLD SERVICE (am)
2100 D News; 2101 A Play of the Week; 2106 S Everywoman (magazine), M Health Matters, T Go Digital, W Discovery, H One Planet, F Science in Action; 2132 S Westway Omnibus, M Quiz or panel game, T Music Review, W/F Westway (drama serial), H The Word (writers & writings) [exc. 24th, World Book Club (discussion)]; 2145 W Heart & Soul (beliefs & values), F What's the Problem? (advice).
[*Special service to the Caribbean on 5975, 11675, 15390 kHz.: 2115 M-F Caribbean Report. Special service to the Falklands on 11680 kHz.: 2130 T/F Calling the Falklands.]

DEUTSCHE WELLE
2100 News; 2105 S Hard to Beat (sport), M-F Newslink Africa, A Religion & Society; 2115 S Inspired Minds, A German by Radio; 2130 S Hits in

Shortwave Guide

Germany [or] Melody Time, M A World of Music, T Arts on the Air, W Living in Germany, H Cool (youth culture), F Focus on Folk, A Africa This Week; 2145 W Europe in Capitals.

RADIO AUSTRALIA
2100 D News; 2105 F Verbatim (oral history), A Australia All Over; 2110 S-H AM (morning news magazine); 2130 S Country Breakfast (rural life), M Earthbeat (ecology), T Innovations (new products), W Educational series, H All in the Mind (the brain), F In Conversation (about science); 2145 A Asia Sunday.

RADIO JAPAN - NHK WORLD
2100 D News; 2110 S Pop Joins the World, M-F Songs for Everyone, A Weekend Japanology; 2115 M-F Asian Top News (headlines from region's radio); 2125 M Japan Musicscape, T Basic Japanese for You, W Japan Music Travelogue, H Brush Up Your Japanese, F Music Beat; 2154 A Japan Music Scene.

VOICE OF AMERICA, Africa Service
2100 M-F News; 2106 M American Gold, T Roots and Branches, W Classic Rock, H Top 20, F Country Hits.

WBCQ, Maine
5105 kHz.: 2100 M-F Radio Caroline.
7415 kHz.: 2100 S Radio Free Euphoria/Radio Three, M Jean Shepherd, H Planet World News Roundup, F Frankie V Radio Show; 2130 H The Last Roundup, F Pab Sungenis Project.
9330 kHz.: 2100 A Allan Weiner Worldwide.

WHRA, Maine
17650 kHz.: 2100 F DXing with Cumbre.

WHRI, Indiana
9495 kHz.: 2130 A DXing with Cumbre.
5745 kHz.: 2100 S DXing with Cumbre; 2105 M-H For the People (populist political phone-in).

WRMI, Florida
15725 kHz.: 2100 S Wavescan (AWR's radio hobbyist program), A World Radio Network (relay); 2130 S Voice of the NASB (consortium of US private international broadcasters).

2200 UTC/ 6pm E/3pm P - Page 56 Freqs

ALL INDIA RADIO
2200 D News; 2210 D Commentary; 2215 S Women's World, M/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interview-2nd/4th), W Book Review (1st)/Window on Science (2nd/4th)/Times & Lives (biography-3rd), H General Talk, A Mainly for Tourists (1st/3rd)/ Indian Cinema (2nd)/On the Export Front (4th); 2225 D Film Tune.

BBC WORLD SERVICE (am)
2200 D The World Today; 2232 F People & Politics, A The Interview (trends).

RADIO AUSTRALIA
2200 D News; 2205 F Asia Pacific (regional current affairs), A Correspondents' Report; 2210 S-H AM (morning news magazine); 2230 F Saturday AM (morning news magazine), A Music Deli (international); 2240 S-H Australia Wide (national report); 2254 A-H Perspective (commentary).

RADIO CANADA INTERNATIONAL
2200 S/A The World This Weekend, M-F The World at 6; 2230 S Inside Track (sports anthologies) M-F As It Happens (interviews with newsmakers), A Summer Comedy Revue.

RADIO PRAGUE
2230 D News; 2235 S Mailbox, M-F Current Affairs, A Insight Central Europe; 2240 S ABC of Czech (the language), T Czech Science, W Witness (eyewitness to history), F The Arts; 2245 S Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), M Talking Point (Czech issues), T One on One (interview), W Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), H Economic Report, F Stepping Out (Prague nightlife).

RVi, Belgium
2200 S Radio World, M-F News, A Music from Flanders; 2204 M-F Flanders Today (incl.press review, reports & 'CD of the Week'); 2208 S Tourism in Flanders; 2214 S Brussels 1043 (letters).

VOICE OF TURKEY
2200 D News; 2210 D Press Review; 2215 S Tunes Spanning Centuries, M Last Week, T Live From Turkey, W Review of the Foreign Media, H Big Powers & the Armenian Problem, F Archaeological Settlements in Turkey, A Outlook; 2220 M Hues & Colors of Anatolia, W Letterbox, A The Stream of Love or DX Corner; 2225 S/F Music, H In the Wake of a Contest; 2230 M/A Music; 2235 S Turks in the Mirror of Centuries, M From Past to Present, W Turkey's Off the Beaten Track Sites, H The Culture Parade, F The Travel Itinerary of Anatolia, A Turkish Arts.

WBCQ, Maine
5105 kHz.: 2200 S Jean Shepherd.
7415 kHz.: 2200 M Radio Weather, W World of Radio, H The Last Roundup (cont'd), F Pab Sungenis Project (cont'd), A Radio Timtron Worldwice; 2230 W The Music Download Scene, H Uncle Ed's Musical Memories, F Wanton Display of Control & Disruption.
17495 kHz.: 2200 W World of Radio.

WHRI, Indiana
5745 kHz.: 2205 A Turn Your Radio On (southern gospel music).

2300 UTC/ 7pm E/4pm P - Page 56 Freqs

BBC WORLD SERVICE (am)
2300 D News; 2306 S Documentary, M-F Outlook (magazine), A Pick of the World (BBC's best); 2332 S Quiz or panel game; 2345 M-F Off the Shelf (book readings), A Write On (letters).

CHINA RADIO INTERNATIONAL
2300 D News & Reports; 2310 A Report on Developing Countries; 2315 F Cutting Edge (sci/ tech); 2320 A CRI Roundup; 2330 S People in the Know (China's leading personalities), M Biz China, T China Horizons (China outside Beijing), W Voices from Other Lands, H Life in China, F Listeners' Garden, A In the Spotlight (cultural magazine).

RADIO AUSTRALIA
2300 D News; 2305 F Country Breakfast (rural life), A The Europeans; 2310 S-H Asia Pacific (regional current affairs), 2330 S Verbatim (oral history), M The Europeans, T Rural Reporter, W The Arts on RA, H The Buzz (technology issues), F Hit Mix (pop/ rock), A Innovations (new products).

RADIO AUSTRIA INTERNATIONAL
2305 S/A Insight Central Europe; 2315 M-F Report from Austria; 2325 S/A Listener Letters; 2335 S/A Insight Central Europe; 2345 M-F Report from Austria; 2355 S/A Listener Letters.

RADIO BULGARIA
2300 D News; 2310 S Folk Studio (Bulgarian folk music), M-F Events and Developments, A Views Behind the News; 2320 M Sports, T-A Timeout for Music; 2330 T-S Keyword Bulgaria (Bulgaria and things Bulgarian); 2340 A Radio Bulgaria Calling (for radio hobbyists), S Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places), M Answering Your Letters, T Magazine Economy, W The Way We Live, H History Club, F Arts and Artists.

RADIO CANADA INTERNATIONAL
2300 D CBC News; 2305 A Quirks & Quarks (science), S Global Village (world music), M-F As It Happens (interviews with newsmakers)[began at 2230]; 2330 W Dispatches (world events in Canadian perspective).

RADIO ROMANIA INTERNATIONAL
2300 D Radio Newsreel; 2310 A The Week, S Focus, M-F Commentary; 0415 A World of Culture, S Sunday Studio, M Pro Memoria (history), T Business Club, W Society Today, H Cards on the Table (debate), F Challenge for the Future or Terra 21st Century [programs alternate]; 0420 A RRI Encyclopedia, M Political Flash, T European Horizons; 0425 A Roots (culture/traditions), M/W Business Update, T Tourist News, H Listeners' Letterbox, F Practical Guide; 0430 A Radio Pictures, S Romanian Itineraries, W Visit Romania, F Cultura Survey; 0435 A Romanian Itineraries, S Listeners' Letterbox, M Performing Arts, T Talking Points or Living Romania [programs alternate], W Partners in a Changing World, H Guest at the Microphone, F Over Coffee (with artists); 0440 A Bucharest Along the Centuries, M Pages of Romanian Literature, S/H Skylark (folk music), W Stage and Screen, F Off Bucharest; 0445 A DX Mailbag, M Romanian Hits, W Romanian Musicians, F Folk Music Box; 0450 S Romanian Folk Music At Its Best, M Sports Roundup, T Athlete of the Week, W Sports Club, H Football Flash, F Sports Weekend.

WBCQ, Maine
5105 kHz.: 2300 S Best of Complex Variables Studio.
7415 kHz.: 2300 A The Real Amateur Radio Show, S Le Show (humor/entertainment), W Off the Hook (public telecommunications issues), H Goddess Irene I Music Show, F The Lost Discs Radio Show; 2330 T Duhh News, A Fred Flintstone Music Show.

WHRA, Maine
7580 kHz.: 2305 S Turn Your Radio On (southern gospel music), M-F For the People (populist political phone-in).

WHRI, Indiana
9495 kHz.: 2330 A DXing with Cumbre.
5745 kHz.: 2330 A World Harvest Country Style.

WWCR, Tennessee
5070 kHz.: 2345 A Ask WWCR.

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

John Babbis, Silver Spring, MD; Rich D'Angelo, *NASWA Flash Sheet*; Bob Fraser, Belfast, ME; *DX Listening Digest*, Anker Petersen, *DX Window;* ODXA/ DX Ontario; Robert E. Thomas, Bridgeport, CT; Prime Time SW, Larry Van Horn N5FPW, MT Asst. Editor; Loyd Van Horn W4LVH, WRGC Sylva, NC; *BCL News; Cumbre DX; Hard Core DX; NASWA Journal;*

Larry Van Horn
larryvanhorn@monitoringtimes.com

Airshow Frequency Update

Each year as we move well into the airshow season, *Milcom* reporters nationwide send in changes to the original frequency list we publish each March in *Monitoring Times*. Normally this consists of only one or two frequencies at the most. This year we have noted with interest several new frequencies being used by the famed Blue Angel flight demonstration team and a new VHF frequency for the Thunderbirds.

We would appreciate monitor reports from air shows in other portions of the country to aid us in determining if these new frequencies are in widespread use.

US Army Black Dagger Parachute Team
138.650 237.300

US Air Force 509BW B-2 Demo
388.850

US Air Force AETC T-6 Texan East Coast Team
283.700 Observed at Keelser AFB/Dobbins JARB (Thanks to Mike Riffle)

US Air Force Thunderbirds
141.850 Comm Test (Victor 1)
142.575 *New* Program audio and air-to-ground
143.850 Four ship formation
143.900 Ground Support
235.250 Solo aircraft

US Navy Blue Angels
170.900 Ground Operations/Air-to-ground
236.450 Unknown usage, air-to-air
238.150 Delta (six ship) formation
249.625 *New* Solo aircraft (Observed at Dobbins JARB, thanks to Mike Riffle)
251.600 Solo aircraft
254.500 *New* (Observed at Fort Lauderdale, thanks Robert Wyman)
273.300 *New* Fat Albert/Blues taxi out (Observed at Dobbins JARB, thanks to Mike Riffle)
275.350 Delta/Diamond formations
299.650 *New* Diamond, used by Boss for coordination with solos (Observed at Dobbins JARB, thanks to Mike Riffle)
345.900 Solo aircraft
381.00 Heard brief comms at end of performance (Observed at Dobbins JARB, thanks to Mike Riffle)

Canadian Snowbirds
272.100 Air-to-air

Civilian Performers
122.750 Patty Wagstaff
122.775 Red Bull Team
122.950 Sean Tucker
123.150 Ian Groom (SU-31)
Geiko Extra 300 - Tim Webber
Pitts Special - USAF reserve
123.475 Patty Wagstaff
Sean Tucker
Red Eagles

◆ 1-3 Aviation Regiment

The 1st Battalion, 3rd Aviation Regiment from Hunter Army Airfield (AAF), Georgia, upgraded its helicopter fleet from 24 AH-64A helicopters to 24 AH-64D/DW Longbow helicopters in 2001. Recently an anonymous contributor passed along the frequency plan used by these Army Aviators.

If you live near Hunter AAF, you might want to dedicate some memory space in your scanner to monitor the 1-3 AVN.

VHF/UHF Radio

01	323.125	126.375	Hunter Army Airfield ATIS (U)/Base Operations (V)
02	291.675	121.800	Hunter Army Airfield Ground Control
03	279.575	133.550	Hunter Army Airfield Tower
04	279.625	127.350	Marne Radio
05	269.275	123.850	Wright AAF (Fort Stewart) Tower
06	273.575	121.700	Wright AAF (Fort Stewart) Ground Control
07	227.300	127.650	Hunter Army Airfield Ground Controlled Approach
08	387.100	125.300	Savannah Approach Control (011-109)
09	354.000	118.400	Savannah Approach Control (270-010)
10	380.025	120.400	Savannah Approach Control (110-269)
11	257.800	119.100	Savannah Tower
12	322.500	120.850	Jacksonville ARTCC
13	257.900	135.550	Atlanta ARTCC
14	360.750	134.500	Macon Approach
15	257.800	126.200	Macon Tower
16	357.600	120.450	Columbus Approach
17	269.525	119.050	Lawson Tower
18	255.400	123.650	Macon Flight Service Station (FSS)
19	309.000	123.750	Hunter Army Airfield Metro (U)/Savannah ATIS (V)
20	228.150	149.100	Unit Internal

FM Radio

01	37.550	Company Internal
02	77.100	Hawk Ops
03	51.050	Air to Air
04	41.300	Marne Radio
05	48.500	Range Control

◆ Helicopter Training Squadron 8/18

The United States Navy's Helicopter Training Squadron Eight (HT-8), along with its sister squadron, HT-18, provides advanced helicopter flight instruction to all Navy, US Marine Corps, and US Coast Guard helicopter flight students as well as international students from several allied nations. Students who successfully complete the program earn the right to wear the coveted "Wings of Gold."

HT-8, the Navy's oldest helicopter training squadron, is based aboard Naval Air Station Whiting Field, Milton, Florida. Spencer Field is HT-8's primary helicopter training site. HT-8's mission is to provide primary and advanced helicopter training for: US Navy, US Marine Corps, Coast Guard, and Allied student naval aviators.

MT Milcom regular Mike Riffle recently came across the frequency plan below for HT-8/18.

Chnl	*Frequency*	*Usage*
01	273.575	Whiting Field South Automatic Terminal Information Service (ATIS)
02	355.600	Whiting Field South Clearance Delivery
03	346.800	Whiting Field South Ground Control
04	348.675	Whiting Field South Tower
05	303.600	HT-8 (Eight Ball)
06	255.100	HT-18 (Factory Hand)
07	250.000	Navy Outlying Field (NOLF) Pace
08	358.800	Navy Outlying Field (NOLF) Spencer
09	361.100	Navy Outlying Field (NOLF) Santa Rosa
10	237.900	Navy Outlying Field (NOLF) Harold
11	251.300	Navy Outlying Field (NOLF)

		Site 8
12	308.200	Western Area Common
13	384.300	Green/Red Route
14	262.700	Black/Orange Route
15	377.100	Purple Route
16	280.350	HLT-IX-514
17	380.400	Primary Formation Common
18	328.200	Secondary Formation Common
19	385.400	Pensacola Approach Control
20	389.100	Eastern Area Common/Eglin Monitor

❖ Monitoring Hawg Smoke

Since we have already featured a US Army and US Navy unit, let's take a look at another branch of service, the US Air Force.

Hawg Smoke is the bi-annual bombing and tactical gunnery competition of the A-10 Thunderbolt II. Squadrons from across the country and around the globe, as far away as South Korea and Germany, send teams to fly and compete for the honor of "Best of the Best" in ground attack and target destruction.

In 2004, the competition was supposed to be held in and around the Alexandria, Louisiana, area. Alexandria shares a special kinship with America's military and the A-10 Thunderbolt II. The first Warthogs arrived at England AFB in 1980, where they were flown by the 23rd Tactical Fighter Wing "Flying Tigers." The base was closed in 1992 the first Gulf War, but remains a vital asset in close air support training held at Ft Polk, Louisiana.

Several reports indicate that Hawg Smoke 2004 was pretty much a wash out. So we might see that competition return again in 2005 to the Alexandria area. If you plan to attend some or all of the local civilian events that coincide with the exercise, be sure to bring your scanner. Here are the frequencies to monitor at Hawg Smoke.

Area Coordination

01	383.300	140.400	Hawgsmoke Ops
02	372.000	121.800	Alexandria Ground Control
03	269.200	127.350	Alexandria Tower
04	226.500	118.600	Polk Approach Primary
05	261.300		Fort Polk Approach Secondary
06	248.200	119.000	Polk Tower
07	346.250	135.100	Houston ARTCC
08	298.600		Claiborne (R3801)
09	259.150		Red Leg/Peason
10	255.400	122.200	Flight Service Station
11	327.000	123.750	Shreveport Approach/Departure Control
12	295.700	128.250	Barksdale Tower
13	225.400		A-10 Supervisor of Flying

VHF Intra-Flight Frequencies

15	139.800	Intra-Flight
16	139.900	Intra-Flight
17	139.675	Intra-Flight
18	141.550	Intra-Flight
19	142.300	Squadron Common
20	140.000	Unknown usage

FM Intra-Flight Frequencies

01	34.150	Intra-Flight
02	40.800	Intra-Flight
03	32.450	Intra-Flight
04	38.650	Intra-Flight
05	34.200	Intra-Flight

❖ Raymond Calling

Recently a member of one of the military newsgroups I belong to was asking for a current list of Raymond callsigns. The Raymond callsign has been used for years to identify wing/group command posts, originally with the now-defunct Tactical Air Command and currently with selected Air Combat Command bases.

The table below is current as of publication and is based on actual monitoring and the latest Department of Defense IFR Supplement publications.

Raymond 06	2BW Command Post Barksdale AFB, LA 311.000 321.000
Raymond 07	27FW Command Post Cannon AFB, NM 381.300
Raymond 08	355 Wing Command Post Davis Monthan AFB, AZ 381.300
Raymond 11	33FW Command Post Eglin AFB, FL 311.000
Raymond 12	5BW Command Post Minot AFB, ND 311.000
Raymond 14	49FW Command Post Holloman AFB, NM 381.300
Raymond 16	1FW Consolidated Command Post Langley AFB, VA 251.350 311.00
Raymond 17	41 Rescue Wing Command Post Moody AFB, GA 381.300
Raymond 18	58FW Command Post Luke AFB, AZ 349.400
Raymond 19	93ACW Command Post Robins AFB, GA 311.000
Raymond 21	55 Wing Command Post Offutt AFB, NE 311.000 321.000
Raymond 22	57 Wing Command Post Nellis AFB, NV 320.000 381.300
Raymond 23	388FW Command Post Hill AFB, UT 381.300
Raymond 24	552 ACW Command Post Tinker AFB, OK 305.600 381.300
Raymond 25	4FW Command Post Seymour Johnson AFB, NC 311.000 321.000
Raymond 26	20FW Command Post Shaw AFB, SC 381.300
Raymond 27	366 Wing Command Post Mountain Home AFB, ID 5703kHz 15091 kHz 381.300
Raymond 31	9RW Command Post Beale AFB, CA 311.000 321.000
Raymond 33	28BW Command Post Ellsworth AFB, SD 311.000 321.000
Raymond 36	102FW/101FS Command Post Otis ANGB, MA 262.000
Raymond 37	7BW Command Post Dyess AFB, TX 311.000 321.000
Raymond 85	85 Group Command Post NAS Keflavik, Iceland 390.000

Note: All frequencies are in MHz unless otherwise noted.

❖ New NOTAM Frequencies

Our regular reporter Jack "Mr NOTAM" NeSmith passes along some interesting frequencies recently posted to the DoD Notice to Airmen system. As always, thanks, Jack.

Knox AHP, KY
395.425 139.125 Skyhawk Tower (Tac-X Tower Operations)
41.075 Skyhawk Ground Control (Tac-X Tower Operations)
34.500 Tac-X Tower Operations Air-to-Air

Westover ARB/Metropolitan, MA
348.750 Tower (ex-384.750)

Nellis AFB, NV
269.075 Departure Control (ex-352.800)
343.725 Single Frequency Approach (ex-321.300)
Note: Both of these were former spectrum holes)

McGuire AFB, NJ
275.800 Ground Control

Wheeler-Sack AAF, NY
134.100 Range Control Test Frequency (Drum Control)
141.025 Range Control
397.750 Range Control

Camp Mackall/Mackall AAF
254.400 Range Control (ex-340.600)

Pope AFB, NC
132.300 ATIS

Laughlin AFB, TX
138.750 Ground Control

Vagabond AAF, WA
40.200 Range Control [Rattlesnake Radio]

Fort Worth ARTCC
314.000 Dublin RCAG, TX (ex-381.850)

❖ Spectrum Holes

Continuing where we left off in the May 2004 column, here are some more spectrum holes from the *MT Milcom* database.

270.550	270.650	271.050	271.150
271.250	271.450	271.650	271.750
272.050	273.150	273.750	274.250
274.350	274.550	274.650	274.850
274.950	275.050	275.550	276.350
276.450	276.750	276.950	277.150
277.250	277.350	277.650	277.850
277.950	278.150	278.250	278.650
278.750	278.950	279.050	279.250
279.350	279.950	280.550	280.750
281.650	281.950	282.150	282.550
282.650	282.850	282.950	283.150
283.350	283.650	284.050	284.250
284.850	285.050	285.350	285.750
286.050	286.650	286.750	286.950
287.050	287.150	287.250	287.550
287.750	288.450	288.650	288.750
288.850	288.950	289.250	289.350
289.450	289.550	289.650	289.750
290.650	290.750	290.850	291.050
291.550	292.050	292.150	292.550
292.650	292.750	293.250	293.650
293.750	294.950	296.750	296.850
297.050	298.550	298.750	300.350
300.850	300.950	301.450	301.650
301.850	302.350	303.750	303.850
304.150	304.850	304.950	305.750
305.850	306.050	306.150	306.650
306.850	307.450	307.650	308.150
308.350	308.450	309.550	309.650
309.750	309.850		

And that does it for another month. Until next time, 73 and good hunting.

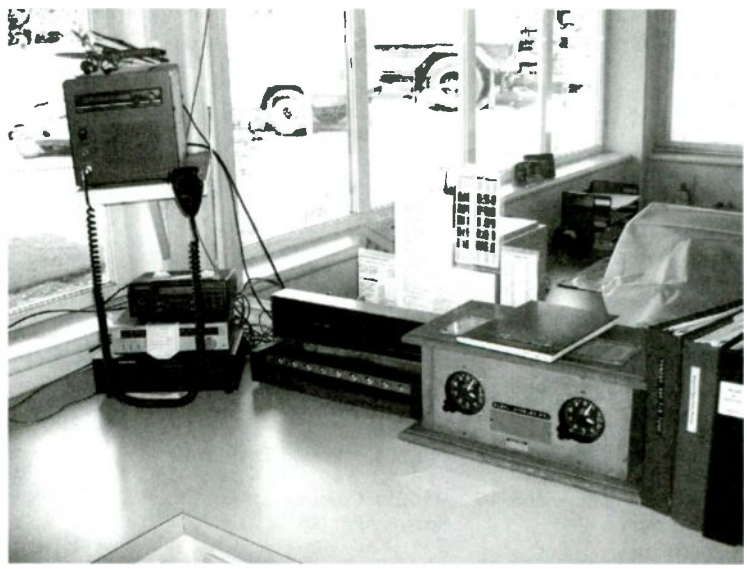
Iden Rogers
idenrogers@monitoringtimes.com

Exploring Your Aero World

Welcome once again to the aircraft column, your path to more interesting aircraft communications listening.

Part of the fun of this hobby is simply listening to certain known frequencies on a regular basis. Other enjoyable parts, at least for me, are exploring around just to see what I can receive on various frequencies and sometimes at the furthest distances I can. From time to time, I follow a plane's transmissions from before take-off, through as many hand-offs as I can, until it simply can no longer be received. I am thrilled when I catch a pilot reading back a hand-off to an adjacent ARTCC in the 175-plus mile range.

At other times, it's fun spending part of a day listening to law enforcement and news media aircraft or transoceanic airliners on HF flying to and from the coast. It's all out there just waiting to be tuned in. In this issue, we will explore yet other areas of listening.



This is a small airport Unicom station. It is interesting to note that about a year ago, they changed frequencies from 123.0 to 122.725. They monitor 123.0 on a Radio Shack scanner in case a pilot calls on the old frequency, which happens. When it does, they switch temporarily to 123.0 to inform the pilot. Photo by author.

◆ An Interesting Search Range

Mentioned last time was the allocations list, *National Civilian Aeronautical Band Assignments* by Larry Van Horn, Assistant Editor, *Monitoring Times* at: **http://www.monitoringtimes/html/mtcivair.html**. From that list, you can see that the 121.6 – 123.575 MHz range is not to be overlooked. Some rather interesting things can be found here, maybe not every day, but with persistent listening. In fact, you can program in a search, scanner model permitting, from 121.5 (the emergency and distress channel) to 123.575 and see what pops up over time.

Here, you may find law enforcement and news helicopters, fire fighting aircraft, fish and game, environmental monitoring, air-to-air, flight test, gliders, aircraft with jumpers, hot air balloons, airport ground control, air show, aerobatics, flight schools, Enroute Flight Advisory Service (EFAS / "Flight Watch" - 122.0), search and rescue, medical transport flights, and Flight Service Stations (The *Aeronautical Information Manual - AIM* -describes FSS service as: "... pilot briefings, en route communications and VFR search and rescue services, assist lost aircraft and aircraft in emergency situations, relay ATC clearances, originate Notices to Airmen, broadcast aviation weather ..." and more).

◆ Unicom Frequencies

Also included in this frequency range are the more routine Unicom frequencies. Only a small portion of airports have control towers. The remaining smaller airports do not have towers and are called "uncontrolled airports."

The pilots landing and departing uncontrolled airports self-announce their intentions and positions on a Unicom frequency assigned to the particular airport so that other aircraft in the area can be informed for obvious safety reasons.

Airports with a Unicom frequency (122.700, 122.725, 122.800, 122.975, 123.000, 123.050, and 123.075 MHz) will have a non-government Unicom operator available at least part of the time. The operators can offer information like wind direction and speed, altimeter settings, runways conditions, fuel availability, parking, lodging, etc., but have no control over air traffic.

It is not uncommon to hear pilots coordinating their flight activities with each other on the frequency. Many of the transmissions you hear from uncontrolled airports don't include the ground side or they may be infrequent or otherwise hard to receive at any distance.

Note that airports with an operating tower ("controlled airports") also have a Unicom frequency – 122.95. It is not used for pilot self-announcements, however, even if the tower communications equipment should fail. And that leads to the subject of CTAF.

◆ What is a CTAF?

The Common Traffic Advisory Frequency (CTAF) is the designated, published frequency where pilots announce their intentions and positions when arriving at and departing from an uncontrolled airport. It is common for the Unicom frequency, mentioned above, to perform the CTAF function at non-tower airports. It is common for the tower frequency to perform this function during hours when the tower is closed or at other times when the tower has an unscheduled closure – the airport being "uncontrolled" at those times. The CTAF can also be a Flight Service Station frequency or a Multicom frequency.

You will run into "CTAF" in the frequency listings for each airport at AirNav.com **http://www.airnav.com/airports/**, in the *Airport / Facility Directory* **http://avn.faa.gov/index.asp?xml=naco/catalog/charts/supplementary/af_directory**, and elsewhere, so it's helpful to understand it.

A non-tower airport with an assigned Unicom frequency of 122.8, for example, would be listed as, "CTAF/UNICOM: 122.8." Riverside Municipal Airport (CA), as another example, has a part-time tower with a frequency of 121.0. It is listed as, "CTAF: 121.0, RIVERSIDE TOWER: 121.0 [0700-2000]." If an airport has no tower, Unicom, or FSS, the frequency of 122.9 is used and will be listed as "CTAF: 122.9."

For additional info, go to: **http://www.faa.gov/atpubs/AIM/chap4toc.htm** and see 4-1-9 "Traffic Advisory Practices at Airports Without Operating Control Tower," 4-1-11 "Designated UNICOM/MULTICOM Frequencies," and 4-1-12. "Use of UNICOM for ATC Purposes."

❖ ATIS / ASOS / AWOS / A What?

Aircraft listening and FAA documents are loaded with acronyms and these three are definitely worth knowing.

ATIS

Automatic Terminal Information Service (ATIS) is a recorded, repeating message at selected airports and air bases. The transmitted message gives the time of the recording, many elements of the weather such as wind direction and velocity, "altimeter setting" (barometer reading), which runways are in use, and other types of information and notices, as needed.

The information is for the use of arriving and departing aircraft; offering it by way of a repeating message spares air traffic controllers from having to convey the information over and over while also relieving frequency congestion. Additionally, it allows the pilot to copy the information at times when cockpit duties may be less pressing.

Typically, at the end of the message before it repeats, there will be something like, "Advise on initial contact that you have information Golf." This lets the controller know at the outset that the pilot has the ATIS information.

The last word, "Golf," represents the letter G using the phonetic alphabet. (For info on the phonetic alphabet, see: **http://www.faa.gov/atpubs/AIM/Chap4/TBL422.GIF**). When the message is updated, the next version will most likely be "information Hotel" – a progression through the alphabet. You may hear a controller say, "Information Golf is current." This lets all who are listening on frequency know that Golf is the most current information.

A busy airport may have an Arrival ATIS and a Departure ATIS. For example, in a listing for Los Angeles International (LAX), "ATIS - 133.8 135.65 (133.8 Arr) (135.65 Dep)." In such cases, part of the alphabet may be used for the Arrival ATIS and another part for the Departure ATIS.

Over time, voice ATIS will probably will be replaced by digital ATIS or D-ATIS. See: **http://www.arinc.com/products/voice_data_comm/d_atis.html**.

Related to ATIS, you may also hear, "have numbers." From the *AIM*, "…..some pilots use the phrase 'have numbers' in communications with the control tower. Use of this phrase means that the pilot has received wind, runway, and altimeter information ONLY and the tower does not have to repeat this information. It does not indicate receipt of the ATIS broadcast and should never be used for this purpose."

A truly memorable 9/11/2001 ATIS message, probably typical of many that day and in the days following: "Mather Tower – Attention all aircraft – effective immediately – until further notice – flight operations in the National Airspace System by U.S. civil aircraft, foreign civil aircraft, foreign military aircraft are prohibited except in accordance with Advisory 043. Any necessary service will be provided on tower frequency 120.65"

ASOS Sensor Group in Salinas, CA, always on duty (Courtesy NWS/NOAA)

ASOS / AWOS

Some of the "Automated Surface Observing System" (ASOS) and "Automated Weather Observing System" (AWOS) stations may be within your receiving range. They collect various types of weather and visibility information. They transmit 24 hours a day in the 118-136 MHz range and can provide yet another angle on the weather if that is of interest to you. For info on the different AWOS system types, see: **http://www.faa.gov/asos/awosinfo.htm** .

Airport identifier	Zulu time
Sky conditions	Visibility
Wind speed	Wind direction
Temperature	Dew point
Altimeter setting	Remarks
Density altitude	Wind gusts

Information broadcast by an AWOS III (Courtesy FAA)

For a great ASOS / AWOS U.S. map see: **http://www.faa.gov/asos/map/map.htm**. You can click on a state to show a map of stations and below that will be a list with frequencies.

In airport frequency lists, ASOS / AWOS can appear like, "WX ASOS: 124.175," and "WX AWOS-3: 120.675." It is also not uncommon to see something like "WX ASOS at DAL (16 nm NE): 120.15, WX ASOS at FTW (16 nm NW): 120.70, WX AWOS-3 at LNC (20 nm E): 118.975." Such notations inform the pilot where additional ASOS / AWOS stations may be with reference to a given airport. Nautical miles are represented by "nm."

❖ Airport Identifiers

The three-letter groups, DAL, FTW, and LNC in the above example, are airport identifiers. By entering a three-letter identifier in the airport search box at **http://AirNav.com**, you will bring up that particular airport. Some U.S. airport lists will show the airport identifier with a "K" preceding the three letters, thus FTW is also KFTW. Either will work at AirNav.com. Some history on three-letter identifiers can be found at: **http://www.skygod.com/asstd/abc.html**.

❖ Fun in the Sun

On clear, sunny weekend days when there are many private planes in the air, the Unicom frequencies (mentioned above) can be quite active and entertaining to listen to. Program them in and take a listen. Aircraft call out the airport name when announcing their intertions to other aircraft in their area. It can be enjoyable to see how many airport names you can log on each frequency and see how far away the furthest airports are. It is useful to use AirNav.com to look up unfamiliar airports.

❖ Listen, Learn, Discover

If listening carefully for and logging the aircraft that self-announce on the various Unicom frequencies appeals to you, then seeking out and logging the ATIS, ASOS, and AWOS stations may have a similar appeal. See how many you can receive and how far away they are from you. You may note that the distance you can receive some of them will vary depending on weather and temperature. Since these stations are transmitting messages that continually repeat, they are easier to find when doing frequency searches. Even so, some may be so weak that it can take quite a bit of listening to identify them all.

Doing the above listening and logging can help you to determine the quality of your antenna system, your usable reception radius, and help you become more acquainted with what is typically in your range. Of course, the number of airports in your area will obviously be a factor in how many signals you receive and how much local air traffic you hear. If you can find other aircraft listeners in your area, it is often fun to compare notes on what each of you is receiving.

Until we meet again, see what you can discover in the aircraft band. Let me know if you hear something good.

Doug Smith, W9WI
dougsmith@monitoringtimes.com

IBOC, the Next Step

Think fast, you've got two weeks to speak your piece... The FCC has issued a notice of proposed rulemaking and inquiry regarding the permanent rules for IBOC digital radio. You have until June 16th to comment – see http://www.fcc.gov/cgb/consumerfacts/howtocomment.html for information, or mail your comments to Marlene H. Dortch, Secretary; Federal Communications Commission; Office of the Secretary; 445 12th Street, SW; Room TW-204B; Washington, DC 20554. The docket number is MM Docket 99-325.

Some of the questions the Commission wants us, the public, to answer:

- Should there be a mandatory date for the end of analog broadcasts, like there is for TV?
- How many different programs should an IBOC station be allowed to carry on a single frequency? (each additional program degrades the audio quality of all programs broadcast)
- When stations air multiple programs on the same frequency, should they be required to air the hourly ID announcement on all programs, or only one?
- How can AM-IBOC stations be authorized to operate at night?
- How can the FCC deal with complaints of IBOC interference to other stations?
- Will FM translators pass IBOC signals?
- What about the fact that the iBiquity IBOC system is patented – all digital stations will be required to obtain a patent license?
- Should non-commercial stations be allowed to carry advertising on "subchannels"?
- Should the FCC come up with some kind of security system to prevent listeners from recording music off the air? (thereby obtaining a music collection without paying for it)

Note that the question of "should we adopt IBOC" is no longer on the table. It will happen, whether we like it or not. There are a few questions DXers will have to ask themselves:

- How do I work around IBOC interference?
- Will the IBOC system collapse once broadcasters realize how much interference it causes?
- Will the IBOC system collapse once broadcasters realize how much it costs?

A separate news release, in the same docket but with a deadline two days earlier on the 14th, asks for comments on authorizing AM-IBOC broadcasts at night. Technical reports compiled by iBiquity, and recommendations of the National Association of Broadcasters based on those reports, can be viewed at http://gullfoss2.fcc.gov/prod/ecfs/comsrch_v2.cgi ; again, the docket is #99-325. I would suppose you could file comments on both releases in the same document.

◆ Bits and Pieces

HDTV Ruckus: Just when Denver residents thought they might be getting high-definition TV... The launch of digital TV in the Denver market has been delayed by fierce neighborhood opposition to the installation of digital transmitters at the existing Lookout Mountain transmitter site. The changes would actually result in fewer towers at the site; stations KCNC, KMGH, KUSA, and KTVD would replace their separate towers with a common tower holding all four stations' antennas. After some ten years of legal battle, the Jefferson County Commission finally approved the stations' plans last year.

Then, in April of this year... Local residents and the city of Golden obtained an injunction, prohibiting construction from proceeding. Judge Brooke Jackson ruled the county Commissioners didn't allow enough time for opponents to respond to some of the documents submitted by the stations to support their zoning request.

(My guess: the locals don't want any towers up there – even though the towers were there for decades before they moved in. They figure if they can stop the construction until 2006, the stations will either build elsewhere or be forced off the air when analog is shut down, and the locals will get their wish. To heck with the hundreds of thousands of Denverites who receive their TV off-air; let them buy cable.)

KCNC, KMGH, and KUSA are currently operating temporary low-power digital transmitters on downtown Denver buildings. KMGH's, at 1.9 kilowatts on a tower only 65 feet high, probably doesn't reach past the city limits. KTVD doesn't yet have a digital signal at all.

WQSV-790 is one station that would suffer considerably from IBOC interference – and may not be able to afford the gear to adopt IBOC for themselves.

DX Test QSL: Patrick Griffith, who sent the above information about digital TV in Denver, has also received a QSL letter from WQMA-1520 Marks, Mississippi. WQMA ran a DX Test broadcast on February 15th. Assistant Program Director Paul Walker, Jr. is a DXer. The address for QSLs from this station is 1820 West Marks Road, Marks MS 38646. As with any small-town station, you should enclose a self-addressed stamped envelope with your reception report. You might be surprised just how close to the (financial) edge most small-town radio stations operate.

Dead Air: Last month, I mentioned a new network called "Air America". This network airs liberal-leaning talk programs. Two of the network's stations, in Los Angeles and Chicago, briefly stopped carrying the network's programs in mid-April. According to the *Los Angeles Times*, a check paying for airtime failed to clear the bank; but the network says they stopped payment on the check whey they learned KBLA-1580 had leased Air America's airtime to someone else. The dispute was settled a few days later, with the agreement calling for the Chicago station to drop the Air America programming. Three new stations – in upstate New York, Florida, and Colorado Springs – have been added to the network.

Openings: After a few months of poor conditions, things seem to be improving considerably. Radio Sawa – broadcasting from Djibouti to the Middle East – has been logged on the East Coast. In the South and Midwest, we've had a pretty impressive VHF/UHF tropo opening. Have you heard anything interesting? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to dougsmith@monitoringtimes.com. Good DX!

OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

George Zeller
georgezeller@monitoringtimes.com

Summer Static and Daylight

Every year, summer conditions change the nature of shortwave pirate radio activity in North America. Increased static levels on shortwave bands cause reception conditions to deteriorate somewhat compared to what we see during the winter. Diminished hours of daylight also reduce long distance pirate reception on 6925 kHz and adjacent frequencies.

But, none of these unfavorable reception conditions ever eliminate pirate broadcasting activity during the summer months. Several pirates still hang out on the North American pirate radio band, just below the Morse code portion of the 40 meter amateur radio band. Our readers heard several of them this month, and it is virtually certain that other stations will continue their activity during the summer. Although summer is never considered to be prime DX season for shortwave listeners, it pays to check out the pirate bands to hear the novel programming from pirate stations anyway.

Most pirates still operate either in upper sideband or lower sideband mode, in an attempt to increase their reception range. But, several stations still use AM mode, just like all commercial medium wave AM stations and like almost all shortwave international broadcasters. A smaller number of stations use other digital modes, such as Morse code, RTTY, and slow scan TV.

One principle is always in effect, no matter what seasonal conditions exist. You never know what you are going to hear from unlicensed pirate broadcasting stations. Their irregular and unpredictable broadcasting habits make pirate DXing an endlessly fascinating pastime.

❖ This Year's Fest

We now have a photo of the participants in the 2004 pirate radio forum at the 2004 Winter Shortwave Listening Festival in Kulpsville, PA, near Philadelphia. Pictured from left to right, we see John T. Arthur, publisher of *The ACE* bulletin in of the Association of Clandestine radio Enthusiasts, still the largest hobby club in North America that specializes in unlicensed broadcasting; Allan Weiner, the owner and driving force behind licensed shortwave broadcaster **WBCQ** in Maine; Chris Lobdell, the editor of the pirate radio column in *The Journal* of the North American Shortwave Association, still the largest shortwave hobby club in the United States; and George Zeller, from the column that you are reading now.

Even though **WBCQ** is fully licensed, their philosophy is to encourage pirate radio program production. To encourage this, Weiner welcomes tapes of pirate radio stations for potential relay on **WBCQ.** Any stations that wish to take advantage of this meritorious policy, should forward their program tapes to Allan Weiner, WBCQ The Planet, 97 High Street, Kennebunk, Maine 04043 USA.

❖ WNFC

According to a press release from Tom Ness and the Michigan Music Campaign, and a column by senior editor of the *Detroit News* Luther Keith, **WNFC** is a new FM pirate in Ferndale, MI. Its purpose is civil disobedience in protest of the FCC's foot-dragging performance in the low power FM issue. The call letters were selected to match the station slogan of "We Need Ferndale Community." Have any of our Michigan readers actually heard this station?

❖ Local Areas Challenge FCC

We have been regularly covering **Radio Free Brattleboro** in Vermont, which is strongly supported by both the local community and the voting public. They remain on the air at press time, and they have requested a rare waiver from the FCC so that they can continue to broadcast without a license to the local community. Meanwhile, the Florida state legislature has passed a law making it a felony under state law to broadcast a pirate radio station without a license from the FCC. The maximum sentence for a conviction is five years in prison and a $5,000 fine.

It will be very interesting to watch the FCC in upcoming months, as they receive challenges to their authority to regulate broadcasting from local legislation in places as diverse as Vermont and Florida.

❖ What We Are Hearing

Our readers heard all of these North American pirate broadcasters this month. All pirates operate on a sporadic schedule, but shortwave pirate broadcasting increases noticeably on weekends and during major holiday periods. The new primary North American pirate frequency of 6925 kHz, plus or minus 30 or 40 kHz, remains the place to scan for the pirates. At least 90% of all North American pirate broadcasts are heard on 6925 kHz. The old 6955 and 6950 kHz frequencies are increasingly abandoned by pirates because of interference from licensed stations, but there are occasional broadcasts on nearby frequencies.

Big Thunder Radio- Vashek Korinek heard this one all the way from South Africa. Sapphire, at Big Thunder says that this has been their most distant reception so for. (Uses bigthunderradio@yahoo.com e-mail)

Black Mountain Radio- Thus far this new pirate has used **WBMR** call letters for its mix of rock and flute music. (Uses wbmrradio@hotmail.com e-mail)

Captain Morgan- Parody ads, rock music, and TV theme songs . (None, says to send reports to ACE, and has QSLed lately)

Ironman Radio- Most of their programming is rock music and identifications. (Belfast)

KRMI- The eclectic programming from Radio Michigan International is still with us. Some readers reported QSLs from them this month. (Uses krmi6955@yahoo.com e-mail)

Martians (unidentified)- Some pirate station has been relaying messages from the Sidonian underground civilization on Mars. This one remains cryptic, but it is an example of the unusual programming that you can hear on pirate radio. Undercover Radio apparently denies being the Martian relay site. (None; what is the postage to Mars anyway?)

Oxycontin Radio- Their drug advocacy format is unrelated to Rush Limbaugh. (Maybe none, but try Providence)

Phat Rock 1650- This isn't really a shortwave pirate station, but they do have a web site that features streaming audio that sometimes works. Check out their Las Vegas web site at http://www.phatrockradio.com on the internet. (Unknown)

Pink Puma Radio- We know very little about this new music pirate so for. Some logs list their ID as the "Voice of" Pink Puma Radio. (None)

Radio First Termer- Somebody has been relaying the old commemorative program about military entertainment stations from the Vietnam war era. (None)

Radio Free Speech- Many have noticed that Bill O. Rights' shows featuring comedy and advocacy for individual rights are normally broadcast in AM mode. (Belfast)

Radio Spaceman- This Europirate made several appearances on radios in North America during the winter. Chris Lobdell received their saucer/earth QSL for a report to the Netherlands. (Neede)

Ragnar Radio- Their rock music "from the Great Lakes" is sometimes supplemented by Morse code identifications. (Uses rangarradio@yahoo.com e-mail)

Smooth Blues Radio- Not all pirates play rock music. Their blues programming often includes live concert recordings. (Uses smoothbluesradio@yahoo.com e-mail)

Sunshine Radio- A recent show featured a mix of British rock oldies and Christian rock. (None, but some replies via the grasscutterradio@yahoo.com e-mail address)

Sycko Radio- They have returned with their well produced rock music format and an ID that sounds like

continued on page 73

SATELLITE SERVICES

MT TRANSPONDER GUIDE *www.monitoringtimes.com/mtssg.html*

All Frequencies (MHz

Robert Smathers
robertsmathers@monitoringtimes.com

SES Americom Americom-6

Ku-Band - 72 degrees West longitude

1(V)	11720	Data Transmissions
2(H)	11740	Occasional video
3(V)	11760	Data Transmissions
4(H)	11780	Data Transmissions / KTEL-TV Carlsbad, NM – Telemundo (digital) / KUIL-TV Beaumont, TX – FOX (digital)
5(V)	11800	Data Transmissions
6(H)	11820	Occasional video
7(V)	11840	Data Transmissions
8(H)	11860	Occasional video
9(V)	11880	Occasional video
10(H)	11900	Occasional video
11(V)	11920	Occasional video
12(H)	11940	Occasional video
13(V)	11960	Data Transmissions
14(H)	11980	Occasional video
15(V)	12000	Data Transmissions
16(H)	12020	Data Transmissions
17(V)	12040	Occasional video
18(H)	12060	Occasional video
19(V)	12080	Occasional video
20(H)	12100	CBandNet Satellite Internet Service (digital)
21(V)	12120	Occasional video
22(H)	12140	Occasional video
23(V)	12160	Data Transmissions
24(H)	12180	Data Transmissions
25(V)	11535	South-American beamed transponder
26(H)	11535	South-American beamed transponder
27(V)	11655	South-American beamed transponder
28(H)	11655	South-American beamed transponder

Panamsat SBS-6

Ku-Band - 74 degrees West longitude

T01(H)	11725.0	Ascent Media (digital)
T02(V)	11749.5	Occasional video
T03(H)	11774.0	Occasional video
T04(V)	11798.5	Occasional video
T05(H)	11823.0	Occasional video
T06(V)	11847.5	The Access Center / SpaceConnection occasional video feeds
T07(H)	11872.0	Occasional video
T08(V)	11896.5	The Access Center / SpaceConnection occasional video feeds
T09(H)	11921.0	The Access Center / SpaceConnection occasional video feeds
T10(V)	11945.5	The Access Center / SpaceConnection occasional video feeds
T11(H)	11970.0	Occasional video
T12(V)	11994.5	MSNBC / CNBC news feeds (digital)
T13(H)	12019.0	Data Transmissions / Occasional video
T14(V)	12043.5	Occasional video
T15(H)	12068.0	Occasional video
T16(V)	12092.5	Occasional video
T17(H)	12117.0	Occasional video
T18(V)	12141.5	Occasional video
T19(H)	12166.0	Occasional video

SES Americom Americom-5

Ku-Band - 79 degrees West longitude

1(V)	11730.0	Data Transmissions / Utah Education Network (digital)
2(H)	11743.0	Data Transmissions
3(V)	11791.0	Data Transmissions
4(H)	11804.0	Oklahoma Educational TV (digital) / Empire Sports Network (digital)
5(V)	11852.0	CBS news feeds (digital)
6(H)	11865.0	Data Transmissions
7(V)	11913.0	Data Transmissions
8(H)	11926.0	Occasional video
9(V)	11974.0	Occasional video
10(H)	11987.0	Occasional video
11(V)	12035.0	CNN news feeds (digital)
12(H)	12048.0	CNN news feeds (digital)
13(V)	12096.0	Occasional video
14(H)	12109.0	Occasional video
15(V)	12157.0	Data Transmissions
16(H)	12170.0	New York Network (digital)

SES Americom Americom-9

C-Band - 85 degrees West longitude

1(V)	3720	Occasional video
2(H)	3740	Occasional video
3(V)	3760	Occasional video
4(H)	3780	Occasional video / RAI International (occasional)
5(V)	3800	NASA Contract Channel (analog or digital)
6(H)	3820	Occasional video
7(V)	3840	Occasional video
8(H)	3860	Occasional video
9(V)	3880	NASA Television
10(H)	3900	Data Transmissions
11(V)	3920	Occasional video
12(H)	3940	Data Transmissions
13(V)	3960	Data Transmissions / Analog SCPC Audio Transmission 1179.40 80.60 International Space Station Audio / Shuttle Audio (missions only)
14(H)	3980	Data Transmissions
15(V)	4000	Pennsylvania Cable Network (digital)
16(H)	4020	Data Transmissions
17(V)	4040	Data Transmissions
18(H)	4060	Occasional video
19(V)	4080	Data Transmissions
20(H)	4100	Occasional video
21(V)	4120	Occasional video
22(H)	4140	Occasional video
23(V)	4160	Occasional video
24(H)	4180	Data Transmissions

SES Americom Americom-9

Ku-Band - 85 degrees West longitude

1(V)	11720	Data Transmissions
2(H)	11740	NBC news feeds (digital)
3(V)	11760	Occasional video
4(H)	11780	NBC news feeds (digital)
5(V)	11800	Occasional video
6(H)	11820	Occasional video
7(V)	11840	Occasional video
8(H)	11860	NBC news feeds (digital)
9(V)	11880	Occasional video
10(H)	11900	Data Transmissions
11(V)	11920	Occasional video
12(H)	11940	Occasional video
13(V)	11960	Occasional video
14(H)	11980	Occasional video
15(V)	12000	Occasional video
16(H)	12020	Occasional video
17(V)	12040	Occasional video
18(H)	12060	Occasional video
19(V)	12080	Occasional video
20(H)	12100	Occasional video
21(V)	12120	Occasional video
22(H)	12140	Occasional video
23(V)	12160	Occasional video
24(H)	12180	Occasional video

SES Americom Americom-3

C-band - 87 degrees West longitude

1(H)	3720	Data Transmissions / Associated Press Television Network (digital)
2(V)	3740	Data Transmissions
3(H)	3760	Data Transmissions
4(V)	3780	Occasional video / Horse Racing (digital)
5(H)	3800	Occasional video
6(V)	3820	Fox Sports Net North – Minnesota, Fox Sports Net North – Wisconsin (digital) / Comcast Sportsnet Mid-Atlantic, Comcast Sportsnet Philadelphia (digital)
7(H)	3840	SuperCanal Caribe (digital) / TVU, Spirit Television (digital)
8(V)	3860	Occasional video
9(H)	3880	WPIX-TV, New York WB affiliate (VC2+)
10(V)	3900	Occasional video
11(H)	3920	Occasional video
12(V)	3940	Occasional video
13(H)	3960	Occasional video
14(V)	3980	Turner Classic Movies (VC2+) 6.20 Descriptive Audio Channel
15(H)	4000	KTLA-TV, Los Angeles WB affiliate (VC2+) 6.80 Spanish SAP
16(V)	4020	CNN fn (VC2+)
17(H)	4040	Data Transmissions / Christian Radio (digital) Ambassador Inspirational Radio 1 Ambassador Inspirational Radio 2 Calvary Satellite Network 1 Calvary Satellite Network 2 Saunds of the Spirit (SOS) Radio Network Focus on the Family 1 Focus on the Family 2 Focus on the Family 3 Focus on the Family Radio Information Radio Network Moody Broadcasting 1 Moody Broadcasting 2 Research Education Foundation Radio Salem Radio Network 2 Salem Radio Network 3 Salem Radio Network 4 Salem Radio Network 5 Today's Christian Music The Word in Praise Solid Gospel Skylight Radio 1 Skylight Radio 2 Sangtime Salem News Network USA Radio Network 1 USA Radio Network 2 USA Radio Network 3 USA Radio Network 4 VCY America 1 VCY America 2 Salem Radio Network Program 1 Family Life Radio "LifeOne"
18(V)	4060	Horse Racing (digital)
19(H)	4080	Occasional video
20(V)	4100	University Network – Dr. Gene Scott
21(H)	4120	Data Transmissions
22(V)	4140	CNBC (VC2+)
23(H)	4160	Occasional video
24(V)	4180	Horse Racing (digital)

SES Americom Americom-3

Ku-Band - 87 degrees West longitude

1(H)	11720	Data Transmissions / GE TiP-TV (digital) / Patient Channel (digital)
2(V)	11740	Data Transmissions / MTA International (digital)
3(H)	11760	Occasional video
4(V)	11780	Data Transmissions
5(H)	11800	Occasional video
6(V)	11820	Occasional video
7(H)	11840	Data Transmissions
8(V)	11860	Occasional video
9(H)	11880	Occasional video
10(V)	11900	Data Transmissions
11(H)	11920	Data Transmissions
12(V)	11940	Occasional video
13(H)	11960	CNN Newsource (digital) / CNN Newsource Washington (digital)
14(V)	11980	Georgia Public Television (GPTV) (digital)
15(H)	12000	Data Transmissions
16(V)	12020	Data Transmissions
17(H)	12040	Data Transmissions
18(V)	12060	Florida Channel, Florida Knowledge Network (digital)
19(H)	12080	Louisiana Public Broadcasting (digital) / Montana PBS (digital)
20(V)	12100	Public Broadcasting Service (PBS) (digital) / WYDN-TV Worchester, MA – Doystar (digital)
21(H)	12120	Public Broadcasting Service (digital) / PBS HD Channel (digital)
22(V)	12140	Data Transmissions / Indiana Higher Education Telecommunication Service (IHETS) (digital)
23(H)	12160	Public Broadcasting Service (digital)
24(V)	12180	Public Broadcasting Service (digital)

Panamsat Galaxy 11

C-Band - 91 degrees West longitude

1(H)	3720	WB 100+ Stations (digital)
2(V)	3740	Fox Cable Networks (digital)
3(H)	3760	Black Entertainment Television (digital)
4(V)	3780	Fox Cable Networks (digital)
5(H)	3800	Fox Cable Networks (digital)
6(V)	3820	Occasional video
7(H)	3840	The Golf Channel (VC2+)
8(V)	3860	Occasional video
9(H)	3880	Ascent Media (digital) YES Network NBA TV NFL Network Bloomberg TV Access Television 1 Access Television 2
10(V)	3900	Shop at Home (analog) / Shop at Home (digital)
11(H)	3920	Eternal Word Television Network (digital) EWTN – Europe EWTN – Pacific Rim EWTN – Latin America EWTN – North America EWTN Radio Radio Paz
12(V)	3940	WE: Women's Entertainment (VC2+) 8.10 American Voice Radio
13(H)	3960	Comcast Media Center (digital) Oxygen TV – East Oxygen TV – West Ovation Adhoc feeds Guthy Renker TV KTVD-TV, Denver, CO - UPN affiliate Varsity TV

Kevin Carey, WB2QMY
kevincarey@monitoringtimes.com

Summer Strategy

Welcome to the July issue of *Below 500 kHz*. DXing during the warmer months presents some unique challenges for longwave enthusiasts. First, there are static crashes to contend with – sometimes lots of them. Lightning, even at distances of 100 miles or more, can generate enough noise to disrupt or even obliterate your listening.

The longer hours of daylight during the summer also limit the time most of us have available for nighttime "skip" propagation. The signals we do hear tend to be close-in "regulars" rather than the prime DX catches we enjoy during the winter.

Finally, summer often demands much of our time away from the shack for other commitments – yard work, vacations and other recreational activities.

Here are some tips for making the most of your summertime listening as you tune the longwave band...

- ***Start Listening Early*** – By doing your listening in the morning, you'll bag some good catches before the noise has a chance to build up. Before 10 AM is best, since there may still be some nighttime skip in effect, especially on the higher LW frequencies (300 kHz and up).

- ***Antennas are Everything*** – Avoid the common "longwire" antenna, especially in the summer. These antennas frequently act as "noise collectors" particularly in urban and suburban locations. Many operators have noted that they seem to pick up every light dimmer and motor in the neighborhood.

  Instead, consider using a Loop Antenna or a carefully-placed Active Antenna. Two commercial sources for these antennas are LF Engineering Co. (**http://www.lfengineering.com**) and Palomar Engineers (**http://www.palomar-engineers.com/Loop_Antenna/loop_antenna.html**). You can also build your own loop for a very reasonable cost. Check the web for a plethora of design ideas.

- ***Roadtrip!*** – Planning a summer getaway? Why not pack your portable receiver, a beacon directory, and your logbook for some new-to-you signals. Imagine the excitement of tuning the band with an entirely new set of signals to hear. Just remember, even DXers need an occasional break, so when on vacation, be sure to log some quality time away from the radio too!

  The pleasant conditions of summer also make it a great time to track down your local beacons. All you'll need is your portable receiver, a local map, and a compass. By using your portable's internal antenna you can take two or more directional bearings and then plot these on the map. The intersection of the bearing lines will show you where the beacon is located. Once you've found a beacon, why not snap a picture of it for the pages of *MT*?

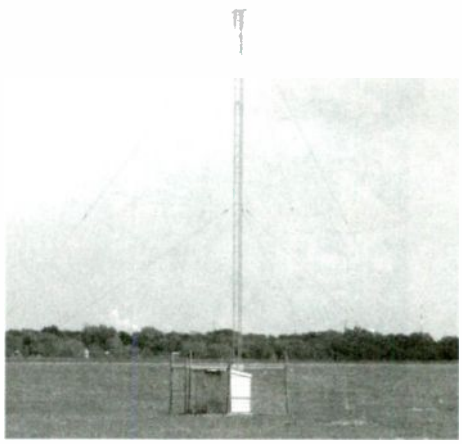
- ***Batteries Required*** – Summer invariably brings with it some local power outages (well, usually they're local – let's not dwell on 2003). The point here is to keep some fresh batteries handy for your portable rig. When the power goes out, you'll have the advantage of operating while all of the dimmer controls, TVs, motors and other static-generating stuff is "off the air." These magic moments come along rarely, so be ready! You may even want to run a tape recorder to preserve the moment.

- ***Retro Longwave*** – Summer is a great time to visit your favorite radio museum, perhaps combined with a family vacation. I'd need several pages to discuss all of the museums out there with a radio/electronic theme, but a decent listing appears on the Antique Wireless Association (AWA) website at **http://www.antiquewireless.org/**. Just click on "Links to other museums" By the way, the AWA's own museum in Bloomfield, NY, is a must-see if your travels bring you anywhere near the Finger Lakes Region of New York. You can take a virtual tour online. Longwave is well represented here.

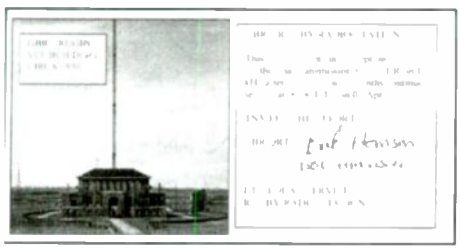
Other News

Congratulations to the **Shortwave Listener's Net** on 16 years of service to the SWL/Ham community. Listeners in the Central New York region can check out the Net each Friday at 8 p.m. on the 147.000 MHz repeater in Auburn, NY. This repeater is linked to other areas, and sports excellent coverage from Rochester eastward to Syracuse, and well beyond.

Even if you're not a ham, you can participate in the net by listening on a scanner and calling the net's "gateway" station by telephone. Information for the gateway station is given during each net. Longwave topics are welcome here, and it was my privilege to be a guest presenter on the Net for two sessions in April. I look forward to meeting more *MT* readers on future nets.



Beacon JPA (347 kHz), La Porte, TX (Photo by Cliff Watts)



Time Station GBR in Rugby, England (16 kHz) sent its final transmission in April 2003, after 77 years of operation. Harald Lutz (Germany) received one of the final QSL cards issued by the station and shares it here with *MT* readers.

Online Help for RFI

Ken Alexander (VE3HLS) of Toronto wrote to announce his new website for the identification of Radio Frequency Interference (RFI). This unique site can be found at **http://www.ve3hls.com/noise/rfihome.html**. Ken writes: "The website is intended to help DXers identify noises that they hear as they monitor the LW/MW/SW bands. It contains .MP3 files of a dozen or more types of QRM, such as light dimmers, TV sets, computers, and computer speaker systems. I live in a rather noisy location, so I'll be adding files to the site every few days."

"I'm hoping that people who visit the site will check out the various noises to see if they hear something like what's bothering them. I am also asking that if someone is plagued by a noise they *can't* identify, that they'll consider sending a sound sample to me. I'll post it on the website as 'unidentified' in the hope that someone else might recognize it."

ODXA Update

In April, we mentioned that the Ontario DX Association (ODXA) was celebrating 30 years of service to the radio community. Harold Sellers, Editor of the ODXA's journal, wrote to thank us for the recognition, and also to make one minor update. For the past few years, the ODXA has welcomed loggings from *outside* Ontario as well as those made inside the province. Full information on this active group can be found online at **http://www.odxa.on.ca**.

73, and best LW DX. I'll see you next month.

ON THE HAM BANDS

THE FUNDAMENTALS OF AMATEUR RADIO

T.J. "Skip" Arey, N2EI
tjarey@monitoringtimes.com

Remembering OSCAR

One of the great things about amateur radio is that we share a history. Even if you have only recently passed your first license test, you join a family of folks who have contributed to the amateur radio art. Their stories are your stories now, too. It is a valuable part of being a ham to learn a bit about where we've been in order to get really excited about where we are going.

This all came to mind for me when I noticed that the amateur radio community was about to launch yet another Amateur Satellite. If all went according to plan, AMSAT OSCAR ECHO was launched on June 29, just a few days before you received this copy of *MT*.

I'm old enough to remember (barely) the launching of Sputnik I. (October 4, 1957, for anyone keeping track) and the subsequent launching of Explorer I (January 31, 1958). These two satellites signaled the beginning of the "Space Race" between the United States and the Soviet Union. Putting these two satellites into orbit was accomplished by the greatest minds in aerospace, electronics and communications technology in two different hemispheres at the cost of many millions of dollars. Yet I can't help but chuckle when I also recall that a group of dedicated amateur radio operators, using what amounts to pocket change compared to Cold War Era space financing, managed to get their first satellite into orbit only around four years later on December 12, 1961.

For those of you new to either ham radio or the aspect of hamming related to amateur satellites, allow Old Uncle Skip to share some of our common lore.

Amateur Radio's first satellite was OSCAR I. OSCAR I stands for **O**rbital **S**atellite **C**arrying **A**mateur **R**adio. OSCAR I was very tiny as satellites go, measuring only 9 x 12 x 6 inches. It weighed a touch under 10 pounds (4.5 kilograms).

OSCAR I was the brainchild of a group of hams in California (operating under the name of Project Oscar) who convinced the Air Force that hams could put up a satellite by having it hitchhike as ballast on one of their scheduled rocket/satellite launches. OSCAR I rode into orbit from Vandenberg Air Force Base in Lompoc, California, as ballast on the upper stage of a Thor Agena B rocket whose main mission was to deploy the USAF Discover 36 satellite. OSCAR I went into an elliptical orbit that ranged from 152 miles to 295 miles on an inclination of 81.2 degrees 91.8 minutes.

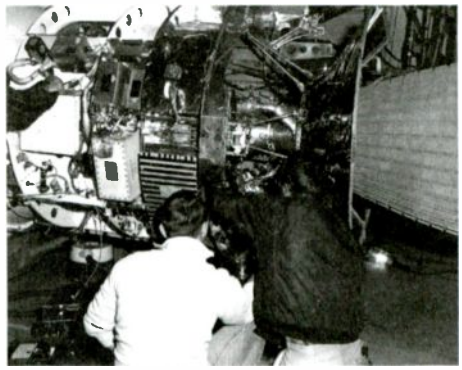
OSCAR I was a fairly basic experiment, not terribly different from the first Sputnik. OSCAR I had a 140 mW transmitter and a single monopole antenna. It had no receiver and its batteries were not rechargeable. All our first satellite could do was repeatedly send the CW characters "HI" on the frequency of 144.983 MHz. It dutifully performed this task for 22 days until its batteries drained. During that period of operation it was documented that the signal was heard by 570 amateur radio operators in 28 different countries.

Due to its relatively low altitude as satellites go, OSCAR I was only able to remain in orbit for a total of 50 days. Still, it was a great first effort, the predecessor of dozens of later amateur satellites.

A number of years ago, not too long after I was first licensed as a ham, I went to the recently opened Smithsonian National Air and Space Museum and saw a mock-up of OSCAR I in the hall that also displayed dozens of other satellites that changed the world. While other people stood in awe of gigantic telecommunications satellites, I smiled down on a little squarish box and remembered a bit of amateur radio history.

As you can imagine, quite a bit has happened since those first amateur satellite efforts in 1961. But let's take a closer look at some of the early milestones that brought us to the place where amateur satellite communication is commonplace and within the capability of any dedicated ham.

OSCAR II was similar in design to OSCAR I, the main difference being that the transmitter's power was lowered to 110 mW in order to increase the lifecycle of the onboard batteries. Like its earlier sibling, OSCAR II was launched from "Vandy" on another Thor Agena B on June 2, 1962. It only remained operational for 19 days and reentered the earth's atmosphere on June 21, 1962. At the same time OSCAR II was constructed, another satellite of similar design was built with a 250 mW transmitter but it was never launched.



Incorporating OSCAR I as ballast into the delivery vehicle (courtesy Project OSCAR)

OSCAR III was the amateur radio world's first true communications satellite in that it had a bi-directional transponder, allowing signals to be received and then retransmitted. An actual orbiting repeater! OSCAR III rode into its 590 mile high orbit on March 9, 1965, on board a Thor Agena D rocket that was carrying seven USAF satellites as its primary payload. OSCAR III received signals on a 146 MHz uplink and retransmitted these signals through a 1 watt, 50 kHz wide transponder on a 144 MHz downlink frequency.

The satellite also had two beacons. The beacon transmitters batteries were rechargeable and connected to solar cells. For this reason, while the transponder ceased operation after 18 days (having relayed more than 1000 signals for hams in some 22 countries), the beacons continued to send data for a number of months afterwards.

OSCAR IV took even more steps forward, but also signaled some of the amateur radio satellite community's first disappointments. OSCAR IV rode on a Titan 3C booster carrying three USAF satellites on December 21, 1965, just four years after OSCAR I. OSCAR IV was designed by the TRW Radio Club in California. It was designed with solar cell rechargeable batteries and boasted a 3 watt wideband transponder that had a uplink of 144 MHz and a downlink of 432 MHz. This operational scheme proved to be a bit of a challenge for hams at that point in history, but many contacts were made, including the first U.S. to U.S.S.R. satellite contact.

However, problems with the boost phase of the flight left OSCAR IV in an extremely elliptical orbit. Communication was severely limited. Further, OSCAR IV only remained in operation for 85 days. It is believed that either the batteries or solar cells experienced failure due to the harshness of the space environment. At this point in history even the "pros" were still only beginning to understand the effects of extremes of heat and cold as well as dust and radiation on spacecraft.

Continued design and development occurred within the amateur radio community even though it was some time until any more satellites were launched. In 1969 AMSAT

was formed to further this process.

OSCAR V was better known as Australis-OSCAR 5 because it was designed and fabricated by a group of students in the Astronautical Society and Radio Club located at the University of Melbourne in Australia. In a joint effort with the newly formed AMSAT in the United States, OSCAR V was launched on January 23, 1970, from Vandenburg AFB. It rode piggyback on a Thor Delta booster with the TIROS-M weather satellite.

OSCAR V was placed into a 925 mile high polar orbit. It was a somewhat simpler experiment than OSCAR IV had been. Weighing in at a little bit under 18 pounds, it contained two telemetry transmitters: a 50 mW unit transmitting at 144.050 MHz and a 250 mW unit transmitting at 29.450 MHz. It was equipped with 2 and 10 meter monopole antennas. It had no transponder, but did have a receiver that allowed a signal to be sent to turn the 29 MHz telemetry transmitter on or off from a ground station.

It was also the first amateur satellite to have a method of attitude stabilization. This was done in a rather novel manner by using a pair of bar magnets to passively align the satellite with the Earth's magnetic field. By doing this, the satellite's antennas were placed into a favorable orientation with ground stations. OSCAR V had no solar cells, but its batteries did hold out long enough to keep the satellite in operation for a total of 52 days. During that time tracking and telemetry reports were logged by hundreds of ground stations in 27 different countries.

OSCAR V became the last of what are now called the Phase 1 amateur satellite experiments. This early group of basic satellites served as proof of concept for many ideas that became the foundation of all future amateur satellite activities.

❖ Earth Base

Now let's talk a bit about what hams needed back then to begin to hear, track and actually talk through these early Phase I satellites.

Listening in on the early OSCARs was not something the casual "appliance operator" was likely to accomplish. You have to remember the era of the '60s. VHF/UHF communications gear was mostly in the hands of technically oriented hams. The now common world of 2 meter FM and repeater systems in every grid square was just beginning to come on line. Over the counter ham equipment for these bands was available, but expensive.

Hams were more likely to experiment with used and surplus commercial gear such as "taxi" radios. Another option was to build your own equipment or transverters for your existing HF gear. Not something for the faint hearted, even today. Still, with a little luck, horse trading, and a current copy of the *ARRL Handbook* on your shelf, it was possible to find a receiver that could tune the right frequencies. With a bit more effort you could even get a station together to transmit and be one of those first folks to put a signal through OSCAR III or IV.

Then came the really challenging part. To maintain contact through one of these early satellites (and to most of the current ones as well) a ham needs a steerable antenna system. The antennas need to track the satellite along its path to make communication possible. Further, these antennas would be most efficient and maintain the longest possible QSO time if they could also be oriented along the vertical axis!

A search though any current ham store catalog or web site today will point you to a number of manufacturers of altitude/azimuth rotor units and dozens of satellite tracking software packages. Back in the '60s no commercial two-axis rotator units were yet on the market. And if you had told any but the most forward thinking ham that he or she would someday soon have a personal computer on the desktop, the laughter would have traveled farther than any of those satellite signals!

Folks had to come up with their own rotator systems, often cobbled together out of a pair of used TV antenna rotators. Calculating the Keplarian movements of the satellite orbits was done by hand and slide rule (we're still a touch early even for personal hand calculators). Still, once you got the details worked out, you could have tons of fun experimenting with antenna designs. Because satellites usually tumbled in their orbits, novel ways were devised to resolve antenna polarization issues. Cross polarized Yagis, Quads and Helix antennas were all starting to pop up on satellite hams' roofs.

We've come a long way since those early days. Right now there are over 20 orbiting amateur radio experiments (including the ARIS ham station on the International Space Station). It is possible to assemble a complete satellite ground station out of any well-stocked ham suppliers catalog or web site. But it is good to remember how things were "back in the day" and to look toward the future while recalling those first small amateur radio steps into space.

Have fun. I'll see you on the bottom end of 40 meters.

UNCLE SKIP'S CONTEST CORNER

RAC Canada Day Contest
July 1 0000 UTC - 2359 UTC

MI QRP July 4th CW Sprint
July 4 2300 UTC - July 5 0300 UTC

IARU HF World Championship
July 10 1200 UTC - July 11 1200 UTC

FISTS Summer Sprint
July 10 1700 UTC - 2100 UTC

QRP ARCI Summer Homebrew Sprint
July 11 2000 UTC - 2400 UTC

North American QSO Party, RTTY
July 17 1800 UTC - July 18 0600 UTC

CQ Worldwide VHF Contest
July 17 1800 UTC - July 18 2100 UTC

RSGB IOTA Contest
July 24 1200 UTC - July 25 1200 UTC

Outer Limits continued from page 69

"Psycho." But, this veteran remains mysterious. (None)

Take it Easy Radio- Rock music still dominates here, not always from the Eagles, but playing more country music. (Uses takeiteasyradio@yahoo.com e-mail)

Undercover Radio- Dr. Benway's music and comedy is fairly eclectic – always changing. (Merlin and undercoverradio@mail.com e-mail)

WBMR- Mike O. Farad at the relatively new Black Mountain Rodio has been verifying some loggings left on the Free Radio Network web site. (Uses wbmrradio@hotmail.com e-mail)

WBNY- This clandestine parody, Voice of the Rodent Revolution, returned around Easter as usual, but they are sometimes active at times other than holidays. (None, old address defunct)

WHYP- James Brownyard from North East, PA, continues to be one of the more active and clever pirates on the air today. His Lake Erie weather reports are not exactly live. (Providence)

WJFK- This John F. Kennedy memorial station remains a big mystery in the pirate radio world. Few people heard their broadcast this year (normally around November 22), but several DXers have received their QSL onyway, now marked with o 6925 kHz frequency that differs from QSLs issued in the past. (None; responds to unknown information sources).

WMPR- The all-time champion of techno rock continues to transmit "dance party" format on the pirate bands, with a "micro power radio" slogan. (Still none)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; Box 73, NL-7160 AB, Neede, The Netherlands; and Casilla 259, Santiago 14, Chile.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for submitting pirate loggings remain *The ACE* ($2 US for sample copies via the Belfast address above) and the e-mailed Free Radio Weekly newsletter, still free to contributors via niel@ican.net. The Free Radio Network web site, another outstanding source of content about pirate radio, is found at **http://www.frn.net** on the internet, and some pirates will QSL a report left on the FRN.

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: John T. Arthur, Belfast, NY; Scott Barbour Jr., Intervale, NH; Artie Bigley, Columbus, OH; Rich D'Angelo, Wyomissing, PA; Alex Draper, Orillia Ontario; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Harry Helms, Las Vegas, NV; Vince Havrilko, Kadena AB, Okinawa; Vashek Korinek, South Africa; Ed Kusalik, Coaldale, Alberta; Chris Lobdell, Stoneham, MA; Larry Magne, Penn's Park, PA; Greg Majewski, Oakdale, CT; Lee Reynolds, Lempster, NH; Fred Roberts, Germany; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Niel Wolfish, Toronto, Ontario; and Joe Wood, Vonore, TN.

Clem Small, KR6A
clemsmall@monitoringtimes.com

Some Rules Were Made To Be Broken

This month we'll consider some rules-of-thumb about antennas. The rules are not necessarily wrong, but, as with most rules, there are exceptions to those rules. And, as always, it helps to keep the idea of antenna reciprocity in mind when thinking about antennas. That is, that antennas generally have the same characteristics (e.g.; radiation patterns, feed point impedance, gain, etc.) for transmitting as for receiving.

❖ The Higher My Antenna the Better It Performs:

Consider VHF or higher band antennas communicating with each other across relatively flat terrain. The propagation paths between antennas in these so-called line-of-sight bands may be blocked by buildings, hills, etc. in their immediate environment. However, once the antennas have been elevated sufficiently high that they can "see" each other over the tops of whatever is blocking their signals then increasing their height generally won't improve communications. But there is a phenomenon called "multipath" which may still make received signal strength sensitive to relatively small variations in antenna height.

Some signal rays may arrive at one antenna on a direct line-of-sight path (direct wave), while other rays of the signal may take a longer path, such as reflecting from the earth between the antennas (ground reflected wave) (fig.1). Time-of-travel difference for the various rays can cause them to arrive at the receiving antenna in-phase or out of phase, causing maximizing or minimizing of overall received signal strength. Depending on the situation, either raising *or* lowering an antenna a fraction of a wavelength may actually either increase *or* decrease signal strength.

Here's another exception to the higher is better rule. Sky-wave signals in the HF and lower-frequency range often reflect from the ionosphere and return to earth. If signals leave a transmitting antenna at a low vertical angle they will travel far before refracting from the ionosphere, and returning to earth. If, on the other hand, they leave the transmitting antenna at a high (closer to vertical) angle, then they bounce back down much closer to the transmitting antenna.

A dominant feature in establishing what vertical-radiation angle a horizontal antenna will have is its height above earth. Ordinarily, positioning a horizontal, half-wavelength antenna a half wavelength above earth will provide low vertical angle performance, and thus support DX communications well. Mounting the antenna a quarter wavelength above earth gives higher-angle performance, and supports closer-in communication. So, if your horizontal antenna is at a height of a half wavelength, lowering it may actually improve reception of stations within a few hundred miles of your antenna. On the other hand, if your antenna is at a quarter wavelength height, and you raise it to a half wavelength the increased height will likely reduce close-in performance, but improve its long-distance performance.

❖ Tuning an Antenna to Resonance Will Improve Reception:

Many antenna elements are designed to be tuned circuits, which means that they respond maximally to the frequency or band on which they are designed to operate. When an antenna element captures a signal at the element's resonant frequency, that signal produces a greater signal-current flow than if the element were not resonant at that frequency. This alone might recommend always using resonant elements. But before we make this assumption let's consider the effect of signal-to-noise ratio (S/N) on quality of reception at HF and the lower frequencies.

An example of received electrical noise is the "static," or background noise that you usually hear on HF and lower frequencies when no other signal is present. Received noise, such as these pops and crackles, is actually a kind of radio signal, and so its strength is increased by resonant antenna elements just as is the desired signal's strength.

Generally, below, say, 20 MHz or so, received noise is the predominant noise in a receiving system. Noise generated in the receiver is so much lower than this received noise that receiver-noise effects the S/N very little. This means that the N in the S/N is essentially the received noise. Increasing the signal-strength output from the antenna will increase noise as much as it does signal, and so S/N doesn't change, and reception quality is not improved.

At frequencies above 20 MHz or so, the strength of received noise becomes low compared to the noise generated within the receiver's circuits. So at these frequencies, especially VHF and higher, the receiver's own noise usually sets the noise level for the S/N. So, at these frequencies, increasing antenna output increases the S part of the S/N without significantly increasing the N, and reception quality is improved.

The above statements are generalizations, and received-noise level varies with location and season as well as with frequency. But usually, for the reasons just given, at VHF and higher frequencies, tuning an antenna to resonance improves reception. On the other hand, at HF and lower frequencies, making antennas resonant simply to increase received-signal strength is not usually effective in improving reception.

From a different perspective, proper tuning of elements is quite important in the performance of beam antennas such as the Yagi-Uda. Element tuning is essential in determining the beam's radiation and reception pattern. Proper tuning does improve S/N, and thus improves weak-signal reception by rejection of noise and interfering signals in off-beam directions. In fact, at HF or lower frequencies, this off-beam noise and interference reduction is usually more important to increasing quality of reception than is

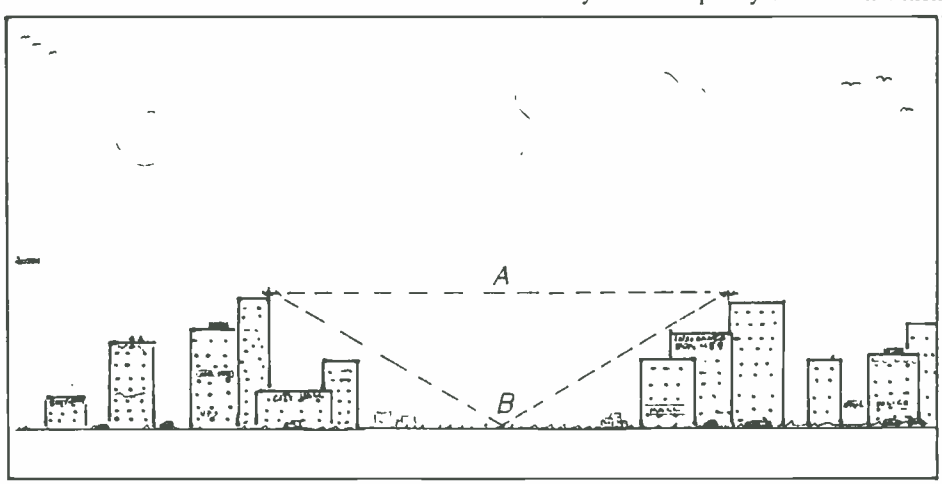


Fig. 1. Various propagation paths are usually possible between antennas. Here we see two possible paths: a direct ray (A), and a ground-reflected ray (B).

This Month's Interesting Antenna-Related Web site:

Some interesting talk about various unusual antennas and accessories: http://www.hard-core-dx.com/nordicdx/antenna/special/

increased gain which a beam may offer.

❖ A Half-Wave Dipole's Feed-Point Impedance is 72 Ohms:

You may read that a half wavelength, center-fed dipole's feed point impedance (FPI) is about 72 ohms, and that a quarter wave, sloped-radial, ground-plane antenna FPI is around 50 ohms, and so on. To get maximum signal transfer from antenna to feed line for receiving, or from feed line to antenna for transmitting, we must match antenna feed-point impedance, and feed-line impedance.

So should we use 72-ohm feed line as lead-in for the dipole antenna? Not necessarily. If we actually measure our antenna for FPI we may find it to be anywhere from near zero to near 100 ohms! Seventy two ohms is the FPI value the antenna would have if it were located out in space. But we have the antenna in our backyard. There any nearby conductive objects, especially the earth, will interact electrically with the antenna and result in a change in its FPI.

Other factors can effect the value of an antenna's FPI, particularly the location of the feed point along the length of the element. If we move the feed point progressively from the center of a half wave dipole toward either end, the FPI progressively increases from less than 100 ohms to a few thousand ohms!

In general, for practical antennas, FPI is often different from the text book, free-space value, and can be changed by changing the location of the feed point, the antenna's height above earth, or the proximity to nearby conductive objects.

❖ A High SWR Causes Significant Power Loss and Poor Reception:

If your antenna doesn't have the same FPI as your feed line's impedance, then signal power will be reflected away from that junction. For reception this reflection is directed back into the antenna. For transmssion the reflection is back down the feed line toward the transmitter. When signal power is reflected back into the feed line, the interaction of the reflected power and the power coming toward the junction will sum to cause standing waves. A large mismatch of impedances will cause a high standing-wave ratio (SWR).

For reception on HF and lower frequencies, not getting maximum signal from the antenna is not generally a problem for reasons discussed above. But for reception at VHF and higher frequencies, maximum signal transfer is important for reasons also discussed above.

When transmitting, if an antenna-system tuner (such as a transmatch) is used at the transmitter, then signal reflected back from the antenna is returned again to the antenna, and essentially the only loss is feed line loss. For reasonable length lines, if low-loss feed-line is used then this loss is low even with rather high SWR values. On the other hand, at VHF and higher frequencies, matching between antenna FPI and feed line impedance provides lowered loss of transmitter power and improved reception.

❖ And So:

It seems that the more we know about antenna performance the less tightly we adhere to rules-of-thumb. If you want to learn more about antennas, a good source is the *ARRL Antenna Book*. Few will want to read it all, but many find it a great reference and study source.

RADIO RIDDLES

Last Month:

I said: "Antennas" were once called "aerials." Why do we now call them "antennas?" Well, early-on, wireless communications was accomplished at rather low frequencies. At these long wavelengths performance was much better with very high, long antennas. Such a high antenna was called an "aerial" which means "high in the air."

However, as technology advanced, and shorter wavelengths also became popular, it became practical to use antennas which were not so high in the air. So "aerial" was no longer so appropriate. It was noted that insects had antennae which received information from their environment in some ways comparable to a receiving antenna receiving radio waves. In response to this, the term "antenna" was chosen to replace "aerial."

This Month:

Why don't antennas trust their connectors?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Marc Ellis
marcellis@monitoringtimes.com

Calling in a Substitute

As those who have followed this column for awhile know, all my "Radio Restorations" projects are done essentially in "real time," with the reader looking over my shoulder as I proceed. I don't finish projects in advance so that I can select only the most successful restorations for publication. I have occasionally been a bit embarrassed by being stumped for a time – but I've never before had to put aside a project before completion (though I came very close during the S-40 restoration finished a few months ago).

I've always felt that the immediacy of my real-time policy makes this column more interesting to the readers. Hey, look at the popularity of the TV reality shows! So I hope you'll be patient with me when I tell you that the NC-46 project has now been "voted out," so to speak.

Despite this, I think it will be instructive to report on the restoration work completed in this session – up and including the point where I discovered the radio's tragic flaw. That should certainly be helpful to anyone who may decide to undertake an NC-46 restoration.

◆ Reversing the Owner Mod

Last month, I had removed the radio's bottom access panel and was very pleasantly surprised by the relatively untouched appearance of the wiring. The only owner mod seemed to be the installation of a d.p.d.t. switch and RCA phono jack on the rear apron. The first thing I did this month was to get out the schematic and trace the added wiring so I could remove it.

The mod turned out to be a phonograph input. In one position of the switch, a phono cartridge plugged into the jack would be connected to the input of the radio's first audio stage. At the same time, plate voltage would be removed from the second i.f. stage to mute any radio signal being received. In the other position, the cartridge would be disconnected and plate voltage restored.

I removed the wiring and switch – restoring the permanent plate connection to the second i.f. tube. I decided to leave the RCA jack in place because it had been fastened with pop rivets that would have to be drilled out. Also it was obvious that the removal would leave a particularly crude-looking hole.

Next I turned my attention to the tubes, removing and testing them one by one. Those of you who were with me during the recently-completed "All American Five" restoration know that a positive test doesn't necessarily indicate a clean bill of health. However, all of the tubes did look good – showing no shorts and (with a couple of exceptions) easily surpassing the test criteria.

◆ Cabinet and Controls

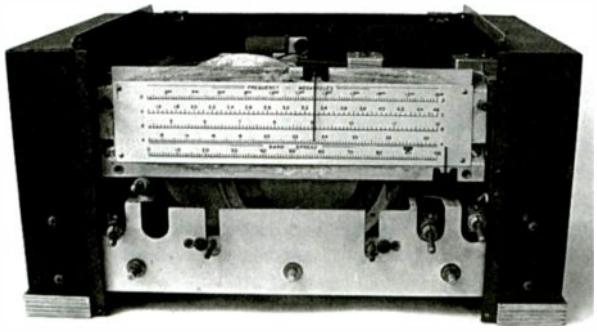
Two components of the NC-46's cabinet were going to require special attention. The front panel would need cleaning and polishing; the hinged lid would have to be cleaned and its crackle finish carefully oversprayed with a matching paint. Luckily, both of these parts were removable.

The lid was fastened to its hinges with machine screws, so removal was quite a simple matter. Removing the panel wasn't too much of a problem either, though it required a bit more work. First the knobs had to come off, of course, and the large tuning and bandspread knobs were a little resistant.

After loosening their setscrews, I was able to twist them off while gripping their shafts with pliers behind the panel. Holding the knobs in my hands, I was surprised by their weight – until I noticed the heavy metal insets that had been installed to provide flywheel tuning action. Quite a luxurious touch!

Once the knobs were off, I could see that the shafts for the tuning knobs and the three lower controls were mounted on the chassis apron behind the panel – protruding through large clearance holes in the latter. (Remember, for electrical safety, the chassis of this a.c.-d.c. radio must be kept from contacting the cabinet). The upper three switches were not in contact with the chassis, being mounted directly on the panel. Removing the switch mounting nuts and five retaining screws freed the panel so that I could slip it right off.

I wasn't ready to do the cosmetic work on the cabinet parts, or to begin the capacitor replacement. The designer of the NC-46 had gone wild with decoupling filters and I wouldn't have had enough caps on hand anyway. Looking around for other things I could do to advance the cause, I applied cleaner/lube to the volume and sensitivity controls as well as to the bandswitch contacts. Then I carried out the test that is putting this project on the shelf.



The National NC-46 stripped down for a restoration that isn't going to happen (see text).

◆ Enter the Tragic Flaw

At some point in my restoration of every communication receiver, I check the primaries of the antenna coils. It doesn't happen very often, but sometimes one of them will be found open – particularly if the set has been left connected long term to an outside antenna without lightning protection. Finding, once, that this had happened to a radio I valued quite a lot (the 10-meter coil primary was open), I became sensitized to the problem.

After I had cleaned up the bandswitch contacts, I decided to check the antenna coils. Connecting an ohmmeter across the receiver's doublet antenna terminals, I rotated the bandswitch through its four positions. To my amazement, only the broadcast band coil showed continuity! After verifying this by connecting my meter directly across the primary of each coil, I realized I had a problem on my hands.

Sure, these primaries had very few turns and could be rewound with patience and care. But disconnecting and removing them from their shielded enclosures would be quite a chore indeed – as well as trying to match and acquire the wire I would need for the windings. If this were a National HRO instead of an NC-46, a procedure like this would definitely be worth the work. As it is, I'm going to put the set together again so I don't lose anything and keep it on the shelf as a parts set for the better example that I hope will eventually turn up.

Speculating on how those coil primaries

might have become wasted, I tested for continuity between the cabinet and the radio's hot chassis. Sure enough, there was a direct short between them. Perhaps there is a shorted capacitor somewhere, or maybe one of the insulating bushings had been disturbed and reinstalled incorrectly.

Like most of these low-end radios, one of the doublet antenna connections had been strapped to cabinet ground so a single-wire antenna lead-in could be connected to the other. If the radio's power plug had been inserted so that the cabinet was hot to ground, and if the antenna had some kind of leakage to ground, voltage from the power line would have appeared across the antenna coil in use and eventually burned it out. The same thing would have eventually happened to the other coils as the listener switched from band to band (amazingly, he seems not to have been knocked on his rear end first).

This is just a theory, but it does explain why so many of the coils were affected when it's more usual to find just one burn-out.

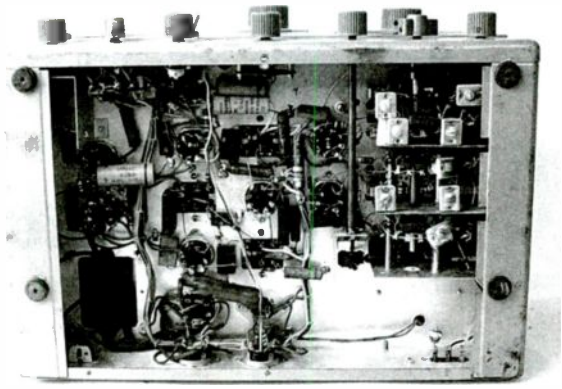
❖ Substituting the NC-57

Some time back, I purchased a National HRO-60 receiver from an estate. Since my sister lived near the seller, I had her pick it up for me. A little later, she e-mailed me to tell me that I had not one radio but two. The seller had thrown in a National NC-57 that I didn't even know was being offered. After I got a look at the radio, I could see why it had been included at no charge. At first glance, it appeared to be in rather pathetic condition.

Yet, in spite of its scuzzy looks, the set seems to be complete. And it makes a certain amount of sense to substitute an NC-57 for the NC-46. As mentioned last month, this is the radio that appeared in 1947 to replace the NC-46 as a competitor to the Hallicrafters S-40. Though not built as massively as the NC-46, it has more features – including a power transformer – so there is no longer a hot chassis problem.

To remind you of some of the other features we mentioned last month, the NC-57 has an r.f. stage (an important lack in the NC-46) and even boasts a voltage-regulated oscillator. Like the S-40, but unlike the NC-46, it has a built-in speaker. Plus, it tunes all the way to the top of the 6-meter band (54 MHz) while the S-40's range ends at 43 MHz. The radio has a fresh postwar look, though it definitely lacks the authority of the more traditional-looking NC-46 or the elegance of the Raymond Loewy S-40 design.

The worst thing about this particular example is the cabinet, which is badly scratched – especially at the top, but there are also plenty of scars on the sides and front. On lifting the lid, I found that all surfaces are covered with a heavy deposit of sticky-looking gray dust. Yet, looking a little closer, the chassis finish appears to be fairly decent under the dust. No obvious signs of corrosion from the presence of mice.



Underside of NC-57 chassis is quite clean and shows little evidence of tampering.

Another modification visible on the topside of the chassis was the rewiring of the send-receive switch. In the stock radio, it is in series with the center tap of the power transformer's high-voltage winding. I could see where the original leads to the switch had been cut off, spliced together, and taped. The switch had then been crudely zip-cord wired in series with the speaker's voice coil.

The cord originally ran under the lid and out of the radio to who knows where. Why the previous owner needed a speaker cutoff rather than a B plus cutoff is anybody's guess. However, I'm concerned that if the radio had been operated without the load of the voice coil for any length of time, the 6V6 audio output tube might well have been damaged. We'll see.

Like the NC-46 this radio has a removable access panel in the cabinet bottom, which made it possible for me to get a look under the chassis without pulling the cabinet off of the front panel. I practically hold my breath when I'm about to get my first view under the chassis of a new restoration project. There may be burning, charring or other signs of electrical disaster or – perhaps worse – the almost inevitable signs of owner modification that might make the original circuit configuration difficult to untangle. And yet, these challenges are really what make restoration projects so much fun!

However, the chassis was very clean underneath and the solid, meticulous National Company wiring showed only a few mods. A couple of wires leading to the volume control – obviously for phono input – had been clipped just after leaving a rear-apron power socket keyway hole, which had been used as a convenient exit point. An obviously non-original power resistor, very likely a sign of some past problem that will have to be looked into, was wired into the power supply circuit.

I wasn't able to test the power transformer under operating conditions because the line cord had deteriorated and was shorting. However, I checked all its windings for continuity and found that all were ok. And, yes, I definitely also checked the antenna coils.

Everything looked fine as I clicked the bandswitch up from the broadcast band through all the other positions – until I reached Band "E," the highest frequency range. The ohmmeter needle immediately dropped from zero to infinity and I thought I had another problem on my hands. However, a look at the schematic showed a 100 pf capacitor in series with this winding. Hooking up my capacitor checker to the antenna terminals in place of the ohmmeter, I sure enough read 100 pf. So it looks like we're in business. More next month when we'll begin cleanup and recapping.

The National NC-57 replaces the NC-46 as our current restoration project. This radio also replaced the NC-46 in the National Company's product line.

Bob Parnass, AJ9S
bobparnass@monitoringtimes.com
http://www.parnass.org

CSI Flex Series Multiprotocol Decoder

Scanner listeners can use CTCSS, DCS, and other codes to help identify who we hear, though the codes are not employed for our benefit. They were developed to permit different radio user groups to share the same frequencies.

We reviewed the Optoelectronics DC-442 CTCSS/DCS/DTMF display in June 1998, but it has since been discontinued.

Connect Systems Incorporated has been manufacturing communications equipment controllers and tone displays in their USA plant for several years. We have described in previous columns how we use a CSI CD-1 decoder connected to a discriminator tap (before de-emphasis) in our receivers to display CTCSS, DCS, and DTMF codes. CSI has since replaced the CD-1 with the newer model CD-2, which is equipped with an RS-232 serial interface for connection to a computer.

We had an opportunity to try CSI's new Flex multiprotocol decoder which displays CTCSS, DCS, DTMF, and LTR codes.

❖ CSI Flex Decoder

CSI's latest generation decoder is the Flex multiprotocol communications decoder. It is larger than the CD series and employs a 2-line LCD display instead of the simple 4-digit red LED display found in the smaller decoders.

The Flex decoder not only displays CTCSS, DCS, and DTMF tones, but LTR trunking data, as well. DCS codes are shown in both normal and inverse polarities simultaneously – for example, code 114 and its inverse of 712.

LTR trunked systems have been increasing in the VHF-high and UHF bands in this area and some of the local scanner club members monitor them and identify repeater users. While the LTR systems are primarily used for business communications, we've logged school bus and other operations on them, too.

The Flex decoder displays the following LTR information: Area bit (0 or 1), the repeater number (1 - 20), the 3-digit ID code, and a GOTO code. The GOTO code may be unfamiliar to most monitorists because current trunk tracking scanners do not display it.

Data displayed on the LCD is also transmitted to a 9-pin RS-232 serial connector. This permits computer savvy hobbyists to use their computer to read data from the Flex decoder for logging or other analysis. The data format is ASCII and described briefly in the Flex instruction manual.

❖ Install New Firmware, Get a New Instrument

Other CSI Flex products include an LTR controller, a simplex repeater, a multiprotocol generator, a voice alarm system, a community tone panel, and a phone patch. More products are in the works.

CSI's Flex products are based on an innovative approach. All Flex series instruments use the same hardware – the Flex Series Universal Controller. If you buy one of the Flex products, you get the controller factory configured with the appropriate firmware and an instruction manual.

A C8051F124 microprocessor forms the brain of the Flex Universal Controller and the function performed by the controller is determined by firmware.

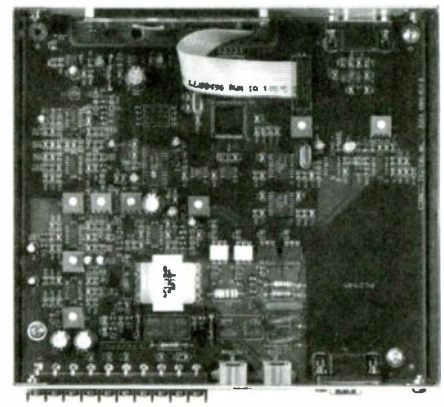
CSI provides electronic copies of instruction manuals and firmware for free download from its web page, **http://connectsystems.com**. Customers who own the Flex controller hardware can purchase a serial to JTAG interface module, download the firmware free and reconfigure the controller to serve a different purpose. If you purchase the Flex decoder, for example, you could "flash" new firmware and transform the instrument into a simplex repeater or multiprotocol generator! Later, you could flash it back to a decoder again.

You need CSI's optional $70 FLEX-M programming module which connects your PC's serial port to a JTAG (Joint Test Action Group) connector inside the Flex controller. Software to perform the flashing is available for free download from CSI's web site, but it requires a Microsoft Windows operating system. We didn't try flashing new firmware into the controller we borrowed from CSI.

❖ Physical

The Flex controller requires 12 - 15 VDC for operation. You will have to furnish your own power supply.

The Flex controller construction is first rate. Surface mount components are used on a printed circuit board and the parts locations are clearly marked. The board is bolted to a steel chassis. The cover and front and rear panels are made of aluminum. It's refreshing to see a metal cabinet when so many other radio accessories are housed in light weight plastic.



The LCD display is blank unless the decoder detects a code. You can change the LCD contrast by tweaking an internal potentiometer. A red LED lights whenever power is applied to the decoder.

The rear panel contains a barrier strip with 10 screw terminals, though you will only use four terminals for the decoding function: two terminals for the 12 to 15 VDC power and another two terminals for the discriminator cable. We recommend you use a short shielded cable between your receiver and decoder.

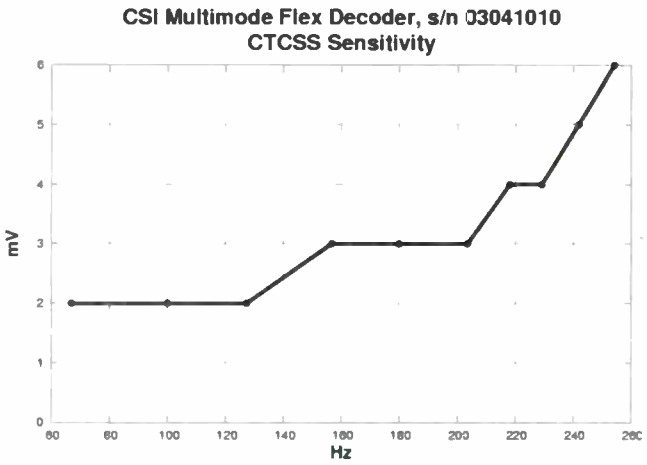
The remaining screw terminals and other jacks on the decoder's rear panel are for use when the controller is programmed for other applications, e.g. as a telephone patch.

❖ Performance

We tried the Flex decoder with an ICOM IC-R8500 receiver and a Uniden/Bearcat BC9000XLT scanner. The IC-R8500 comes standard with a discriminator output jack and we added a discriminator tap to the BC9000XLT a few years ago. We had to change the position of the Flex's internal jumper JP-3 in order to display LTR data when connected to the IC-R8500. CSI says that a future version of the decoder firmware will eliminate the need for this jumper.

The instruction manual describes how to adjust the decoder's sensitivity, if required, using an internal jumper and a potentiometer. We found the original factory settings satisfactory.

The Flex decoder displays CTCSS and DCS slightly faster than our CD-1. We used a Hewlett-Packard audio analyzer to measure our Flex decoder's CTCSS sensitivity at various tone fre-



quencies (see graph).

The Flex decoder loads down our BC9000XLT more than CD-1 does, affecting the radio's squelch control setting. That's probably due to the way we implemented the BC9000XLT discriminator tap – with little isolation. We did not observe any loading with the IC-R8500.

The decoder's LCD display is not backlit, making it more difficult to read than the CD-1's brilliant red LED display.

None of CSI's decoders have a power on/off switch. We drilled a hole on our CD-1's rear panel to install a small toggle switch and would perform the same modification to a Flex controller after the warranty expired.

We are impressed with both the Flex decoder's performance and construction. It is a professional and not a hobby grade product. The instruction manual contains schematics, board layouts, and a parts list, so there's no need to purchase a separate service manual.

The Flex controller is available directly from CSI for $399 (desktop mount), $424 (rack mount version) or through dealers. Connect Systems, Inc is located at 1802 Eastman Ave., Suite 116, Ventura, CA 93303, phone (805)642-7184. Web site: **http://connectsystems.com**

◆ Monitor vs. Scanning Receiver

Every so often, John Strand posts a classified advertisement on the Internet looking to buy unmodified Regency ACT-R1 monitor receivers. If you're a scanner collector, you already know that ACT-R1 is a simple, single channel crystal controlled receiver manufactured in the 1970s.

Why does John want ACT-R1 receivers? John answers, "While I own many scanners, I still find that I miss some critical traffic at the most inopportune times. Therefore, I prefer single-channel receivers. My daughter is a captain with a county fire department here in central California, and I prefer to keep 'an eye' on her, especially during fire season."

John continues, "Typically, I add a C.O.R. [carrier operated relay] to the receiver (a simple DC amplifier) and light a panel-mounted light when the particular frequency becomes active. My setup is similar to the traffic news position at the original KNX Radio news room, which was profiled in two or three issues of RCMA news in the olden days."

"Scanners work okay for me for casual listening, but I prefer dedicated receivers for the really 'hot' stuff." For example, John uses a 960 MHz receiver to monitor the highway patrol's down-link from a remote base on a nearby mountain top. This permits him to hear the car traffic via 960, without relying on the low-band direct path.

John has been monitoring for a long time – "since before scanners were invented," he writes. His original public safety receiver was a converted Motorola 5V.

John characterizes his supply of state-of-the-art radios as "fairly meager." They include an ICOM IC-R7000, IC-R70, IC-R10, IC-32 walkie-talkie, IC-900A, and a Yaesu FRG-100A.

John writes, "Everything else is in the 'boat-anchor' league, i.e., [Motorola] Micors, Motrans, [GE] MVPs, Uniden 8100s, and my trusty Collins 51J3, Hallicrafters SX-43, S-20R, and Hammarlund HQ-129X. I still have a special place in my heart for radios that glow in the dark!"

John Catalano, PhD
johncatalano@monitoringtimes.com

Can Radio Monitors Love a Butterfly?

When I browse the Internet I am always attracted to programs with monitoring sounding titles. Sometimes I come up with programs that are no way connected with radio monitoring. Other times the results are so narrow only Ham radio operators looking to win a specific contest would be interested. But sometimes, just sometimes, my diligence pays off.

The one we will look at this time has the nondescriptive name of MixW and has a butterfly for its icon. Neither the name nor the icon exactly elicits excitement in radio users. But MixW version 2.12 can do some amazing things for radio monitors.

What's In a Name?

The MixW Help file states, "MixW stands for a Mixture of different modes." This program was designed for Hams and has the capability of receiving and transmitting a number of modes without the need of a TNC (terminal node controller) or decoding/encoding box between the radio's audio and the computer. MixW version 2.12, which we will be using, does all decoding via the PC's soundcard input. Of course when used by licensed Hams with a transmitter, the output of the sound card is used to modulate a transmitter.

MixW212 is capable of handling many different modes including CW, BPSK31, QPSK31, BPSK63 & 125, MFSK, RTTY, FSK31, Packet (HF and VHF including TCP/IP over AX25), Pactor RX/TX (TX requires TNC), Amtor (Sitor) TX/RX (No TNC needed), Hellschreiber, FAX (RX only), SSTV, THROB, and MT63.

Again, all that is needed to decode all of these modes with MixW is a simple connection between the receiver's audio and the PC's soundcard's Line In. If all these modes are not enough for you, there is a provision in MixW for calling other TNC based decoding programs from within MixW.

Is There More?

You bet there is. Although pretty impressive as a decoder/encoder, MixW does much more, such as receiver control logging and multi-channel monitoring and analysis. So you think MixW might be worth a look from a monitoring perspective? I thought you might. So let's start at the beginning with MixW's computer requirements.

To use MixW you'll need a computer running Windows 9x, ME, NT, 2000, or XP operating system, and a compatible soundcard. That's it. I'm running it just fine on my old HP Pavilion 3266 Pentium I 233MHz machine, with 128 Meg of RAM using Windows 98 second edition.

A 15 day trial version is downloadable from **http://mixw.net**. The program is about 2.5 Meg in size so be prepared to wait a bit if you connect to the Internet via dial-up. We will use a full registered version for this column. It is registered under my old Ham call WB2DUL, a ticket I received when I was thirteen years old and dinosaurs walked the earth.

Today we will use MixW to control a little ICOM IC-R10 via a homemade interface. The audio from the R10 will be used for decoding via the computer's sound card.

Up In Less Than 5

Once downloaded the program installed itself automatically, quickly and without a problem in less than two minutes. Clicking MixW's butterfly icon, which will be installed on your Windows desktop, will bring up Figure 1.

Near the top right of Figure 1 you can see that we have tuned the R10 to 3.580.034 (MHz) and are in the CW mode. Fine-tuning is as easy as moving the cursor to the arrows under the frequency and clicking the mouse. Clicking the right arrows increases the frequency, while clicking the left arrows decreases it. The tuning step is set from the "Configure" drop down menu at the top. Then clicking the "TRCVR CAT/PTT" menu brings up the tuning step setting.

Tuning to a Ham band is done quickly via the drop down menu arrow to the right of the frequency. Alternatively, you can type the frequency right into the box via the keyboard. And if that's not enough, just tune the radio manually and it will be reflected on the screen.

The CAT's Meow

While we are on this menu I should point out that this is also where we choose the radio that the CAT (Computer Aided Tuning) will control. Many different radios are supported by name. However, ICOM radios that are not specifically named, such as the R10, can be controlled by first selecting ICOM. Then select "Other" as the radio. Finally the ICOM set address of the model is entered. For the R10 this address is 53 in hexadecimal. Of course, the proper level converter is

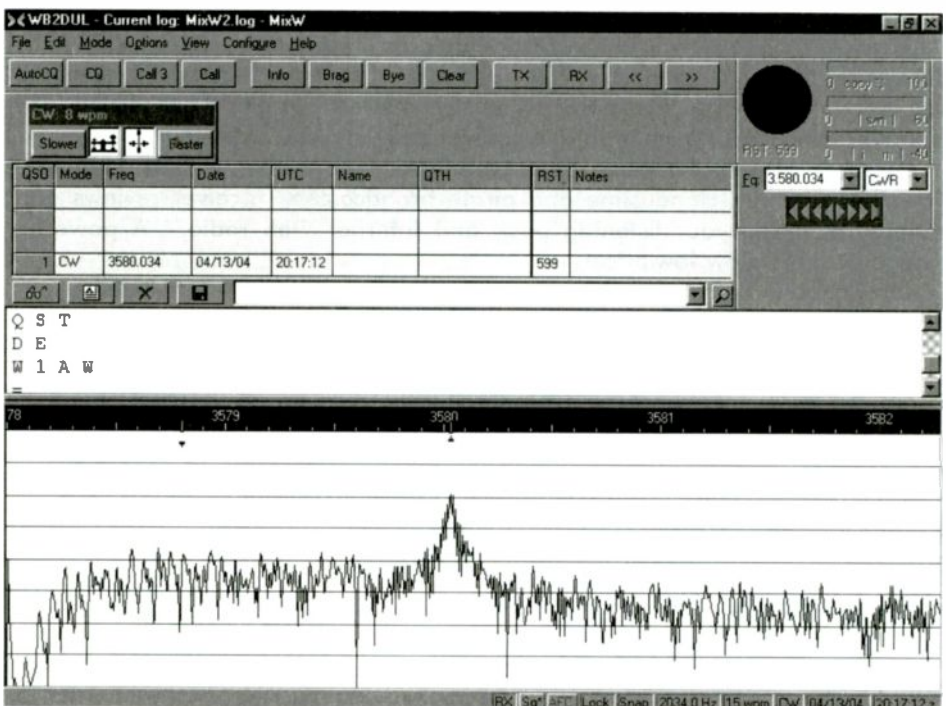


Figure 1- MixW version 2.12 - Main Screen With Lots Happening!

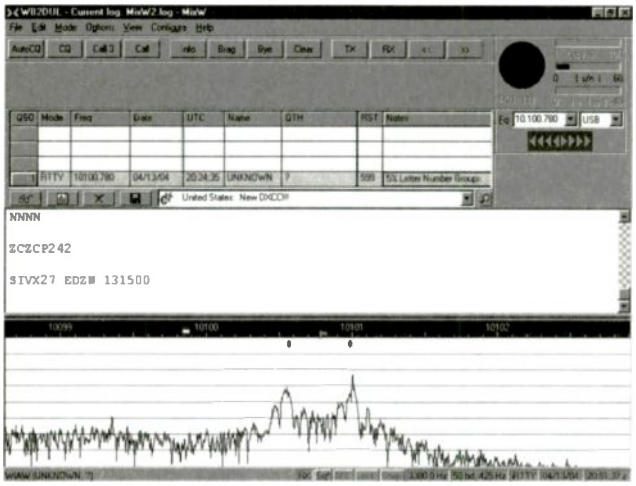


Figure 2- MixW Decoding RTTY

required to connect the radio to the computer. I found some great interface construction websites for ICOM radios at **http://wald.heim.at/wienerwald/550826/deutsch/icom_d.html**. For other radios check this website **http://www.qsl.netok1rr/control.html** .

The Real Deal

Take a look at the lower section of Figure 1. Here we can see a graph of signals stretching across a frequency range, in this case 3.578 to 3.582. The peak in the middle is a CW signal. Decoding CW is very easy. First click the drop down Mode menu at the top of the screen. Then set the mode to CW.

Now look at the spectrum display. At the top of this display is a small blue "flag". You will have to look very closely to see the flag in Figure 1. Now drag the small flag to the peak of the signal you wish to decode.

Reading the Mail

Once you do this, decoded Morse code will be displayed in the area above the spectrum. Here, in Figure 1 we can see the actual identification "DE (this is) W1AW" which is the American Radio Relay League's station in the state of Connecticut in the USA. This is one of their code practice sessions that is broadcast daily in a number of the Ham bands. Check their website **http://www.arrl.org** for times and frequencies.

The decoder performed very good even in a noise (QRM) environment. The only comment I have is that it doesn't space words well. Perhaps this can be adjusted via one of the many, many features that I have not yet discovered.

As Easy As RTTY

Figure 2 shows MixW decoding RTTY from a weather METEO station on 10.100.780 (MHz). In the received message area above the spectrum graph we can read that this is METEO weather station SIVX27. Figure 2's spectrum display shows the two peaks corresponding to the two RTTY tones.

RTTY stations are tuned to in a manner similar to CW. However in the case of a RTTY signal the flag in the spectrum display is dragged to a frequency equally between the two peaks.

Now we look at the line at the very bottom of the screen. You probably cannot see it in Figure 2, but this line is an active menu line. We can access the RTTY Settings screen by clicking on the baud rate and shift at the bottom of Figure 2. The resulting screen, Figure 3, allows the user to adjust the Shift, Baud rate, sense and other RTTY decoder parameters. The user can also select the character set to be displayed including English, Russian, Swedish and others.

Start the process by selecting a shift so that the two lines in Figure 2 match the peaks. Here the correct shift is 183 Hz. Setting the

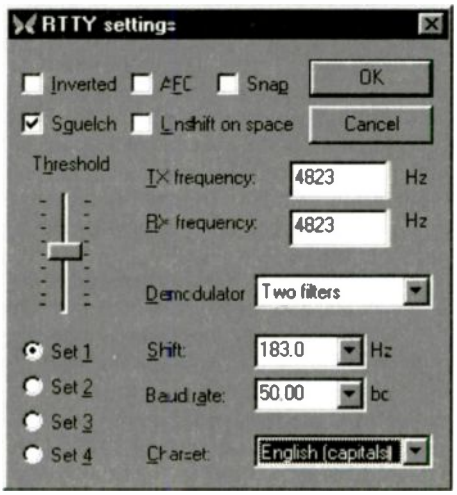


Figure 3- RTTY Setting Screen

correct Baud rate is more of a hit and miss activity, along with the "Inverted" sense parameter. But as you can see, the effort is well worth it. Once the correct parameters are set the RTTY copy was rock solid, even on weak signals.

Logging In MixW

Again looking to Figure 2, the area above the message area is the logging display area. Each row represents a different logging. MixW automatically enters frequency and time entries into the log line. Other details are manually added to the log by click the "QSO Details" icon. This icon looks like a sheet of paper with an "A" on it and is located below and to the left of the Log area. Figure 4 then appears.

Here you can see that we have added some station details. From the call that we entered, SIVX27, the program determined that this is a Swedish station. This, of course, is based on Ham radio call sign conventions. But in this case I think it is correct. The logging section could use a bit of work to make it more monitor friendly.

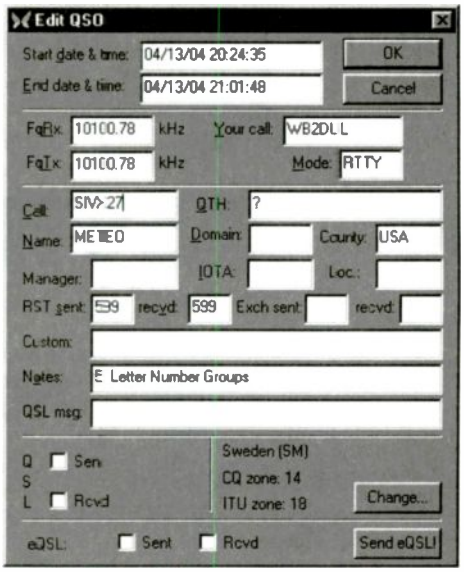


Figure 4- The Detailed Logging Screen

What a Ham! Not Really

We have not even touched on many of MixW's capabilities – for example, the many other decode modes and log searching features. Not bad for a program that's "just for Hams."

MixW performed great without any surprises. The Help file is very basic but adequate. The on-line registered version of MixW 2.12 will cost you $50 in the US. I think it is well worth a look if you have a CAT capable radio. The fifteen day trial version is free at **http://www.mixw.net** . So what do you have to lose? Words of free advice to the makers of MixW ...change the name!

Next time we'll dig deeper on the internet, ignore their names and find some more programs that have been written with you, the radio enthusiast, in mind.

MT REVIEW

AOR WL-500 Antenna

By Larry Van Horn, N5FPW

Monitors who are consistently successful in monitoring the HF spectrum will tell you that their success is the result of their antenna systems just as much as the receiving equipment they use. The old adage "the more metal, the more signal" is the best formula for success. Those living in an apartment or condo know that not being able to put up an outdoor antenna can be a real hindrance to monitoring the HF radio spectrum.

The only real solution to this problem is to use one of the active HF antennas in the market. And while these antennas do perform well, they have their own set of problems that they bring to the listening equation.

First, noise loves antennas that are vertically polarized. If you want to see exactly how much noise you really have in your neighborhood, switch your HF antenna over from horizontal to vertical polarization. The difference can be startling.

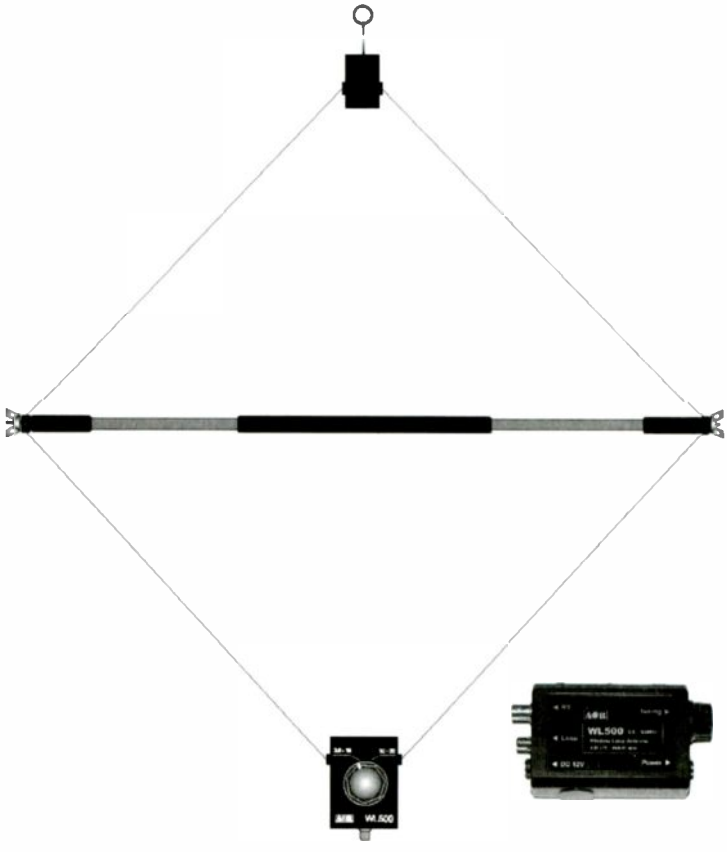
Second, to make up for the smaller capture area of most active antennas versus a full size longwire or dipole, the active antenna uses an amplifier (the "active" portion of an active antenna). That amplifier not only amplifies stations you want to hear, but amplifies any noise at the same rate. If noise was an issue at your location with a vertical, it will be an amplified issue with an active antenna.

There is no easy answer to the noise problem, but the AOR WL-500 Window Loop goes a long way towards reducing some of the noise issues we have seen with other active antennas in the marketplace.

The WL-500 Advantage

During our test of the WL-500 we used it on a several receiver models, including the venerable Sony 2010 portable. My local shack RF environment tends to get a bit noisy at times with computer and television interference being the primary culprits. And while noise was still an issue using the WL-500, having the ability to turn and null out some of that noise was a definite plus. Compare that to some of the other active antennas on the market that only use an omnidirectional vertical whip antenna, and you realize that the WL-500 might be just the ticket for monitors who can't put up outdoor antennas.

We took the WL-500 out of my shack environment and hiked into the woods with the 2010. Our noise issues disappeared and really let the WL-500 shine. The 16dB amplifier really helped pull out some nice DX on the 2010. The portability of this antenna will be especially appealing to the camper and traveler alike. Assembly was a snap and took about a minute and a half to accomplish.



Quick Setup

The loop is constructed of flexible twin cable braced by a center pole which splits into two sections so that it can be easily stored away. When set up, the loop forms a diamond shape with an approximate diameter of 23.6 inches (60cm). The loops covers 3.5 to 30 MHz with a range switch mounted at the termination point of the loop (switching at 10 MHz).

A length of screened cable is supplied, which is terminated to a RCA Phono plug to connect the loop to the control box. The control unit provides preselection and amplification terminated in a BNC socket for connection to the receiver. The unit exhibits good, strong signal handling characteristics.

The WL-500 can be powered using an internal 9VDC battery (battery consumption is around 16 mA) or an external 12VDC power source (not included) using the 1.3mm power socket.

While the WL-500 will operate below 3.5 MHz, performance in the medium and longwave portions of the bands will be enhanced if used with the optional 500LM bar element.

If you are looking for an excellent travel or camping shortwave antenna and space/weight is a consideration, then the AOR WL-500 should be on your short list of antennas you should consider for the task. The WL-500 sells for $198.95 plus shipping and is available from Grove Enterprises (ANT24).

Propagation continued from page 25

nighttime openings on periods with higher flux levels. Because we are well into the decline of the current solar cycle, Cycle 23, I don't expect a lot of long-range DX on the highest HF bands. Some sporadic-E will make reception of signals possible, though.

Twenty-five through 31 meters will be fairly good in the evenings and mornings. At night, those paths that remain open may be marginal. During periods of low geomagnetic activity that I expect this summer (we get less solar storm activity during the years closer to cycle minimum), this band may offer long distance DX all through the night. The most reliable band for both daytime and nighttime should be a toss-up between these two bands.

Forty-one and 49 meters offer domestic propagation during daylight hours and somewhat during the night. The tropical bands (60, 75, 90, and 120 meters) are not noticeably affected by the solar flux, but are degraded during geomagnetic storminess. Through the summer, expect these bands to be more challenging, though less this year than last year, due to the geomagnetic activity levels expected. Look for Europe and Africa as early as sunset. After midnight, start looking south and west for Pacific, South America, and Asia. Short-skip should be possible out to about 750 miles during the daytime.

Expect some openings on 75 and 90, similar to how 40 Meters will be acting. Fairly frequent short-skip openings up to 1000 miles are possible during darkness, but expect very few daytime openings with all the static and absorption. MW and 120 meter propagation is rough in the summer due to the high static and higher overall absorption caused by the short nights and higher D-Layer ionization.

Overall, daytime bands will open just before sunlight and last a few hours after dark. Look higher in frequency during the day, as these frequencies will be less affected by any solar storms occurring, and more broadcasters have transmissions in these upper bands.

VHF

Statistical studies show that a sharp increase in sporadic-E propagation takes place at mid-latitudes during the late spring and summer months. During July and August short-skip propagation over distances as great as 1400 miles should be possible for about ten percent of the time on 6 Meters. Higher VHF (2m) openings may also be possible during periods of intense sporadic-E ionization.

In addition, conditions for tropospheric ducting begin to form over wide areas of North America, and over the Atlantic and Pacific Oceans. Watch for stalled high-pressure cells between your location and the DX. Each summer season in North America, weather systems develop that produce conditions favorable for VHF DX. Stalled high-pressure weather cells, with pressures reaching above 1025 millibars, are known to cause ducting of VHF radio signals. When ducts occur, VHF radio signals may propagate through these ducts far beyond the normal line of sight distances.

Tropospheric ducting forms each year between Hawaii and the U.S. West Coast, and from San Francisco to Los Angeles, Denver to Dallas, Texas to Florida, the Great Lakes to the eastern seaboard, from the Great Lakes to Texas, Nova Scotia to Miami, and from the Midwest to the Southeast.

Advanced visual and infrared weather maps can be a real aid in detecting the undisturbed low clouds between the West Coast and Hawaii or farther during periods of intense subsidence-inversion band openings. This condition occurs also over the Atlantic. There is a great resource on the Internet that provides a look into current conditions. Bill Hepburn has created forecast maps and presents them at **http://www.iprimus.ca/~hepburnw/tropo_xxx.html**, which includes maps for the Pacific, Atlantic, and other regions.

Write Me

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

I also invite you to check out my propagation resource center on the Internet at **http://prop.hfradio.org**. If you have a cellphone or other handheld device capable of reading WML, I have a WAP version of this resource center at **http://wap.hfradio.org**. You can even sign up for my propagation eAlert service for free. These propagation eAlerts keep you informed of the various index numbers, in real-time. I wish you a happy radio-monitoring season!

73 de NW7US, Tomas Hood
tomashood@monitoringtimes.com
(P.O. Box 213, Brinnon, WA 98320-0213)

Audio Amplifiers You *Can* Build

By Carl Herbert AA2JZ

The secret to being able to create working circuits, is by building, building, and more building! The more familiar you are with a variety of circuits, reading schematics and identifying parts, the better builder you will become. Here are circuits that are easy to build, and you can use one of them in your next project. Try one!

New builders are often intimidated by schematics presented in various magazines and books. The exotic looking circuitry has the tendency to "scare away" neophyte builders. The number of parts used to create them or the technical descriptions describing them can sometimes be intimidating.

Here are two *easy to build* audio amplifiers and a basic description of what the parts are and their functions. Even the most inexperienced builder can complete and enjoy these circuits. Most of the parts can be found in the most frugal "junk box," or can be purchased from the local parts source without excessive expense.

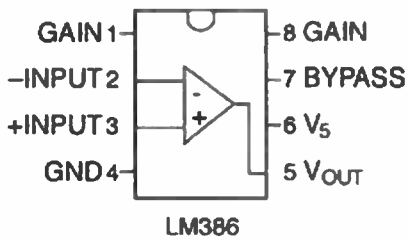
There is ample space on a Radio Shack RS 276-148 circuit board for the audio amplifier created using the LM386. This style of board is good for the new builder. It provides adequate space for parts, has side labels making identification of pin numbers much easier, and can be reused if desired. Just don't allow your soldering pencil to put too much heat on the pads. They will remove themselves from the board if too much heat is applied.

The second circuit, designed by Jim Kortge, will require a larger board, such as RS 276-1499 or similar. I constructed these using "Modified Ugly Construction" techniques, also known as "*Manhattan Style.*" The soldering locations are small pieces of circuit board stock cut and placed on the base "ground plane" using an adhesive such as "Crazy Glue.™"

Not familiar with "*Manhattan Style*" construction? More information about this easy method of circuit construction is available on my website.[3]

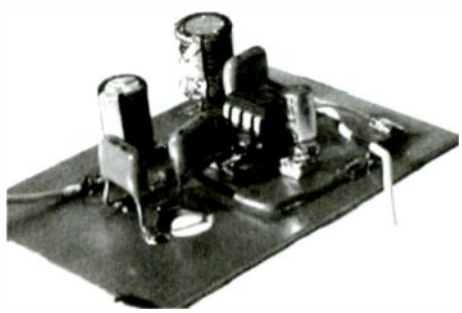
◆ "Old Faithful"

The first amplifier[1] uses the reliable device known as the LM 386 (RS 276-1381). The LM386 is a packaged audio amplifier, requiring only a few external parts to make it fully functional. This eight pin device has been the final audio amplifier in many QRP kits of recent years. The output from it is about 1/2 watt of audio, and will easily drive an 8 ohm speaker or headphones. See Photo A and Figure 1 for a photograph of the basic circuit and the schematic drawing.



Pinout diagram for the LM 386 Chip

There are numerous variations of this schematic, all based on the audio amplification provided by the LM386 chip. The components used in the circuit below, enable the chip to perform its function. R1, a 5K (5,000 Ohms) potentiometer, is a panel mounted variable resistor and does not show in Photo A. It is used to adjust the amount of low level audio allowed to enter the device for amplification. Often it is labeled "volume control or gain" on the front panel of a receiver.



This resistor is actually two resistors within one case. As the control shaft is turned, the amount of resistance on either side of center is changed proportionally. As the center wiper approaches the top of its run, the amount of resistance to ground is increased, and the audio becomes louder.

C1, a 1µf (microfarad) electrolytic or tantalum capacitor, is the "coupling capacitor." Its function is to block the DC potential, and allow the audio to pass through to pin 3 of the amplifier chip. Either electrolytic or tantalum capacitors can be used here. The main factors for choosing the type of capacitor are availability or building space considerations.

Electrolytic capacitors are created from two sheets of metallic film, separated by a non-conductive layer called the "dielectric," then wrapped into a cylindrical form. The layer closest to the outside of the device is the negative side, and the positive side is towards the inside. The placement of these layers won't affect C1's operation in the above paragraph, but when used as a filter, placement would become an important consideration. The outer surface, or negative lead, is more susceptible to becoming "tainted" with noise or unwanted signals. When used as a "filter," this lead is placed at ground potential, thus shorting the "filtered-out noise" to ground.

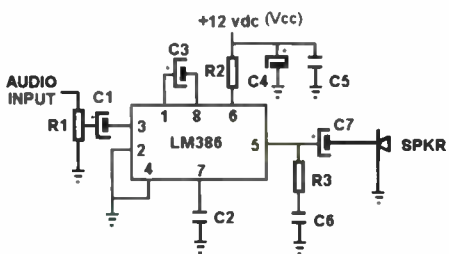


Figure 1: The LM386 Audio Circuit

A second method used to manufacture capacitors is by creating multiple common plates of conducting material, one set for the positive and one set for the negative, and separating them with a dielectric. Picture this by holding your two hands in front of you, fingers spread apart. Now mesh them together, but leave an "air space" between each finger. The plates (fingers) on the left are one set of plates, and the fingers on the right are the other set of plates. The air space represents the dielectric material. Greater capacitances in a small space can be achieved using this method.

C3, a 10 µf electrolytic capacitor between pins 1 and 8, is used to connect portions of the internal amplifier sections to create additional gain. C7, the 220 µf capacitor is the "output coupling capacitor." It con-

nects the speaker to the device while isolating the device from the ground connection of the speaker (or headphones).

R2, the 100Ω resistor, (omega being the symbol for Ohms) adjusts the input DC voltage (sometimes labeled as Vcc) to a level more usable by the device. C4 and C6, the capacitors next to it, provide a path to ground for stray noise that could be "hitching" a riding on the DC potential. They are called a "filter capacitors." C4 also provides a measure of regulation of the DC voltage by charging and discharging in proportion to the variations that could be happening to the input voltage.

R3 and C6 are attached to pin #5, the audio output pin. Their function is to develop the audio output level, while isolating the pin from ground.

Variations (additional components) can be found in other publications. These adaptations are to increase gain, obtain a more stable operation, less operating noise, etc. They all begin with the basic circuit.

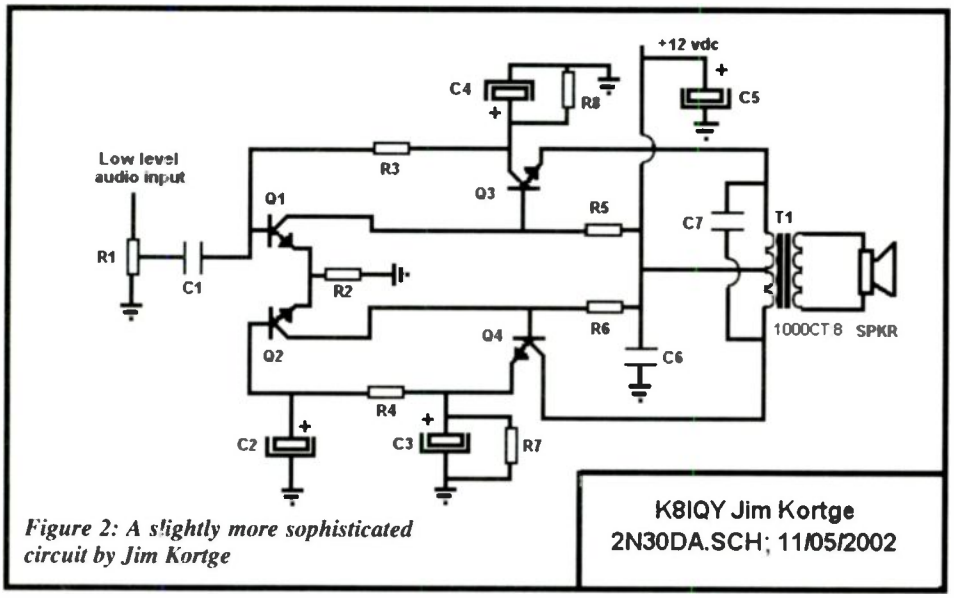


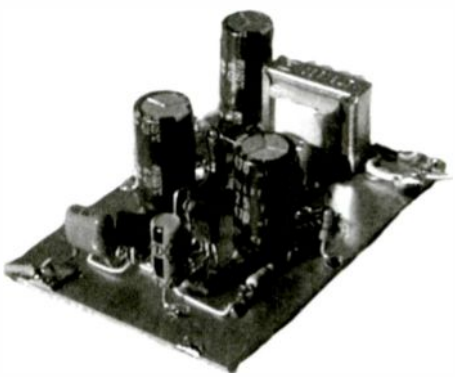
Figure 2: A slightly more sophisticated circuit by Jim Kortge

A More "Exotic" Circuit

The next figure, Figure 2, uses NPN transistors and an output transformer to provide audio amplification. Photo B is a picture of the completed circuit.[2] Again, the volume control is panel mounted and does not show in the picture.

Don't let this circuit intimidate you!

I like to begin construction from the output of the transformer and proceed to the volume control at the other end. Try to make your circuit board as "symmetrical" as possible. That is, make your circuit "look" like the schematic as much as is possible. The output leads from the transformer (RS 273-1380) red and white, are on the outer edge of the board. These are attached to the speaker tabs. The three input leads – yellow, black (center tap) and green – are towards the main



part of the board.

The two NPN transistors feeding the input leads of the transformer, Q3 and Q4, are placed immediately following the transformer leads. Resistors can be placed "on-end" to save space. Q1 and Q2 provide low level amplification for Q3 and Q4.

NPN transistors are used in the circuit. These transistors are created having a "P" type material sandwiched between two layers of "N" type material. The schematic calls for PN2222 units. These aren't the only devices that could be used here. 2N3094, NTE-123, 2N2222, MPS... (or any transistor that converts to NTE-123 as a low level audio amplifier) will work well in this circuit. Just be careful to use the correct "pin output" of the device you have to work with. The ones listed above all have the same "pin output." That is, while looking at the flat side of the device, with the legs pointing downwards, the Emitter is on the left, Base in the middle and Collector is the pin on the right.

Hey! It Works!

These are "easy to build" circuits, and are a great way for the novice builder to practice building skills, and can result in a working audio amplifier to be use in your next receiver project. Wires should be dressed neatly to aid in finding any troubles you have. I use red wire (RS 278-501) for voltage lines and white (RS 278-502) for the audio connections. To make the ground connections, I use either RS 278-1341, pretinned solid bus wire or snippets of the red or white wire with the insulation removed. The colors aid me in identifying circuit wiring after construction is completed.

Either circuit could be the audio amplifier section for your next project. To test the amplifier, first check your wiring for errors and then check it again. When you are satisfied that all is as it should be, attach negative lead (-) to the ground leg and a positive (+) lead to the Vcc leg and apply power (12 vdc). Unless there appears to be a wiring error (usually denoted by the appearance of smoke), touch the center tab on R1 with your finger. You should hear a low audio hum from the speaker. If not, remove the power from the circuit and go back through the schematic, comparing it to your work, while checking for mistakes.

Poor Boy Audio Tester

Lacking an audio generator to check the operation of your circuit, your pocket portable radio will also serve double duty as a generator. Remove the outer cover exposing the speaker and its connecting wiring. Turn on the battery powered radio and select a station. *Adjust the radio for a low audio output.* Connect jumpers from each of the tabs on the speaker in the radio and attach the one attached to ground to the ground lead, which is often a black wire (R1 bottom) of your circuit, and the other, which can be any color other than black, to the audio input (R1 top). Apply power to your new circuit and adjust the volume of R1 to a comfortable level.

"Finis!" There you have it! Two audio circuits that aren't difficult to build and can become an integral part of your next project.

Perhaps next time we can attach more circuits to the amplifier and be on our way towards a working receiver!

Happy building!

Acknowledgements

[1] LM 386 amplifier circuits are found in many publications today. I can't claim to be the author of these circuits. They have been published in countless periodicals, etc.

[2] K8IQY, Jim Kortge, designed this circuit was originally used in the first "2n2/40" rig in 1998, and published in the Winter Issue of QRP Magazine. He also used this circuit in his 2n2/30, " A 30 Meter CW Transceiver," as published in the "Atlanticon 2003 QRP Forum," March 29, 2003. Jim and N2APB, George Heron, the publisher of the "Forum," kindly give their permission to include this circuit in this article.

[3] *Visit my website at* ***http://www.geocities.com/oghmcarl****, and select "articles I have written." (OGHM is what my offspring chose to call me, Old Gray Haired Man. Oh well.)*

This is your equipment page. Monitoring Times pays for projects, reviews, radio theory and hardware topics. Contact Rachel Baughn, 7540 Hwy 64 West, Brasstown, NC 28902; email editor@monitoringtimes.com.

Jock Elliott KB2GOM
jockelliott@monitoringtimes.com

The C. Crane Freeplay Plus – An Emergency Preparedness "Gottahave"

In the event of any kind of power outage, whether it is caused by weather, terrorism or other civil misadventure, it's a good bet that government entities will use local AM and FM radio stations to communicate with the populace. So naturally, every household will want a radio that can receive those stations even when the power is out. The ability to receive at least some shortwave stations would be useful as well, and so would a flashlight. In a perfect scenario, you would have all that without having to worry about batteries.

That's exactly where the Freeplay Plus radio from C. Crane Company comes in. The Freeplay Plus does not require batteries to provide you with virtually endless hours of radio and light during a power failure or at any location where power is not available. Weighing five pounds and measuring 11" W x 8" H x 8" D, the Freeplay Plus offers AM, FM and shortwave (3.0-18.1 MHz) radio reception and a magnetic, detachable flashlight with three white light emitting diodes and a six-foot reel-up cord.

What really sets the Freeplay Plus apart is that it has a three-way power system. We'll get to that in just a moment, but first let's take a guided tour of the Freeplay Plus.

On the front panel, at the extreme left is a 3.5-inch speaker behind a metal grill. To the right of that is a sliderule tuner for AM, FM, SW1 and SW2. Below that is a large tuning knob, and to the right of that is an ON/OFF/VOLUME knob. Further down the face of the radio is a knob for fine tuning shortwave reception.

On the right side of the Freeplay is a switch for selecting which radio band to receive (AM, FM, SW1 or SW2). Below that is a socket for plugging in an optional AC adaptor, and below that is a headphone jack.

On top of the radio is a large plastic carry handle, a switch for the LED flashlight, a solar panel, and a telescoping whip antenna. On the back of the Freeplay is a crank.

This'll Give You a Charge

Now, getting back to the three-way power system: flip out the crank and give it about 60 turns, and a clockwork generator puts out enough electricity to power the radio and the flashlight. Turning the crank requires some effort, but certainly a medium-sized kid could do it. Alternatively, place the radio in bright sunlight, and the solar panel provides enough juice to power the radio.

Finally (and here's the really cool part), the Freeplay Plus is equipped with a rechargeable NiMH battery back that you can charge up ...

(1) from the crank – just wind the crank and let it run without turning on the flashlight or the radio, but it will take a lot of windings to fully charge the battery,

(2)from the solar panel – place the radio in direct sunlight for a full day, or

(3) from an optional AC adaptor – it takes about 12-15 hours to charge.

When the battery pack is fully charged, it will run the radio for about 40 hours.

Pleasurable Listening

I truly enjoyed listening to local AM and FM stations on the Freeplay Plus. I had no problem tuning them in, and I was surprised at the richness of the sound from the speaker. Tuning shortwave stations is more difficult because of the slide rule tuning; there's a mark at, say, 5 MHz and another at 6 MHz, and nothing in between to tell you exactly where you are. I found, nevertheless, that I could "band-scan" by tuning slowly with the main tuning knob and tweaking the reception with the fine-tuning knob. While I would turn to other radios for DXing, it sure is nice to have shortwave capability that doesn't require batteries or plug power!

In addition, I found the 3-LED flashlight is more than adequate for navigating a darkened house or campsite, and it is tremendously reassuring to know that you don't have to worry about running out of batteries.

A couple of notes: C. Crane says the crank mechanism should be good for 10,000 windings and the NiMH battery pack should last for five years and is replaceable. Just remember to fully charge it once or twice a year.

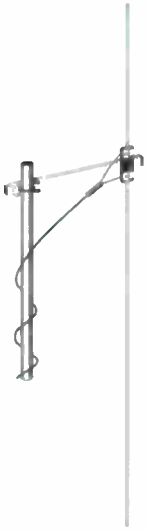
So, would I recommend the Freeplay Plus for your household's emergency preparedness plan? In a heartbeat. It has worthy AM and FM, with shortwave as a bonus, plus an LED flashlight, with solar and crank power to free you from batteries and the power grid. In addition to its emergency capabilities, you'll find the Freeplay Plus works very well as a radio for camping, trips to the beach, or just working in the yard.

The sale price of the Freeplay Plus is $109.95. For more information call C. Crane at 1-800-522-8863 or visit **http://www.ccrane.com**.

The Freeplay Plus is an excellent choice for a household emergency radio.

Did your antenna system survive the harsh winter weather?
Do Your Signals Seem a Little Weak?

It's Time to Upgrade Your Reception with These Fine Grove Products!



Grove OMNI II

Designed by Bob Grove, this exclusive Grove product offers 25-1300 MHz coverage; lightweight, compact design, high performance, and low cost! Designed especially for wide-area metropolitan listeners, the 68" Omni can be mounted on a mast, in an attic crawl space, against a wall—just about anywhere convenient.

BONUS FEATURE! Although the Omni is essentially non-directional, a metal mast gives it useful directional properties. Overload interference from paging transmitters, weather stations, FM or TV broadcasters, or other sources may be reduced or eliminated when positioning the antenna on the mast at the time of installation! Similarly, a distant, weak signal may be peaked by the same technique!

Balun transformer with F connector, offset pipe, mounting hardware and full instructions included.

Order ANT 5
$29.95
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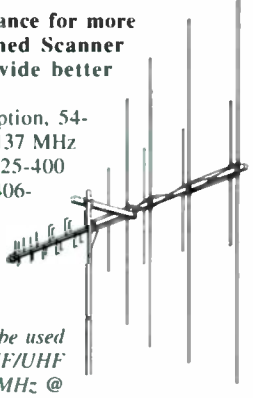
SCANNER BEAM II

A standard of unexcelled performance for more than 20 years, our world-renowned Scanner Beam has been improved to provide better directivity!



Ideal for 30-50 MHz low band reception, 54-800 MHz FM Broadcast and TV, 108-137 MHz aircraft, 137-174 MHz high band, 225-400 MHz military aircraft and satellites, 406-512 MHz UHF, and 698-960 MHz extended microwave mobile.

The major lobe pattern is directional from 100-900 MHz, non-directional outside of that range.

HAMS NOTE: The Scanner Beam can be used for transmitting up to 25 watts on VHF/UHF with the following average VSWR: 50 MHz @ 1.9:1, 144 MHz @ 3:1, 222 MHz @3:1, and 430 MHz @ 1.5:1. 50-72 ohms nominal impedance.

May be used with inexpensive TV antenna rotator or fixed in favored direction. Local signals still come in loud and clear from all directions. *Balun transformer, offset pipe and all mounting hardware included (requires TV type F connector on your coax).*

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$64.95
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THE SCANTENNA

This omnidirectional scanner antenna will equal or outperform any competitor on the market. Its dipole-cluster design utilizes broadband techniques to provide continuous frequency coverage from 25-1300 MHz, offering superb reception of public safety, civilian and military aircraft, hams, personal communication devices, maritime, CB— anything in its frequency range!

Approximate size 7-1/2"H x 4-1/2"W.

SPECIAL: Now includes 50' of coax cable plus Motorola and BNC connectors!

$49.95 ***ORDER ANT 07***
plus $6.95 UPS Ground

Professional Wideband Discone

The discone antenna is used by government and military agencies worldwide because of its wide bandwidth characteristics and non- directional coverage. Now Diamond offers a professional grade discone at a popular price.

Designed for use with wide-frequency coverage VHF/UHF scanners and receivers, the Diamond D130J discone consists of 16 rugged, stainless steel elements and is capable of transmitting up to 200 watts in the amateur 50, 144, 220, 432, 900, and 1200 MHz bands.

As a receiving antenna, the D130J is omni-directional for continuous 25-1000 MHz (and above) coverage. A base-loaded, vertical top element is used as a low band (30-50 MHz) frequency extender.

The elements are arranged on a 24-inch support pipe equipped with two strong mounting brackets to accomodate any standard mast-pipe (1"to 2-1/8" diameter).

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High performance and low cost—an unbeatable combination! Why restrict your frequency coverage with the gaps found in expensive trap dipoles or unpredictable random wire when you can get unsurpassed full-frequency reception with the Grove Skywire? *Comes assembled with Budwig center connector ready for your PL-259 (UHF male) equipped coaxial cable (50 or 75 ohm); includes two professional porcelain end insulators and complete instructions.*

HAMS! Ideal for transmitting when used with a transmatch. (1.8-30 MHz at up to 250 watts)

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What's NEW

Tell them you saw it in Monitoring Times

What's New at Uniden

In a recent interview with *Monitoring Times*, Uniden's Product Manager Mr. Paul Opitz announced five new scanner models that will be added to their product line between now and the end of this year.

BC-898T

Uniden's newest scanner, the BC-898T, is almost identical appearance to the scanner it is replacing – the BC-895XLT. But looks are deceiving, and it is what is under the hood that truly separates these two radios in performance.

The 898T is a base/mobile scanner 500 memory channels, organized in 10 banks of 50 channels each and 1000 talk group channels. The BC-898T uses TrunkTracker III technology which allows the user to track the following trunk systems: Motorola Type I, Type II, Type IIi, Hybrid, SMARTNET™, and PRIVACYPLUS™ analog trunk systems*, EDACS (including EDACS SCAT - Single Channel Autonomous Trunking), and LTR analog trunk systems. The BC-898T will not decode APCO-25 digital communications nor can it be upgraded for digital.

The BC-898T provides reception coverage from 29-54 MHz, 108-174 MHz, 216-512 MHz, and 806-956 MHz (less cellular). The scanner has 17 preprogrammed service search bands (including the NOAA Weather Service band):

25.0-27.995 MHz	Citizens Band/Business Band
28.0–29.995 MHz	10-Meter Amateur Band
30–49.995 MHz	VHF Law Band
50.0–54.0 MHz	6-Meter Amateur Band
137–143.995 MHz	Military Land Mobile
144–147.995 MHz	2-Meter Amateur Band
148–174 MHz	VHF High Band

Above frequency ranges searched in 5 kHz steps

108–136.9875 MHz	Aircraft Band
216-224.9875 MHz	HF High Band
225–399.9875 MHz	UHF Air Band
400–419.9875 MHz	Federal Land Mobile
420–449.9875 MHz	70-cm Amateur Band
450–469.9875 MHz	UHF Standard Band
470–512 MHz UHF	"T" Band
806–823.9875 MHz	"800" Band Mobile
850-868.9875 MHz	"800" Band Base
895-956.0000 MHz	"800" Band

Above frequency ranges searched in 12.5 kHz steps

Published specifications indicate that the radio will have a scan rate of 100 channels per second in conventional mode, scan delay fixed at two seconds. The BC-898T feature a six level signal strength meter, and a rotary tuner/knob for either channel or frequency selection. Instant decoding of CTCSS (50 tones) and DCS (104 tones). CTCSS and DCS detection can aid scanning in several ways, allowing you to identify specific CTCSS or DCS tones if present, and the ability to search or scan by a specified tone.

Some of the other published features include a RS-232 DB9 PC interface, display backlight, priority scan, trunk scan and search, one-touch weather reception, SAME weather alert, AutoStore and much more. The case style and basic operation of the BC-898T remain unchanged from the previous model.

Pricing for the Uniden BC-898T was not established at presstime, but check your favorite dealer for price and availability.

BC-246T

The next Uniden scanner that the consumers will see in the marketplace, probably in the fall, will be the new BC-246T TrunkTracker III handheld. While this radio is designed to replace the older second generation BC-245XLT, it doesn't even come close to it in looks or performance. To quote Mr. Opitz, "The BC-246T is truly a revolutionary development in scanner technology, equivalent to when micro processors were first put in radios."

Two features will make this radio stand head and shoulders above the rest. The first is Dynamic Memory Management – the BC-246T will have no banks! The radio will have a set number of memory locations that will be used to program frequencies, alpha tags and talk groups. This will allow the user to be completely flexible in programming trunk systems, conventional frequencies, and talk group IDs.

The second feature is guaranteed to draw scanner enthusiasts to this radio *en masse* – a revolutionary approach to scanning that Uniden has dubbed Close Call™ RF Capture Technology. While the details have not been fully released at press time, think of "Close Call" as a built-in, monitorable frequency counter incorporated in your new BC-246T.

Preliminary specifications for the BC-246T include:

- 0 Scan Banks using Dynamic Memory Management, up to 3300 memory channels (1600 typical if alpha tagging used on all channels). Programmed systems limited only by scanner memory
- 12 Preprogrammed and 10 Custom Search Ranges
- Preprogrammed with emergency dispatch channels for over 400 towns, cities, and counties
- 25-54, 108-174, 216-225, 400-512, 806-956 and 1240-1300 MHz coverage (excluding cellular)
- Close Call™ RF Capture Technology
- AA Battery Operation (no proprietary rechargeable battery packs)
- Alpha Tagging on a two-lined alpha display
- Backlit Display
- I-Call, Emergency Alert, Trunk Search, ID Blockout
- Internal Battery Recharging
- PC Programming and Control (software extra)
- Instant CTCSS/DCS Decode
- SAME Weather Alert
- Search and Store Operation
- 4½ x 3 x 1¼ inches (not counting knobs, antennas, etc)

BC-72XLT/BC-92XLT

The BC-72XLT (10 bank, 100 channel handheld) replaces the BC-60XLT, and the BC-92XLT (10 bank, 200 channel handheld) replaces the BC-80XLT. In addition to adding memory, features and reducing the size of these units (4-1/2 x 3 x 1-1/4 inches not counting knobs, antennas, etc), features of both units include:

- Service Search including Weather, Police, Fire, Aircraft, Marine, and Ham Radio
- 10 User-Selectable Search Ranges
- 25-54, 108-174, 406-512, 806-956 MHz coverage (excluding cellular): BC-92XLT
- 25-54, 108-174, 406-512 MHz coverage: BC-72XLT
- Close Call™ RF Capture Technology
- Compact Design with backlight display
- Scan Speed: 100 channel/second, Search speed: 100 steps/second, Hypersearch: 300 steps/second
- Priority Scan
- One-Touch Weather
- AA Battery Operation

SC-230

Replacing both the SC-180 and the SC-200, this model incorporates many of the same innovations as the BC246T, but is targeted for use at auto races. Its many features include:

- Over 1000 channels
- Dynamically Allocated Channels
- Preprogrammed with NASCAR and BUSCH series frequencies
- Close Call™ RF Capture Technology
- Race Track Operating System (makes it easy to quickly listen to your favorite driver)
- On-Air Cloning
- Stubby antenna included
- PC Programming and Control (software extra)
- 4-1/2 x 3 x 1-1/4 inches (not counting knobs, antennas, etc)

According to Opitz, as noted above, all three of these radios will have some version of their new Close Call ™ RF Capture Technology system incorporated within their design, and the SC-230 will also include a version of their new Dynamic Memory capability.

With the exception of the BC-898T, which has already been FCC type accepted and is in production, the four handhelds described above are still in development. Therefore specifications and features are subject to change.

– Larry Van Horn, N5FPW

Icom IC-R20

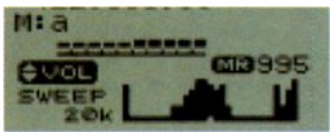
The Icom IC-R20 is an extremely wideband handheld receiver with frequency coverage from 150 kHz to 3305 MHz (less cellular in the U.S.). Reception modes are SSB/CW/AM/FM/WFM, with CTCSS/DTCS/DTMF decode functions. It comes with a telescopic BNC antenna, but a ferrite antenna is built-in for medium-wave recep-

What's NEW

Tell them you saw it in Monitoring Times

tion.

The R20 has a number of scan modes; the fastest is 100ch/sec in VFO mode. It also features Voice Scan Control, to help avoid stopping on data channels while scanning. Dual watch capability is available in specific bands, allowing simultaneous monitoring of two channels. The bandscope function shows active channels within a specified bandwidth (from 1kHz to 100kHz) both visually and audibly while sweeping.



1250 memory channels include 1000 memory channels, 25 scan edge, 200 auto-write scan (Max. 100 channels x 18 banks). Some channels are preprogrammed – TV Audio channels, weather channels (in U.S. versions), and popular shortwave frequencies. The large backlit 2-line dot-matrix LCD supports 8 character alphatags.

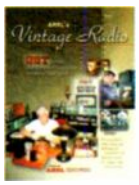
Amazingly, in a receiver this size, the R20 also offers an audio recorder built-in with selectable recording times of 1, 2 or 4 hours! The lithium-ion battery allows long operation, and can also be charging while in use. PC control capability (CI-V) is available via the optional CT-17 cable and CS-R20 software CD.

The R20 comes with Telescoping Antenna, Belt clip, Battery spacer, Hand strap, Battery pack, and AC adaptor. This sophisticated receiver is expected to be available soon, with a street price of around $520.

ARRL's Vintage Radio

When people ask me in the genealogy classes I teach why they should compile their family history, my answer is simple. "How do you know where you are going if you don't know where you came from?"

I had the same sort of feeling when I reviewed a new American Radio Relay League publication called *ARRL's Vintage Radio* – articles about the lure of vintage Amateur Radio gear which were published in *QST* magazine.



Compiled by ARRL Staffer Steve Ford, WB8IMY, *Vintage Radio* lets you revisit the ham radio of yesteryear in a collection of articles describing vintage equipment and restoration. Included are personal experiences and interesting points in the history of Amateur Radio that will evoke a sense of nostalgia.

This collection covers vintage radio articles published between 1977 and 2003, and includes three year's worth of "Old Radio" *QST* columns by John Dilks, K2TQN. A selection of classic *QST* advertisements from the '20s through the '70s rounds out this fascinating look back in time. You will also enjoy ads from Collins, Drake, Heathkit and more.

ARRL's Vintage Radio (ISBN: 0-87259-918-3) 9183 is a softcover book with 192 pages. Published by the American Radio Relay League, Inc. it can be ordered from the ARRL website (**http://www.arrl.org**), on their toll-free telephone line 1-888-277-5289 (Outside US +1-860-594-0355), or via snail mail at ARRL Publication Sales Department, 225 Main Street, Newington, CT 06111-1494 USA. Order ARRL catalog number 9183 – $19.95 plus shipping.

– Larry Van Horn

Radio Propagation - Practice and Principles

By Ian Poole

A knowledge of radio propagation is vital for anyone associated with radio communication technology. *Radio Propagation - Principles and Practice* addresses the fundamental principles of radio signal propagation as well as the practical application. It provides a fascinating description of all the relevant information about radio propagation from HF to VHF, UHF and beyond, enabling the reader to be able not only to understand the underlying principles, but also be able to have a practical understanding of them so that he or she can use them to their best.

Written in Ian Poole's easy to read and understand style, the book provides a comprehensive description of everything that is needed to grasp the essentials of radio signal propagation, starting with radio waves themselves and how they travel. The book then describes the environment in which they travel around the Earth, detailing how it affects them. The Sun, its make-up and how it affects the upper layers of the atmosphere (the ionosphere) are all described in some detail along with the ionosphere itself.

Ionospheric modes of propagation are comprehensively explained as are the effects of solar disturbances on the ionosphere. An understanding of how to predict what conditions may be like is given along with a brief overview of propagation prediction programs. Other modes such as tropospheric propagation, meteor scatter, and satellite communications are also discussed.

Radio Propagation is 112 pages, published by the Radio Society of Great Britain in paperback form. It is available from the RSGB for GBP14.99 or from the ARRL (see contact info above), though it was not yet posted on their web page at presstime. For more information refer to Adrio Communications websites at http://www.adrio-communications.com and also to **http://www.radio-electronics.com**

Quebec Radio-Scanner CD

Canadian scanning hobbyist and ham radio operator Gilles Thibodeau (VE2KGF) has updated his *Quebec Frequency Directory* for 2004. This information-packed volume of scanning and ham radio related information is presented on CD-ROM. The target readership for this volume is the Quebec market in French-speaking Canada, although Gilles makes an attempt to appeal to French and English speakers alike.

"Chapters" are organized as folders containing data, programs, pdf files, and images. Major topics include a substantial number of scanner and amateur equipment modifications (in English and French), amateur radio information such as the Canadian amateur callsign list and Morse code programs; 10 Codes for Quebec and nearby areas; electronic circuits, projects and schematics; ACARS information and programs, shareware and more. There is even an electronic catalog for a popular brand of semiconductors on the disk.

Changes since the previous edition include expansion of the section on trunking, especially the new Quebec Police Force trunk system, and supporting information about the Uniden BC780XLT scanner for those hobbyists who need to upgrade to follow local trunk systems.

The main feature of the CD is the frequency database. Over 14,000 frequencies are listed covering emergency services, Quebec provincial and federal police forces and trunking systems, as well as frequencies from nearby New England states. Files are in DBF format and can be searched using the enclosed software, or imported into commercial software supporting the DBF file format.

The CD is available by mail order ($30.00 postpaid in Canada. For shipping in the US add $1.00; overseas please request shipping charge). Contact Gilles by e-mail at ve2kgf1@hotmail.net, or the old-fashioned way at: Gilles Thibodeau, C.P. 193, Lac-Megantic, Quebec, G6B 2S6 Canada.

– Rachel Baughn

Books and equipment for announcement or review should be sent to " What's New?" c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to Rachel Baughn, editor@monitoringtimes.com

Lawrence Harris
lawrenceharris@monitoringtimes.com

HRPT Hardware Failing

It is fortunate that the weather satellites NOAA-12, NOAA-15 and NOAA-17 continue to provide low-cost imagery (a format called *automatic picture transmission*) because during recent weeks, NOAA-16's high resolution scanner has experienced increasing problems.

As always, the **National Oceanic and Atmospheric Administration (NOAA)** engineers have been working on the most effective means to minimize or even eliminate the cause of the problems. The older satellite NOAA-14 gave us a tantalizing few days of good high resolution (HRPT) imagery before reverting to the unsynchronized mode, and then finally failing.

More details at: **http://noaasis.noaa.gov/NOAASIS/**

◆ LRIT and LRPT – Manufacturer Comments

As far as I am aware, the market for APT reception equipment for amateurs did not exist in the early 1960s following the launch of the Tiros satellites. I believe that some electronics experts first designed a framestore, using what were then relatively expensive components to decode the telemetry stream. During the 1970s and 1980s, component prices fell, computer options became available, and the market for amateur reception of the 137MHz band APT transmissions grew rapidly.

We have therefore had almost two decades during which the cost of low resolution weather satellite (WXSAT) equipment has steadily fallen. As discussed in recent editions of this column, this is about to change. Although APT is expected to continue until later this decade, and possibly beyond, the new WXSAT transmission format LRPT – from polar orbiting WXSATs – is on the way. LRIT (from geostationary satellites) started last year from the European WXSAT MSG-1 (now METEOSAT-8), and test transmissions are now continuing from GOES (see below).

I invited manufacturers to let me know of their development work, and have received an update from **George Isleib** of GTI Electronics.

He explains: "We are in the process of developing the LRIT system for the GOES system, and then the LRPT for the polar orbiters. One of the problems the manufacturers found is that the change to the replacement WEFAX system is rather complex, requiring a new receiver and software. The LRIT is BPSK with Viterbi and Reed Solomon encoding. I believe NOAA thought this system would run on a 3 foot dish but they dropped the signal strength by about 12dB from WEFAX, and made it 30 times wider with two carriers at both ends of the LRIT signal."

One company has a receiver that sells for about $4000 – more than a complete ground station would cost when the GTI system meets the market. Many WEFAX users have anticipated that their current equipment could, with minimal modifications, be used for LRIT; unfortunately this is very much not the case. George adds: "The receiver requires a lot more work than a simple WEFAX or polar orbiter required prior to the newer formats."

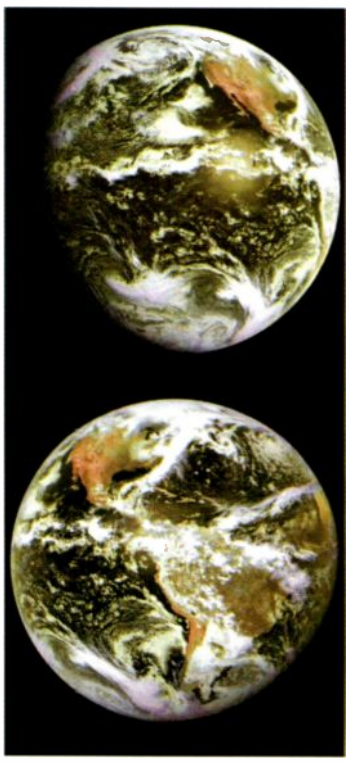
My thanks to George for his update. GTI Electronics website: **http://www.gtielectronics.com**

◆ GEO and RIG meetings held in UK

Meetings of weather satellite enthusiasts are invariably popular events. In Britain the Remote Imaging Group (RIG) has held regular meetings for many years and built up a significant membership. A few months ago a number of RIG committee members decided that they preferred a different style of group and therefore separately formed the **Group for Earth Observation**. In my capacity as a journalist/reporter on weather satellite matters, I was kindly invited to attend the first public meeting of GEO held in Leicester, at the National Space Centre in Britain on May 1st, and given a lift there by member Clive Finnis.

The room was full and the speakers included **Gordon Bridge** of Europe's EUMETSAT, local radio amateurs from the Centre, **David Taylor** (the software writer), and members of the Dutch weather satellite group. **Francis Bell** welcomed the delegates and **Charles Bishop**, the CE of the Centre described its formation and current work. As an educational establishment designed to encourage a public interest in space engineering and astronomy, it had quickly proved viable and highly successful, particularly with the European Mars Explorer project.

Gordon Bridge spoke about the first year's results from the new European all-digital WXSAT METEOSAT-8. It had so far provided a year of high quality, high resolution images to hundreds of amateurs across Europe who – due to the failure of an onboard component – had unexpectedly been able to receive the new HRIT images using low cost, off-the-shelf satellite receiving systems. Gordon showed several animation sequences using special color palettes to enhance features never before seen – such as exploding storm tops.



GOES-10 (west) and GOES-12 (east) providing simultaneous (1800UTC May 3) visible-light views from different locations. Courtesy NOAA and (c) EUMETSAT 2004

David Taylor spoke about the effect that the ongoing upgrading of computer systems was having on the new METEOSAT-8 computer reception hardware. Although one year ago the recommended system was for separate receive and data processing computers, the new 3GHz (plus) speeds were proving effective at doing the whole operation on one machine.

Robert Moore is a professor from Liverpool (coincidentally my home town!) who lives in north Wales and is a keen WXSAT hobbyist. He showed examples of his HRPT images and several amazing animations of images received from METEOSAT-8, including a severe storm that crossed Britain last November.

Ruud Jansen of the Dutch WXSAT group provided a live demonstration of receiving METEOSAT-8 imagery using a small dish placed outside the building. He used a 3GHz Pentium-4 machine to simultaneously receive and animate images whilst running an Orbiter Simulation program as well!

The RIG meeting was held on the same day in another town, and I have not received any reports about its proceedings.

Frequencies

NOAA-12 and -15 transmit APT on 137.50 MHz
NOAA-17 transmits APT on 137.62 MHz.
GOES-10 (west) and GOES-12 (east) use 1691 MHz for WEFAX
LRIT (the new digital format for geostationary WXSATs) is time-shared with WEFAX from GOES-12.

Abbreviations

APT - Automatic Picture Transmission
HRPT - High Resolution Picture Transmission
LRIT - Low Rate Information Transmission
LRPT - Low Rate Picture Transmission

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Closing Comments

Sharing is Good – Yes?

By Rachel Baughn, MT Editor

"Adapt, evolve or die," was the message of Federal Communications Commission Chairman Michael K. Powell to the annual National Association of Broadcasters conference.

Broadcasting no longer has the exclusive ear of Congress it once did. Universal access to broadband connection and other wireless technologies is the new darling on the Hill. Over the last two years alone, the Commerce Department and the FCC have pushed to free up nearly 8 gigahertz of spectrum (more than 40,000 times the amount allocated to cellphone use) for new wireless applications.

This spectrum space is not an exclusive allocation, but is part of Powell's goal of efficient use of spectrum by frequency sharing. Two of the most recent bands proposed to be opened up for secondary use by unlicensed wireless devices and broadband providers are the 3650 MHz band (now in use by fixed satellite service earth stations), and unused bands of the broadcast television spectrum between channels 4 and 51 – television's "core" broadcast spectrum. These lower frequencies are very desirable spectrum, as they would allow more distant coverage by wireless internet providers and are not as easily blocked by obstacles as those in the 2.4 gigahertz range, for example.

Operation on these and previously opened bands would be on the condition that those wireless devices do not interfere with existing, licensed broadcast signals. Powell makes the case that there is very little "new" spectrum left to be distributed – the best that can be done is to "get more use out of spectrum that 80 percent of the time lies fallow."

This vision of the future relies heavily on the evolution of technology variously called "smart radio," "cognitive radio," or "software defined radio," which uses "frequency agile" techniques to detect traffic and switch to an unused channel. For example, frequency agile technology will be expected to protect licensed services from interference from another initiative – broadband over power lines (BPL – see last month's *Closing Comments*). *Monitoring Times* will be running an informative series on software defined radio beginning next month.

FCC Abdicates to Market Forces

The American Radio Relay League says it generally supports the FCC's pursuit of efficient spectrum use and universal access to broadband, but urged the FCC to avoid large-scale deployment of cognitive radio technology – and especially of unlicensed devices in spectrum regularly used by licensed services – "until further experience with the technology is obtained." The ARRL also strenuously objected to a proposal to allow cognitive radio technology devices to operate under Part 15 in "undefinable" rural areas at up to a sixfold increase in the currently permitted power level in several UHF bands that include amateur allocations.

The League questioned why the FCC was willing to put forth such proposals "without the slightest real-world test deployment" of the systems it wants to authorize.

Statements by Chairman Powell and by Commissioner Michael Copps appear to reflect a sea-change in the way the FCC defines its role as protector of the public interest. In the past this has meant protecting the public's access to mass media from interference – in other words, protecting broadcasting. Today it has shifted to ensuring individual access to all kinds of media via internet and broadband technologies – possibly at the expense of broadcasting. Instead of the FCC testing and coming up with proven, approved technology for spectrum sharing, it is allowing the market to do all the development and real-world testing.

Powell has said that the "laborious process" of government command and control "has served the country well to this point, but is futilely too slow to rapidly move things to new and better innovative uses."

In a speech at the Quello Symposium in February, Commissioner Michael Copps made this astonishing statement: "With ubiquitous [broadband] deployment ... new technologies would have a chance to prove how disruptive they can be. Otherwise we'll never know. Technology could do the disruption rather than having poor regulation disrupt the promise of technology."

A Forecast of Things to Come?

Sharing spectrum space is a commendable goal for efficient spectrum use. But, when you get more than one service using the same spectrum, sooner or later conflicts will arise. Proving or resolving the dispute isn't necessarily easy, nor is the public usually very understanding when their unlicensed Part 15 device suffers interference. Two recent incidents which involved hundreds of consumers and which received substantial media attention prove the point.

Back in February, more than a hundred car owners in the area around Las Vegas complained about malfunctioning keyless vehicle entry devices. Keyless entry systems operate on unlicensed frequencies shared with the military, and the Las Vegas incident occurred as the military was gearing up for the Red Flag air combat training exercise.

Traditionally, the 225-400 MHz spectrum has been used for worldwide military air-traffic control and tactical training communications. But this sporadically-used frequency range has now been tapped for another purpose. In last month's *Milcom* column, Larry Van Horn uncovered plans for a new military land-mobile radio system to be located in the 380-399.9 MHz bands. As the first of these systems was tested in mid-May at Eglin Air Force Base, Florida, homeowners all over the Niceville, Valparaiso, and Crestview areas began reporting malfunctioning garage door openers.

Motorola Inc., the system contractor, said it would try to minimize the problem by running the system at slightly different frequencies. However, since the Air Force is entirely within its licensed frequency band of 225-400 MHz, users of garage door openers may have to change theirs, said a spokesperson for the FCC.

Similar radio systems have been requested for Pensacola Naval Air Station and other nearby installations, according to a Navy spokesman. One *MT* contributor reported that the entire US Air Force would be going to this digital trunked system for VHF ground communications.

Uncharted Territory

The FCC seems to be hoping market forces will take the ball and run – developing technology to satisfy the consumer and the FCC's demand for non-interference simultaneously. But will the manufacturers or the consumers necessarily play along?

John Catalano has reminded us more than once of grand ideas which never came to fruition simply because manufacturers had no guarantee the numbers were there to support product development, or because there was no assurance which technology would become the industry standard. If you can't get the micro-chip you can't make the product: simple as that, says John.

The FCC seems to have faith that there are technical solutions to most conflicts. Perhaps there are, but at what expense? Most Part 15 devices are not high-ticket items. Is it realistic to expect products such as wireless networking cards for computers, wireless connections to printers, keyboards, computers, and phones, garage door openers and keyless entry systems, etc. to be frequency-agile? Would anyone be able to afford them if they were?

Will the FCC's new approach lead to discovery or disaster? As we say so often in this column, "only time will tell." But get set for a bumpy ride. As with broadband over power lines, it's going to be hard to put this horse back into the barn once it gets out, and who's going to rein it in? Surely not the FCC?

This page is open to thoughtful opinions on radio-related topics. Views expressed on this page do not necessarily reflect the opinion of Monitoring Times or Grove Enterprises.

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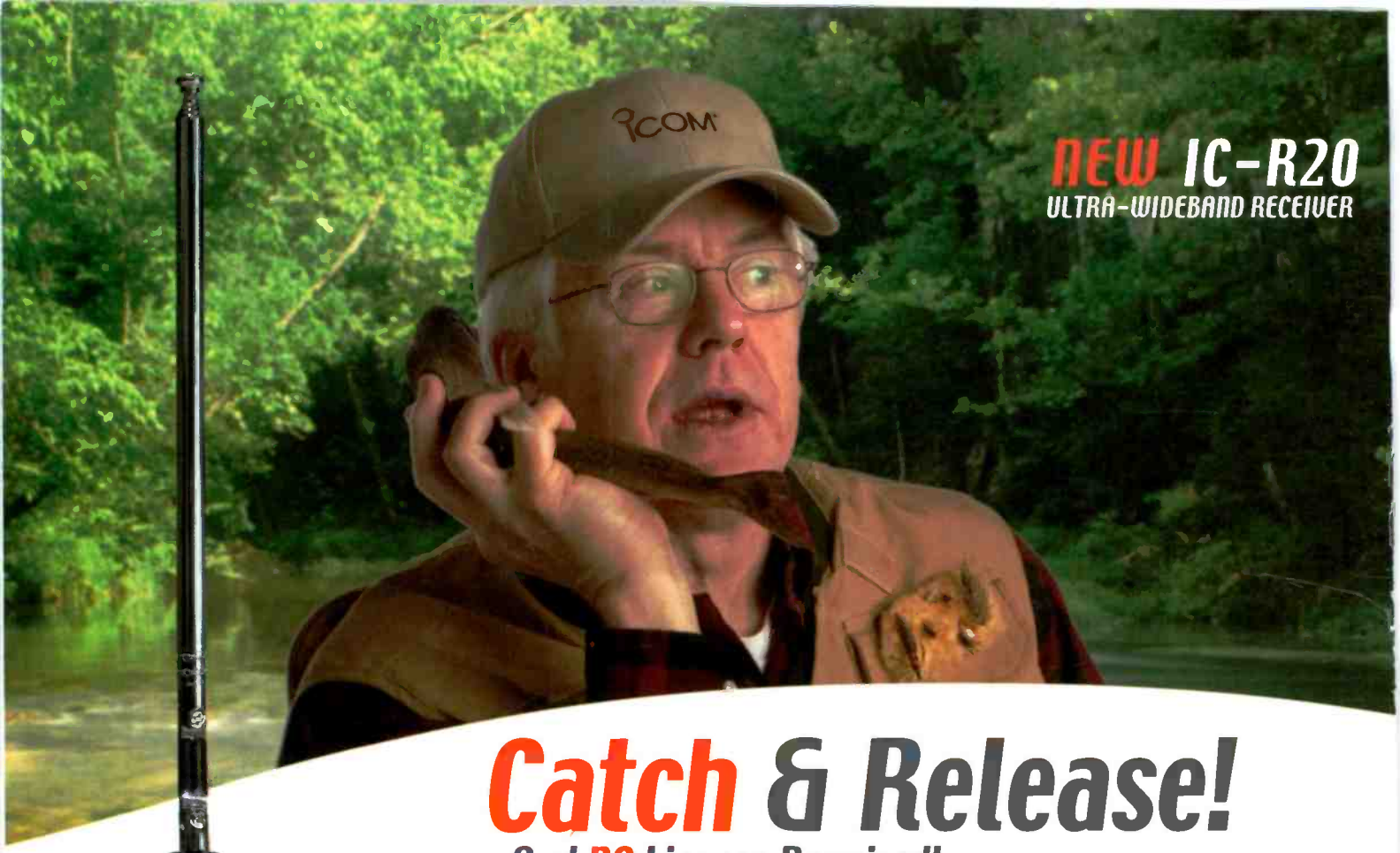

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